CAROLE HOLLINS

# *Basic Guide to* DENTAL PROCEDURES

SECOND EDITION

WILEY Blackwell

# Basic Guide to Dental Procedures

# BASIC GUIDE TO DENTAL PROCEDURES

## Second Edition

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WILEY Blackwell

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# How to use this book

As the title suggests, the book has been written as an introductory guide to the more usual dental procedures carried out in a modern dental practice. It does not attempt to explain the full theoretical and clinical technique behind these procedures, rather it aims to give a sufficient overview of them, with the use of 'before and after' colour photographs to hopefully make the book useful for helping to explain certain dental procedures to patients. In this second edition, each chapter has been updated as necessary in line with the latest dental techniques and materials available to the profession.

However, the main readership is envisaged to be dental care professionals, especially those unqualified or inexperienced dental nurses who may not have access to viewing many of the procedures described, as many practices continue to specialise in providing dental care only in certain areas of dentistry. It should be used, then, in conjunction with the excellent textbooks already available for dental nurse training, where more detail of instruments used and other underpinning knowledge is provided. By popular request, photographic examples of the instruments and materials, which may be required for various procedures, have been included in this edition, and while the images used provide guidance for those undertaking OSCE-style training and assessment, they are not intended to be exhaustive in their content.

The text in each section is laid out to explain the reasons behind the treatment described, the relevant dental background, the basics of how each procedure is carried out and any aftercare information necessary. It is beyond the remit of the book to cover every current technique in every dental discipline discussed, so it is hoped that the text provides at least the basic information required for the reader to gain an understanding of the procedure, before seeking a greater depth of knowledge elsewhere.

The inclusion of information on extended duties for dental nurses in this edition is of particular relevance to the United Kingdom-based readership. Examples have been given throughout the chapter of the type and extent of 'in-house' training that may be provided in a broad selection of these duties, as well as examples of suggested recording sheets that may be used to provide evidence of monitoring and competency in various of the necessary skills discussed. It is hoped that the information provided will help UK dental practices to train and extend the useful skills of its workforce, in an effort to develop their dental team and widen their provision of dental services for the ultimate benefit of their patients.

Wherever possible the correct dental terminology has been adhered to, but as the dental knowledge of the expected readership will vary widely, a glossary of terms has been updated and included to clarify certain definitions in the context to which they have been referred to in the text.

# Chapter 1

# Preventive techniques

## REASON FOR PROCEDURE

Preventive techniques are aimed at preventing the onset of dental caries in teeth, to maintain the dental health of a patient.

The two procedures discussed are:

- Application of fissure sealants
- Application of topical fluorides – full mouth or specific teeth

## BACKGROUND INFORMATION OF PROCEDURE – FISSURE SEALANTS

Any surface area of a tooth that cannot be cleaned easily by the patient can allow food debris, and ultimately plaque, to accumulate there and allow caries to develop by acting as a stagnation area. Patients usually clean their teeth by tooth brushing, flossing, the use of other interdental cleaning aids, mouthwashing, or any combination of these techniques.

The usual sites that can act as stagnation areas are the occlusal pits and fissures of posterior teeth (Figure 1.1), and especially the first permanent molars which erupt at around 6 years of age.

These teeth are particularly prone to caries because:

- They are the least accesible teeth for cleaning, being at the back of the young patient's mouth
- They erupt at an age when a good oral hygiene regime is unlikely to have been developed, so may be cleaned poorly by the patient
- Younger patients often have a diet containing more sugars than an adult, as the concept of dietary control will not be appreciated

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**Figure 1.1** Molar tooth model showing occlusal fissure system

## DETAILS OF PROCEDURE – FISSURE SEALANTS

The occlusal pit or fissure needs to be eliminated to prevent it acting as a stagnation area, and this is achieved by closing the inaccesible depth with a sealant material.

The materials used are either unfilled resins, composites, or glass ionomer cements, or a combination of these two materials (known as a compomer).

The usual instruments and materials that may be laid out for a fissure sealant procedure are shown in Figure 1.2.

**TECHNIQUE:**

- The tooth is kept isolated from saliva contamination, as materials will not adhere to the tooth when it is wet
- Isolation techniques include the use of cotton wool rolls and low speed suction techniques using a saliva ejector (Figure 1.3)

- The occlusal fissures and pits are chemically roughened with acid etch to allow the microscopic bonding of the sealant material to the enamel
- The etch is washed off and the tooth is dried; the etched surface will appear chalky white
- Unfilled resin is run into the etched areas to seal the fissures or pits, and then locked into the enamel structure by setting with a curing lamp
- If any demineralisation of the fissure is present, one of the alternative materials listed above is used to replace the enamel surface

**Figure 1.2** Fissure sealant instruments and materials

**Figure 1.3** Tooth isolation techniques

## BACKGROUND INFORMATION OF PROCEDURE – TOPICAL FLUORIDE

Other very difficult to clean areas of the teeth are the points where they have contact with each other in the dental arch – the interproximal (interdental) areas.

There are certain oral health products available specifically for cleaning these areas, such as dental floss and interdental brushes, but they require a certain amount of dexterity and determination by the patient to be used effectively.

All fluoridated toothpastes provide some protection of these areas from caries, but some patients require additional full mouth fluoride protection by the professional application of a topical fluoride varnish or gel.

They are:

- Children and vulnerable adults with high caries rates
- Physically disabled patients who are unable to achieve a good level of oral hygiene
- Medically compromised patients for whom tooth extractions are too dangerous to be carried out (haemophiliacs, patients with some heart defects)

## DETAILS OF PROCEDURE – FULL MOUTH TOPICAL FLUORIDE APPLICATION

A high concentration of fluoride is required to be applied to the interproximal areas that is viscous enough not to be washed away quickly by saliva, so that it can be taken into the enamel structure of the tooth and make it more resistant to caries. The usual material used is a sticky fluoride varnish or gel, such as that shown in Figure 1.4.

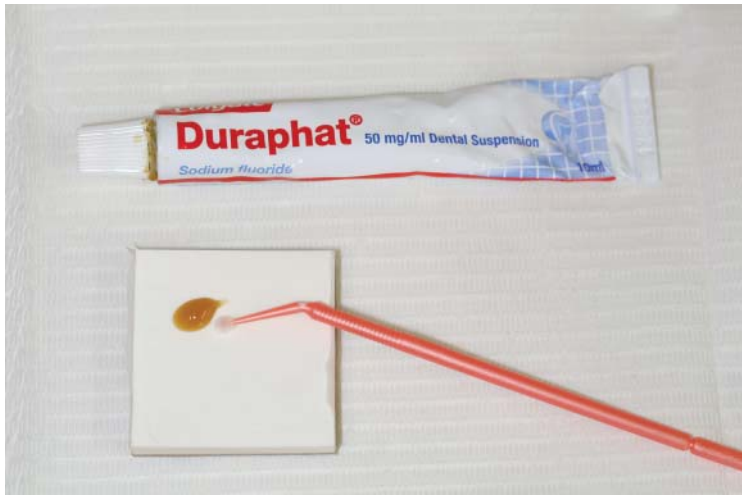


**Figure 1.4** Fluoride gel for professional application – Duraphat

**TECHNIQUE:**

- The operator and the patient wear suitable personal protective equipment
- The teeth are polished with a pumice slurry to remove any plaque present and allow the maximum tooth contact with the fluoride
- The polish is thoroughly washed off and the teeth are dried
- Adequate soft tissue retraction and moisture control are provided by the dental nurse, so that the dry tooth surfaces are accessible and the gel will not be displaced by accident during the procedure
- The viscous fluoride gel is manually applied to all available surfaces of each tooth, using one or more applicator buds and one arch at a time

## DETAILS OF PROCEDURE – SPECIFIC TOOTH TOPICAL FLUORIDE APPLICATION

In some patients, individual teeth may show signs of previous acid attack from certain foods and drinks as a 'brown spot' lesion on the enamel surface (Figure 1.5). Other patients may have gingival recession present, which exposes the root surface of a tooth to dietary acids and sugars, therefore making it vulnerable to attack by dental caries (see Figure 5.8). These specific areas can be protected by the direct application of a localised fluoride varnish such as that shown in Figure 1.4, using a similar technique to that of a full mouth application as described earlier.

**Figure 1.5** Brown spot lesion indicating previous enamel damage

# Chapter 2

# Oral hygiene instruction

## REASON FOR PROCEDURE

Oral hygiene instruction is given to patients to ensure that they are maximising their efforts to remove plaque from their teeth, to minimise the damage caused by periodontal disease and caries.

Dietary advice is also given to help patients avoid foods and drinks that are particularly damaging to their teeth – those high in refined sugars or those that are acidic.

When the advice is correctly followed on a regular basis, the patients can enjoy a well cared for and pain-free mouth, as well as avoiding the expense of reparative dental treatment.

The procedures discussed are:

- Use of disclosing agents
- Toothbrushing
- Interdental cleaning

## BACKGROUND INFORMATION OF PROCEDURE – DISCLOSING AGENTS

Disclosing agents are harmless vegetable dyes supplied in liquid or tablet form and in various colours, usually red or blue (Figure 2.1).

They act by staining any plaque on the tooth surface to their own colour (Figure 2.2), thus making it far easier to show the presence and location of the plaque to the patient, as plaque is normally a creamy white colour and may be difficult to see otherwise (Figure 2.3).

Once stained, suitable oral hygiene instruction can be given to remove the plaque effectively. The dyes do not stain the teeth themselves, nor any restorations.

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**Figure 2.1** Disclosing tablets

**Figure 2.2** Disclosed teeth showing the presence of plaque

## DETAILS OF PROCEDURE – DISCLOSING AGENTS

The agents can initially be used at the practice by the oral health team so that the correct problem areas can be identified and suitable cleaning advice given. The patient can then use the agents at home to check their progress on a regular basis. The commonest agents used are disclosing tablets.

**Figure 2.3** Appearance of undisclosed gingival plaque

**TECHNIQUE:**

- A protective bib is placed over the patients so that their clothing is not inadvertently marked
- The patients are given one disclosing tablet and asked to chew it for about 1 min
- After this time, they are asked to spit out the chewed tablet and saliva, but are instructed not to rinse their mouth out
- Using a patient-mirror, any stained plaque is pointed out by the oral health team and the worst areas noted (very often the gingival margins)
- Detailed advice is then given on how to improve their tooth brushing and cleaning techniques to eliminate the plaque from these areas
- The patients can follow these instructions immediately so that all the stained plaque is removed while under the supervision of the oral health team
- With the plaque easily visible due to the disclosing agent, the patients are able to see their own progress and develop the skill to maintain good oral hygiene

## BACKGROUND INFORMATION OF PROCEDURE – TOOTHBRUSHING

Toothbrushing is the commonest method used by patients to remove plaque from the easily accessible flat surfaces of the teeth, but not from the interdental areas.

Many toothbrushing techniques have been suggested over the years – especially side to side brushing and rotary brushing – but the technique used is immaterial as long as the plaque is removed successfully without causing damage to the tooth surface. Disclosing agents can be used to determine the most successful method for a patient.

When performed thoroughly and to a consistently high standard, manual brushing should be just as effective as that completed with a good quality electric brush, but the latter takes the effort out of good brushing for those patients who lack the time and skill to perform manual brushing well.

When toothbrushing is combined with the application of a fluoridated toothpaste, the teeth and gums are cleaned free of plaque and the teeth are protected from dental caries by the action of fluoride on the enamel.

## DETAILS OF PROCEDURE – TOOTHBRUSHING

The aim of good toothbrushing is to remove plaque from the gingival margins and some stagnation areas, and to protect the tooth surface with a layer of fluoride.

Many toothpastes are available (fluoridated, tartar controlling, desensitising, whitening, etc. – Figure 2.4) and the oral health team will advise on the most suitable to be used in each case.


**Figure 2.4** Examples of various toothpastes

Similarly, many toothbrush designs are available – both manual and electric – but as a general rule the head should be small to allow easier manouverability, and the bristles should be multitufted and made of medium nylon. Even so, some patients brush with such force that they actually saw into the necks of their teeth and produce abrasion cavities.

**TECHNIQUE:**

- Identify those patients with regular residual plaque after toothbrushing
- Wet the patient's own brush and apply a small amount of toothpaste, then allow them to brush their teeth in their usual way and in their usual time
- Disclose the plaque to identify the areas of its continued accumulation
- Develop a more thorough brushing technique with the patient to remove all the plaque, particularly that which has accumulated at the gingival margins (Figure 2.5)
- This may involve a change of brush from manual to electric or vice versa, as well as a change of brushing technique by the patient
- Once an effective technique has been identified, a methodical approach is to be developed so that a routine brushing technique is carried out every day
- This tends to be more effective if the more difficult areas are tackled first, such as the lingual surfaces of the lower teeth
- The patient then brushes all the teeth in a systematic manner, starting in the same place and ending in the same place each time
- Advice can then be given on the frequency of brushing – usually twice daily as a minimum, but some patients may continue with a high sugar diet and need to brush after each meal
- Full dietary advice should also be discussed and ideally adjusted where necessary
- Toothbrushes should be replaced once the bristles start to splay, as they will not remove plaque effectively when worn down (Figure 2.6)

**Figure 2.5** Tooth brushing the gingival margins

**Figure 2.6** Comparison of new and worn toothbrush

## BACKGROUND INFORMATION OF PROCEDURE – INTERDENTAL CLEANING

The surfaces of the teeth that remain untouched by toothbrushing are the contact points, or interdental areas (Figure 2.7). Plaque accumulates here just as easily as the flat surfaces of the teeth, and even more so when restorations extend into the interdental areas as microscopically they provide more potential for stagnation areas to occur.

**Figure 2.7** Contact points of the teeth

**Figure 2.8** Interdental 'flossettes'

Although toothbrushes are too large to clean interdentally, other oral health products have been designed to do so:

- Tape or floss
- Manual interdental brushes
- Dental woodsticks
- Some specialised electric toothbrush heads
- Some mouthwashes

The first four are used to physically clean plaque from the interdental areas, while some mouthwashes can be vigorously rinsed and swished through the interdental areas by the patient to dislodge larger particles of debris.

A certain amount of manual dexterity is required by the patient to use dental tape or floss effectively, and a lack of dexterity is often the cause of patients abandoning the technique. Some products have been developed to help, whereby a fork design holds a small piece of tape or floss firmly while it is used with one hand to enter and clean the interdental areas (Figure 2.8). This removes the need by the patient for wrapping the tape around the fingers and holding it firmly while trying to access the interdental areas.

## DETAILS OF PROCEDURE – FLOSSING

This is the technique used by the majority of patients who routinely clean interdentally, despite it being the most difficult to achieve.

Some tapes and flosses are waxed to assist easier entry into tight interdental areas, and others are impregnated with fluoride so that the interdental surfaces of the teeth are protected once accessed (Figure 2.9).


**Figure 2.9** Examples of dental floss and tape products

**TECHNIQUE:**

- Ideally the patient should carry out flossing with the aid of a mirror, in a well-lit room
- A piece of tape or floss (approximately 20 cm) is removed from the holder and wrapped around both index fingers, leaving a central portion between the hands (Figure 2.10)
- This is held over both thumb pads and guided into each interdental area, one at a time
- Once in the area, the thumbs are used to adapt the tape to first the surface of one tooth then the other forming the contact point (Figure 2.11)
- While in contact with the tooth surface, the tape is drawn from side to side to wipe any plaque from each surface
- As the tape is dirtied, it is loaded off one finger and onto the other so that a clean portion is available for the next interdental area
- Tape is more gentle on the gingivae than floss if the patient is heavy-handed or if force is required to access some tight interdental areas, but some patients may find tape too thick to use effectively

## DETAILS OF PROCEDURE – INTERDENTAL BRUSHING

This is an alternative and useful technique of cleaning the interdental areas for patients who have contact points wide enough to admit a specially designed interdental brush into the area. Several 'bottle-brush' style designs of interdental brush are available and a widely-used example is shown in Figure 2.12. These brushes are provided in a variety of colour-coded width sizes so that patients with spaced teeth can successfully use larger brushes to clean their interdental areas, while patients with tight contact points are also able to insert the smallest design of brush to clean their interdental areas (Figure 2.13).

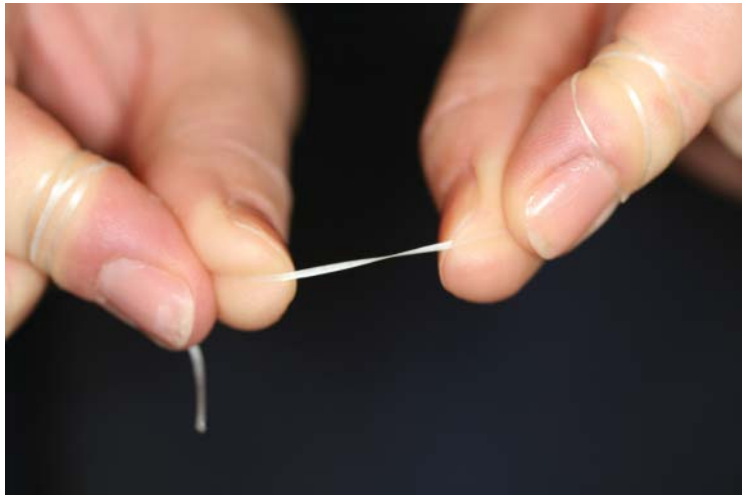

**Figure 2.10** Correct positioning of floss around fingers

**Figure 2.11** Flossing technique

**TECHNIQUE:**

- Ideally the patient should carry out interdental brushing with the aid of a mirror, in a well-lit room
- The patient should be advised by the oral health team on the correct size of interdental brush to use

- Some patients may require to use more than one size of brush for different areas of their mouth, while other patients may need to use only one size of interdental brush for cleaning one specific area of their mouth
- Depending on the area of the mouth to be cleaned, the brush head can be angled to make its insertion into the interdental area easier to achieve – this is particularly useful when cleaning between posterior teeth (Figure 2.14)
- The head is pushed into the interdental area, then used in a backwards and forwards motion to clean plaque from each side of the adjacent teeth and to dislodge any food debris present
- The brush can also be rotated while inserted in the interdental area to give better tooth contact and debris removal
- Any visible debris on the brush bristles must be removed by rinsing before the next contact point is accessed, otherwise plaque and food will be transferred from one area to another
- Dislodged food particles in the mouth can be spat into the sink or swallowed
- The interdental brush can be rinsed clean and re-used until it becomes ineffective at cleaning or the bristles become bent, and should then be replaced

Some good quality electric tooth brushes have specifically designed interdental cleaning attachments that can be used by the patient in a similar way to the manual ones, to ensure that plaque and food debris are removed from the contact points (Figure 2.15).

Again, the interdental area must be wide enough to allow their safe use, and the patient should follow the manufacturer's instructions or ideally be instructed by the oral health team on their correct use.


**Figure 2.12** Interdental brush design


**Figure 2.13** Size range of interdental brushes

**Figure 2.14** Use of interdental brush for posterior cleaning


**Figure 2.15** Electric brush attachment for interdental cleaning

# Chapter 3

# Scaling and polishing

## REASON FOR PROCEDURE

Everyone's mouth contains a variety of bacteria, some of which react with saliva and the food that is eaten to produce a sticky film called plaque. Plaque forms wherever the food debris becomes lodged in the mouth, the usual areas being along the gum margin (see Figure 2.3) and in difficult to clean areas called stagnation areas.

Plaque lying along the gum margin will irritate the soft tissue and eventually cause inflammation of the gum, or gingivitis. Regular toothbrushing and interdental cleaning by the patient will remove the plaque and prevent this from happening.

However, if the plaque is not removed, it gradually hardens by absorbing minerals from the patient's saliva and becomes calculus (tartar). Calculus cannot be removed by toothbrushing alone, and the dentist, therapist or hygienist will need to remove it by scaling the teeth. When the plaque or calculus lies attached to the tooth surface above the gum line it is called 'supragingival' (Figure 3.1).

If the calculus is left untouched, it gradually forms further and further down the side of the tooth root as the gum tissue is destroyed, and eventually the supporting structures of the tooth (the jaw bone and periodontal ligaments) are also destroyed and the tooth becomes loose in its socket. This is called periodontal disease, or periodontitis, and the plaque and calculus are referred to as 'subgingival'.

The more advanced the damage to the periodontal tissues, the more difficult it is for the oral health team to treat, and the more likely that long term problems including tooth loss will occur.

The procedures discussed are:

- Simple scaling of supragingival debris
- Deep scaling and debridement of subgingival debris
- Polishing

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**Figure 3.1** Supragingival calculus



## BACKGROUND INFORMATION OF PROCEDURE – SCALING

The dentist, therapist or hygienist can scale a patient's teeth using hand instruments or electrical scalers, or a combination of both. The aim of the procedure is to remove all the calculus and plaque from around each tooth so that the supporting structures are no longer irritated and inflamed, and repair themselves.

If the calculus has extended down the side of the root and under the gum (subgingival), its removal is more difficult to achieve. Electric scalers vibrate ultrasonically and have a spray of water at their tip to help remove the calculus both from the tooth root and out from under the gum (Figure 3.2).

Some patients find the vibration and cold water uncomfortable and may choose to have a scaling procedure carried out under local anaesthetic.

## DETAILS OF PROCEDURE – SIMPLE SCALING

The presence of supragingival plaque and calculus will have been noticed by the dentist during routine examination of the patient's mouth. The amount present and whether local anaesthesia is required will help to determine if a second appointment will be needed, or if the scaling can be completed during the examination appointment. The dentist, therapist or hygienist will act as the operator to carry out the procedure while assisted by the dental nurse.

Supragingival scaling removes plaque and calculus deposits from the enamel surface of the teeth down to the gingival margins of the teeth. The hand instruments used are shaped accordingly, to fit around the shape of the teeth (sickle and Jaquette scalers), or

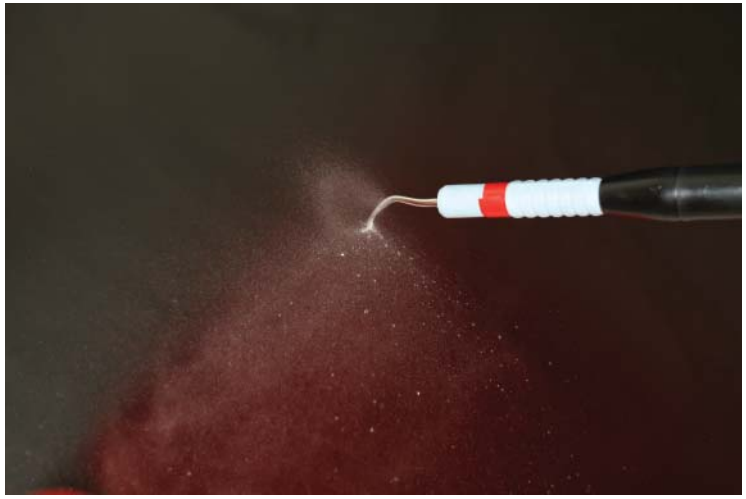


**Figure 3.2** Ultrasonic scaler showing water spray effect

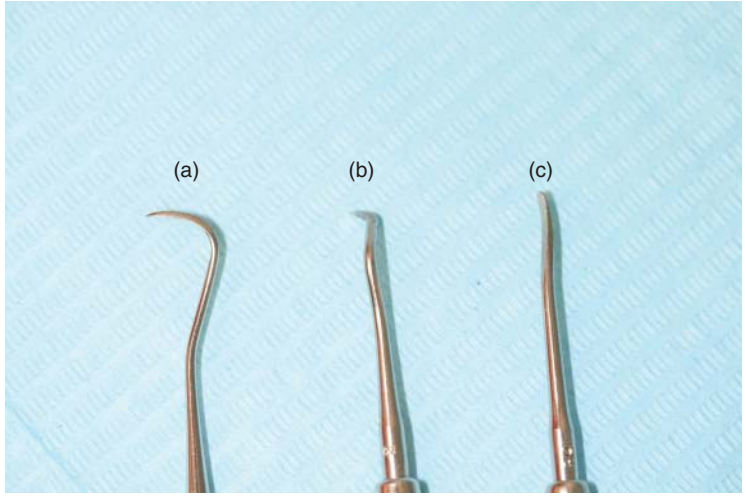



**Figure 3.3** Supragingival scalers. (a) Sickle scaler. (b) Jaquette scaler. (c) Push scaler

are shaped like a fine chisel (push scaler) to be pushed between the anterior teeth to remove interdental calculus (Figure 3.3).

In addition, a high speed suction tip and tissues or gauze sheets to wipe the debris from the instruments are required.

The instruments and materials that may be required to carry out a simple scale and polish procedure are shown in Figure 3.4.

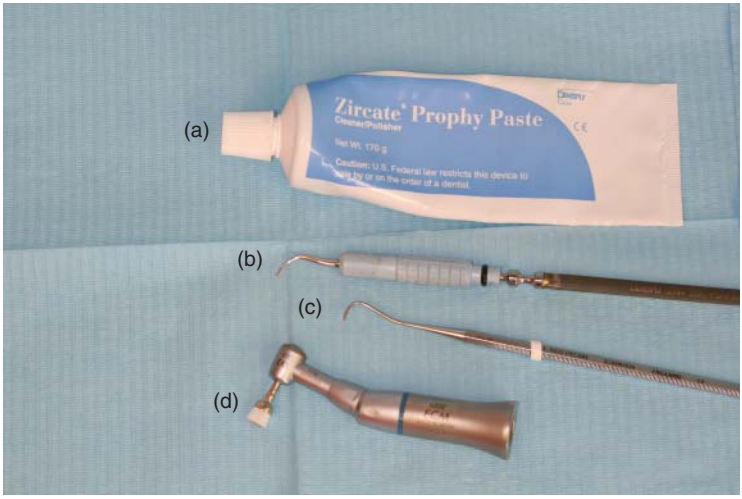



**Figure 3.4** Instruments and materials for simple scale and polish procedure. (a) Prophylaxis paste. (b) Ultrasonic scaler. (c) Hand scalers. (d) Polishing brush with handpiece

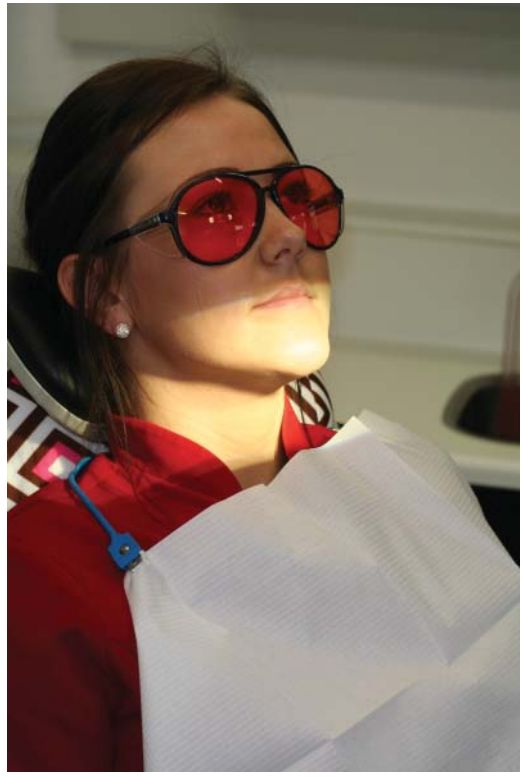
**TECHNIQUE:**

- The oral health team and the patient wear personal protective equipment (Figure 3.5)
- Local anaesthetic is given if required
- Hand and/or electric scalers are made ready
- If an electric scaler is used, the dental nurse uses high speed suction to remove water and debris from the patient's mouth as the scaling is carried out
- The operator will systematically scale each tooth that has calculus present, using vision and tactile sensation to determine when it has been fully removed
- The scaler is worked from the bottom edge of the calculus upwards in a scraping motion, so that it is dislodged 'en masse'
- The instrument is then reapplied to remove any remaining specks of calculus until a smooth tooth surface is achieved (Figure 3.6)
- The process causes some amount of bleeding of the gums as they are in an inflamed state, but scaling does not cut into the gums themselves
- The gums will return to their healthy pink appearance within days of the calculus being removed

## DETAILS OF PROCEDURE – DEEP SCALING AND DEBRIDEMENT

The presence of subgingival plaque and calculus is determined by the dentist while carrying out a basic periodontal examination of the teeth, and the presence and depth of any periodontal pockets recorded. Plaque retention factors such as overhanging fillings are also noted.

(a)



(b)

**Figure 3.5** Personal protective equipment. (a) Oral health team members – gloves, mask and eye protection. (b) Patient – bib and safety glasses

**Figure 3.6** Appearance after completion of supragingival scaling

Deep scaling and debridement is usually carried out under local anaesthetic and in a few sections of the mouth at a time, and the number of areas to be treated determines the number of appointments required. Subgingival scaling removes plaque and calculus deposits from the root surfaces of teeth within the periodontal pockets. In addition, the instruments are also used to remove a layer of contaminated cementum from the root surfaces during debridement, and the debris created is then irrigated from the pockets and aspirated from the mouth.

The instruments used to achieve subgingival scaling and debridement have to be long enough to reach the base of each periodontal pocket, and be thin enough to do so without tearing the soft tissues, and are called curettes (Figure 3.7). The ultrasonic scaler unit has interchangeable heads so that it can be used for both supragingival and subgingival scaling and debridement procedures.

**TECHNIQUE:**

- The oral health team and the patient wear personal protective equipment
- Local anaesthetic is administered as required, the particular equipment and materials that may be required to do so are shown in Figure 3.8
- Currettes and the ultrasonic unit are made ready
- The dental nurse uses high speed suction to remove water and debris from the patient's mouth as the scaling and debridement are carried out
- The operator will systematically deep-scale each root in the anaesthetised mouth section that has calculus present, using vision and tactile sensation to determine when it has been fully removed
- The currette is worked from the bottom edge of the calculus upwards in a scraping motion, so that it is dislodged 'en masse'
- The instrument will then be reapplied to remove a layer of contaminated cementum from the root surface during debridement, the process being repeated until a smooth root surface is achieved
- Deep pockets may be irrigated with antiseptic mouthwash solutions by some operators, to assist in the destruction and removal of the periodontal bacteria

**Figure 3.7** Currettes for subgingival scaling and debridement

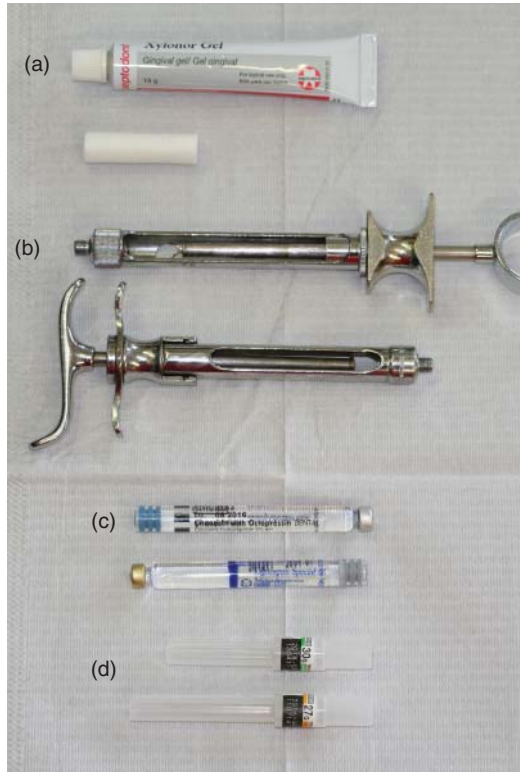



**Figure 3.8** Local anaesthetic equipment. (a) Topical anaesthetic and cotton wool roll. (b) Syringe – aspirating or non-aspirating. (c) Cartridge – content specific to patient need. (d) Needle – long or short

## BACKGROUND INFORMATION OF PROCEDURE – POLISHING

Whether calculus is present or not, everyones' teeth can stain from time to time by exposure to normal dietary substances such as tea, coffee, red wine and highly coloured foods. Smokers can also develop unsightly dark staining from tobacco tar products.

The process of professional polishing of the anterior teeth using special abrasive pastes can easily remove all but the most tenacious of these surface stains, giving the teeth a cleaner and brighter appearance.

Obviously, continued exposure to the staining agents will cause the discolouration to develop again with time, but it can usually be kept under control if the patient has a good and regular oral hygiene routine.

Polishing causes no surface damage to the teeth.

## DETAILS OF PROCEDURE – POLISHING

Polishing is usually carried out at the end of a course of treatment, and especially once scaling has been completed. The use of bristle brushes or rubber cups in the dental handpiece (Figure 3.9) to apply the abrasive polishing paste gives a greater cleaning effect than if it were applied using a toothbrush.

The pastes are often flavoured for the benefit of the patient, and feel quite gritty in the mouth.

**Figure 3.9** Polishing brush and cup in dental hand pieces

**TECHNIQUE:**

- If not already in place, the operator, nurse and patient wear personal protective equipment
- Either a bristle brush or rubber cup will be locked into the dental handpiece, and then dabbed into the polishing paste so that a small amount is picked up
- With the lips held out of the way, the rotating brush/cup will be moved across the front surface of each anterior tooth, from one contact point to the next until the stains are removed
- The patient may feel a not unpleasant tickling sensation in each tooth
- The brush will be worked over the whole tooth surface, and especially into the contact points of the teeth where stains usually accumulate
- Fresh paste is picked up on the brush for each tooth
- Once the procedure is complete, the patient can rinse the gritty paste out of the mouth

# Chapter 4

# Diagnostic techniques

## REASON FOR PROCEDURE

When a patient attends a dental appointment for a dental examination, the dentist has to check the oral health and determine the presence and location of any caries, periodontal disease or oral soft tissue problems. While the visual skills of the dentist are of paramount importance in identifying problems of the oral tissues, it is often necessary for diagnostic techniques to be implemented so that a definitive diagnosis can be made.

The three techniques discussed are:

- Use of dental hand instruments
- Dental radiographs
- Study models

## BACKGROUND INFORMATION OF PROCEDURE – INSTRUMENTS

A variety of dental hand instruments called probes have been designed to aid the dentist in detecting the presence of both caries and periodontal disease.

Those used to detect caries have sharp points that can be run over the tooth surface to find any softened areas of the enamel, which indicates that demineralisation has occurred and the area has undergone carious attack.

Those used to detect periodontal disease are blunt-ended and have graded depth markings on them, so that the gums are not pierced during use and any gum pockets discovered can be depth recorded.

## DETAILS OF PROCEDURE – INSTRUMENTS

Frank carious cavities in teeth are easily visible to the dentist when they occur on uncovered and easily accesible surfaces of those teeth (Figure 4.1), but more difficult areas

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**Figure 4.1** Cavity in tooth

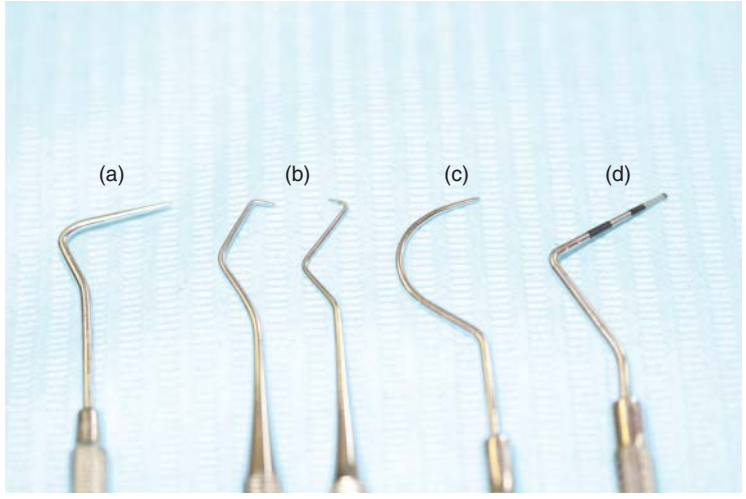


**Figure 4.2** Diagnostic probes. (a) Right angle probe. (b) Briault probe. (c) Sickle probe. (d) Periodontal BPE probe

to examine require the use of dental probes. All have been designed so that their pointed ends are bent at various angles so that all surfaces of each tooth can be easily probed by the dentist (Figure 4.2).

**TECHNIQUE:**

- The patient is placed in the dental chair at a suitable angle for the dentist, with the dental inspection light providing good illumination when the mouth is open

- Visual examination is carried out first so that any suspicious tooth surfaces are detected
- Each suspect area is then revisited and the probe end is run over the tooth surface
- A hard, scratchy surface indicates sound enamel
- A soft, non-scratchy surface indicates the presence of dental caries
- The dentist will be able to determine the presence of either by tactile sensation through the probe to the hand
- The dental nurse will record the findings of the dental examination on a manual chart or its computer alternative, and either can be referred to at a later date to monitor the improvement or deterioration of the patient's dental condition and any treatment that has been provided by the oral health team to treat any caries found



Periodontal disease is often more difficult to detect by vision alone as the gums of some patients appear to be quite healthy and exhibit no bleeding when touched. The presence of periodontal pockets alongside the tooth roots indicates that some destruction of the supporting tissues of the tooth has occurred – and the deeper the pocket, the more severe the destruction.

The pockets are not visible to the naked eye, but can be easily detected using a periodontal probe (see Figure 4.2).

**TECHNIQUE:**

- The patient is placed in the dental chair at a suitable angle for the dentist, with the dental inspection light providing good illumination when the mouth is open
- Visual examination is carried out first, including the presence of any plaque or calculus and the identification of any tooth mobility
- Each suspect tooth/gum junction is then inspected for periodontal pocketing by 'walking' the blunt-ended probe around the gingival crevice
- A healthy gingival crevice is no deeper than 2 mm and does not bleed when probed
- Where a periodontal problem exists, the probe sinks easily below the tooth-gum junction and the area bleeds on probing
- The probe may sink for several millimetres and greater depths indicate more severe periodontal disease (Figure 4.3)
- Sometimes the probe may also detect specks of subgingival calculus on the tooth root
- The dental nurse records the findings of the periodontal examination on a manual chart or its computer alternative, and either can be referred to at a later date to monitor the improvement or deterioration of the patient's periodontal condition

## BACKGROUND INFORMATION OF PROCEDURE – DENTAL RADIOGRAPHS

Radiographs provide the dentist with a method of seeing within the dental tissues themselves, without having to drill or cut into those tissues beforehand.

**Figure 4.3** BPE probe inserted in periodontal pocket

They are an invaluable diagnostic technique for determining the presence or absence of dental disease, as well as such widely varied features as unerupted teeth, jaw or tooth fractures, extra teeth, foreign bodies and so on.

A wide variety of images can be produced depending on the type of radiographic view required, ranging from a single tooth to the whole oral cavity. Where a single tooth or just a few teeth are to be viewed, an intra-oral radiograph is taken, which can then either be chemically processed to produce an image or transmitted with specialist digital equipment to a computer screen for immediate viewing.

Examples of the types of radiograph discussed are shown in Figure 4.4 and are:

- Bitewings
- Periapicals
- Occlusals

When a more extensive area is to be radiographed, an extra-oral dental pantomograph (DPT) view is taken, using a cassette containing intensifying screens to reduce the X-ray exposure of the patient. The image produced will show all the teeth in both the upper and lower jaws, as well as the surrounding bony anatomy (Figure 4.5).

A specialist cephalometric view can also be taken in certain orthodontic cases, so that measurements can be made of the angulation of the teeth, jaws and skull to each other to determine the severity of the malocclusion, and the likelihood of the need for orthognathic surgery to correct the jaws. The view produced is referred to as a lateral skull image (Figure 4.6).

## DETAILS OF PROCEDURE – DENTAL RADIOGRAPHS

When an intra-oral view is taken, it is important that there is no distortion of the film or the image produced, as can happen if the film is bent in the mouth or if the angulation of

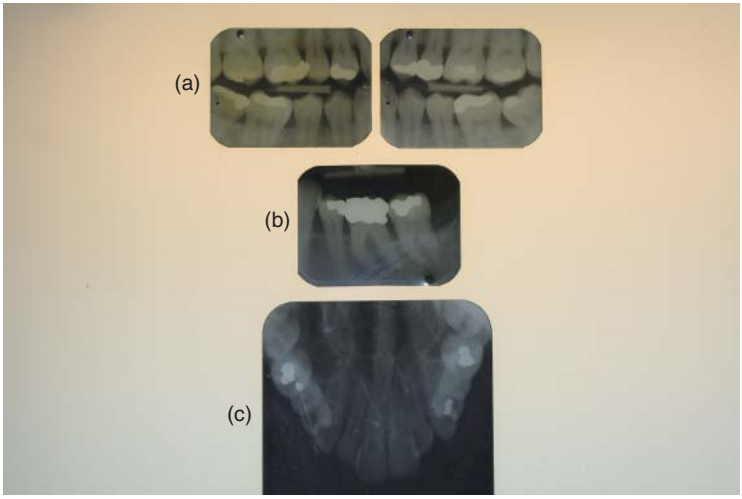


**Figure 4.4** Examples of intra-oral radiographic views. (a) Bitewings. (b) Periapical. (c) Upper occlusal

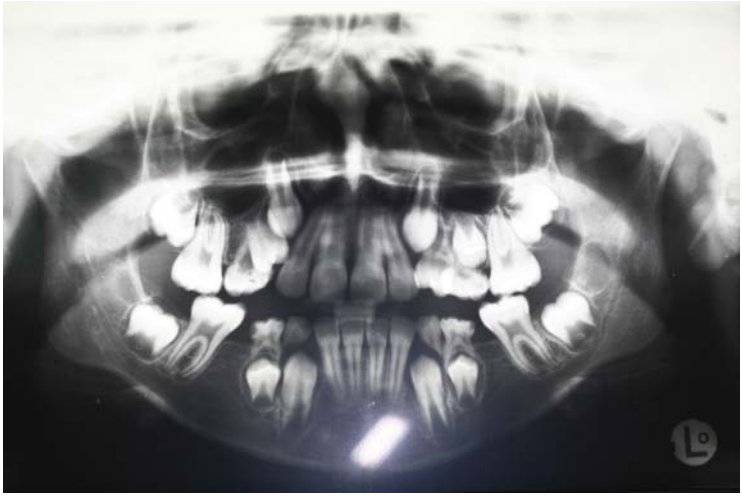

**Figure 4.5** Dental pantomograph

the X-ray machine cone is incorrect. Therefore the film is placed into one of a variety of holders before being positioned in the patient's mouth, so that the film is held in parallel to the tooth being exposed and prevents distortion, as well as allowing the cone angulation to be set correctly.

If a digital radiograph is to be produced, the sensor unit is treated in the same manner.

**Figure 4.6** Lateral skull view

**TECHNIQUE:**

- The patient is seated comfortably in the dental chair, usually in an upright position or nearly so
- All removable prostheses are taken out of the mouth, as they superimpose their image over the teeth and make diagnosis difficult
- The X-ray machine exposure and time settings are chosen by the operator, depending on which tooth and view is being taken
- A suitable holder is chosen, depending on whether a bitewing, anterior or posterior periapical view is required (Figure 4.7)
- Occlusal views do not require the use of a holder, as the patient is able to bite onto the film packet itself and hold it correctly in place during exposure
- The intra-oral film is correctly inserted into the holder so that the front of the film faces the X-ray cone
- The holder and film are then gently but accurately positioned in the patient's mouth, so that the tooth to be viewed lies between the film holder and the X-ray cone, and in parallel with both (Figure 4.8)

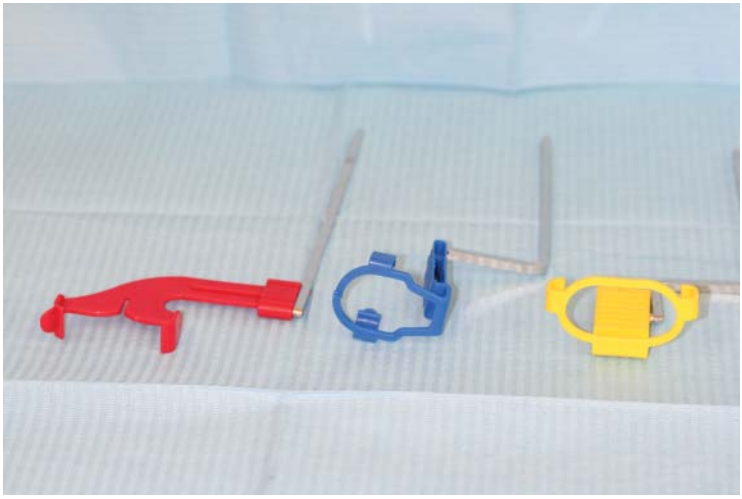

**Figure 4.7** Examples of film holders. (a) Bitewing holder. (b) Anterior periapical holder. (c) Posterior periapical holder

- The final position of the X-ray cone is checked before all personnel except the patient move outside the 2 metre safety zone
- The patient is told to remain completely still during the exposure, which is identified by a ringing or buzzing sound
- The operator presses the X-ray machine button to expose the film, releasing it only when the audio alarm ends
- A digital X-ray view is produced immediately on the computer screen
- An ordinary film is removed from the patient's mouth and holder, and taken to be chemically processed either manually or in an automatic processor
- The processed radiograph can be viewed on a viewer within 5 min, and a diagnosis made

When a DPT is to be taken, the patient has to be correctly positioned within the headset of the X-ray machine, so that the film produced is in focus throughout and so that no positional distortions are produced (Figure 4.9). The exposure time is usually in the region of 15 s, but a reduced X-ray dose to the patient is achieved by the use of intensifying screens within the cassette.

The film is chemically processed to produce the image, either manually or automatically. These views are often taken for orthodontic diagnosis of missing or unerupted teeth, as well as to identify jaw fractures and pathology.

## BACKGROUND INFORMATION OF PROCEDURE – STUDY MODELS

When a patient has a complicated occlusion, it is easier for the dentist to visualise this by copying the dental arches and the way they bite together by producing a set of study

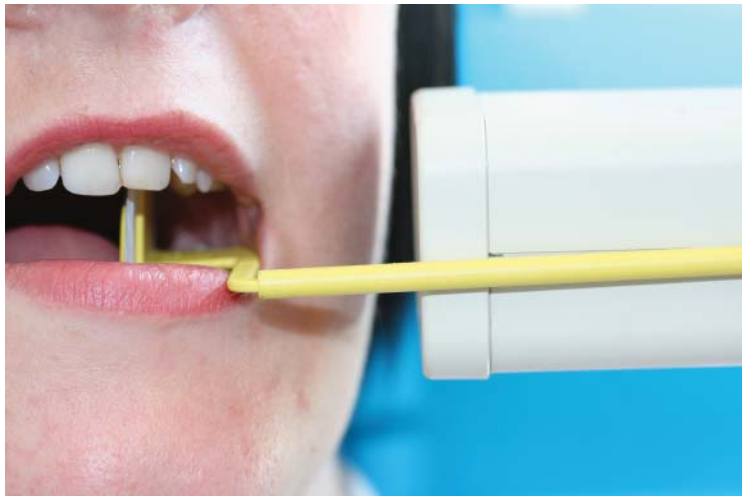

**Figure 4.8** Film packet and holder in place ready for exposure

**Figure 4.9** Patient positioned in DPT machine

**Figure 4.10** Set of simple study models



models (Figure 4.10). These can then be viewed from all angles by the dentist, without the hinderance of the patient's lips, cheeks and tongue.

Often, unexpected details are discovered that were not evident just by viewing the patient in the dental chair, such as abnormal wear patterns on the teeth.

Diagnostic study models are invaluable aids to the dentist for the following situations:

- Orthodontics
- Multiple crown restorations
- Bridges
- Implants
- Bruxism (tooth grinding)
- Denture design

## DETAILS OF PROCEDURE – STUDY MODELS

When producing diagnostic study models, an impression has to be taken of each arch of the patient's dentition that is accurate without being prohibitively expensive. The impression material of choice is alginate, which is sufficiently elastomeric to be accurate as well as being relatively inexpensive. Correctly sized stock trays are adequate to hold the impression material, and a wax wafer bite allows the accurate positioning of the two models produced.

The materials and equipment that may be required for a set of simple study models are shown in Figure 4.11.

In more complicated cases, the models are often mounted on an articulator by the laboratory technician so that jaw movements can be reproduced and a more in-depth occlusal analysis carried out.

**Figure 4.11** Equipment and materials for taking a set of simple study models

**TECHNIQUE:**

- The patient is usually seated upright in the dental chair, so that excess material does not cause gagging during the procedure
- A protective bib is placed over the patient
- All removable prostheses are taken out of the mouth, unless their presence is required for the occlusal analysis
- A wax wafer bite is taken if necessary, using warmed pink wax
- Upper and lower stock trays are sized to the patient's dental arches, so that each arch is fully covered by the tray without being uncomfortable or actually choking the patient
- A stiff, bubble-free mix of alginate is prepared and loaded into one of the trays and then inserted into the patient's mouth to fully cover one of the dental arches
- The patient is advised to breathe through the nose while the impression is being taken, not to swallow, and to keep the lips and cheeks in a relaxed state
- Once set, the impression is carefully removed from the mouth in the tray and disinfected as necessary
- The process is repeated for the opposing arch
- Study models are cast in dental stone from the impressions, ideally within 24 h of the impressions being taken

The technique of taking alginate impressions for study models is one that can be carried out by suitably trained dental nurses as an extended duty, and the full procedure is discussed further in Chapter 13.

Chapter 5

# Tooth restoration with fillings

## REASON FOR PROCEDURE

When a tooth is attacked by caries, a process of demineralisation occurs in the hard tissues of the tooth, starting in the enamel outer layer. This opens the inner dentine layer to infection by the bacteria involved in caries, and as this layer contains nerve endings, the patient feels hot and cold sensitivity and eventually pain. Once painful, there is a loss of function as the patient avoids chewing with the affected tooth.

The caries attack progresses further into the tooth until it reaches the pulp chamber, eventually causing an abscess and the death of the tooth, unless the tooth is dentally treated by filling before the pulp chamber is breached.

A tooth may also require a filling if it fractures, whether caries is involved or not, as a fractured tooth may also become sensitive to hot and cold food, or cause soft tissue trauma to areas within the oral cavity.

The purpose of the filling procedure is to ultimately restore the tooth to its normal function, and this involves the elimination of any caries first, as well as the elimination of any discomfort or pain experienced by the patient.

The procedures discussed are:

- Amalgam fillings
- Composite fillings
- Glass ionomer fillings

## BACKGROUND INFORMATION OF PROCEDURE – AMALGAM FILLINGS

Amalgam is a metallic material used for fillings, produced by the mixing of an alloy powder (containing mainly silver) with a small amount of liquid mercury. This produces a malleable material that can be inserted fully into the tooth cavity and then carved to the shape of the tooth surface. Once set, it forms a solid plug in the cavity that is hard enough

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to chew on, as well as sealing the tooth's sensitive inner layers from further exposure to hot and cold stimulants.

As the material is metallic in appearance, it tends not to be used for anterior fillings as far more acceptable aesthetic substances are produced for use here, using tooth-coloured filling materials.

## DETAILS OF PROCEDURE – AMALGAM FILLINGS



The procedure is normally carried out under local anaesthetic so that the patient feels neither pain nor thermal stimulation in the tooth. The effects of the local anaesthetic wear off after several hours, by which time the dental treatment has been completed painlessly.

The instruments and materials required to administer a local anaesthetic are shown in Figure 3.8.

During the procedure, the dental nurse provides good moisture control in the oral cavity using high speed suction equipment, so that the dentist has a clear field of vision at all times. The suction equipment is used to remove saliva, debris from the tooth and water from the dental handpiece that cools the drill while in use.

The instruments and materials required to carry out an amalgam filling procedure are shown in Figure 5.1.

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment for safety reasons and this usually consists of goggles and mask for the dental team, and a protective bib and safety glasses for the patient (see Figure 3.5)
- Local anaesthetic is administered and allowed to take full effect
- All caries is removed from the tooth cavity using a combination of high and low speed dental handpieces with drills and occasionally with the additional use of cutting hand instruments
- This produces a firm tooth cavity surface into which the filling can be placed, which is then undercut to prevent loss of the completed filling
- Depending on the depth of the finished cavity, a protective lining may be placed over its base so that the pulp beneath is not exposed to thermal irritation through the metallic filling
- The walls of the cavity can also be sealed using a light-cured resin-type material, which improves the tooth resistance to thermal stimulation and assists in reducing marginal leakage of the set filling
- If more than one tooth surface has been destroyed by the caries, a metal matrix band is placed around the tooth and tightened, to allow the amalgam to be pushed into the cavity from one surface without it squeezing out of the other
- The mixed amalgam is inserted into the cavity in increments by the dental team, starting at its deepest point and gradually filling the cavity to the surface of the tooth
- After each increment, the dentist uses hand instruments to push the plastic amalgam material into all the cavity depths so that no voids remain – these air spaces weaken the filling and allow future fracture, if present
- The dental nurse uses the high speed suction to remove all excess amalgam from the area, as the dentist carves and shapes the surface of the filling
- Once completed, the shaping of the filling should allow the patient to bite together without prematurely contacting it, but so that the tooth can still be used for chewing
- The patient is advised not to attempt chewing until the local anaesthetic has worn off, otherwise there is the risk of biting oneself
- By this time, the amalgam is hardened and fully set (Figure 5.2)

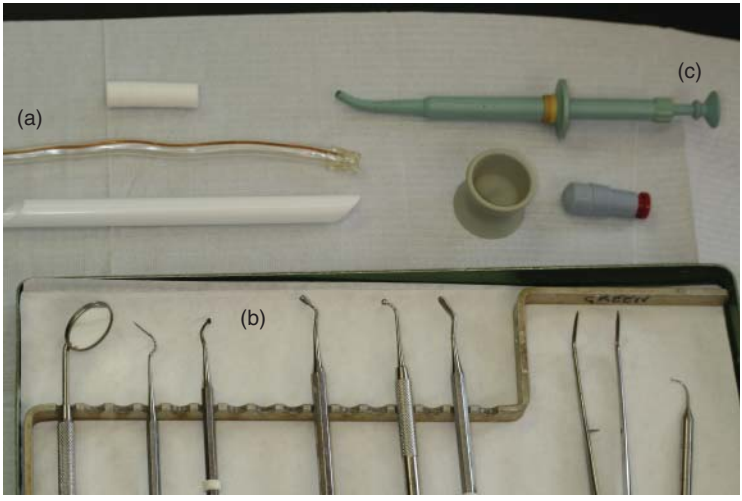


**Figure 5.1** Instruments and materials for amalgam filling procedure. (a) Moisture control items. (b) Hand instruments. (c) Amalgam capsule, well and carrier

**Figure 5.2** Completed amalgam filling



## BACKGROUND INFORMATION OF PROCEDURE – COMPOSITE FILLINGS

Composite is a tooth-coloured filling material that is available in many shades to match a very wide range of tooth colours. It can be polished, once set, to produce a shiny surface that matches tooth enamel superbly and is therefore an excellent material to be used for anterior fillings. Some modern types of composite are also strong and wear-resistant enough to be used as a posterior filling material instead of amalgam.

Unlike amalgam, composite is not freshly mixed and then allowed to set with time, but rather it is used in its ready-mixed plastic state to fill a cavity, and then set (or cured) by exposure to a blue curing lamp. This gives the dentist more time to fully adapt the plastic material to the tooth as required, before using the curing lamp to harden it in a controlled manner.

Although composite is far superior to amalgam aesthetically, it can take longer to use and the procedure is technique-sensitive. In addition, only certain types of composite are strong enough to be used in larger cavities in posterior teeth as the chewing forces generated here are considerable.

## DETAILS OF PROCEDURE – COMPOSITE FILLINGS

Again, local anaesthesia is usually administered before dental treatment begins, and a dental nurse provides moisture control throughout the procedure, as composite is particularly sensitive to moisture contamination from saliva, blood or irrigation water.

Indeed, some dentists choose to isolate the tooth completely from the rest of the oral cavity while placing composite fillings, by using a rubber dam. This allows the tooth to be restored to project through the rubber dam sheet while keeping all other oral structures away from it, thus preventing saliva contamination of the tooth while the filling is placed.

The instruments required to apply rubber dam to a tooth are shown in Figure 5.3

The equipment and materials required to carry out a composite filling procedure are shown in Figure 5.4.

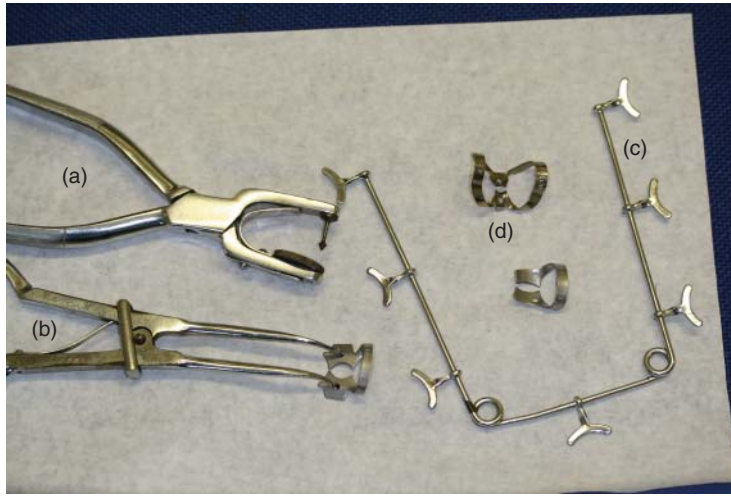


**Figure 5.3** Rubber dam instruments. (a) Dam punch. (b) Dam clamp forceps, with clamp. (c) Dam frame. (d) Selection of other clamps

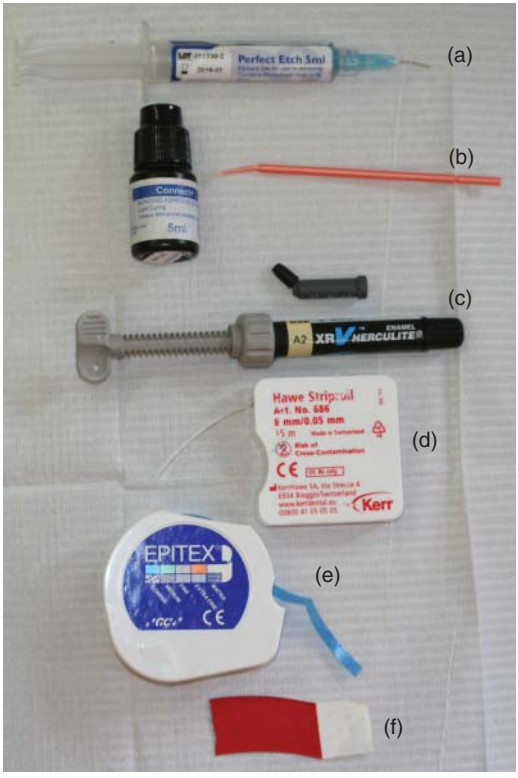


**Figure 5.4** Equipment and materials for composite filling procedure. (a) Acid etchant. (b) Resin and applicator. (c) Composite material example. (d) Transparent matrix strip. (e) Finishing strip. (f) Articulating paper

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective eqiupment, and ideally the patient's safety glasses are orange-tinted to counteract the blue curing lamp
- Local anaesthetic is administered and allowed to take full effect
- A rubber dam is placed if required (Figure 5.5)
- All caries is removed from the tooth cavity as before, but then the preparation can be minimal as the composite material bonds to enamel and no undercuts are required to hold the filling in place
- A lining may be placed in deeper cavities to prevent chemical irritation of the pulp by the filling material
- The required shade is chosen using a shade guide in natural light (this may be taken beforehand if a rubber dam is placed)
- The exposed enamel edges of the cavity are covered in acid etch to chemically roughen their surfaces

(*continued*)

**Figure 5.5** Rubber dam in place on lower molar tooth

**TECHNIQUE: (*Continued*)**

- The etch is washed off, the edges dried, and then unfilled resin is wiped over them and cured with the blue lamp for a short time to produce a sticky layer of material
- The resin forms a bond between the enamel and the filling material, locking the latter into place
- A transparent matrix strip is used to avoid overspill as the composite is placed into the cavity, in 2 mm increments that are individually cured to ensure full setting of the overall filling
- The matrix is transparent to allow the curing light beam to pass through it
- Coloured articulating paper is used to identify any premature contacts on any biting surfaces of the filling, and these are removed to allow the patients to achieve their correct bite
- Polishing strips, discs, and burs are used to produce the final shiny surface of the completed filling (Figure 5.6 shows an old composite filling, as a new one is very difficult to see because of their superb aesthetics)
- Although the filling is fully set once cured, the patient is advised not to attempt chewing until the local anaesthetic has worn off, to avoid soft tissue injury

## BACKGROUND INFORMATION OF PROCEDURE – GLASS IONOMER FILLINGS

Glass ionomer is another tooth-coloured filling material available for tooth restoration, although the shade range is more limited than for composite. It is also less translucent and cannot be polished to give a shiny surface, so the final aesthetics produced are inferior to those achieved with composite materials.

The advantage that glass ionomer has over other filling materials is that it is adhesive to all tooth surfaces – enamel, dentine, and cementum – and is therefore invaluable in filling

**Figure 5.6** Completed composite filling – old filling shown as new one is not easily visible



cavities where only minimal, if any, tooth preparation is possible. This is a particular advantage when filling abrasion cavities produced at the necks of the teeth, often by over-zealous toothbrushing by the patient.

It is also useful in filling the deciduous teeth of young patients who often do not tolerate the administration of local anaesthetic. It is of special value here as it releases fluoride into the cavity and helps to slow or stop the progression of the caries.

It is usually provided as a powder of glass-like material to be mixed by hand with an acidic liquid, or as a capsule containing both to be mixed mechanically; some set chemically with time while others set after exposure to the blue curing lamp. Attempts to adjust the surface of the filling once set produce a chalky appearance, so accurate placement of a light-cure type requiring no adjustment produces the best aesthetic result.

The equipment and materials required to carry out a glass ionomer filling procedure are shown in Figure 5.7.

## DETAILS OF PROCEDURE – GLASS IONOMER FILLINGS

As little or no tooth preparation is required with this material unless caries is present, local anaesthesia may not always be required. However, good moisture control is imperative to the filling setting properly, so a rubber dam may well be placed in adult patients.

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment
- Local anaesthetic is administered if caries removal is necessary

(*continued*)

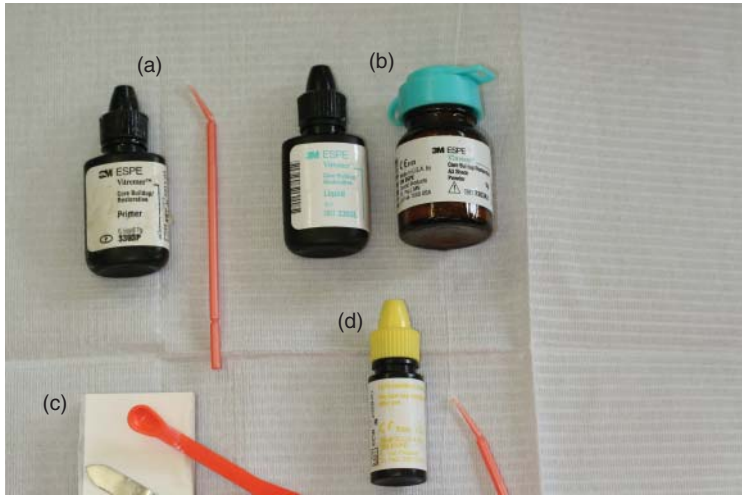


**Figure 5.7** Equipment and materials for glass ionomer filling procedure. (a) Conditioning liquid and applicator. (b) Powder and liquid filling material example. (c) Waxed pad, spatula, and measuring scoop. (d) Varnish and applicator

**TECHNIQUE: (*Continued*)**

- A rubber dam is placed if required
- Any caries is fully removed if present, otherwise no tooth preparation is required
- The cavity is conditioned by wiping it over fully with polyacrylic liquid, to remove dirt and any preparation debris and allow chemical bonding of the filling to the tooth
- The conditioner is washed off and the cavity dried
- Deeper cavities are lined to prevent chemical irritation of the pulp
- The mixed filling material is applied and fully adapted to the cavity so that no adjustment is required once set
- Light-cured types of glass ionomer are cured as necessary, while chemically cured types are kept dry while setting occurs with time
- The set surface is coated with a waterproof varnish to prevent the filling drying out once set (Figure 5.8)

## AFTERCARE OF FILLINGS

No matter how well placed, microscopically the edges of a filling provide a new surface area for plaque and oral bacteria to adhere to, giving the potential for further carious attack if not removed regularly.

Consistently high standards of oral hygiene must be maintained by the patient to prevent this happening, especially interdentally if the filling extends between the teeth. This involves the use of a good toothbrushing technique with a good quality fluoridated

**Figure 5.8** Completed glass ionomer filling on lower molar

toothpaste, as well as the use of floss, tape or interdental brushes. Ideally, a plaque suppressing mouthwash should also be used routinely.

The standard of oral hygiene achieved should be monitored and reinforced as necessary at regular dental examinations. Where techniques are poor and calculus has developed, this should be fully removed by scaling and polishing the teeth.

Patients should also be advised to alter their diet when they have experienced caries previously. Their intake of foods and drinks high in refined sugars or acids should be reduced as far as possible, and confined to mealtimes to allow the natural buffering action of saliva to minimise any carious attack.

Failure to comply with these oral health instructions is likely to result in further caries and the need for further fillings in the future.

Chapter 6

# Tooth restoration with crowns, bridges, veneers or inlays

## REASON FOR PROCEDURE – CROWNS

Each time a tooth is restored with a filling, some of the tooth tissue is removed. Eventually, this compromises the strength of the remaining tooth and it may begin to fracture under normal occlusal forces. This especially occurs when teeth have been root treated, so it is usual for heavily filled and root filled teeth to be crowned before fracture occurs.

In other cases, a tooth may be poorly shaped and require elective crowning to be more aesthetically pleasing. Similarly, a tooth may be too poorly shaped to assist in the retention of, say, a denture, but can be made so by elective crowning.

## BACKGROUND INFORMATION OF PROCEDURE – CROWNS

Posterior crowns are sometimes constructed from non-precious or precious metals such as yellow gold. These metallic materials provide maximum strength to withstand occlusal forces and have no risk of fracture. More modern posterior crowns and anterior crowns are made of either tooth-coloured ceramic throughout, or have porcelain bonded to a substructure of metal, and these give an aesthetically pleasing result when shaded and matched accurately with the adjacent teeth. Although modern techniques of crown construction are superb, it is possible for ceramic crowns to fracture or to break away from their metallic substructure, so that repairs or even replacements are required. This can occur in patients with especially heavy bites or in those who grind their teeth.

## DETAILS OF PROCEDURE – CROWNS

Unless the tooth to be crowned has been root treated and is therefore non-vital, crown preparation is usually carried out under local anaesthetic so that the patient feels neither

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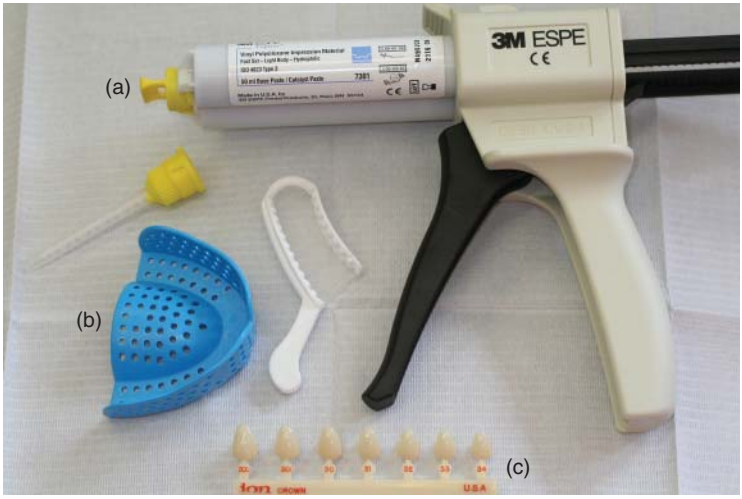


**Figure 6.1** Equipment and materials for crown preparation procedure. (a) Elastomer based impression material example. (b) Selection of impression trays. (c) Temporary crown form example

pain nor thermal stimulation in the tooth throughout the procedure. The equipment and materials required to administer local anaesthetic are shown in Figure 3.8.

The prepared tooth requires thermal protection by being covered with a temporary crown material such as acrylic, as the crown has to be individually constructed by a technician before it can be fitted.

During the preparation procedure, a dental nurse provides good moisture control in the oral cavity using high speed suction equipment. This provides a clear field of vision for the dentist, as well as making the patient more comfortable by removing water, saliva and tooth debris from the mouth.

The instruments required to carry out a crown preparation procedure are shown in Figure 5.1b.

The equipment and materials required to carry out a crown preparation procedure are shown in Figure 6.1.

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment, as usual
- Local anaesthetic is administered and allowed to take full effect
- The shade and shape of crown are chosen by the dentist and patient, using a shade guide
- A rubber dam is placed if required
- All sides and the occlusal surface of the tooth are reduced by a uniform amount using a bur in the high speed handpiece, so that space is created for the crown to be constructed and fitted over the remaining tooth without altering the patient's occlusion
- The side reduction is completed to produce a near parallel tooth core, to give maximum retention of the crown on cementation (Figure 6.2)
- Once the tooth preparation is complete, impressions are taken of both arches and the patient's normal biting position is recorded

(*continued*)

**TECHNIQUE: (*Continued*)**

- Impression of the opposing arch can be taken in alginate, but that of the working arch has to be in a very accurate, non-tearing elastomeric material such as a silicone or polyether
- When satisfactory impressions have been produced, the tooth core is coated with a temporary acrylic material or fitted with a temporary crown form, to prevent sensitivity and to restore some degree of aesthetics while the permanent crown is constructed (Figure 6.3)
- Once the crown has been constructed, the patient reattends for its cementation



**Figure 6.2** Teeth prepared for crown procedure

**Figure 6.3** Temporary crowns in place on the upper left incisors


**Figure 6.4** Equipment and materials for crown cementation procedure. (a) Mixing pad and spatula. (b) Luting cement example. (c) Articulating paper

The equipment and materials required to cement a permanent crown are shown in Figure 6.4.

- Again, local anaesthetic is administered and a rubber dam placed if required
- On removal of the temporary material, the crown is tried onto the tooth core and checked for accuracy of fit, shade and occlusion
- If satisfactory, the crown is cemented permanently onto the tooth core using one of a variety of luting cements (Figure 6.5)

**Figure 6.5** Cemented crowns

## AFTERCARE OF CROWNS

As with fillings, microscopically all fixed prosthetic restorations provide a surface area for the attachment of plaque and oral bacteria. As crown margins are deliberately placed at the gingival margin to give superior aesthetics, any plaque accumulation can potentially cause either caries of the underlying tooth core or periodontal disease down the root of the tooth.

A consistently high standard of oral hygiene around crown margins is therefore imperative. This involves good toothbrushing using a good quality fluoride toothpaste, and successful interdental cleaning using floss or tape. As many crowns are placed specifically to close existing interdental spaces, it is unlikely that the use of interdental brushes is possible.

Regular use of a plaque-suppressing mouthwash should also be encouraged, and the oral hygiene standard achieved by the patient can be monitored and reinforced at regular dental examinations. Any calculus found to be present should be fully removed by scaling and polishing the teeth.

As always, a diet high in sugars and acids should be reduced to an absolute minimum, and confined to mealtimes only.

## BACKGROUND INFORMATION OF PROCEDURE – BRIDGES

A bridge is a fixed restoration used to replace one or a few missing teeth in a dental arch, although in advanced cases multiple bridges can be fitted to provide full mouth rehabilitation.

Various designs of bridges are available, and that used in each case has to be determined by the dentist on its merits.

For patients with only a few missing teeth and a low biting force in the area of the bridge, a minimal amount of tooth preparation can be carried out and an acid etch retained bridge placed. Where occlusal forces are likely to dislodge this type of restoration, a more conventional design is used, where the adjacent teeth are prepared as for crowns and the missing teeth incorporated into the whole structure.

Bridges are usually constructed of porcelain bonded to a metallic substructure, although some modern, all ceramic materials are also available.

## DETAILS OF PROCEDURE – BRIDGES

As minimal tooth preparation is carried out for an acid etch bridge preparation, it is often not necessary for local anaesthetic to be administered. With more conventional designs involving whole tooth preparation, it is usual for local anaesthetic to be administered for any vital teeth involved.

As always, a dental nurse provides good moisture control in the oral cavity throughout the bridge preparation procedure.

The instruments, equipment and materials required for a bridge preparation are as for those detailed previously for a crown preparation (see Figures 5.1b and 6.1).

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment
- Local anaesthetic is administered if necessary, and allowed to take full effect
- The design of the bridge will have been discussed and determined previously, and the shade is now chosen
- A rubber dam is placed if required
- If an acid etch bridge is being provided, a small area of enamel at the back of the retaining adjacent teeth is removed to provide room for the technician to construct the retaining metal wings to hold the bridge in place
- These have to be constructed so as not to interfere with the patient's normal occlusion
- When a more conventional bridge is being provided, each retaining tooth is reduced to a core as for a crown preparation, using the same technique and design principles (see Figure 6.2)
- Once prepared, an impression of the working arch is taken in a highly accurate material such as silicone or polyether, and one of the opposing arch is taken in alginate
- The bite and jaw movements can be recorded simply, or with the help of articulated study models, depending on the complexity of the case
- The prepared teeth are temporarily covered to prevent sensitivity, as with crown preparations
- In complex cases, the metallic substructure of the bridge (if used) is tried in for accuracy of fit before the porcelain is bonded to it, as this avoids costly full remakes if problems do occur
- Once the bridge is fully constructed, the patient reattends for its cementation

The equipment and materials required to cement a bridge are shown in Figure 6.4.

- Local anaesthetic is administered and a rubber dam placed as necessary
- On removal of the temporary coverings, the bridge is tried onto the retaining teeth and checked for accuracy of fit, shade and occlusion
- The replaced missing tooth (or teeth) is checked for its fit against the bony ridge of the dental arch, to ensure that the area can be easily cleaned by the patient
- Once satisfactory, an acid etch retained bridge is cemented using one of a variety of light cured bonding materials
- A conventional bridge is cemented using one of a variety of luting cements

## AFTERCARE OF BRIDGES

All of the aftercare advice for crowns is similarly applicable to bridges, but additional oral hygiene techniques also need to be employed when maintaining the pontic areas of a bridge. The pontic is the section of the bridge that replaces the missing tooth or teeth, and rests on the ridge of the dental arch itself, once the bridge is cemented in place.

The point where the pontic rests on the gingiva is a difficult area to clean and may accumulate plaque and oral bacteria quite easily. This causes gingival inflammation unless the plaque is removed, either by vigorous mouthwashing or by physically cleaning the underside of the pontic, using floss or tape.

Where the pontic has retainers on both sides so that the bridge is a solid structure, superfloss can be threaded beneath the pontic and used to clean its underside. Superfloss

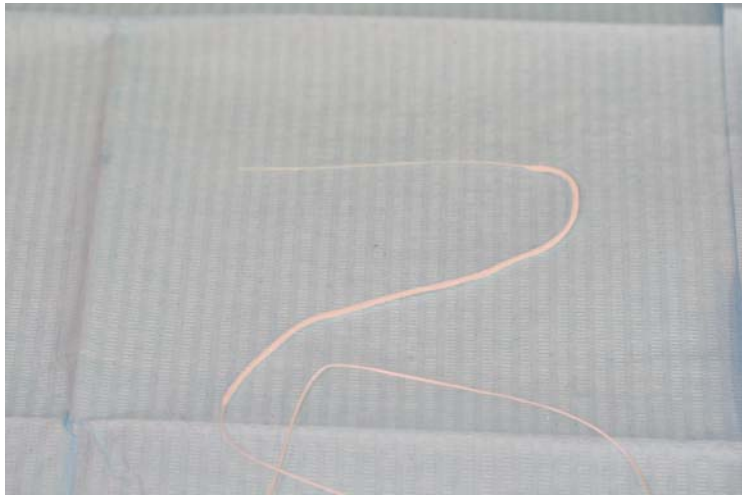

**Figure 6.6** Superfloss for cleaning beneath a bridge pontic

has a stiff end for threading as described, which is attached to an expanded spongy section that then runs into normal floss (Figure 6.6). It has been designed specifically to clean bridges in this way.



## BACKGROUND INFORMATION OF PROCEDURE – VENEERS

A less invasive technique than conventional crown preparation for improving the aesthetics of a tooth is to place veneers. These are thin layers of porcelain that are acid etch cemented to the front surface of any number of anterior teeth, to improve a patient's appearance by correcting dark or malaligned teeth, or both.

They have no other functional purpose than a cosmetic one, and their fragility and ease of fracture or loss dictates their case suitability. Patients with aberrant occlusal habits or heavy bites are usually unsuitable for veneers.

Although usually constructed of porcelain, it is possible to place either composite or acrylic veneers on a temporary basis.

Nowadays, a patient with well-aligned but discoloured anterior teeth may also undergo professional tooth whitening to improve their appearance, rather than undergo the relatively invasive procedure of having porcelain veneers fitted (see Chapter 12).

## DETAILS OF PROCEDURE – VENEERS

As minimal tooth preparation is carried out for a veneer, it is often not necessary for local anaesthetic to be administered. Indeed it is frequently root filled, discoloured teeth that have veneers placed to improve aesthetics, as full crown preparations on these teeth can sometimes compromise them enough to cause fracture with time.

A dental nurse provides good moisture control in the oral cavity throughout the veneer preparation procedure.

The instruments, equipment, and materials required for a veneer preparation are those shown in Figures 5.1b and 6.1, although a temporary crown form is unnecessary in veneer cases.

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment
- Local anaesthetic is administered as necessary, and allowed to take full effect
- The shade and shape of the veneer are chosen by the dentist and patient, and the need for any opaquing technique if a particularly dark tooth is involved is decided upon
- This may be necessary to prevent the tooth discolouration from being visible through the thin porcelain veneer, once fitted
- A rubber dam is placed if required (see Figure 5.3)
- The labial (front) surface of each tooth to be veneered is reduced uniformly using a bur in the high speed handpiece (Figure 6.7)
- This is to provide the technician with sufficient space to construct the veneer so that the restoration remains in line with the adjacent teeth, rather than projecting further forwards than required
- Once the veneer preparation is complete, a highly accurate working impression is taken in a material such as silicone or polyether
- If the occlusion of the prepared tooth has been altered, then an opposing alginate impression and bite record is also taken
- The prepared tooth surface can be temporarily covered with glass ionomer or composite to avoid sensitivity and improve aesthetics, but this is sometimes not carried out with non-vital teeth
- Once the veneer has been constructed, the patient reattends for its cementation



**Figure 6.7** Tooth preparation for veneers

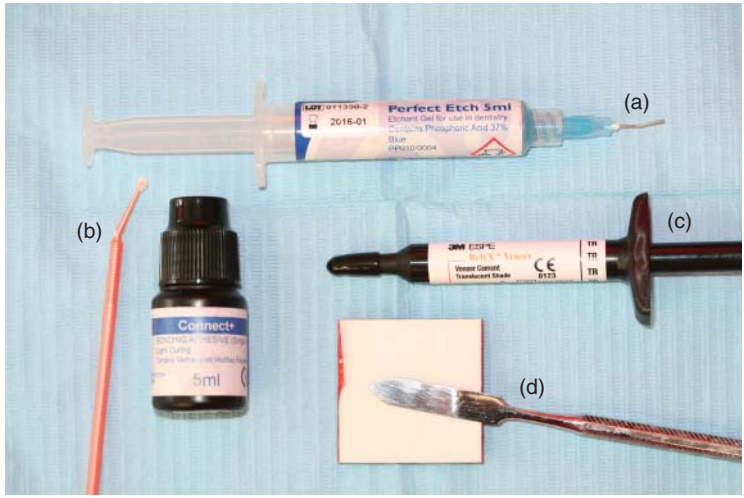


**Figure 6.8** Equipment and materials for veneer cementation procedure. (a) Acid etchant. (b) Resin and applicator. (c) Veneer luting cement example. (d) Mixing pad and spatula

The equipment and materials required to cement a veneer are shown in Figure 6.8.

- Local anaesthetic is administered and a rubber dam placed if required
- On removal of any temporary covering placed, the veneer is placed onto the tooth and checked for accuracy of fit, shade and shape
- The final shade can be accurately achieved by the use of various tooth-coloured cements if necessary
- The veneer is secured to the tooth using one of a variety of light-cured bonding materials (Figure 6.9)

## AFTERCARE OF VENEERS

As with other restorations, veneers can be subject to plaque and oral bacteria accumulations at their margins. Their aftercare advice is similar as for crowns, whereby a consistently good standard of plaque removal is required to prevent caries developing at the veneer margins and periodontal problems developing at the ginival margins.

This is achieved using a thorough toothbrushing technique with fluoride toothpaste, careful interdental cleaning using floss or tape, and the regular use of a plaque-suppressing mouthwash.

Regular dental examinations should be carried out, where oral hygiene techniques can be reinforced as necessary, as well as any scaling and polishing carried out to remove any accumulated calculus deposits.

Diet advice includes the reduction in intake of sugars and acids to a minimum, as well as for them to be confined to mealtimes only.

**Figure 6.9** Cemented porcelain veneers

Patients should also be advised of the potential fragility of veneers in certain circumstances. Actions such as biting finger nails and habits such as holding pens in the mouth may be sufficient to crack a porcelain veneer and require its removal and remake. Patients should always be discouraged in these types of habits and activities anyway, as they are often sufficient to splinter fillings and slivers of enamel from the teeth.



## REASON FOR PROCEDURE – INLAYS

An inlay is a device used to fill a prepared cavity in a tooth with a solid, pre-formed material rather than with a more conventional malleable filling material that can be manipulated into shape before setting, such as amalgam. The advantage of using an inlay in this situation is the greater strength of the material used versus that of conventional filling materials. This is of particular importance in patients with a very strong bite or in patients who habitually grind their teeth, as they tend to suffer from an increased incidence of filling fracture.

The inclusion of inlays in this chapter rather than with fillings is due to the similarity in the method of tooth preparation required as well as the materials available for inlay construction, both features being similar to those for crown and bridge work.

## BACKGROUND INFORMATION OF PROCEDURE – INLAYS

As with crowns and bridges, inlays are constructed indirectly in a laboratory rather than at the chair side, using materials such as precious and non-precious metal alloys and ceramics.

Inlays are usually placed in posterior teeth which undergo heavy occlusal forces during normal chewing actions. These forces may be strong enough to fracture large conventional fillings, and allow caries to recur in the affected tooth through the fracture. Small uncomplicated cavities do not usually warrant the extra time and expense of restoring them with an inlay, and their use in anterior teeth has also declined with the development of better aesthetic anterior filling materials.

## DETAILS OF PROCEDURE – INLAYS



Unless the tooth receiving the inlay has been root treated and is therefore non-vital, inlay preparation is usually carried out under local anaesthetic so that the patient feels neither pain nor thermal stimulation in the tooth throughout the procedure.

While the inlay is being constructed in the laboratory by the technician, a temporary filling material is placed to seal the cavity and prevent any food packing from occurring in it, as well as to protect the tooth from any uncomfortable thermal stimulation.

During the preparation procedure, a dental nurse provides good moisture control in the oral cavity, using high speed suction equipment. This provides a clear field of vision for the dentist, as well as making the patient more comfortable by removing water, saliva and tooth debris from the mouth.

The instruments required to carry out an inlay preparation procedure are shown in Figure 5.1b.

The same impression and bite recording techniques are used as for crown or bridge preparation procedures. The only additional equipment and material required is that for mixing and placing a temporary filling material to seal the cavity while the inlay is constructed.

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment
- Local anaesthetic is administered as necessary, and allowed to take full effect
- The material used to construct the inlay is decided previously by the dentist and the patient, and if a ceramic is to be used the shade is chosen
- A rubber dam is placed if required (see Figure 5.3)
- Any existing filling is removed using ordinary cavity preparation burs in the high speed handpiece
- Similarly, any carious tooth tissue is removed down to sound dentine to leave a hollowed out cavity within the tooth, of varying shape and size dependent on the amount of caries removed
- The inner walls of the cavity must now be prepared to produce a near-parallel shape, by the infilling of any undercuts with an adhesive restorative material such as composite or glass ionomer (Figure 6.10)
- The walls must be near-parallel to allow the inlay to be seated accurately, while providing the maximum retention to prevent its inadvertent dislodgement during use

- Once the inlay preparation is complete, a highly accurate working impression is taken in a material such as silicone or polyether
- An opposing alginate impression and bite record are also taken so that the technician can construct the inlay surface to fit neatly into the occlusion
- The inlay cavity is then temporarily filled while the inlay is being constructed by the technician
- Once the inlay is available, the patient reattends for its cementation

The equipment and materials required to cement an inlay are the same as for a crown cementation, and are shown in Figure 6.4.

- Local anaesthetic is administered and a rubber dam placed if required
- The temporary filling material is carefully drilled out of the cavity, without altering the shape at all
- The inlay is placed in the cavity to ensure it seats fully, fills the cavity to the margins fully and sits accurately in the occlusion (Figure 6.11)
- Once satisfactory, the inlay is cemented into the cavity using a conventional luting cement or a dual-cure cement
- A final check is made of the seated restoration, using articulating paper to highlight any premature contacts

## AFTERCARE OF INLAYS

As with other restorations, inlays can be subject to plaque and oral bacteria accumulations at their margins. Many inlays also involve extensions into the interdental areas of the dental arch to replace contact points between teeth, and these are particularly difficult regions to clean in the oral cavity. Consequently, in addition to the usual oral hygiene



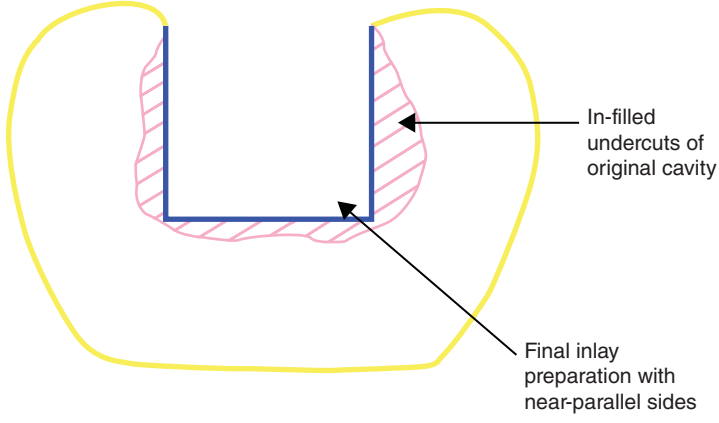


**Figure 6.10** Inlay preparation with in-filled undercuts

**Figure 6.11** Inlay cemented in tooth

advice of effective and regular brushing using a fluoride toothpaste, these patients should also be advised to carry out regular interdental cleaning, using floss or tape, or a recommended size and design of interdental brush (see Figure 2.13).

The restoration is routinely checked for any signs of marginal leakage at each recall appointment.

Diet advice includes the reduction in intake of sugars and acids to a minimum, as well as for them to be confined to mealtimes only.

Chapter 7

# Tooth restoration with endodontic techniques

## REASON FOR PROCEDURE

Any event that results in the pulp tissue within the root canal of a tooth being at risk of inflammation or infection may eventually lead to the death of that tooth. Once a tooth has died, it is a source of either painless chronic infection or of acute and very painful infection – neither of which is amenable to the oral health of a patient.

Events that can occur resulting in the inflammation of the pulp (pulpitis) include the following:

- Deep caries lying close to, or exposing, the pulp
- Thermal injury, from the use of hand pieces without cooling irrigation, for example
- Chemical irritation from some restorative materials
- Trauma, which may have been severe enough to cause tooth fracture in some cases
- Prolonged irritation of the pulp tissue from very deep fillings within the tooth, which may transmit thermal and pressure shocks easily

The method available to the dentist for removing the symptoms and treating the tooth to save it from extraction is one of the following endodontic techniques:

- Pulp capping
- Pulpotomy
- Pulpectomy (conventional root canal treatment)

Occasionally a successful root-filled tooth may develop problems at a later date (sometimes years later) and result in a recurrent infection at the end of the root. This may be treated and the tooth saved from extraction by a surgical procedure called an apicectomy.

## BACKGROUND INFORMATION OF PROCEDURE – PULP CAPPING

This is a technique carried out as a temporary measure to stabilise the tooth before proceeding to either pulpotomy or pulpectomy, to save it from extraction. It is necessary

*Basic Guide to Dental Procedures*, Second Edition. Carole Hollins.

when a small pulp exposure occurs unexpectedly during restorative dental treatment, or when a patient attends as an unscheduled emergency following trauma to the tooth, which has resulted in a very small pulp exposure.

The aim of pulp capping is to seal the exposed pulp from the oral cavity and the myriad of microorganisms within it, until time allows for a full endodontic procedure to be carried out to save the tooth.

## DETAILS OF PROCEDURE – PULP CAPPING

If the pulp exposure occurred during restorative treatment, it is likely that a local anaesthetic has already been administered previously. If a recent trauma has caused the exposure, the tooth is likely to be concussed and unresponsive to stimulation, therefore not requiring a local anaesthetic procedure to be carried out anyway.

In any event, the tooth must be kept as clean as possible to prevent the introduction of microorganisms into the pulp chamber. Once completed, pulp capping prevents pain and infection developing before further treatment can be carried out.



**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment
- The tooth is isolated from any saliva contamination using appropriate moisture control techniques
- Any bleeding at the exposure site is arrested using sterile cotton wool pledgets, possibly soaked in a local anaesthetic solution containing a vasoconstrictor such as adrenaline
- Once bleeding has been arrested and the area is dry, a paste of calcium hydroxide material is carefully placed over the exposure site to fully cover and form a 'cap' over it
- The exposure site may be further protected by placing a second, more sturdy, cap over the calcium hydroxide material using an item such as a section of a glass ionomer matrix
- The remaining cavity or fracture site is then sealed with a sedative temporary dressing material to protect the calcium hydroxide cap and assist in reducing any inflammatory response by the pulp to the initial injury (Figure 7.1)

## BACKGROUND INFORMATION OF PROCEDURE – PULPOTOMY

When trauma occurs to a permanent tooth in a young patient, it is often the case that the root canal is still wide open at the apex as the root is still growing – this can be determined by taking a radiograph.

When this is the case, the tooth often does not die as a result of the trauma, as the wide apex ensures that a good blood supply to the pulp is maintained during the inflammatory process and pulpal death is avoided. In these cases, only the potentially infected part of the pulp at the exposure site needs to be removed, while the apical blood supply ensures that the remainder of the pulp tissue heals itself.

The partial removal of pulp tissue from the pulp chamber only, and not the root canal, is called pulpotomy.

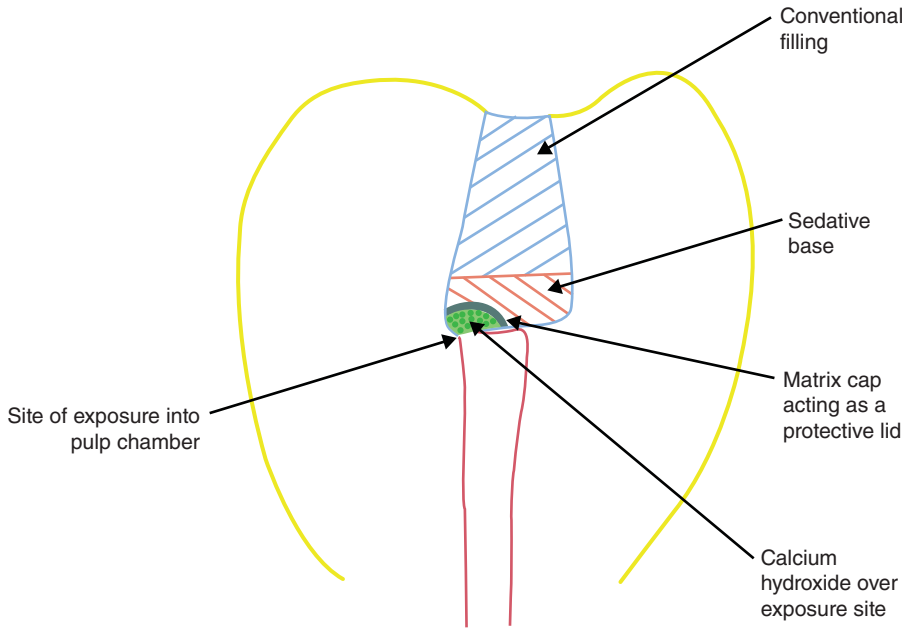


**Figure 7.1** Illustration of pulp capping technique

## DETAILS OF PROCEDURE – PULPOTOMY

As the pulp tissue is still vital, local anaesthetic is required for the procedure. It is important to the success of the technique that any risk of contamination of the remaining pulp tissue is kept to an absolute minimum, so the dental nurse provides good moisture control throughout.

Similar additional equipment and materials as those used for a pulp capping procedure are required

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment
- Local anaesthetic is administered and allowed to take full effect
- The tooth is isolated from saliva contamination, ideally using a rubber dam but this may not be possible on a young patient
- The pulp chamber is opened through the fracture site using a bur in the high speed hand piece
- The pulp tissue, within the pulp chamber only, is separated from that in the root canal using sharp sterile hand instruments or a sterile bur in the low speed hand piece

(*continued*)

**TECHNIQUE: (*Continued*)**

- Any bleeding of the amputated pulp stump is arrested using sterile cotton wool pledgets, possibly soaked in a vasoconstrictive local anaesthetic solution such as adrenaline
- Once dry, the pulp stump is covered with a calcium hydroxide lid of material that encourages the formation of a protective layer of secondary dentine to grow with time, and seal off the pulp tissue in the root canal from the injury site
- A stiff base material is placed over the calcium hydroxide lid to further protect the remaining pulp tissue from the oral environment
- The fracture site and tooth are then restored to full function and aesthetics, using one of the permanent restorative filling materials
- Depending on the degree of success of the technique, it may eventually be necessary to carry out a full root filling procedure on the tooth, but in the meantime the pulpotomy allows the root apex to close to a more normal size so that conventional root filling in future is more likely to be successful



## BACKGROUND INFORMATION OF PROCEDURE – PULPECTOMY

When a permanent tooth undergoes an event causing pulpal inflammation in an adult patient, the end result is usually the death of the tooth. The closed root apex of an adult tooth prevents an adequate blood flow from helping to fight the inflammation and remove the excess fluids that build up during the inflammatory process. The ensuing swelling compresses the pulpal tissues within the root canal and tooth death occurs. An infection develops at the root apex that is referred to as a periapical abscess. If the infection develops quickly, it tends to be associated with swelling and pain and is an acute abscess, whereas a slowly developing chronic infection is often painless with no swelling, but often exhibits a discharging sinus tract which is referred to as a 'gum boil' by patients (Figure 7.2).

**Figure 7.2** 'Gum boil' appearance of a chronic infection

The patient therefore experiences varying degrees of pain and swelling throughout the tooth death process, and only a succesful pulpectomy procedure helps to avoid the extraction of the affected tooth.

The aim of pulpectomy, or root canal treatment, is to remove all of the pulpal tissue from the tooth and replace it with a sterile root filling material. This material must fully seal the root canal and prevent any contamination from causing further infection at the root apex.

## DETAILS OF PROCEDURE – PULPECTOMY

Although a dead tooth should be unable to feel pain, many patients are more psychologically comfortable and relaxed during the procedure if a local anaesthetic is administered. The success of the pulpectomy technique depends very much on maintaining a sterile field to prevent contamination of the root canal system with saliva and oral microorganisms, and good moisture control is of paramount importance.

Often the full root canal treatment is carried out in one appointment, but if heavy infection is present or other difficulties occur, then it may be completed in more visits.

As well as a full conservation tray of instruments, the additional equipment and materials that may be required to carry out a pulpectomy procedure are shown in Figure 7.3.



**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment
- Local anaesthetic is administered as required and allowed to take full effect
- The tooth is isolated from the oral cavity, ideally by a rubber dam (see Figure 5.3)
- Access is gained to the pulp chamber and root canal system using a bur in the high speed hand piece
- All pulpal tissue is removed (extirpated) from the tooth using specialised endodontic barbed broach instruments
- The root canal system is enlarged laterally and to the root apex, using endodontic reamers or files, either by hand, with a slow speed hand piece and special files (or reamers), or more usually with specially designed endodontic hand pieces and their own specific files
- The walls of the root canal are also smoothed by the action of the endodontic files, to remove any infected tissue and surface irregularities that could harbour microorganisms in the future
- The root canal is irrigated throughout the preparation procedure to remove loose debris, lubricate the area, and avoid instrument fracture due to their snatching into the otherwise dry tooth structure and becoming stuck
- Once the root canal system is satisfactorily cleaned to the root apex and widened sufficiently to allow root filling, the decision is made whether to continue in a one-stage technique or to dress the root canal for a time with disinfecting medicaments
- Full length access to the root canal can be confirmed using an apex locator or by taking a periapical radiograph with a file inserted to a known length
- To root fill the canal, it is dried with paper points and then a gutta percha point smeared with a sealant material is inserted to the previously determined full working length of the root canal

(*continued*)

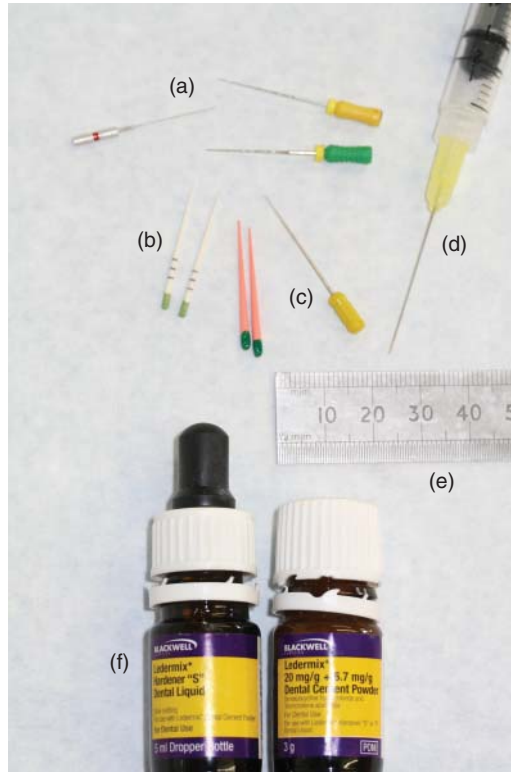


**Figure 7.3** Equipment and materials for pulpectomy procedure. (a) Barbed broach and hand files. (b) Paper points. (c) Gutta percha points and finger spreader. (d) Irrigation syringe and needle. (e) Measuring ruler. (f) Sealing material example

**TECHNIQUE: (*Continued*)**

- Similar points are inserted laterally to fully obliterate both the full length and width of the root canal (obturation)
- This ensures that no spaces remain for microorganisms to linger and recontaminate the root canal in future
- The tooth is restored to full function and aesthetics, using one of the permanent restorative filling materials

## AFTERCARE OF ROOT-TREATED TEETH

Although teeth that have undergone pulpectomy are now non-vital (dead), they can still be subject to carious attack if a consistently good standard of oral hygiene is not maintained, or if they are exposed to a diet high in sugars or acids. The patient feels no symptoms of

thermal sensitivity or pain in these teeth, and only regular dental examinations will detect the presence of any caries.

If left undiagnosed, the root-treated tooth can become so undermined by caries that it fractures, usually catastrophically at the gingival margin of the tooth. It then requires extensive rebuilding, often involving the insertion of metal or carbon fibre posts into the root canal to anchor and support the rebuilt tooth.

Additionally, root-filled teeth can become brittle over time once their vitality is lost, and may then fracture more easily if their structure is not protected soon after the procedure has been completed. Many root filled teeth are therefore crowned as part of their restoration to full function (see Chapter 6). Similarly, when the endodontic procedure involves the removal of a considerable amount of tooth tissue to gain access to the root canal, a crown is likely to be placed to protect the remaining tooth and help restore it to full function.

However, if the tooth fractures catastrophically and is unrestorable, it requires extraction.

## BACKGROUND INFORMATION OF PROCEDURE – APICECTOMY

Sometimes, a successfully root-filled tooth can develop an infection around the root apex many years after the initial procedure is carried out, and the associated infected tissues require removal if the tooth is to be saved from extraction. The tooth will often have already been restored using a crown (with or without a post cemented into the root canal) and access to the area of infection is best achieved by a direct surgical technique called an apicectomy.

The apicectomy procedure is therefore a second line treatment in conjunction with conventional root canal therapy, or after the failure of that conventional root canal therapy.

## DETAILS OF PROCEDURE – APICECTOMY

The procedure is classed as a minor oral surgery technique and therefore performed under surgical conditions. Although the tooth involved is usually non-vital, local anaesthetic is still required as the oral soft tissues have to be cut open to provide access to the affected tooth root. Once the area of infection and the root apex have been removed from the surgical site, the cut end of the root stump has to be resealed to prevent further bacterial access and re-infection and this is often achieved by placing a conventional filling there.

Throughout the procedure the dental nurse provides adequate moisture control and careful soft tissue retraction, so that good visibility is provided and the patient's oral tissues are protected from possible trauma.

The instruments required for placing a conventional filling are shown in Figure 5.1b, and the available materials are discussed in Chapter 5.

The surgical instruments required to carry out a minor oral surgery procedure such as an apicectomy are shown in Figure 7.4.

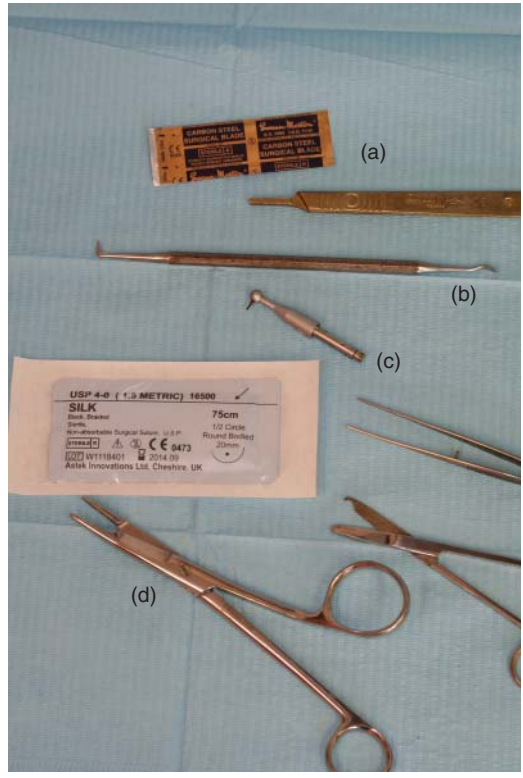


**Figure 7.4** Examples of surgical instruments to carry out an apicectomy procedure. (a) Scalpel blade and handle. (b) Instruments to raise the tissue flap off the bone and remove infected soft tissue. (c) Micro-head with bur to prepare root cavity. (d) Suturing equipment

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment
- Local anaesthetic is administered and allowed to take full effect
- The surgical site is disinfected using cotton wool rolls soaked in an appropriate solution, such as chlorhexidene
- A soft tissue flap is cut over the affected tooth and adjacent teeth to either side of it using the scalpel instrument, and is peeled off the underlying bone to expose the root apex area
- The flap is carefully retracted from the surgical site to allow good visibility and prevent trauma while the rotary instruments are in use
- A small window is cut into the bone so that the affected root apex and its associated infection are visible
- The infected soft tissue is removed and the root apex is cut off from the remaining root structure and removed from the surgical site
- The open end of the root canal that is then visible is prepared and filled using the micro-head and bur, and a conventional filling material

- Alternatively, specialised endodontic materials can be used to seal the root canal
- The bony cavity that remains is irrigated with sterile saline solution to remove any remaining debris
- The soft tissue flap is repositioned over the bone and carefully sutured back into place
- The sutures require removal in 7 to 10 days after the surgery

## PATIENT AFTERCARE FOLLOWING MINOR ORAL SURGERY

Bruising, swelling and post-operative pain may all occur after any minor oral surgery procedure has been carried out, as the oral cavity has an extensive nerve and blood supply. Patients are told to expect any combination of these events over the first few post-operative days, and are given appropriate advice on the use of pain killers (analgesics) during this period.

A soft diet is usually recommended initially, and a good standard of oral hygiene must be maintained throughout the healing period, but without disturbing the sutures.

Hot salt water mouthwashes on a regular basis also assists greatly in the healing process, and these can be started the day after surgery and continued until the oral tissues have fully healed.

The patient should be advised to return to the surgery if any of the following events occur:

- Worsening pain, several days after the procedure
- Bleeding from the wound site
- Any discharge from the wound site
- Loss of the sutures so that the wound re-opens
- Extensive swelling, especially within the mouth rather than on the face

# Chapter 8

# Tooth extraction

## REASON FOR PROCEDURE

Despite the best efforts of the dentist, there are times when a tooth is beyond restoration and it has to be extracted.Often in these circumstances, the patient could suffer from dental infection and pain if the tooth is allowed to remain. The cause of the infection or pain may be gross caries, severe trauma, periodontal disease, or failure of an endodontic technique.

There are also several reasons why a tooth may be electively extracted (that is, by choice rather than necessity) and these include the following:

- Prosthetic reasons, where the tooth is malaligned and preventing the placement of a denture or bridge
- Severe malalignment that cannot be corrected orthodontically
- To create space in a crowded dental arch so that other teeth can be aligned orthodontically
- Partially erupted and impacted teeth that cannot be adequately cleaned by the patient and suffer from repeated localised infection
- Retained deciduous teeth that prevent their adult successor from erupting correctly
- Patient choice, where the alternative is complicated and possibly expensive dental treatment

In most cases a tooth can be simply extracted by loosening it in the bony socket and removing it whole, but in more difficult cases a surgical procedure may be required, where either the bony socket or the tooth itself has to be cut away or into pieces, so that the tooth can be removed from the oral cavity.

The procedures discussed are:

- Simple extraction
- Surgical extraction

## BACKGROUND INFORMATION OF PROCEDURE – SIMPLE EXTRACTIONS

A tooth is extracted by loosening it in its socket and then pushing it out of the socket, using a variety of dental extraction forceps, elevators, or luxators. To loosen the tooth

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there has to be access to the top of the root or roots for the dentist to hold onto with the extraction forceps – the tooth is never held by its crown as this would simply fracture during the procedure.

Alternatively, luxators can be used to sever the periodontal ligament attachment to the tooth and also widen the bony socket so that the tooth is loosened. It is then pushed out of the socket as the instrument is pushed apically.

Physical strength is less of an issue in successful tooth extraction than the skill of the dentist in loosening the tooth.

## DETAILS OF PROCEDURE – SIMPLE EXTRACTIONS

No matter how loose a tooth, local anaesthetic should always be administered before an extraction procedure. This must be sufficient to numb not just the tooth but all of the surrounding gingiva if the procedure is to be painless for the patient.

The dental nurse provides good moisture control in the oral cavity using high speed suction, as well as providing head support to stabilise the patient and assist the dentist during the procedure.

Extraction forceps are designed to be used on certain teeth only, rather than universally, and there are therefore many patterns of design available, depending on the tooth to be extracted. Those required to extract a tooth are shown in Figure 8.1.

Examples of a luxator and various elevators are shown in Figure 8.2.

**TECHNIQUE:**

- A current radiograph of the tooth is displayed so that the dentist is aware of any root curvatures
- The dentist, nurse and patient wear personal protective equipment
- Local anaesthetic is administered and allowed to take full effect
- The dental chair is angled so that the dentist can apply suitable pressure to the tooth without straining, as tooth extraction requires some physical exertion
- The dental nurse supports the patient's head firmly but comfortably to prevent rocking movements, as these waste the physical effort of the dentist during the extraction
- The dentist uses extraction forceps, luxators and/or elevators to gradually loosen the periodontal attachment of the tooth root to the bony socket walls
- High speed suction is used by the dental nurse to remove any blood and keep the operative field visually clear for the dentist
- The tooth is firmly held by the forceps and removed from the oral cavity as the extraction is completed
- A bite pack is placed over the socket and the patient is instructed to bite down hard onto it to achieve haemostasis
- The tooth is inspected to ensure that it has been extracted whole, and that no fractured root fragments remain in the socket
- The socket is inspected once bleeding has stopped, to ensure no bony fractures to the socket wall have occurred – any loose sequestrae are removed
- Full verbal and written post-operative instructions (Figure 8.3) are given to the patient, to ensure the socket heals uneventfully

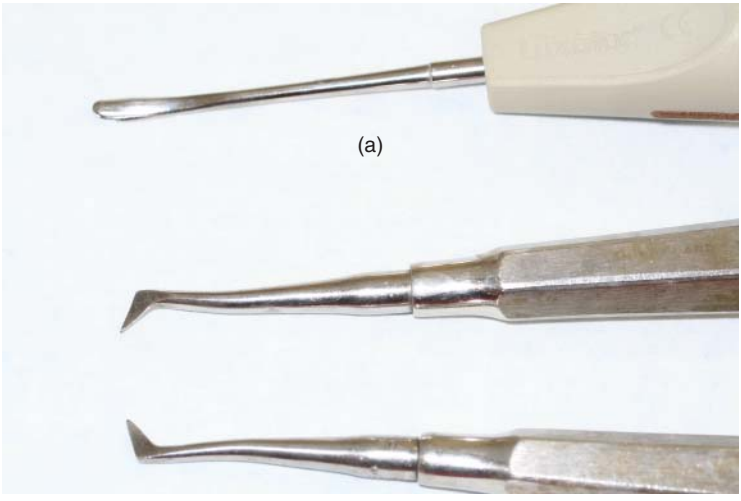
(a)

(b)

**Figure 8.1** Examples of extraction forceps. (a) Upper anterior and premolar teeth/roots. (b) Upper molar teeth/roots. (c) Lower teeth and roots

(c)

**Figure 8.1** *(continued)*



(a)

(b)

**Figure 8.2** Examples of other extraction instruments. (a) Luxator. (b) Elevators


**Figure 8.3** Example of written post-operative instruction leaflet



## PATIENT AFTERCARE FOLLOWING A SIMPLE EXTRACTION

It is particularly important after an extraction for the patient to follow the post-operative advice that is given by the oral health team – that is why they are given both verbally at the surgery (so the patient can ask any questions) and also in a written format (so that they can be read again at home, and referred to by the patient as required).

Failure to follow the post-operative instructions is likely to result in a problem developing for the patient, usually a painful one. The instructions given are detailed below, with an explanation of their relevance and importance.

- Bite on the bite pack for a minimum of 15 min – this applies pressure to the torn blood vessels in the extraction site and assists in their constriction and in the control of haemorrhage from the wound
- Do nothing to encourage the wound to start bleeding again – therefore the patient should refrain from exercise, alcohol, hot drinks, mouth rinsing and touching the wound for the next 24 h
- Hot salt water mouth washes – these start the day after the extraction and should be carried out at least 3 times daily for 3 days, to help clean the wound and encourage healing

- Refrain from smoking – there is an increased risk of developing a post-operative infection in the wound if the patient smokes while it is still raw
- Eating – the patient can eat once the local anaesthetic has worn off, but avoid the extraction site and take warm, bland foods only, so that the tissues are not irritated during healing
- Analgesics – the patient can take pain killers if necessary, but must not exceed the correct dose and must avoid aspirin-based products as these act as anticoagulants and allow bleeding to recur
- Problems – if there is severe pain, swelling or recurrent bleeding, contact the surgery for emergency advice, and treatment where necessary

## BACKGROUND INFORMATION OF PROCEDURE – SURGICAL EXTRACTIONS

When a tooth has decayed such that caries extends into the roots, it is likely to fracture during a simple extraction attempt. Similarly, a heavily filled tooth is weak to the forces applied during extraction and may also fracture and disintegrate during the procedure.

Some teeth, especially multi-rooted posterior ones, have curved roots that make simple extraction difficult, as attempts to elevate it from the socket in one direction often locks the curved root in place.

Partially erupted teeth (and obviously unerupted ones) are, by definition, not fully through the gingivae, so access to their roots for extraction purposes is impossible.

In all these cases, the dentist resorts to some form of surgical technique to extract the tooth involved, ideally without leaving any pieces in situ.

## DETAILS OF PROCEDURE – SURGICAL EXTRACTIONS

When a simple extraction cannot be performed because of curved roots, the dentist can often simply section the tooth into two or three separate roots (hemisection or trisection, respectively) and elevate each one as a single root, without the need for peeling the gingiva from the underlying bone as a full surgical procedure.

In all other cases of surgical extraction, some degree of gingival and possibly bone removal is necessary, so again local anaesthetic is required. Specialised surgical instruments are employed, and the dental nurse uses high speed suction and fine surgical tips to maintain moisture control and provide a clear operative field for the dentist.

Examples of the surgical instruments required during a surgical extraction are shown in Figure 7.4, although the micro-head and bur are not required for an extraction procedure.

**TECHNIQUE:**

- A current radiograph of the tooth is placed on display for the dentist's reference
- The dentist, nurse and patient wear personal protective equipment

(*continued*)

**TECHNIQUE: (*Continued*)**

- Local anaesthetic is administered and allowed to take full effect
- The dental chair is angled so that the dentist and nurse have clear visibility of the tooth without straining, as surgical extractions can take considerable time
- The dentist cuts the surrounding gingiva with a scalpel blade and peels it back from the underlying bone using surgical instruments
- The dental nurse retracts the soft tissues and uses high speed suction to maintain a clear operative field
- The tooth roots are assessed and bone may be removed to improve access to them, usually using a surgical bur and handpiece with copious irrigation
- Once sufficient bone has been removed, the dentist uses a variety of elevators, luxators and forceps to remove the roots
- Ideally all the tooth and root pieces are removed, but just occasionally, small but very deeply placed root fragments may remain inaccesible without some considerable bone removal
- A decision may be made to leave these *in situ* and keep them under observation radiographically, rather than proceed with excessive bone removal that could weaken the jaw itself
- The patient is informed of this decision at the time
- Once the tooth and root removal is completed, the socket is checked for any loose bony sequestrae, which are removed
- The gingival tissue flap is sutured back into place to cover the underlying bone and allow healing to occur
- The patient is instructed to clamp onto a bite pack placed over the socket until haemostasis has been achieved
- Full verbal and written post-operative instructions are given to the patient



## PATIENT AFTERCARE FOLLOWING A SURGICAL EXTRACTION

All the instructions relevant to a simple extraction procedure are given for surgical cases too, and the following information is additionally provided to patients undergoing surgical extractions:

- Post-operative pain and swelling – these are likely to occur, as with any surgical procedure, and should be managed with routine pain killers and anti-inflammatories as necessary
- Sutures – the majority of surgical extractions involve the use of sutures to assist the soft tissues to fully heal, and they must not be interfered with by the patient, but require removal by the oral health team after 7 to 10 days (although some types are available which 'dissolve' over time and therefore do not require removal)
- Post-operative infection – the deeper oral tissues are vulnerable to post-operative infection until the surgical site has healed fully, and the need for the patient to follow the instructions correctly cannot be over-emphasised

Chapter 9

# Tooth replacement with dentures

## REASON FOR PROCEDURE

Tooth replacement is necessary for several reasons, the main ones being to provide adequate masticatory function and to improve aesthetics. The absence of one or several teeth may also allow overloading of those remaining, so that excessive tooth wear or even tooth fractures occur. When a tooth is missing, those on either side of it can collapse into the space remaining so that the occlusion is altered, or those in the opposite dental arch can over-erupt into the space and cause unnatural wear of the remaining teeth.

Dentures are removable appliances made in several stages in a laboratory, designed to replace just one or several teeth, or a full dental arch in an edentulous patient. Unlike bridges, no tooth preparation is usually required for their construction as long as denture retention is available, and they can be removed from the patient's oral cavity for cleaning as necessary.

They are retained in the mouth by a film of saliva between the oral soft tissues and the denture surface providing suction, as well as by the muscular support of the cheeks, lips and tongue. When the patient has some natural teeth present, additional retention can also be provided by using metal clasps incorporated in the denture design to grip these standing teeth.

The base of the denture can be constructed using a pink or transparent acrylic material, or a very thin skeleton design of chrome-cobalt metal. The latter tends to be more comfortable to wear and more hygienic as less soft tissue is covered, but usually requires the additional retention provided by clasps on suitably positioned standing teeth.

The dentures discussed are:

- Full or partial acrylic dentures
- Full or partial chrome dentures
- Immediate replacement dentures

## BACKGROUND INFORMATION OF PROCEDURE – ACRYLIC DENTURES

Acrylic dentures (Figure 9.1) are the more common type of dentures provided, as they are cheaper and more easily constructed than chrome dentures. They are also more easily

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(a)

(b)



**Figure 9.1** Examples of acrylic dentures. (a) Full upper denture. (b) Partial upper denture with clasp, on model

adjusted to fit as necessary, as well as being more amenable to relining and tooth addition as the patient's oral cavity alters with time. However, they can fracture during normal usage in patients with heavy bites, as well as if they are inadvertently dropped while out of the mouth.

None the less, acrylic dentures fulfil their necessary functions of restoring the patient's occlusion so that adequate mastication is possible, as well as improving their appearance, especially when anterior teeth are missing.

Whether one tooth, several teeth or all of the dental arch is to be replaced, the construction procedure for an acrylic denture is basically the same.

## DETAILS OF PROCEDURE – ACRYLIC DENTURES

The denture construction normally takes up to five appointments, as each stage has to be sent to a laboratory for the next stage to be constructed. Where a partial denture is being made, the tooth shade is chosen to match that of the remaining standing teeth, but when full dentures are being provided, any shade can be chosen although the dentist tends to advise a natural creamy shade rather than a more unnatural stark white one.

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment at each appointment
- The dental chair is kept upright for patient comfort, as well as being the ideal position for the dentist to access the oral cavity for this procedure
- Initial impressions are taken in alginate material and sent to the laboratory for study model casting and the provision of personalised impression trays to be constructed, as well as wax bite recording rims (Figure 9.2)
- The equipment and materials required for the impression-taking stage are shown in Figure 4.11
- At the next appointment, accurate impressions are taken in one of the elastomeric impression materials available, using the specially constructed impression trays, and the final decision on tooth shade and shape is made by the dentist and the patient
- Occlusal bite recording is carried out using the wax bite rims, so that a partially dentate patient has the same bite with the denture as without, and an edentulous patient can have the bite set at a comfortable position to allow speech and mastication, without the jaws being closed up or opened too much
- The equipment and materials required for the bite recording stage are shown in Figure 9.3
- Wax bite rims are warmed and stuck together during the bite recording process, and once placed onto the study models, the technician can reproduce the patient's bite accurately
- In complicated cases, the study models may be mounted onto an articulator at the laboratory
- At the next appointment, a waxed-up try-in of the denture is provided, with the teeth set at the previously recorded occlusion and in the shade and shape chosen (Figure 9.4)
- The fit of the denture is assessed for accuracy, although it feels slack to the patient as the wax base warms in the mouth
- The occlusion and aesthetics of the denture are assessed, and any minor adjustments carried out at the chairside by simply selectively warming the wax bases and adjusting the teeth as necessary
- If any major adjustments are required, the try-in is returned to the laboratory with details of the adjustments required, and a re-try appointment is arranged
- Once the dentist and patient are happy with the try-in, it is returned to the laboratory where a flasking process is carried out to replace the wax base with the permanent acrylic material, as the final construction stage of the denture

(*continued*)

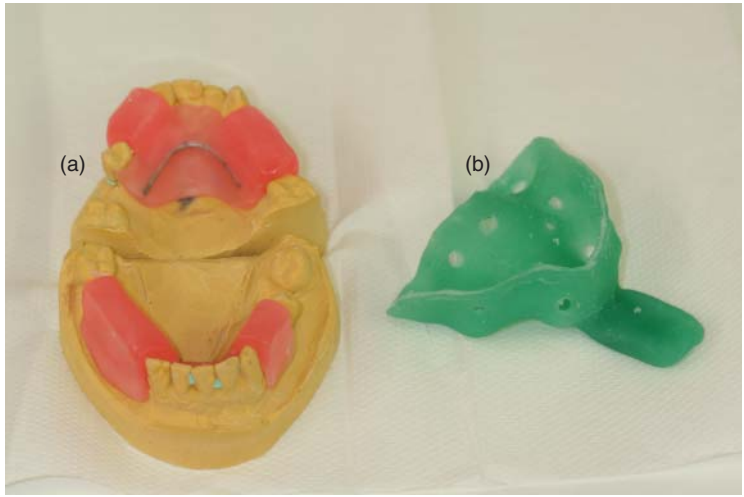


**Figure 9.2** Second stage of denture construction. (a) Wax bite rims on models. (b) Special trays



**TECHNIQUE: (*Continued*)**

- If metal clasps are being used for additional retention with a partial denture, they are usually added at this final stage, although some laboratories add them at the try-in stage
- At the final appointment, the completed denture is checked for any sharp edges or specks on the fitting surface before being tried in the patient's mouth, as these would cause soft tissue trauma with time, if left
- The equipment and materials required for the fitting of the denture are shown in Figure 9.5
- The denture is then tried in the patient's mouth and assessed for accuracy of fit, function and aesthetics
- Minor occlusal adjustments can be carried out using an acrylic trimming bur and the slow speed handpiece, so that the patient has an even occlusion around the full dental arch
- Post-operative verbal and written care and cleaning instructions are given to the patient

## BACKGROUND INFORMATION OF PROCEDURE – CHROME DENTURES

Chrome dentures (Figure 9.6) provide a strong alternative to acrylic in those patients with such a heavy bite that they continually fracture their denture base. As chrome can also be constructed as a relatively thin base compared to acrylic, it is also the material of choice in patients who gag easily while wearing dentures.

As the chrome is so strong, the denture can be designed to have minimal soft tissue coverage and be specifically designed not to cover the gingival margins of the teeth, where

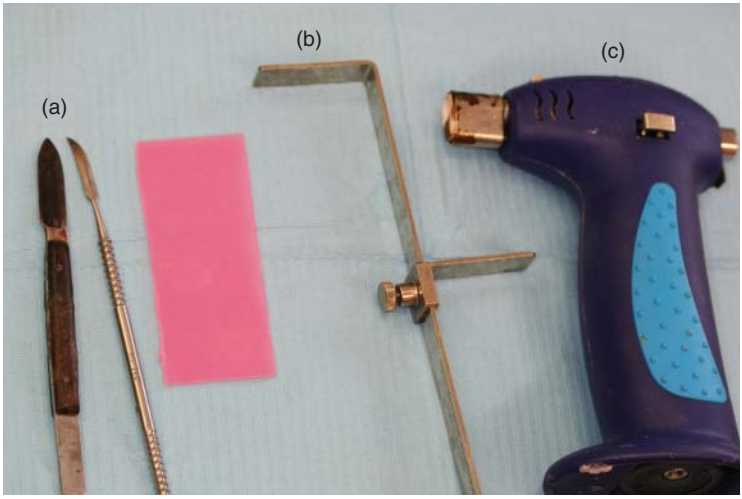


**Figure 9.3** Equipment and materials for the bite recording stage. (a) Wax knife, carver and pink wax. (b) Bite gauge. (c) Heat source



**Figure 9.4** Try-in stage of lower full denture

plaque accumulates very easily. Consequently, chrome dentures are far more hygienic for the patient, and more tissue-friendly to the gingivae.

The construction of a chrome partial denture is similar to that of an acrylic one, but is less amenable to any inaccuracies of design and fit, as once the chrome-cobalt base has been cast, it cannot be added to or adjusted.

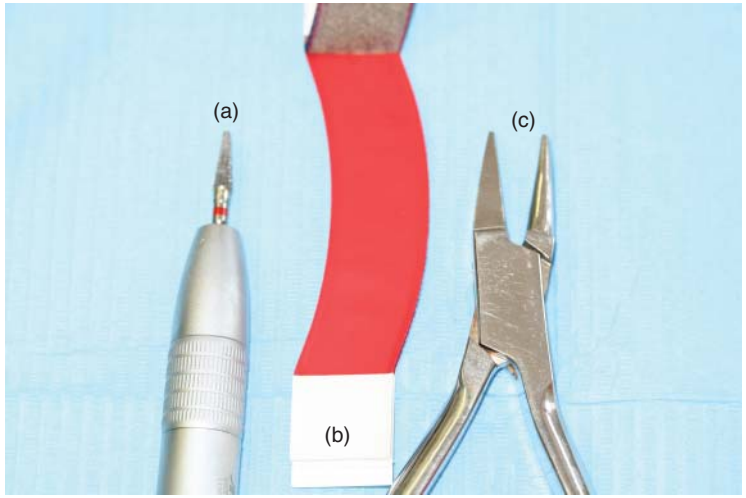


**Figure 9.5** Equipment and materials for the fitting stage. (a) Straight hand piece and acrylic bur. (b) Articulating paper. (c) Pliers to adjust clasps



**Figure 9.6** Example of chrome-cobalt partial denture on model

## DETAILS OF PROCEDURE – CHROME DENTURES

The denture construction normally takes up to five appointments, with each stage being sent to a laboratory, as with acrylic dentures. Second impressions must be taken using the special trays made from the study models, as these must be accurate for the chrome base to be constructed well and to fit correctly.

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment for each appointment
- The dental chair is kept upright for patient comfort and ease of access for the dentist
- Initial impressions are taken in alginate material and sent to the laboratory for casting of study models, construction of special impression trays and wax bite recording rims
- In partially dentate patients, the denture design is developed to make use of all naturally retentive features by placing clasps on suitable, undercut teeth
- At the next appointment, accurate impressions are taken in the special trays, using one of the many elastomeric impression materials available, such as silicone or polyether
- Occlusal bite recording is carried out using the wax rims, either to maintain the same occlusion or to adjust it accordingly for an edentulous patient
- Again, these can be mounted on an articulator in the laboratory by the technician, if necessary
- The final decision on shade and tooth shape is made by the dentist and the patient
- At the next appointment, the chrome-cobalt base design, including all clasps, is available to try in the patient's mouth for accuracy of fit and design
- Any discrepancies in the metal base requires a re-casting to be carried out by the laboratory
- The teeth may also have been added at this stage for a wax try-in, or may be added as an additional stage once the metal work has been approved
- The occlusion and aesthetics of the denture are assessed once the tooth try-in is received, and any minor adjustments made at the chairside (Figure 9.7)
- Once the dentist and patient are happy with both the metal and tooth try-in, it is returned to the laboratory for the flasking process to join the metal base to the acrylic gingivae and teeth
- At the final appointment, the completed denture is checked once again for accuracy of fit, function and aesthetics
- Minor occlusal adjustments can be carried out using an acrylic trimming bur and the slow speed handpiece, but the metal base should need no adjustments
- Post-operative verbal and written care and cleaning instructions are given to the patient

**Figure 9.7** Chrome and tooth try-in on model

## BACKGROUND INFORMATION OF PROCEDURE – IMMEDIATE REPLACEMENT DENTURES

As their name suggests, immediate replacement dentures are those that are fitted at the time that one or several teeth are extracted. They are usually provided when a patient is to lose one or several anterior teeth and requires the extracted teeth to be replaced at the same time for aesthetics, rather than have visible, unsightly spaces for a while.

Although the aesthetic concerns of the patient are very understandable in these circumstances, it has to be accepted that the resulting denture will not be as accurate a fit as if it had been constructed conventionally – after the tooth extraction and following a suitable period of tissue healing.

Due to the usual event of bone resorption occurring after the extraction, the denture also becomes slack relatively quickly and requires relining or even remaking at some point.

As these alterations are expected to be required, the immediate replacement denture is always made from acrylic, which can be quite easily added to and adjusted.

When significant bone resorption has occured, usually after 4 to 6 months, a new denture can be constructed in chrome-cobalt if required.



## DETAILS OF PROCEDURE – IMMEDIATE REPLACEMENT DENTURES

The appliance construction follows similar stages to that of a conventional acrylic denture, except that there may be no possibility nor requirement for a try-in if no other teeth are missing except those to be immediately replaced by the denture.

It is imperative that the completed denture is ready for fitting on the day that the patient is due to have the extractions carried out, and this must be checked (as well as that the correct teeth have been incorporated into the denture construction) before the patient's teeth are extracted.

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment for each appointment
- The dental chair is kept upright for patient comfort and ease of access for the dentist
- Initial impressions are taken in alginate material, and sent to the laboratory for study model casting and possibly for special tray construction
- A special tray may not be necessary if only one tooth is to be immediately replaced, as the completed denture is expected to be less accurate than a conventional one anyway
- Similarly, wax bite rims may also not be necessary if the study models can easily be placed into the correct occlusion without them
- In these simple, one-tooth cases, it is usual to take a shade at the initial impression stage and proceed directly to the final acrylic construction of the denture
- Otherwise, the second accurate impression and occlusal bite recording are carried out at the next appointment, as usual
- The final decision on tooth shade is made by the dentist and the patient, and the technician copies the tooth shapes from the study models

- At the next appointment, a waxed try-in of any teeth already missing is provided, but of course the teeth to be immediately replaced cannot be present at this stage
- The try-in is checked for accuracy of fit, occlusion and aesthetics as far as possible, and any minor adjustments are carried out at the chairside
- Once the try-in and study models are returned to the laboratory for completion of the denture, the technician carefully removes the teeth to be extracted from the model and replaces them with suitable denture teeth, ensuring that the occlusion is not altered during the process
- The flasking process is carried out to replace the wax base with the permanent acrylic of the denture
- At the final appointment, the teeth to be replaced are extracted under local anaesthesia, and once haemostasis has been achieved, the denture is inserted into the patient's mouth
- The aesthetics are checked, and the fit and occlusion are checked as far as possible, bearing in mind the patient is still numb from the local anaesthetic
- Post-operative verbal and written care and cleaning instructions are given to the patient, and a review appointment is provisionally made so that any problems that become apparent once the local anaesthetic has worn off can be corrected

## AFTERCARE OF DENTURES

Any type of denture is designed to be a removable appliance, one that the patient can take out of the mouth for cleaning purposes as well as to leave out overnight. Acrylic partial dentures are designed to fit around any standing teeth, and these areas allow plaque to accumulate and cause either localised caries of standing teeth or periodontal disease if the plaque is not removed promptly.

As chrome dentures are usually designed to cover less oral soft tissue, they tend to allow less plaque accumulations to develop. Plaque is still produced in patients with no natural teeth of their own and once mineralised into tartar, deposits can often be seen as a yellow crusty layer in the centre of lower full dentures or at the sides of upper full dentures. Tartar forms in these areas as they are close to the openings of various salivary glands in the mouth, and saliva provides the minerals for plaque to harden into tartar.

Dentures should be cleaned at least twice daily, using either a specific denture paste or ordinary toothpaste with a toothbrush. They are best cleaned over a bowl of water to avoid breakages if dropped, and should be rinsed well before reinserting.

The important surface of the denture to be cleaned is that which covers the oral soft tissues – the roof of the mouth with upper dentures or the bony ridge of the lower jaw with lower dentures. These areas are in contact with the soft tissues whenever the dentures are worn, and any food debris or plaque that is left in these areas allows microorganisms to flourish, in particular a fungus which causes oral thrush and denture stomatitis ('denture sore mouth').

Tiny perforations and scratches in the acrylic elements of dentures that occur over time also allow staining to develop, especially with products such as tea, coffee and red wine.

Various denture soaking agents are available for use overnight to assist with cleaning and stain removal (Figure 9.8), but care should be taken with bleach-based ones which are not suitable for chrome dentures, as they cause metal corrosion with time.


**Figure 9.8** Examples of denture cleaning products

# Chapter 10

# Tooth replacement with implants

## REASON FOR PROCEDURE

Missing teeth can be replaced using bridges, dentures or implants. Each technique has its own advantages and disadvantages, but they are all required for the same reasons – to provide adequate masticatory function and to improve aesthetics.

Implants are the most advanced technique of tooth replacement, although their use has been developing over at least the last 30 years. They involve the surgical placement of a threaded titanium cylinder (implant) into the jaw bone, which then has an abutment screwed into its top end to project into the oral cavity. This abutment then forms the attachment for either a crown replacing a single tooth, a bridge retainer replacing several teeth, or an overdenture replacing many if not all the teeth in a dental arch.

The advantages that implants have over other methods of tooth replacement are that they can be used in patients without having to cut into adjacent teeth to construct bridgework, and in patients with very poor retention for conventional dentures.

However, these more complicated cases can involve all of the following:

- Oral and/or periodontal surgeon
- Specialist in prosthetics
- Advanced computerised radiographic techniques
- Specialist implant laboratory

The procedure described is for the more simple replacement of a single tooth only.

## BACKGROUND INFORMATION OF PROCEDURE – SINGLE TOOTH IMPLANT

Even when a single tooth is to be replaced, a detailed dental and radiographic assessment of the patient must be carried out by the dentist beforehand. This determines the feasibility

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of placing the implant and its likelihood of success, as well as the suitability of the patient for the procedure and likelihood of complying with the long term care of the restoration.

The initial placement of the implant cylinder is a full surgical technique, and is usually left *in situ* for up to 6 months while the jaw bone grows around it to anchor it firmly. Only then is the abutment attached and the single tooth crown constructed and placed.

During the interim period, the patient is provided with either a temporary denture or a temporary etch retained bridge, to replace the missing tooth and sit comfortably over the implant head.

However, more recently, a technique is being developed whereby the implant cylinder is placed at the time of tooth extraction, and then a single temporary crown is fitted over the top. This can only be done when the replaced tooth is kept free from occlusal loading, so that the bony attachment between implant and jaw bone can occur.

## DETAILS OF PROCEDURE – SINGLE TOOTH IMPLANT

Only those dentists who have been suitably trained to provide implants undertake the procedure, as the technique is a specialised field that is not covered by undergraduate training.

In a normal situation, the patient has an anterior tooth already missing and replaced either by a denture or an acid etch retained bridge. The latter is removed intact before the implant placement, and then adjusted as necessary and reattached while the healing process occurs. All necessary radiographs and study models are taken and assessed beforehand.

Specialist surgical instruments and equipment are required, and the dental nurse provides good moisture control throughout the procedure.

An example of an implant kit containing various items such as bone drills, locators, and various sizes of implant cylinder is shown in Figure 10.1.

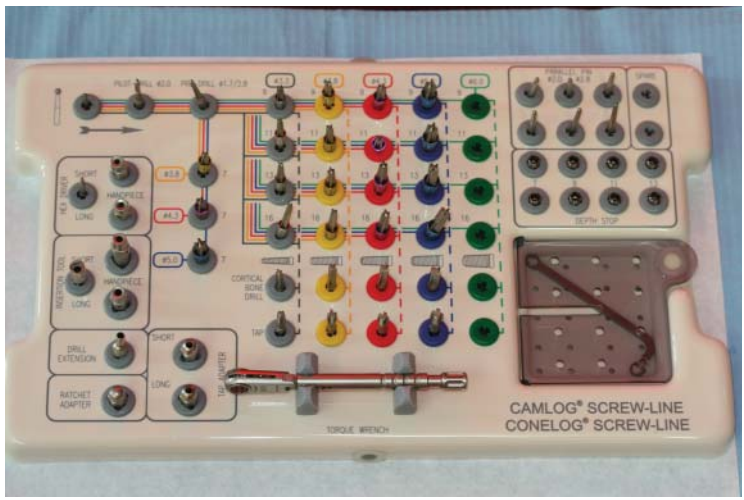


**Figure 10.1** Example of implant kit

**TECHNIQUE:**

- Current radiographs of the implant site are available for reference by the dentist, and the implant dimensions and required angulation of insertion previously determined
- The dentist, nurse and patient wear personal protective equipment at each appointment
- As the implant placement technique is a full surgical procedure, the dentist and nurse wear sterile gowns over their uniforms, as well as sterile hair covers and sterile (surgical grade) gloves (Figure 10.2)
- The patient drapes are also single-use and sterile, rather than the usual clinical (non-sterile) type
- The dental chair is placed at an angle to allow easy and comfortable access for the dentist and nurse, as well as full visibility of the operative site
- Local anaesthetic is administered to all the surrounding oral soft tissues and allowed to take full effect
- The dentist cuts the surrounding gingiva with a scalpel blade and peels it back from the underlying bone, using surgical instruments (see Figure 7.4a, b, and d)
- The dental nurse carefully retracts the soft tissues and uses high speed suction to maintain a clear operative field, and provide copious irrigation during bone surgery

(*continued*)

**Figure 10.2** Personal protective equipment suitable for an implant procedure

**TECHNIQUE: (*Continued*)**

- The irrigation solution for the procedure is provided as a bag of sterile fluid which is connected to the specialised hand piece equipment (Figure 10.3)
- The jaw bone ridge is flattened at the point where the implant is to be inserted
- A hole is drilled into the jaw bone at the correct angulation and to the correct depth, using specialised implant drills (mill)
- The prepared depth is checked using a calibrated depth gauge
- The chosen implant is driven into the jaw bone using specialised insert instruments and a surgical hammer, and a radiograph shows its correct positioning (Figure 10.4)
- The gingival tissue flaps are repositioned to close the surgical site, with just the implant head projecting through (Figure 10.5)
- If the missing tooth requires replacement during the healing process, the implant head is covered with a plastic cap, and either a temporary denture or a temporary etch retained bridge is placed
- Full verbal and written post-operative instructions are given to the patient
- Following 3 months of healing and the natural attachment of the implant to the surrounding jaw bone, the plastic cap is removed and a suitable abutment is screwed into the implant cylinder




**Figure 10.3** Example of implant placement hand piece and irrigation system


**Figure 10.4** Radiograph showing position of implant cylinder

**Figure 10.5** Implant head in place

**TECHNIQUE: (*Continued*)**

- Its shape is that of a conventionally prepared crown core, and its size is dictated by the adjacent tooth positions and the patient's occlusion
- An accurate impression is taken of the abutment and the adjacent teeth, using a silicone or polyether elastomeric material, and an opposing arch impression and occlusion are recorded in the usual way as for a conventional crown or bridge preparation
- The technician constructs the crown in the laboratory, using the same procedure as for a conventional crown
- At the final appointment, the crown is cemented onto the abutment after checking for fit, function and aesthetics and appears no different from a conventional crown cemented to a tooth (see Figure 6.5)
- Full verbal and written post-operative instructions are given to the patient

## AFTERCARE OF IMPLANTS

Although the implant cannot be affected by caries, it can develop plaque accumulations around it and allow a periodontal infection to occur. Ultimately this can result in the formation of periodontal pockets around the implant, destruction of the bone-implant attachment, and loosening of the implant itself.

As with real teeth, the prevention of periodontal infection depends on a consistently high standard of oral hygiene being carried out by the patient. This should include correct toothbrushing, the use of interdental cleaning aids around the implant and the use of a good quality toothpaste and mouthwash.

Where bridges are supported by implants, the gingival ridge beneath any areas of missing teeth is cleaned using Superfloss in a similar way to that used for conventional bridges (see Figure 6.6).

Regular dental examinations should be carried out of both the real teeth and the implant, and regular oral hygiene reinforcement and scaling as necessary.

Chapter 11

# Tooth alignment with orthodontic appliances

## REASON FOR PROCEDURE

Although a patient's desire for straight teeth is usually based on aesthetics, there are several dental advantages to aligning uneven teeth. Crooked and crowded teeth provide lots of potential areas for plaque to accumulate that would not exist if the dental arch was well aligned. It takes a consistently high standard of oral hygiene for life in these cases to prevent any carious or periodontal damage from occurring with time, as each crooked tooth and crowded area requires individual attention during every toothbrushing session.

When teeth are severely crowded, they sometimes do not bite together well enough for the patient to chew food efficiently, and in very severe cases where the jaw sizes do not match, the patient may also experience speech difficulties. These severe cases often benefit from a combined approach of orthodontics and jaw surgery.

When the bottom jaw bites too far behind its normal position, the upper anterior teeth appear to project forwards quite prominently (proclined), and these upper teeth are vulnerable to trauma or even fracture by being so positioned (Figure 11.1).

Finally, the psychological well-being of the patient should be considered in severe cases, where the malocclusion is responsible for excessively low self-esteem and may be the cause of childhood teasing or even bullying.

The simpler techniques used for tooth alignment are:

- Removable appliances
- Conventional fixed appliances
- Short-term cosmetic fixed appliances
- Non-brace techniques – aligners

## BACKGROUND INFORMATION OF PROCEDURE – REMOVABLE APPLIANCES

Removable appliances are made from an acrylic base with metal attachments to provide retention and are similar to acrylic dentures. They have additional metal components

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**Figure 11.1** Proclined incisors with damage evident to the left tooth

incorporated as necessary to carry out the required tooth movement to be achieved, and these can be one of a variety of springs, screw devices, or adjustable metal bars (Figure 11.2).

These components are checked and adjusted by the dentist on a regular basis to effect tooth movement.

Where severe crowding is present in the dental arch, it may be necessary for tooth extraction to be carried out before an appliance is fitted. This creates the space required to reposition the other teeth and align the arch.



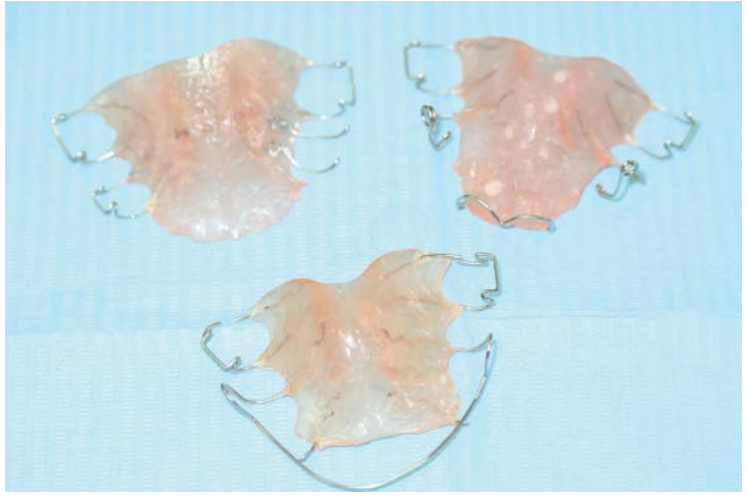

**Figure 11.2** Examples of removable appliances

The amount of movement possible with a removable appliance is sufficient in many cases to fully correct malaligned teeth, but the force applied is limited by the appliance being removable – if too much force is applied, the brace is not stable in the mouth. It is then that a fixed appliance is required.

Whichever type of appliance is planned, many new plaque retention areas are created in the patient's oral cavity and it is imperative that a consistently good standard of oral hygiene and diet control are practised throughout the course of orthodontic treatment.

Poor oral hygiene is the main factor that prevents many patients from being offerred orthodontic treatment, no matter how great their need.

## DETAILS OF PROCEDURE – REMOVABLE APPLIANCES

The dentist carries out an oral, photographic and radiographic assessment of the patient beforehand, and determines the orthodontic treatment required and the appliance necessary to achieve it by taking study model impressions and studying the casts produced. The need for any tooth extractions is decided, and then the full treatment course is put to the patient to decide whether to undergo orthodontic treatment. This includes the need for the appliance to be worn at all times except during meals, and the necessity of good diet control and oral hygiene throughout the full course of treatment.

If the patient is amenable to the propsed course of treatment, the removable appliance can be constructed.

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment at each appointment
- Alginate impressions are taken of both dental arches for the technician to produce the working casts (see Figure 4.10)
- The written design of the appliance is sent with the impressions
- The patient receives oral hygiene instruction and dietary advice, usually from the dental nurse
- At the next appointment, the new appliance is checked for accuracy of its design and then tried in the patient's mouth (Figure 11.3)
- Once comfortably tight, any metal components involved in tooth movement are activated by the dentist and the treatment commences (Figure 11.4)
- Specific oral hygiene instruction is given for the appliance itself, as well as the wearing details
- At each appointment thereafter, the dentist checks the progress of the tooth movement against the original study casts to ensure it is progressing correctly
- Retentive cribs are tightened to ensure the appliance is not loose, and active components are adjusted accordingly
- Various instruments may be required during a removable appliance fit or adjustment procedure
- Once the tooth movement required is achieved, a retainer is provided to hold the teeth in their new positions until they have settled into alignment
- The retainer can either be the deactivated removable appliance itself, or a soft gum shield type, both of which are usually worn at night only

**Figure 11.3** Removable appliance in the mouth

**Figure 11.4** Activated spring on the right incisor



## BACKGROUND INFORMATION OF PROCEDURE – CONVENTIONAL FIXED APPLIANCES

As their name suggests, fixed appliances are actually bonded onto the patient's teeth for the duration of the orthodontic treatment. In this way, greater force can be applied

**Figure 11.5** Conventional upper fixed appliance in place

and more severely malaligned teeth corrected than can be achieved with removable appliances alone.

However, greater care is needed by the patient during normal day-to-day activities so as not to dislodge any components of the appliance, as it cannot be removed for meals, cleaning or during sport sessions as a removable appliance can. Similarly, a low sugar and acid diet must be strictly followed, as the number of plaque retentive areas created by a fixed appliance is large, and caries can easily occur.

Conventional fixed appliances tend to be used in child and teenage patients rather than adults and aim to produce an 'ideal' occlusion in both arches, as well as aligning poorly positioned or crowded teeth.

The fixed appliance consists of individual metal brackets and bands that are harmlessly bonded onto each tooth in exactly the correct position, and joined together by tying a continuous archwire into each component (Figure 11.5). The wire carefully guides the movement of each tooth along it, gradually aligning the dental arch as it does so. The wire is changed on a regular basis by the dentist, using thicker, less flexible ones as the treatment progresses.

As with removable appliances, tooth extraction may have been required to create space in the dental arch first.

## DETAILS OF PROCEDURE – FIXED APPLIANCES

The dentist carries out an oral, photographic and radiographic assessment of the patient beforehand, and determines the order and progression of the archwires required, using the initial study casts. The need for any tooth extractions is decided upon and discussed with the patient while presenting the treatment plan. The strict diet and oral hygiene

control necessary throughout the course of treatment is also explained, and then the patient decides whether to proceed with the full course of orthodontic treatment. If the patient is amenable to the treatment proposed, the fixed appliance can be fitted.

The components of a conventional fixed appliance are shown in Figure 11.6.

The instruments and materials required to bond a conventional fixed appliance are shown in Figure 11.7.

**Figure 11.6** Components of a conventional fixed appliance

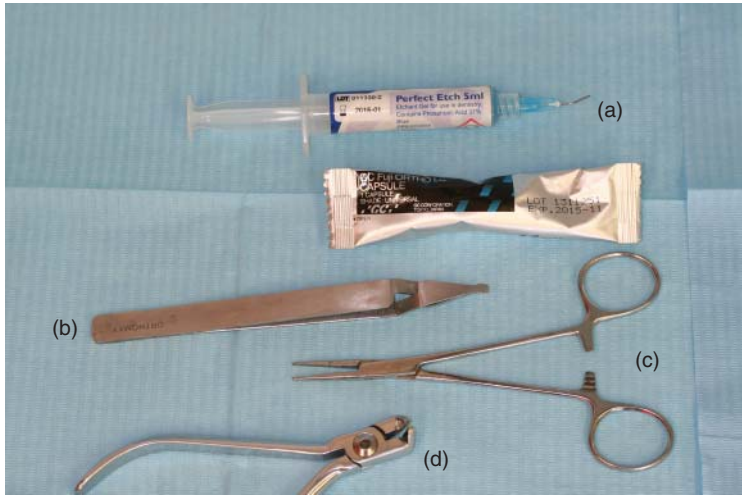


**Figure 11.7** Examples of materials and instruments for fixed appliance procedures. (a) Acid etch and bonding material. (b) Bracket holders. (c) Elastic holders. (d) Archwire cutters

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment at each appointment
- The dental chair is placed supine for ease of access, and good moisture control is provided throughout the bonding appointment using low speed suction and cotton wool rolls
- The decision is made previously with regard to whether just one or both dental arches are to be bonded at the same appointment
- The teeth are blown dry and a spot of acid etch is applied to the centre of the labial surface of each tooth in the dental arch
- The etch is washed off and carefully collected using high speed suction, then the teeth are dried again
- Individual brackets are then bonded one at a time to each tooth, in exactly the correct position and at the correct angulation for each tooth, using a special orthodontic material similar to either composite or glass ionomer materials
- Any bands required are sized on the tooth and then cemented firmly into place using any material that is used for crown cementation
- Once all the tooth attachments are firmly in place, the first archwire is positioned and tied onto each attachment using special elastic loops
- The first archwire is usually the thinnest and most flexible available, as it needs to be accurately distorted into each attachment, no matter how malaligned the teeth sit in the dental arch
- The archwire ends are trimmed to avoid sticking into the patient's cheeks
- Detailed oral hygiene instructions are given for the thorough cleaning of the appliance, without dislodging it
- This task may be carried out by a suitably trained dental nurse as an extended duty skill, and is discussed in detail in Chapter 13
- At each appointment thereafter, progress is checked against the original study casts to ensure the required tooth movement is proceeding correctly
- The archwire is replaced as necessary with a gradually thicker and less flexible successor, as the dental arch gradually aligns
- Once the tooth movement required has been achieved, a retainer is constructed for each dental arch to hold the teeth in their new positions until they have settled into alignment
- The retainer may be a soft gum shield type, to be worn at night only, or may be a fixed wire bonded to the backs of the teeth for a firmer method of retention
- In recent years it is the norm to provide post-orthodontic tooth retention for life to avoid any relapse, rather than just for a set period of time
- Both arches are then de-bonded, final models and photographs are taken, and the fixed retainers are cemented into place or the removable retainers are given to the patient
- If necessary, the teeth are scaled and polished to remove any residual plaque or tartar

## BACKGROUND INFORMATION OF PROCEDURE – SHORT-TERM COSMETIC FIXED APPLIANCES

For adult patients, the concept of having to wear conventional fixed appliances for up to 2 years to align their teeth is usually enough to dissuade them from undergoing this type of treatment, but very often their only complaint is the appearance of their front teeth alone. Their posterior occlusion (the way their back teeth bite together) has developed and become stable years earlier, so there is often no requirement to adjust the back sections

of the dental arches, and consequently a second type of fixed appliance treatment has been developed for these patients, which has the following advantages over conventional treatment:

- As only the front teeth are to be re-positioned, the treatment time is greatly reduced and the technique is actually referred to as short-term orthodontics
- In carefully chosen cases, the treatment time is usually between 4 and 9 months, with an average of 6 months (hence the phrase 'six month smiles')
- The back teeth are not moved during the treatment so the occlusion remains stable, as it was before treatment began
- The space required to align the front teeth is provided by careful trimming and adjustment of individual tooth widths as the treatment progresses, and only in rare cases is tooth extraction required
- The components of the fixed appliance used in short-term orthodontcis are aesthetically acceptable to adult patients, as they are all tooth-coloured

However, not all cases are suitable to be treated with this technique and the dentist chooses those which are appropriate with great care. Children and teenagers are treated using conventional fixed appliance therapy so that the ideal occlusion is developed.

## DETAILS OF PROCEDURE – SHORT-TERM COSMETIC FIXED APPLIANCES



The dentist carries out an oral, photographic and radiographic assessment of the patient beforehand and discusses with the patient the main complaint so that the treatment parameters are determined. Impressions are taken in alginate to provide a set of

**Figure 11.8** Prepared quadrant of short-term fixed appliance

pre-treatment study models (see Figure 4.10), and a second set of impressions is taken using a more accurate material such as silicone. These are sent to a specialised laboratory where the working models are cast and used to construct the fixed appliance itself.

In the laboratory, the technician carefully places each bracket onto each model tooth in the same way as the dentist does when bonding a conventional fixed appliance in the surgery. Once placed, the brackets are secured into their positions with two warmed sheets of rubbery material that are drawn down over the models under vacuum. When cooled, these sheets are trimmed and split in the midline to produce a quadrant of the appliance for each area of the mouth to be treated: left and right upper arch and/or lower arch (Figure 11.8). These are then returned to the dentist so that they can be bonded to the patient's teeth.

The bonding technique is very similar to that used for conventional fixed appliances, as are the instruments and materials required (see Figure 11.7).

**TECHNIQUE:**

- The dentist, nurse and patient wear personal protective equipment at each appointment
- The dental chair is placed supine for ease of access, and good moisture control is provided throughout the bonding appointment using low speed suction, cotton wool rolls and a full mouth soft tissue retractor
- The teeth in one quadrant are blown dry and a spot of acid etch is applied to the centre of the labial surface of each tooth
- The etch is washed off and carefully collected using high speed suction and the teeth are dried again
- A thin layer of adhesive is then painted onto each etched tooth
- Meantime, the dental nurse applies the bonding cement to the brackets in the quadrant that is being bonded
- The tray is then seated onto the quadrant of teeth and the cement is set using a curing light
- Once all four quadrants have been bonded, the double trays are carefully peeled off the teeth, leaving the brackets in their correct positions on each tooth
- Excess cement is carefully removed, and any necessary tooth trimming is carried out to begin creating the space necessary to resolve the tooth crowding
- The archiwre is then tied into each bracket in a similar way to that of conventional fixed appliances
- The bonded appliance is shown in Figure 11.9
- In cases where the lower arch brackets interfere with the patient's full bite, small bumps of composite filling material are placed to prop the bite open slightly while the teeth move into better positions – these bumps are then removed once the bite has adjusted and the brackets are safe from being knocked by the upper teeth
- Detailed oral hygiene instructions are given for the thorough cleaning of the appliance, without dislodging it
- At each appointment thereafter, progress is checked against the original study models, any necessary tooth trimming is carried out to allow the crowded teeth to align, and new archwires are placed
- Once the tooth movement required has been achieved, both a fixed retainer and a removable soft gum shield retainer are provided for each arch, and is worn for life to prevent relapse of the tooth positions
- Both arches are then de-bonded, final models and photographs are taken, and the fixed retainers are cemented into place
- If necessary, the teeth are scaled and polished to remove any residual plaque or tartar

**Figure 11.9** Short-term cosmetic fixed appliance in place on model

## BACKGROUND INFORMATION OF PROCEDURE – ALIGNERS

For those adult patients who do not wish to wear any form of orthodontic appliance fixed to their teeth, even cosmetic ones, a technique of achieving tooth movement using a series of pre-formed, retainer-like appliances has been developed. These are called 'aligners'. In skilled hands, a wide range of tooth movement can be carried out with this technique, without the patients having anything bonded to their teeth, but movements such as de-rotation of twisted teeth are particularly difficult to achieve. Nevertheless, aligners are a useful alternative to fixed appliances for suitable adult patients.

## DETAILS OF PROCEDURE – ALIGNERS

The dentist carries out an oral, photographic and radiographic assessment of the patient beforehand, and discusses the patient's treatment aims to determine the suitability of this type of orthodontic treatment.

Impressions are taken in alginate to provide a set of pre-treatment study models (see Figure 4.10), and a second set of impressions are taken using a more accurate material such as silicone. These second impressions are sent to a specialised laboratory where the working models are cast and used to produce the series of aligners required to straighten the teeth in each arch.

The working models are scanned in three dimensions into a specialised computer programme, which then automatically produces an image of the perfectly aligned arches. The computer then determines the tooth movements required to go from the initial arches to the aligned arches, and produces a set of gum shield-like aligners which must be worn in sequence over a set period of time to produce the aligned arch results. These are then sent

back to the dentist, who ensures that the patient can insert and remove the first aligner correctly, and so the treatment begins.

Some patients are capable enough to have the full set of aligners handed over at this appointment, knowing the sequence to follow and how long each one must be worn for before moving onto the next one, but the majority re-attend to have the aligners fitted sequentially by the dentist.

No special oral hygiene techniques are required as the aligners are removed for cleaning and tooth brushing, but the patients must ensure that they clean their teeth after each meal before re-inserting the current aligner so that food debris is not inadvertently trapped beneath it and does not cause tooth cavities to develop.

At the end of the treatment, the final aligner acts as the retainer.

## AFTERCARE OF ORTHODONTIC BRACES

As with acrylic dentures, removable appliances are cleaned with a toothbrush and fluoride toothpaste over a bowl of water after each meal. This is especially important at bedtime as the orthodontic appliance must be worn over night. The patients must also clean their own teeth thoroughly after each meal while the appliance is out, in the usual manner – see Chapter 2.

Fixed appliances have to be thoroughly cleaned *in situ* after each meal, using a combination of toothbrush, fluoride toothpaste, and interdental brushes used specifically to clean beneath the archwire itself – see Chapter 13 for details.

Some good quality electric toothbrushes have special orthodontic heads for use by the patient during the course of orthodontic treatment (Figure 11.10).

Patients with removable appliances are advised to store the brace in a rigid container while out of their mouth at mealtimes or during sport sessions, to avoid breakages. Fixed


**Figure 11.10** Orthodontic head for an electric toothbrush

appliances can be protected from damage during sport sessions using specially designed shields that fit over them in the mouth. These also prevent soft tissue trauma if the patient inadvertently receives a blow to the mouth; however, contact sports are best avoided during the course of the orthodontic treatment.

If the oral hygiene is not sufficiently maintained, or the diet correctly controlled, the patient risks developing caries in any tooth, but especially in those teeth in contact with the orthodontic appliance. In fixed appliance cases, this can result in unsightly cavities on the most visible part of each tooth that require permanent restorations for life.

# Chapter 12

# Tooth whitening

## REASON FOR PROCEDURE

In an increasingly appearance-conscious society, tooth whitening is becoming a greatly popular treatment for patients to request. In the majority of cases it is carried out for aesthetic reasons only; however, some patients have unnaturally dark teeth that cause them great embarrasment and low self-esteem. As with some orthodontic patients, the dentist is in a position to improve the quality of those patients' lives by performing a relatively simple and non-invasive technique.

There are a variety of tooth whitening systems available, including over-the-counter products and whitening toothpastes on sale.

When used correctly, they are all perfectly safe and cause no damage whatsoever to the teeth. The alternative dental treatment to achieve tooth whitening is to undergo multiple veneer or crown preparations, and all of the long-term maintenance and care of these restorations that that would entail.

The procedures discussed are:

- Home whitening using trays
- In-house power whitening

## BACKGROUND INFORMATION OF PROCEDURE – HOME TRAY WHITENING

This is a simple technique whereby the patient self determines the use of the product and the end result achieved. It involves the use of specially constructed trays – similar to thin gum shields or orthodontic retainers – that are worn at home by the patient with the whitening paste within them. The trays can be worn as often as the patient decides, and obviously the more usage produces the greater whitening effect, but a noticeable tooth shade improvement normally takes weeks to develop.

As long as the trays fit accurately around the teeth, the treatment course can be repeated as often as the patient wishes. The whitening paste has no effect on any restorations

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already present, such as white fillings or crowns, so these may require replacement at a later date if the shade difference is noticeably obvious.

## DETAILS OF PROCEDURE – HOME TRAY WHITENING

Several home whitening products are available to the dental profession, but all rely on the use of custom-made trays to hold the paste on the surfaces of the teeth for long enough to have an effect. Other than the provision of the product and construction of the trays for each patient, the dentist has little input to the procedure.

### TECHNIQUE:

- The dentist, nurse and patient wear personal protective equipment
- Alginate impressions are taken of one or both dental arches, for the working models to be cast
- Using a shade guide provided by the whitening paste manufacturers, the patient's tooth shade is recorded so that the degree of whitening achieved can be quantified
- A photograph may also be taken and kept in the patient's records for future reference
- The cast models are used to construct the customised, vacuum-formed trays for each patient, either in-house or at a laboratory
- The taking of the impressions and the production of the whitening trays are both tasks that can be carried out by a suitably trained dental nurse as extended duty skills – see Chapter 13 for details
- The teeth which are to be whitened (usually premolar to premolar) have a spacing agent placed over their front surface on the model which creates a 'well' area in the tray, so that the whitening gel is held in the correct position over each tooth while the tray is being worn (Figure 12.1)
- At the next appointment, the trays are checked for accuracy of fit and then the paste application into the tray is demonstrated to the patient (Figure 12.2)
- Excessive amounts of paste should not be used, as this is not only wasteful but the excess also spills onto the soft tissues and may cause irritation
- Each consignment of whitening paste has patient information details enclosed, and these are explained verbally, then given to the patient for reference, as various products are available for either daytime or nightime use, with varying concentrations of whitening agent
- The patients can request more whitening paste as necessary, and can carry out the whitening procedure at home whenever they wish
- Some patients use the technique continually, especially those who smoke and therefore tend to be more susceptible to tooth staining
- Others home-whiten sporadically for special events such as holidays, weddings, parties and other special occasions



## BACKGROUND INFORMATION OF PROCEDURE – POWER WHITENING

As the name suggest, this is a whitening technique that provides an instant result for the patient after just one application. It relies on the use of an intense light source to

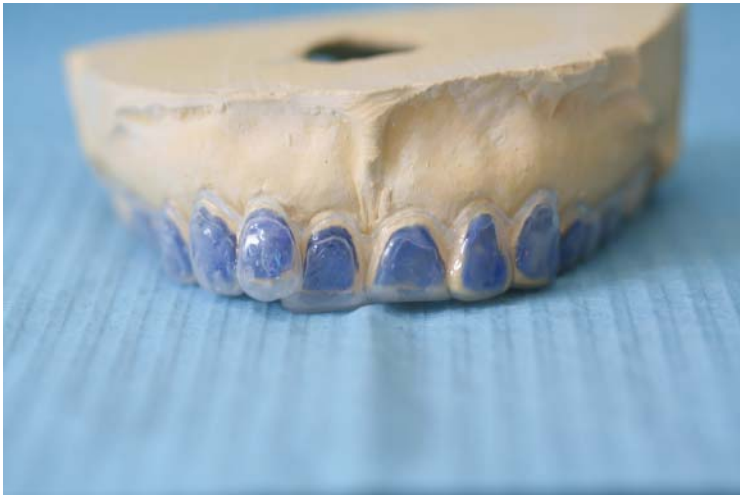


**Figure 12.1** Home whitening tray on spaced model

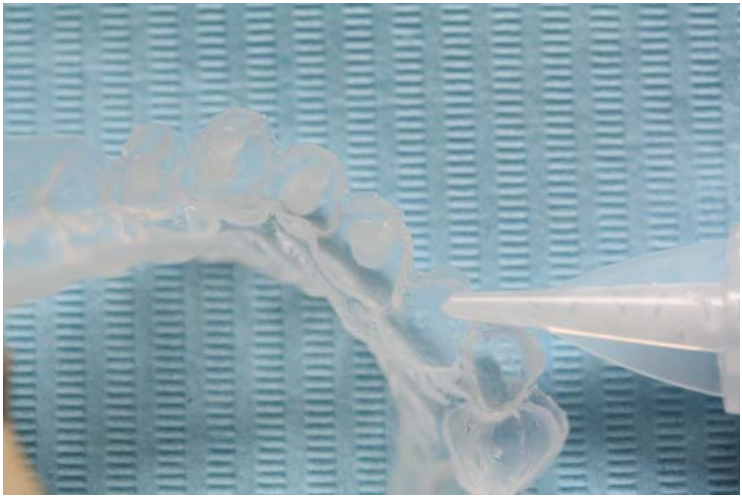


**Figure 12.2** Application of whitening agent into tray 'well'

chemically activate the whitening process of the paste after it has been applied to the teeth, and must be done in a controlled environment at the practice.

As the activated paste is so intense, all the soft tissues of the oral cavity must be protected from contact with it during the procedure to avoid soft tissue irritation or burns. Similarly, the patient's face and lips should be protected from the light source by being covered in total block suncream and lip balm.

## DETAILS OF PROCEDURE – POWER WHITENING

Suitable patients are chosen carefully, as the intense nature of the procedure can cause temporary tooth sensitivity, sometimes intense in nature. This is prevented in the majority of cases by the patient's use of a high concentration fluoride toothpaste for several weeks before the whitening procedure is carried out. Also, some medications and even some herbal products can cause the patient to be over-sensitive to the light source used, causing sunburn or sunstroke-like symptoms. Careful pre-operative questioning identifies any likely problems.

Patients who have anterior tooth restorations (fillings, veneers or crowns) are advised that these are likely to require replacement after the whitening procedure, as they are not affected by the process and are in contrast with the whitened teeth.

The shade guide is used to determine the pre-treatment tooth shade, and should be photographically recorded.

### TECHNIQUE:

- The dentist, nurse and patient wear personal protective equipment throughout the procedure, especially orange-tinted safety glasses whenever the light source is in use
- The patient is made comfortable in the dental chair, angled at 45°, as the procedure can take up to 2 h once started
- Suncream and lip balm are spread liberally over the patient's facial soft tissues
- The special lip and tongue retractor is carefully placed in the mouth so that all the oral soft tissues are held away from the teeth
- The inner sides of the lips, cheeks and the surface of the tongue are fully covered with cotton gauze to give full protection and moisture control (Figure 12.3)



**Figure 12.3** Soft tissue retraction and moisture control in place

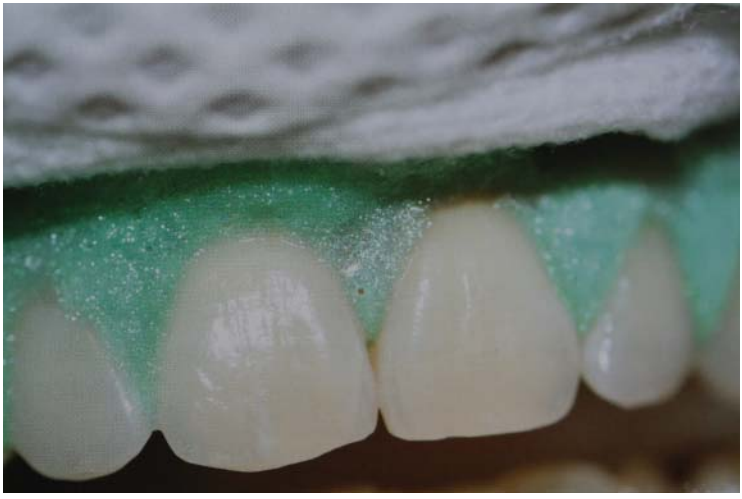


**Figure 12.4** Isolation of teeth before whitening

- The protective paste ('liquid dam') is carefully run across all the exposed gingival tissues up to the necks of the teeth, then set hard so that it provides a light-proof barrier for the underlying tissues (Figure 12.4)
- The whitening paste is mixed and carefully applied to the labial surfaces of all anterior teeth
- The power light is positioned directly over these teeth and locked in position for each of the three 15-min cycles of exposure required (Figure 12.5)
- The teeth are washed, dried and fresh whitening paste is reapplied before each exposure
- At the end of the procedure the new tooth shade is recorded, and the soft tissues are checked for any signs of irritation and a soothing balm placed if necessary
- The patient is given full post-operative instructions with regard to avoiding smoking and highly coloured foods and drinks for 48 h, to avoid staining of the teeth, as the teeth are very porous during this initial period
- Any tooth sensitivity is temporary and easily alleviated using a desensitising gel provided in each whitening kit

## AFTERCARE OF WHITENED TEETH

Any restorations previously present may need replacement, especially with the power whitening technique. Some patients may choose to continue the initial shade improvement achieved with the in-house procedure by using customised trays and home-whitening pastes, and the process is as previously described.

The length of time the whitening effect lasts (Figure 12.6) with no further treatment depends upon the smoking and dietary habits of the patient. In particular, tea, coffee and red wine are all notorious for causing tooth staining in any patient, and advice should be

**Figure 12.5** 'Zoom' light in use

**Figure 12.6** End result after power whitening of upper teeth


**Figure 12.7** Examples of whitening oral healthcare products

given on reducing their consumption for a lasting effect after whitening. The use of one of the many whitening tooth pastes and mouthwashes available also helps to maintain the whitening effect when used regularly (Figure 12.7)

As any tooth whitening technique is non-invasive, no special care and maintenance instructions are necessary, except to carry out a good daily oral hygiene programme.

# Chapter 13

# Extended duties of the dental nurse

## REASON FOR INCLUSION

This chapter is relevant in the United Kingdom, where dentists and dental care professionals (including dental nurses) are regulated by the General Dental Council (GDC).

Extended duties are those skills which may be developed by registrants after their initial qualification to enhance the scope of their practice, following appropriate training to a suitable level of competency, and with suitable indemnity insurance in place. It involves undergoing appropriate training in the workplace, which is delivered by a team member who is already trained and competent in the same skills, rather than by attending a formal training course elsewhere. This training is often referred to as being delivered 'in house', meaning that it has occurred on the workplace premises.

Details of the 'in house' training must be retained to prove that it has actually been given, and the most suitable format is as a mini hand-out which lists the information that has been passed on to the registrant. Records should be kept of each time that the registrant then carries out the supervised extended duty (including in the patient's records where the skill is used directly on a patient) until the registrant is deemed to be competent – this should also be recorded. Ideally, the workplace can develop and use assessment sheets to provide a record of the supervised tasks, and examples are given for some of the extended duties available to dental nurses in the Appendix.

Once deemed competent, the registrant's indemnity insurance should be arranged to include cover for extended (or extra) duties, rather than cover just for basic duties.

At all times, all GDC registrants must carry out their duties in accordance with the Council's standards document 'Standards for the Dental Team' and ensure that they never attempt to provide care or carry out tasks which fall outside their scope of practice.

The standards and scope of practice documentation is available to download at www.gdc-uk.org

## BACKGROUND INFORMATION ON BASIC DUTIES

In the United Kingdom, all dental nurses must be qualified in their basic duties and registered with the GDC to legally work at the chairside, or they must be a student on

*Basic Guide to Dental Procedures*, Second Edition. Carole Hollins.

an approved training course working to gain their basic register-able qualification. The basic duties of a dental nurse are those which they are expected to carry out to provide clinical and other support to registrants and patients, and are described as follows:

- Prepare and maintain the clinical environment, including the equipment
  - Set up the surgery area and equipment for a range of dental procedures
  - Maintain the surgery area and equipment between procedures so that it is safe to be re-used for several patients
  - Close down the surgery area and equipment at the end of a work session so that it is safe to be left, and safe to be re-used at a later date
- Carry out infection prevention and control procedures to prevent physical, chemical and microbiological contamination in the surgery or laboratory
  - Carry out full decontamination and sterilisation procedures to prevent cross infection
  - Dispose of contaminated items by the correct waste segregation category and method
  - Use all accepted methods of preventing contamination of equipment and items in the surgery and laboratory
- Record dental charting and oral tissue assessment carried out by other registrants
  - Tooth charting
  - Periodontal charting
  - Soft tissue assessment
  - Orthodontic and occlusal assessment
- Prepare, mix and handle dental bio-materials
  - Filling materials (temporary and permanent)
  - Impression materials
  - Luting cements
  - All accessory materials
- Provide chairside support to the operator during treatment
  - Readying the patient
  - Having all the relevant equipment, instruments and materials to hand
  - Assisting during the procedure
  - Monitoring the patient throughout the procedure
- Keep full, accurate and contemporaneous patient records
- Prepare equipment, materials and patients for radiography
  - Switch the equipment on
  - Have the correct film packet, cassette, sensor plate and holder to hand
  - Have the correct patient identified and ready for the radiographic procedure
- Process dental radiographs
  - Use automatic and manual processing equipment correctly to produce radiographs
  - Maintain automatic and manual processing equipment correctly
  - Replace and dispose of processing chemicals correctly
  - Accurately record quality assurance ratings of radiographs
  - Recognise common exposure, handling and processing faults of radiographs
- Monitor, reassure and support patients
- Give appropriate patient advice
  - Administration advice
  - Basic dental emergency advice
  - Basic treatment advice
  - Basic oral health advice

- Support the patient and their colleagues if there is a medical emergency
  - Recognition of signs and symptoms of various medical emergencies
  - Resuscitation skills
  - Maintain up-to-date medical emergency knowledge and skills
- Make appropriate referrals to other health professionals
  - Refer patients to an appropriate colleague for advice when information required is outside their own knowledge and capabilities

## BACKGROUND INFORMATION ON EXTENDED DUTIES

Once the dental nurse has qualified in the basic duties shown above and become a GDC registrant, additional skills that could be developed during appropriate 'in house' training include the following;

- Further skills in oral health education and oral health promotion (see later)
- Assisting in the treatment of patients who are under conscious sedation (see later)
- Further skills in assisting in the treatment of patients with special needs
- Further skills in assisting in the treatment of orthodontic patients (see later)
- Intra- and extra-oral photography (see later)
- Shade taking
- Pouring, casting and trimming study models
- Tracing cephalographs

All these skills can be carried out without direct intervention from another registrant once the required level of competence has been achieved. Throughout the working career, the registrant should then attend suitable and verifiable continuing professional development activities in those areas of extended duties which involve direct access to patients (especially the first four duties listed above), so that their knowledge and skills are maintained. Regular monitoring of their competence in the final four duties can be carried out in the workplace by other, suitably trained and knowledgeable colleagues.

Further additional skills can also be developed in the following areas but only when on prescription from another registrant – so a more senior registrant has made the decision that the task is a necessity for a particular patient, and has delegated its completion to a suitably trained and competent dental nurse:

- Taking radiographs – specifically, pressing the exposure button when instructed to do so
- Placing rubber dam
- Measuring and recording plaque indices (see later)
- Removing sutures after the wound has been checked by the dentist (see later)
- Applying topical anaesthetic to the prescription of the dentist
- Taking impressions to the prescription of the dentist or a clinical dental technician (CDT) (see later)
- Constructing occlusal registration rims and special trays
- Constructing mouth guards, bleaching trays and vacuum-formed retainers to the prescription of the dentist (see later)
- Repairing the acrylic component of removable appliances
- Application of fluoride varnish to the prescription of the dentist, or directly as part of a structured dental health programme

## FURTHER SKILLS IN ORAL HEALTH EDUCATION AND ORAL HEALTH PROMOTION

The two main oral diseases – dental caries and periodontal disease – are both caused by an accumulation of plaque, either on the tooth surface or within the gingival crevice or periodontal pockets (when present) respectively. Instruction from the dental team in how to remove this plaque effectively, as well as appropriate dietary advice, is the mainstay of good oral health promotion to prevent dental disease in patients.

Only the most dedicated of patients are likely to maintain a high standard of oral hygiene without any intervention or advice from the dental team, so it is likely that many patients will require regular reinforcement of key oral health messages throughout their time with the practice. As this patient support is often best delivered in one-to-one sessions and can be time consuming, a dental nurse with appropriate training in these extended duties is a huge benefit to the workplace, by allowing the dentist and other dental care professionals to provide treatment to some patients while the dental nurse delivers personal oral health education to others.

## SIMPLE BRUSHING, FLOSSING AND INTERDENTAL CLEANING INSTRUCTIONS

The aim of conventional tooth brushing is to remove plaque from the gingival crevice area around each tooth, and from the labial, buccal, lingual, palatal and occlusal surfaces of the teeth. Conventional tooth brushing will not clean the interdental areas unless a sonic brush is used, or an electric brush with an interdental adaptation (see Figure 2.15).

Flossing (or the use of dental tape) and the use of interdental brushes are recommended for thorough interdental cleaning of the mesial and distal contact points of teeth.

To ensure that the patient learns from the oral hygiene advice and is willing and able to carry out the instructions given by the dental nurse at home afterwards, the instruction session must achieve all the following:

- Be delivered at a level of understanding suitable for each individual – this involves the use of terminology relevant to each patient, as well as the use of good communication skills; this topic is covered in detail in both text books dedicated to dental nurse training: 'Levison 11th edition' and 'Level 3 Diploma in Dental Nursing' ('NVQ 3rd edition')
- Be sensible in the advice given – this will involve giving valid reasons for the actions explained and the points made so that the patients can understand why the advice is relevant to them
- Be easily remembered by the patient – this will involve helping the patient to develop a systematic approach to their oral hygiene regime, one that they can follow each day without having to think about it
- Be reinforced appropriately – this will involve the use of relevant patient information leaflets and hand outs which the patient can take home and refer to at a later date
- Be recorded in the patient's notes – this allows the advice given to be re-evaluated at a later date by the dental nurse (or other team members) and adjusted accordingly, to ensure that the patient achieves a consistently good level of oral hygiene


**Figure 13.1** Examples of aids and products for use during OHI session. (a) Demonstration model. (b) Disclosing tablets. (c) Tooth brushes. (d) Toothpastes

## Tooth brushing

Simply chatting to the patient about tooth brushing techniques will have little effect in improving their skills; they need to be able to see what is being discussed, and ideally to be able to 'have a go' themselves while being advised by the dental nurse (a typical 'tell; show; do' learning experience). A good supply of relevant oral hygiene products and aids is therefore essential to the success of the session (Figure 13.1), as well as a large mirror so that they can watch themselves while brushing. When discussing a child's brushing techniques with a parent, the dental nurse should demonstrate on the child so that the parent learns how to correctly supervise the child's brushing until the child is of an age to carry it out successfully without supervision (Figure 13.2).

**TECHNIQUE:**

- Briefly discuss the aims of adequate tooth brushing to the patient, with particular reference to any problems already identified with the current technique (such as missing the lower teeth by keeping the mouth closed, taking too little time, and so on)
- Demonstrate the required tooth brushing technique on a dental arch model, so that the patient can see the correct tooth brush manipulation and which areas are to be cleaned
- Allow the patient to 'have a go' at tooth brushing on the model, so that the correct brush angulation and speed and force of brushing are achieved
- Using the model, divide each dental arch into three sections: left side, right side and front, and then divide each section further into actual tooth surfaces

- Refer to these areas in terms the patient can understand – cheek side, tongue side, biting surface, and so on
- Ask the patients where they normally start and finish their tooth brushing, and then develop a systematic routine of including each of the eight tooth surface areas in both arches into that regime, so that no surface is missed
- Provide the patients with a waterproof bib and then use a disclosing tablet to expose their plaque retention areas – these can be viewed in the large mirror
- Allow the patients to 'have a go' at brushing the disclosed plaque off their teeth using the new regime that has just been discussed, reinforcing and updating the advice as necessary if they keep missing certain areas
- By the time the disclosed plaque has been fully removed, the patients should have developed a methodical approach of their own to brush all tooth surfaces in their mouth, which they can then repeat at home on a daily basis so that it becomes a subconscious routine
- Effective full mouth brushing should take around 2 min, and patients can be advised to use an egg timer or alarm call to help them learn to pace themselves accordingly
- The patients should be instructed not to rinse their mouth after spitting out the excess toothpaste at the end of the brushing session – any toothpaste remaining around the teeth is an important source of topical fluoride
- A small headed, multi-tufted medium nylon bristled tooth brush is suitable for the vast majority of patients, and is likely to need replacing every 3 months or as soon as the bristles show signs of wear (see Figure 2.6)
- The dentist will have recommended a suitable toothpaste for the patients to use, depending on whether they require a good quality fluoride toothpaste or one with additional additives for a particular dental problem (see Figure 2.4)
- Good quality, re-chargeable electric tooth brushes can also be recommended, especially those that use a sonic method of cleaning, as these take the hard work out of the task for the patient
- The vibratory action of the electric brushes, especially when accidently caught on other teeth as they are moved around the mouth, does take time and perseverance by the patient to get used to them – the dental nurse should encourage this perseverance, as the level of cleaning is likely to be far better than that achieved manually for the vast majority of patients
- The patient should also be instructed to clean the teeth over a sink and with the lips closed around the electric tooth brush during use – this limits the amount of 'dribbling' of the tooth paste solution that always occurs with their use, and avoids spillages onto clothing
- The benefits of electric tooth brushes should be reinforced to suitable patients whenever necessary:
  - More effective cleaning than manual tooth brushing
  - Sonic effect allows some interdental cleaning to occur
  - Head adaptations allow a variety of uses, including specific interdental cleaning
  - Many have 2 min timers incorporated, to ensure brushing occurs for long enough
  - Many have 30 s beeps to remind patients to move to the next quadrant; this ensures full mouth cleaning
  - Many have sensors to detect excessive pressure during use; this stops the brush from working briefly and helps teach the patient to use the correct brushing force
  - Heads are interchangeable, so one base unit can be used for several patients within a family, each with their own tooth brush head
  - Heads tend to last longer than manual brushes
- A similar demonstration session to that described for manual brushes can be carried out by the dental nurse for patients new to the use of electric tooth brushes

**Figure 13.2** Dental nurse demonstrating child tooth brushing techniques

## Flossing and interdental cleaning

These skills are required to assist the patient in removing interdental plaque on a regular basis, where regular tooth brushing alone is ineffective. Again, a clear demonstration of the correct techniques, assisted by good aids and products, is the key to engaging the patients in learning these skills and enabling them to carry them out at home (see Figures 2.8, 2.9 and 2.12).

**TECHNIQUE:**

- The technique used to clean interdentally will depend to a large extent on the dexterity of the patient, the options being;
  - Use of conventional dental floss or tape
  - Use of pre-threaded 'flossette' type devices
  - Use of interdental or interspace brush (Figure 13.3)
  - Use of electric brush adaptations
- Wood sticks are not recommended for routine interdental cleaning as they are designed more for occasional use to dislodge food particles that have become stuck interdentally

- A discussion of any prior attempts by the patients to clean interdentally will help to determine the technique that may be suitable for them
- With conventional dental floss and tape, many patients find the use of waxed tape more successful than of floss, as the wax allows the material to slide more easily into the interdental areas without forcing it through and risking cutting into the gums, and the tape then provides a larger surface area for tooth cleaning
- A demonstration is given of how to wrap the floss/tape around the fingers to provide a suitable length which can be guided into the interdental area and manipulated across the tooth surfaces using the thumbs (see Figure 2.10)
- Once proficient, the patients can be supervised to insert the floss/tape into an interdental area and wrap it around one of the tooth surfaces (mesial or distal), and then use a sawing action to clean the tooth surface as the floss/tape is withdrawn from the area (see Figure 2.11)
- They then unwrap a small section of floss from one finger and wrap it onto the other finger so that a clean section becomes available – this is then guided back into the same interdental area and used to clean the opposing tooth surface in the same way
- Patients who struggle with this technique for their posterior teeth can be instructed in the use of 'flossette' type devices in the same way to clean these interdental areas (see Figure 2.8)
- It may take several devices to clean the interdental areas fully, as the floss/tape is secured in the prongs and cannot be changed once soiled – the patients should be discouraged from continuing to use a heavily soiled 'flossette' as they are merely transferring plaque and food debris from one interdental area to another, rather than cleaning the tooth surfaces
- Suitably sized interdental brushes will be the method of choice for interdental cleaning for some patients
- Determine the size necessary for the patient (see Figure 2.13), and demonstrate how the brush end can be angled to access posterior interdental areas more easily (Figure 13.4)
- Allow the patients to 'have a go' at inserting the interdental brush in various areas of their mouth, and then using a brushing and twisting action to clean the tooth surfaces before withdrawing it (see Figure 2.14)
- The brush can also be used with a smear of toothpaste, so that fluoride and cleaning agents are also introduced into the area
- Large interdental brushes or interspace brushes are more suitable where large gaps are present between teeth, such as where a tooth is missing from the arch
- The brushes can be rinsed clean and re-used, but must be discarded when the bristles show signs of wear
- For those patients who routinely use an electric brush to carry out their oral hygiene regime, or those who are suitable to be advised to do so, various interdental and interspace head adaptors are available with good quality varieties, which are used to simulate the manual techniques described

## DIET ADVICE

Regular and efficient plaque removal will help prevent caries and gingival and periodontal problems from developing, but the incidence of caries is also greatly influenced by the patient's diet. A diet containing regular non-milk extrinsic sugars and dietary acids will always have the potential to allow caries to occur, no matter how effective the oral hygiene regime.

**Figure 13.3** Interdental and interspace brushes


**Figure 13.4** Interdental brush angled to aid use

The vast majority of patients are aware of the potential for obvious foods and drinks to cause caries, such as chocolates, cakes, carbonated drinks, biscuits, and so on. What many are unaware of are the 'hidden sugars' in many foods and drinks, the role that acidic products have in causing caries, and the importance of frequency and timing of the consumption of these products in the development of caries. Dietary advice should be geared around these areas.

To give effective diet advice, the patient's dietary contents and habits first need to be known, and the most effective way of discovering this information is to have the patient

complete a diet sheet like the one shown below. The aim is to have an accurate record of the following points on a daily basis:

- What food and drink is consumed
- When they are consumed throughout a 24-h period
- When any oral hygiene procedures are carried out during the same time cycle
- What variations there are from day to day, with both the products consumed and the oral hygiene procedures undertaken

To be effective, the patient has to be totally honest – and this must be emphasised before proceeding with a dietary recording and analysis, otherwise there is little point in continuing. The desire to help the patient avoid future restorative dental treatment (and its cost) and to maintain a healthy smile should be stressed from the outset by the dental nurse.

A selection of packaging from various food and drink products containing hidden sugars may be used as 'props' to help convince the patient that the advice is given on a non-judgemental, purely helpful basis by the dental nurse. Again, good communication skills are required if the patient is not to be alienated by the whole procedure.

Once the diet sheet (or sheets if there is a large variation between week days and weekends, for example) has been completed and returned to the practice by the patient, it should be carefully analysed to determine the answers to the four questions set above. The dental nurse may discuss the findings with the dentist or another competent dental care professional, making notes of the relevant points to discuss with the patient. The patient then attends an oral hygiene instruction and promotion session with the dental nurse.

| Tuesday | Food or drink | Oral hygiene |
|---|---|---|
| 6 a.m. | Cereal with sugar, orange juice | — |
| 7 a.m. | — | Tooth brushing, fluoride tooth paste |
| 8 a.m. | — | — |
| 9 a.m. | — | — |
| 10 a.m. | Biscuit, coffee with two sugars | — |
| 11 a.m. | — | — |
| 12 p.m. | Pizza, chocolate muffin, diet coke | — |
| 1 p.m. | — | Chewing gum, not sugar free |
| 2 p.m. | — | — |
| 3 p.m. | Diet coke, chocolate biscuit | — |
| 4 p.m. | — | — |
| 5 p.m. | Cheese and onion crisps | Chewing gum, not sugar free |
| 6 p.m. | — | — |
| 7 p.m. | Chicken burger and chips with side salad, glass of white wine | — |
| 8 p.m. | Glass of white wine | — |
| 9 p.m. | Glass of white wine | Tooth brushing, fluoride tooth paste and general use mouthwash |
| 10 p.m. | — | — |
| 11 p.m. | Glass of diet lemonade | — |
| 12 a.m. | — | — |

The information contained in the diet sheet example shown above, and to be discussed with the patient, is as follows.

Food and drink consumed in this scenario;

- Several obvious sugar and acid episodes
  - Sugar in cereal and in coffee
  - Orange juice and carbonated drinks
  - Biscuits and muffin
  - Wine
- Several hidden sugar episodes;
  - Cereal – even plain examples such as whole wheat cereal and corn flake style products contain sugar
  - Pizza – the tomato paste base contains sugar, as do most tomato sauce or paste products
  - Chewing gum – unless stated as 'sugar free' these products will contain sugar
  - Chicken burger – if additions such as mayonnaise or relish are used

Time of consumption in this scenario;

- The sugar and acid 'hits' occur frequently throughout the day
- This allows potentially harmful levels of food debris and plaque acids to lie in direct contact with tooth surfaces for prolonged periods of time, causing demineralisation

Time of oral hygiene procedures in this scenario;

- Tooth brushing occurs within the hour after breakfast, so some food debris and plaque will be removed
- No other oral hygiene measures occur for the following 14 h
- This allows all sugars and acids consumed in that time to potentially cause some caries, especially interdentally where no cleaning technique has been carried out for the whole 24-h period
- The beneficial effects of the bedtime tooth brushing and mouth washing procedures will be cancelled out by the consumption of the carbonated drink less than 2 h later
- This acidic drink then has the following 7 to 8 h to lie undisturbed and erode the tooth enamel overnight

Any variations between completed diet sheets for different days can be analysed in a similar manner.

Armed with all this information, the dental nurse can give the necessary dietary advice to the patients in an effort to educate them in reducing the potential harm that their dietary habits may cause. It is unrealistic to expect the patients to change their diet completely, and it is highly unlikely that an average diet would avoid all sources of hidden sugars. Consequently, the advice given should focus on reasonable and achievable goals for that particular patient, including the following suggested points.

Food and drink consumed:

- Can healthier alternatives be used, such as
  - Artificial granulated sweetener on the cereal and in the coffee
  - Savoury biscuits and cheese (although there is likely to be a hidden sugar content)

  - Fruit or yogurt instead of crisps (although the yogurt may contain hidden sugar)
  - Limit the carbonated drinks, or have squash drinks instead – even 'diet' drinks are potentially harmful if they are fizzy, because they are acidic
  - Plain water instead of any other overnight drink
- White wine contains less sugar than many other alcoholic drinks such as ciders, sherries and mixers with spirits, but it is still acidic, so the length of drinking time should be monitored by the patient

Time of consumption:

- Frequency?
  - The same foods and drinks consumed in two or three set meals rather than spread over the 14 h period will cause less tooth damage, as there are less sugar and acid 'hits' on the teeth
  - Can the orange juice be taken before the cereal at breakfast, so that the acid is much reduced before tooth brushing is carried out – the combination of softened enamel from acid exposure and tooth brushing can cause increased enamel loss
  - In particular, the overnight drink of lemonade has the potential to cause massive demineralisation if carried out on a regular basis, and should be replaced by plain water

Time of oral hygiene procedures:

- Frequency?
  - Much plaque develops in the mouth overnight, so can the teeth be brushed both before breakfast (to remove that already present) and after breakfast (to remove that developing from the food just consumed) – this will remove the maximum amount of harmful plaque
  - Can a lunchtime oral hygiene procedure be carried out – ideally tooth brushing with a fluoride toothpaste, or the use of a good quality mouth wash
  - If not, sugar free chewing gum will stimulate saliva flow to wash away some debris, and physically pull some particles off the teeth As a last resort, swilling the mouth with plain water after a meal will have some beneficial effect
- Procedures?
  - If acids are likely to be consumed on a regular basis, advise on the use of enamel repair products to minimise the erosive effect
  - Avoid brushing immediately after finishing acidic drinks, including alcohol – wait for at least 20 min to allow the acids to be neutralised, or use a mouth wash
  - Introduce an interdental cleaning procedure into the regime – bedtime may be ideal as the patient is likely to have more time than in the morning before work
  - If time is an issue, advise the use of a good quality sonic electric tooth brush that will clean interdentally on a regular basis
  - Use sugar free chewing gum as a cleaning aid when other procedures are not possible, but do not chew gum excessively as this will encourage tooth wear on the biting surfaces of the teeth

In summary, any amount of this information and these oral health instruction and promotion techniques can be developed by the dental nurse into personalised oral health

education sessions with the patient. The information here covers the basics of oral health instruction and promotion techniques, and can be used in total or as a starting point for the development of a suitable training programme.

To be successful in this extended duty, the dental nurse must be adequately trained to become competent in all the following skills;

- Tailor the information to the direct needs of each patient
- Ensure the information is correct and in line with the policies and beliefs of the work place
- Communicate effectively so that the oral health messages are correctly delivered
- Maintain an up-to-date level of knowledge of the topics likely to be discussed with patients
- Know the limits of one's knowledge and understanding, and be willing to ask a senior colleague for inputs when necessary

A post-registration qualification in Oral Health Education is available for dental nurses in the United Kingdom, which trains students to a much greater depth of knowledge in this topic and provides them with a recognised qualification. Further details are available at www.nebdn.org

## ASSISTING IN THE TREATMENT OF PATIENTS WHO ARE UNDER CONSCIOUS SEDATION

Conscious sedation is an anxiety control technique used to allow fearful (or phobic) patients to undergo routine dental procedures, as well as to allow regular patients to undergo fearful or traumatic dental procedures. The two techniques most frequently used in general practice are

- Single drug intravenous sedation
- Inhalation sedation (previously referred to as relative analgesia)

As an extended duty where both techniques are used, the role of the dental nurse may include any or all of the following skills:

- Be able to set up the equipment and materials to carry out intravenous sedation
- Be able to read a pulse oximeter machine
- Be able to take the patient's blood pressure
- Be able to carry out basic safety checks on the inhalation sedation machine
- Be able to monitor the patient during a conscious sedation session, and record the vital signs when necessary

In workplaces where only one or the other technique is used, the level of competency of the dental nurses is limited to that technique alone, and to the specific tasks that they have been trained to carry out only. The role of gaining informed consent in written form before a conscious sedation procedure is a regulatory requirement, and is the responsibility of the dentist rather than a duty for the dental nurse to carry out.

## Intravenous sedation

This is a technique of conscious sedation for adult patients where a single drug is injected intravenously into them so that

- Their anxiety of dental treatment is significantly reduced
- They are willing to receive dental treatment
- They remain conscious throughout and therefore do not require intubation

Examples of the equipment and materials required to be set out for the induction procedure are shown in Figure 13.5, and the function of all the potential items required are as follows:

- Midazolam (Hyponovel) ampoule – the drug that is injected intravenously to produce the sedation
- Flumazenil (Anexate) ampoule – the reversal drug to bring the patient out of the sedation in case of emergency
- 5 mL syringes and long needles – to draw up the Midazolam (and Flumazenil when required)
- Cannula – either a venflon or a butterfly to administer the Midazolam

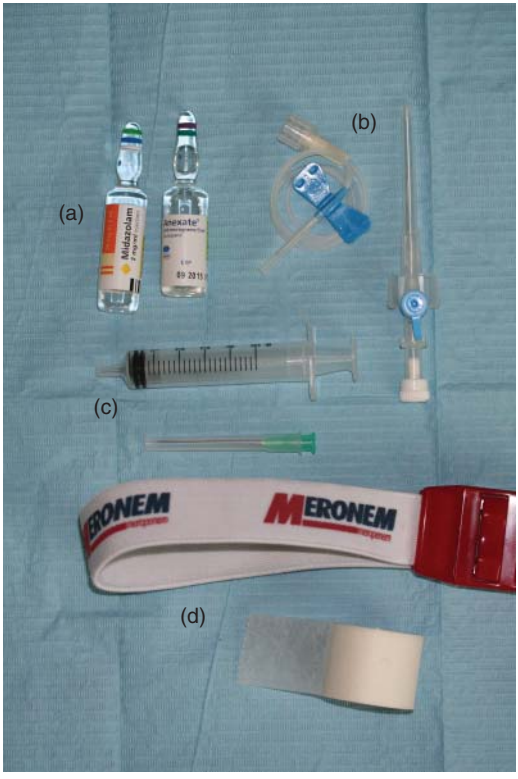



**Figure 13.5** Example of items to set out for intravenous sedation. (a) Intravenous drug and antidote. (b) Selection of cannulas. (c) Syringe and needle to draw up agents. (d) Tourniquet and tape

- Alcohol wipe – to clean the injection site before the cannula is used
- Tourniquet – to fasten around the upper arm or wrist to raise the vein
- Arm splint – to keep the arm straight throughout the procedure if a butterfly is used in a vein in the arm, as the needle remains in the vein and may cause damage if the patients bend their arm (a venflon has a plastic tube which remains in the vein and the arm can therefore safely be bent)
- Micropore tape – to secure the cannula in the vein throughout treatment, and to hold a cotton wool roll over the site after the cannula has been removed (alternatively a plaster may be used)
- Pulse oximeter (Figure 13.6a) – the machine connected to the patient throughout the procedure by a finger probe, which reads their oxygen levels (as a %) and their pulse rate (as a number counted per minute)
- Blood pressure machine – either a dedicated device or as part of the pulse oximeter (see Figure 13.6b), which is used to record the patient's blood pressure both before and after the procedure
- Oxygen cylinder and nasal cannula – to administer oxygen to the patients during the procedure if their oxygen level is at 90% or below for more than a minute, or if their oxygen level keeps dipping
- Mouth props – for use during the procedure to keep the patients' mouth open wide, otherwise they will keep closing it while in a relaxed state

The nurse's role during the induction procedure is to

- Assist with taking the patient's blood pressure before starting the induction, or actually take the blood pressure using an automated machine
  - Place the cuff around the upper arm in the correct location (this is usually marked on the cuff itself, for both the left or right arm)
  - Use the Velcro strip to secure the cuff in place
  - Ensure the cuff tubing is connected to the machine correctly
  - Press the start button to inflate the cuff
  - Follow the deflation of the cuff and make a note of the automatically recorded blood pressure reading, writing the systolic pressure over the diastolic pressure on the monitoring sheet (see below)
- Help to keep the patient as calm and relaxed as possible during the induction by talking quietly but encouragingly to them, by holding their hand if possible (or getting someone else to do so)
- Assist the dentist by passing the necessary items to carry out the induction, in the correct order
- The order is: tourniquet → alcohol wipe → cannula → Midazolam syringe → micropore tape
- Close the vein with a finger while the needle is removed, if a venflon is used
- Attach the syringe end to the butterfly tubing, if a butterfly is used
- Release the tourniquet when told to do so
- Apply the micropore tape to secure the cannula
- Assist with applying the arm rest when a butterfly is used in a vein in the arm
- Attach the finger probe correctly to the patient – the diode window side is usually marked with a finger nail pictogram on the probe, so that it is not placed upside down
- Switch on the pulse oximeter and ensure the alarm is on and is automatically set at 90% – this level can be raised if necessary but only on the direction of the dentist
- Record the first oxygen and pulse readings, and the time they were taken on the monitoring sheet


(a)

(b)

**Figure 13.6** (a) Example of a combined pulse oximeter and blood pressure machine (b) Dedicated blood pressure machine in use

### Monitoring the patient during the procedure

The patient must be monitored throughout the procedure, with a written record kept of the oxygen levels and pulse rate readings at 10 min intervals.

- Use the monitoring sheet provided and complete all sections (example shown in Figure 13.7)
- The information to be recorded is as follows:
  - Pre- and post-operative blood pressures

- Oxygen levels
- Pulse rate
- Drug used, amount given, time of first and last increments
- Batch number and expiry date of all drugs given
- Details of any problems or additional information, such as the provision of oxygen
- The level of responsiveness of the patient at discharge, and the time of discharge
- Patient's escort

**IV SEDATION PROCEDURAL RECORD**

**PATIENT NAME:** **DATE:**

**ASA:** **RELEVANT MH?** **YES** **NO**

| IV DRUG | EXPIRY DATE | BATCH NUMBER | INCREMENTS | | TOTAL DOSE |
|---|---|---|---|---|---|
| | | | FIRST | LAST | |

| VENOUS ACCESS? | SITE | CANNULA |
|---|---|---|
| YES<br>DIFFICULT<br>NO | | |

| MONITORING TIME | OXYGEN SATURATION | PULSE | BLOOD PRESSURE |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

| RECOVERY SITE | SURGERY | | |
|---|---|---|---|
| FIT FOR DISCHARGE | WALK | TALK | LISTEN |
| POST-SEDATION INSTRUCTIONS | TO ESCORT–VERBAL/WRITTEN | | |
| TIME OF DISCHARGE | | | |
| CLINICIAN | | | |
| NURSE | | | |

**Figure 13.7** Example of an intravenous sedation monitoring sheet

In addition, the patients should be monitored visually to notice the following:

- Their colour, especially any blueness which indicates lack of oxygen
- Their chest movements, especially whether they are regular and steady or not, which indicates a possible respiratory obstruction
- Their level of responsiveness, especially whether they respond to verbal commands or not, which indicates their level of sedation may be too deep and they are at risk of passing into unconsciousness
- Whether they are tapping their finger or clenching their hand with the finger probe on, as this will send false readings to the pulse oximeter, as well as setting off the alarm
- Whether they are bending their arm with a butterfly inserted, as this will pierce the side of their vein and cause bruising

Sedation patients are understandably anxious before the induction session begins, and will appreciate the presence of a friendly and empathetic dental nurse to 'hold their hand' – whether physically or emotionally. During the session the patients will be relaxed and will often have to be given the same instructions several times before they respond (turn their head, open their mouth wider, breathe through their nose, and so on) – it is important that they are spoken to pleasantly and calmly, and that they are constantly reassured by the dental nurse throughout the session.

Although midazolam does cause a period of amnesia (memory loss) during its use, the patient is not deaf, so no inappropriate comments or personal chatting should occur during the session – the dental nurse should be wholly focussed on the welfare and comfort of the patient throughout.

The dental nurse's role during the recovery period is to

- Remain with the patients and monitor their visible signs
- Talk to the patients to help their recovery
- Assist with, or take, a post-operative blood pressure reading
- Assist with the removal of the cannula and place a dressing
- Ensure the monitoring sheet is fully completed when the patient is ready to be discharged
- Check with the escort that the post-operative instructions are understood and will be followed
- Report any problems to the dentist
- Assist the patient safely from the premises

## Inhalation sedation

This is a conscious sedation technique suitable for child and adult patients, where they inhale a variable mixture of gases so that

- Their anxiety of dental treatment is significantly reduced
- They are willing to receive dental treatment
- They remain conscious throughout and therefore do not require intubation

The equipment to set out for the procedure is as follows:

- Inhalation sedation trolley which is connected to the oxygen and nitrous oxide gas supplies – the gas flow and percentage of nitrous oxide delivered is controlled with the machine dials

**Figure 13.8** Inhalation sedation machine in use with nasal hood in place

- Nasal hood with tubing – this is placed over the patient's nose to inhale the gas mixture during the session without impeding access to the mouth (Figure 13.8)
- Scavenger tubing – taking away exhaled air from the operative area so that waste gases do not build up, as the dental team will be affected by the sedative gas mixture otherwise

The pulse oximeter and blood pressure machine do not have to be used with inhalation sedation, but it is good practice to do so and record the readings as for IV sedation.



### Pre-operative checks

The inhalation sedation machine must be checked prior to every use on a patient to ensure that it is working correctly, and this is carried out as follows:

- Check the oxygen and nitrous oxide cylinders are switched on and that the gas is flowing (Figure 13.9)
- The level of nitrous oxide in the cylinder can only be determined by weighing the cylinder, so it cannot be assumed that the dial reading is accurate
- The pin index system on the pipe connections prevents the incorrect connection of the gas cylinders to the delivery machine when the colour coding is followed
  - Oxygen – white
  - Nitrous oxide – blue
- On the machine, the reservoir bag is filled and checked for any leaks by listening for a gas escape and by squeezing the bag to ensure it does not deflate
- The oxygen flush button is checked for its correct working, so that the patient can be given 100% oxygen in an emergency (Figure 13.10)
- The nitrous oxide cut-off ability is checked to ensure the flow switches off automatically if the oxygen flow stops, so the machine will not operate without a minimum oxygen flow


**Figure 13.9** Nitrous oxide tank, valve and gauge

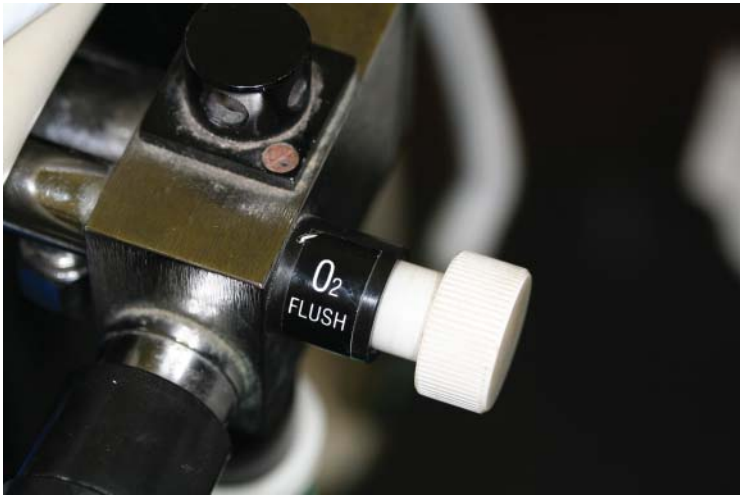



**Figure 13.10** Oxygen flush button

- The minimum flow is set at 30% oxygen, and this is also checked to ensure the flow cannot be reduced any further – so the maximum nitrous oxide delivery can only be 70%
- The flow dial calibrations are checked to ensure they work correctly, so if 30% oxygen is given the nitrous oxide should read 70%, if 50% then 50%, and so on

If any of these are not working, the machine is not safe to be used and the matter must be reported to the dentist.

The role of the dental nurse during induction and treatment is as follows:

- During induction, the nasal hood is placed on the patient and the gas mixture is gradually altered to increase the percentage of nitrous oxide in use until a suitable level of sedation is achieved
- The patient may need to be reminded to breathe through the nose and not to talk during induction
- The technique allows the patient to respond well to a degree of hypnotic suggestion, and it is important not to interrupt the induction during this phase, but still help to keep the patient calm by hand holding, for example
- During the session the patient should be visibly monitored as for IV sedation
- Keep a note of the maximum % of nitrous oxide given to the patient, and whether active or passive scavenging was used (ideally, scavenging should always be active so that the waste gases are physically drawn away from the area and expelled)
- The patient must be given a minimum of 2 min of 100% oxygen at the end of treatment before removing the nasal hood and disconnecting the machine, otherwise they will develop diffusion hypoxia
- Nitrous oxide does not cause patient amnesia, so no inappropriate comments must be made throughout the session
- The gas does have some analgesic properties, but it is unlikely to be enough for undergoing dental treatment without local anaesthetic
- The patient should be able to leave the premises within 15 min of the end of the inhalation session, and adult patients do not need an escort
- The machine must be closed down correctly, by switching off the cylinders, flushing out the machine, and disposing of the single-use liner of the nasal hood

A post-registration qualification in Dental Sedation Nursing is available for dental nurses in the United Kingdom, which trains students to a much greater depth of knowledge in both techniques. The qualification awarded is a usual employment requirement for those wishing to work with conscious sedation techniques in the dental hospital setting. Further details are available at www.nebdn.org

## FURTHER SKILLS IN ASSISTING IN THE TREATMENT OF ORTHODONTIC PATIENTS

Most orthodontic treatment is carried out in specialist practices or clinics in the United Kingdom, so many dental nurses have little or no access to the speciality in general practice. Of those dental nurses who do work within the orthodontic speciality, one with extended duties in this area of dentistry is a valuable member of the team in delivering this treatment, along with the dentist and the orthodontic therapist. The extended duties that can be developed include any or all of the following:

- Recognition and laying out of the specialised orthodontic instruments and materials – although this area of dentistry is included in the dental nurse curriculum of the register-able qualification, the knowledge required is only to a basic level
- Setting up of brackets and tubes for the bonding of fixed appliances
- Specific oral hygiene instruction for orthodontic patients

- Measurement and recording of plaque indices before, during and after treatment (this skill can be gained as a separate extended duty – see later)
- Tracing cephalographs (this skill can be gained as a separate extended duty)

## Laying out instruments and materials

The vast majority of orthodontic treatments carried out in the United Kingdom involve the use of removable or conventional fixed appliances (see Chapter 11 for further details). Many of the instruments and materials required for the fitting/bonding, adjustment, and removal of these appliances are unique to this speciality and are therefore unlikely to be familiar to many dental nurses. The table below lists the most likely instruments to be required for removable appliances (see Figure 11.2) and conventional fixed appliances (see Figure 11.5) and their functions. Those to be laid out will be determined by the appliance involved and the stage of the treatment that is being undertaken.

| Item | Function |
|---|---|
| Adam pliers | Removable appliance – to tighten cribs, adjust springs and retractors |
| Straight hand piece with acrylic bur | Removable appliance – to trim the acrylic base plate of the appliance |
| Measuring ruler | Removable and fixed appliances – to take accurate measurements of tooth movements, such as the overjet |
| Bracket holders (see Figure 11.7b) | Fixed appliance – to pick up, hold and position individual brackets during their bonding onto the teeth |
| Alastik/elastic holders (see Figure 11.7c) | Fixed appliance – ratcheted design to pick up and tightly grip alastiks and elastics as they are used to tie in the arch wire to the bracket (alastik) or to provide traction to teeth (elastics) |
| Arch wire (end) cutters (see Figure 11.7d) | Fixed appliance – angled wire cutters to trim off the excess ends of the arch wire from directly behind the molar band or tube, often with a self-gripping attachment so that the cut piece of wire can be safely removed from the mouth |
| Wire cutters (Figure 13.11a) | Fixed appliance – straight wire cutters to trim off the ends of wire ties or ligatures |
| Bracket removers (Figure 13.11b) | Fixed appliance – chisel-ended pliers to remove brackets from the teeth at the end of treatment or when a bracket needs removing and repositioning |
| Band removers (Figure 13.11c) | Fixed appliance – chisel-ended blade and a plastic stopper to remove bands at the end of treatment; the stopper rests on the occlusal surface of the tooth while the other blade is located at the gingival rim of the band, and then the pliers are squeezed together to dislodge the band from the tooth |

The materials that may be required to be laid out are as follows;

- Alginate impression material and water for pre- and post-operative study models, and for the working model when a removable appliance is to be constructed (see Figure 4.11)

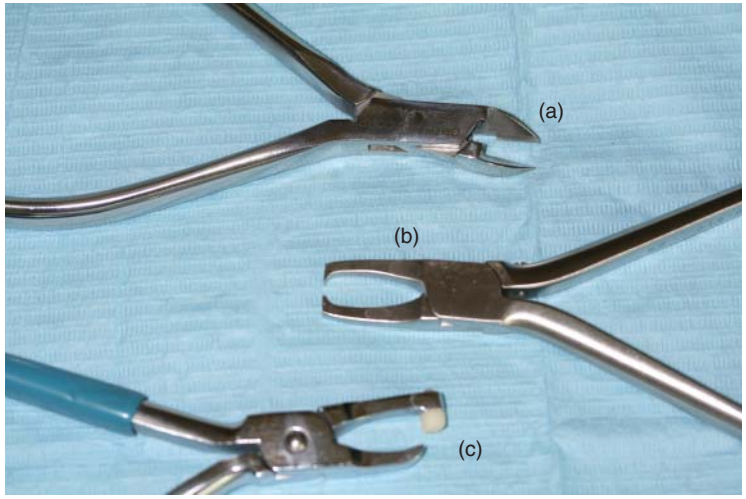



**Figure 13.11** Fixed appliance instruments. (a) Wire cutters. (b) Bracket removers. (c) Band removers

- Acid etch and a suitable bonding agent when a fixed appliance is to be placed (see Figure 11.7a)
- Luting cement for the cementation of molar bands (see Figure 6.4)

## Setting up for a bonding procedure

Bonding a conventional fixed appliance to an upper, lower or both arches is a fiddly and sometimes time-consuming procedure, and forward preparation is a key element in the smooth running of the appointment, for both the patient and the dentist.

The dental nurse can assist greatly by being trained to set out the brackets and molar tubes beforehand. This is best done using an orientation card with a sticky backing on which the brackets and tubes can be firmly located, ready for the procedure. Each bracket and tube is designed for use on a specific tooth only and great care must be taken in orientating each one correctly. Brackets have coloured dots placed on their disto-gingival wing by the manufacturers to assist in their identification, but the colours used may vary between suppliers, so bracket sets should not become mixed together. The exception is lower incisor brackets which have a rounded base that follows the gingival margin of the tooth, but can otherwise be used on any of the lower incisors. Canine brackets can also have disto-gingival hooks placed by the manufacturer for use with elastic traction. Molar tubes have distally orientated hooks which are set gingivally, so upper right molar tubes can also be used on lower left molars, and upper left molar tubes can also be used on lower right molars.

When placing the brackets, the dental nurse should use the bracket holders so that they become familiar with their use and handling.

A correctly laid out orientation card for an upper and lower bonding is shown in Figure 13.12.


**Figure 13.12** Orientation card ready for upper bonding

## Orthodontic oral hygiene instruction

Both removable and fixed appliances provide many more stagnation areas in the patient's mouth than would exist without the appliance *in situ*, and the high level of oral hygiene that must be maintained throughout the treatment is imperative if tooth damage and localised gingival problems are to be avoided. The patient must be taught how and when to clean adequately around the appliance, as well as any necessary dietary controls to be followed during the treatment phase – this oral hygiene instruction can be delivered by a suitably trained dental nurse.

Over and above any general oral hygiene advice and instruction which is relevant to all patients, that specific to those wearing removable appliances is as follows:

- Food and drink must be confined to mealtimes rather than having snacks throughout the day, as the teeth will need cleaning every time something has been consumed so that food debris is not held against the teeth by the appliance
- The quantity of food and drink containing non-milk extrinsic sugars and acids must be kept to an absolute minimum, to reduce the potential of causing cavities during treatment
- The appliance must be removed and cleaned twice daily with a tooth brush and toothpaste, taking care not to damage any springs or clasps while doing so
- Cleaning should be carried out over a sink of water so that if dropped, the appliance will not break
- Both fluoride mouthwash and toothpaste should be used during the treatment phase on a daily basis, to provide maximum protection against caries to the teeth
- Patients should be encouraged to self-disclose their teeth on a weekly basis to ensure their oral hygiene regime is adequate
- If extraction spaces are present in the dental arch, the patient should be instructed in the use of an interspace brush to clean the area effectively until space closure occurs

**Figure 13.13** Use of interdental brush to clean beneath the arch wire

Over and above any general oral hygiene advice and instruction which is relevant to all patients, that specific to those wearing fixed appliances is as follows:

- The quantity of food and drink containing non-milk extrinsic sugars and acids must be kept to an absolute minimum, to reduce the potential of causing cavities during treatment
- Both fluoride mouthwash and toothpaste should be used during the treatment phase on a daily basis, to provide maximum protection against caries to the teeth
- Patients should be encouraged to self-disclose their teeth on a weekly basis to ensure their oral hygiene regime is adequate
- Patients should be instructed in the use of interdental brushes to clean around each bracket where the arch wire passes over, as this is a particular stagnation area where ordinary manual tooth brushing alone is not sufficient (Figure 13.13)
- Alternatively the patient can be instructed in the use of an electric tooth brush with an orthodontic head attachment to clean these areas (see Figure 11.10)

In either form of orthodontic treatment, if a less than adequate level of oral hygiene is being maintained by the patient, the dental nurse can provide a one-to-one disclosing and cleaning session, to emphasise the problem areas and help the patient to improve plaque removal.

## Measurement and recording of plaque indices

A plaque index is a method used to measure the amount of plaque present in the patient's mouth at any time, and when carried out repeatedly at further visits it provides a record of a patient's progress in oral hygiene standards. So it allows a numerical value to be placed on the level of oral hygiene at that point, which can then be used to monitor progress over a period of time – and the use of a numerical value makes the information more

understandable to the patients; they can quantify their own progress. Plaque indices are particularly useful with potential and ongoing orthodontic patients because they provide information that can be used in the following ways:

- A high plaque index in a potential orthodontic patient prevents the start of treatment until improvement is seen – it 'weeds out' unsuitable patients who are most likely to develop caries if treatment proceeds
- It gives the patient something to aim for if they desire treatment – to reduce the numerical value to an acceptable level
- It monitors the compliance of the patient during treatment – if problems are identified, they can be resolved before tooth damage occurs
- If problems continue, the treatment can be abandoned with a recorded (and therefore irrefutable) good reason, and hopefully before tooth damage occurs
- When treatment has been successfully completed, a lowered index provides a retrospective record of the need for the treatment initially – the patient's oral hygiene has improved as cleaning became easier with well-aligned teeth

Two established methods are available for measuring and recording the amount of plaque present in the patient's mouth – one method involves every tooth present, while the other involves just six teeth as a representative sample of the mouth as a whole, and is therefore a speedier procedure.

**METHOD 1:**

- Assume each tooth is divided into six sites – mesial, mid and distal on both the buccal and lingual/palatal sides
- Multiply the number of teeth present in the patient's mouth by six – a typical teenager is likely to have all but their third molars present, so 28 teeth × 6 = 168
- The presence or absence of plaque at each site is determined by running a blunt probe along the gingival margins of each tooth, or by thoroughly disclosing the patient and looking directly at the teeth
- Total the number of sites (out of 168) where plaque is present – so say 102 sites out of 168 had plaque present, 102/168
- Multiply this fraction by 100 to give a percentage plaque index = 60.7%

A plaque index this high indicates the patient has a poor standard of oral hygiene and is not suitable for orthodontic treatment until the plaque index has been much reduced and then maintained at a reduced level consistently. So the quantified information can be used to motivate a keen patient to improve oral hygiene, or to justify the denial of treatment to an insistent patient who has little interest in improving oral hygiene, but wants treatment anyway.

**METHOD 2:**

- Six teeth are chosen as a representative sample of the mouth – the upper right first molar (UR6, 16) and lateral incisor (UR2, 12), and the upper left first premolar (UL4, 24); the lower left first molar (LL6, 36) and lateral incisor (LL2, 32), and the lower right first premolar (LR4, 44)

(*continued*)

**METHOD 2: (*Continued*)**

- The presence or absence of plaque is determined on four sites of each tooth – mesial and distal of both the buccal and lingual/palatal sides
- The plaque is scored as follows;
  - No plaque = 0
  - Plaque present by probing = 1
  - Visible plaque = 2
  - Extensive plaque = 3
- The average plaque scores of each tooth are added together and then divided by six (the number of teeth that have been recorded) to give a single figure which is taken as a representative average for the mouth as a whole – this is the patient's plaque index
- So using the following example;
  - UR6 = 2
  - UR2 = 0
  - UL4 = 2
  - LL6 = 3
  - LL2 = 3
  - LR4 = 2
- Total = 12 ÷ 6 = plaque index 2
- Using this qualitative and quicker method, the plaque index will range from 0 (excellent) to 3 (poor), so again this patient is currently unsuitable for orthodontic treatment

The plaque index can be calculated by the dental nurse at any point during treatment and compared with the pre-operative scores to monitor the oral hygiene progress of the patient, and highlight any potential problems as they occur and before any tooth damage is likely to have happened. The plaque index can be recorded at the examination or recall appointment of any patient, not just those considering orthodontic treatment, and is a useful method of monitoring routine oral hygiene standards and the patient's compliance with any previous oral hygiene instruction given.

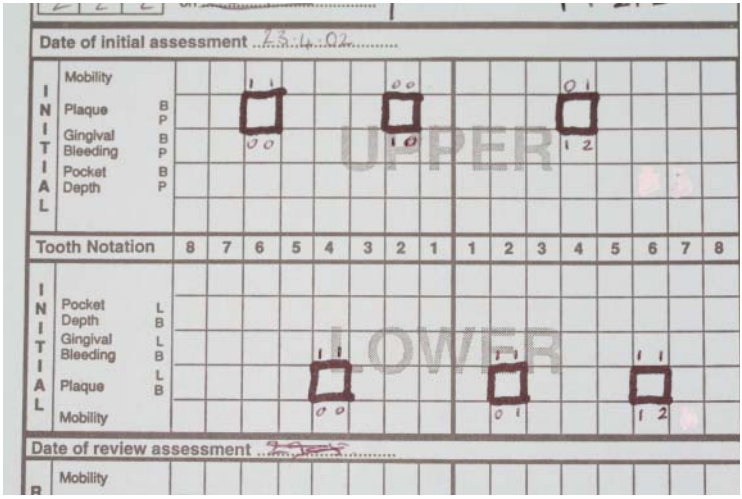
Methods of recording the information to determine the plaque index vary widely, but probably one of the simplest ways is to use a variation of a standard periodontal diagnosis and treatment plan chart (Figure 13.14a). The chart has the buccal, lingual, and palatal surfaces of each tooth pre-printed onto it, and plaque can be recorded as either a coloured dot at each site (method 1) or as a numerical value at each site (method 2). Alternatively, a pre-printed dental arch diagram (Figure 13.14b) can be used in a similar fashion.

A post-registration qualification in Orthodontic Dental Nursing is available for dental nurses in the United Kingdom, which trains students to a much greater depth in this speciality and is particularly useful for those dental nurses wishing to work in a specialist orthodontic workplace. Further details are available at www.nebdn.org

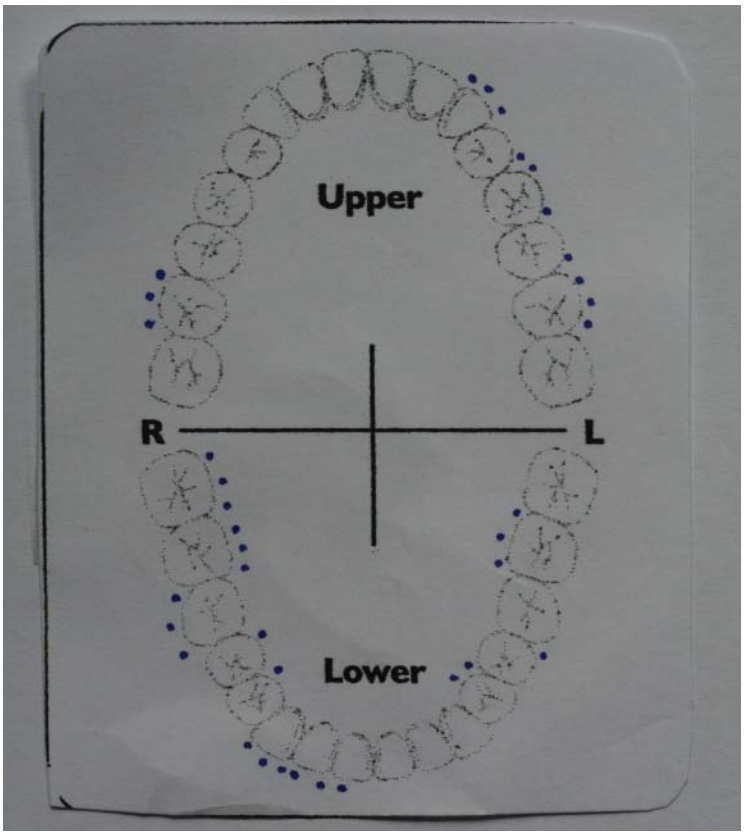


## TAKING IMPRESSIONS

Alginate impressions are the most frequently taken and widely useful of the impression materials available. They are used to produce study models in various fields of dentistry, to produce opposing models and initial models in fixed and removable prosthodontics, and




(a)




(b)

**Figure 13.14** Examples of plaque index recording methods. (a) Variation of standard periodontal chart. (b) Pre-printed dental arches

to produce models for the construction of mouth guards, vacuum formed retainers, and whitening trays (see later).

A trained and competent dental nurse who is able to take consistently good quality and therefore useful alginate impressions is an asset to any dental workplace. The stages involved in taking alginate impressions are as follows:

- Selection of the patient – many patients are fearful of undergoing impression taking, as they believe they will choke, gag, or vomit, and excessively fearful patients are best left to the dentist to handle
- Selection of the trays
- Mixing of the alginate and loading of the trays
- Insertion of the loaded trays
- Removal of the trays after setting
- Monitoring and handling of the patient throughout

The equipment and materials required to take a set of study models are shown in Figure 4.11.

## Selection of the trays

It is usual for single use, perforated box trays to be used for alginate impression taking, with the correct tray handle inserted before use. Tray handles should always be used, otherwise the trays may be difficult to remove once the alginate has set.

Suitably sized trays should just fit over the dental arch in either jaw, without being excessively wide (they will be difficult to insert through the oral aperture of the lips), without being excessively long (they need go no further posteriorly than the end of the dental arch), and without being excessively short (they must record the full length of the dental arch). A trial tray insertion must always be carried out on the patient before proceeding with the impression taking, to avoid poor quality impressions which will need to be retaken. When a chosen tray has been inserted, it should be lifted up and down over the dental arch – if there is any catching on the teeth, or any resistance to being fully seated, then the tray is too narrow (Figure 13.15a and b).

Usually upper trays are used for upper impressions, and lowers for lower impressions. However, on occasions when the palate does not need to be recorded (such as with retainers and bleaching trays) a suitably sized lower tray may be used in the upper arch, and this is also less likely to stimulate a gag reflex in some patients.

## Mixing of the alginate and loading of the trays

All dental nurses are familiar with the correct mixing of alginate, and the technique is summarised below.

- Ensure the powder measuring scoop and the water measure are for the same material, otherwise the 1 : 1 powder to water proportions will be incorrect
- Shake the powder container to mix the contents
- Use full and levelled scoops of powder, usually two are required for each impression
- Make a well in the powder in the mixing bowl and pour the room temperature water into the centre of the well (Figure 13.16a)
- Fold the powder into the water initially then vigorously mix and spatulate the mixture against the sides of the bowl (Figure 13.16b)
- Ensure all of the powder is mixed in and that no air bubbles have been introduced into the mix – when fully mixed it should have a uniform consistency (Figure 13.16c)

(a)

(b)

**Figure 13.15** Sizing of tray for impression taking. (a) Tray catching molar teeth – too narrow. (b) Correct tray size, just covering the dental arch

(a)

(b)

**Figure 13.16** (a–e) Alginate mixing and tray loading

Upper trays are loaded with the full mix gathered on the spatula, and from the back of the tray forwards so that it is loaded uniformly across its whole width and length (Figure 13.16d).

Lower trays are loaded in two stages, with half the mix gathered on the spatula for each. The first half of the mix is loaded into one half of the tray from the inner side of the tray arch, and the second half into the other side (Figure 13.16e) so that the tray is equally filled with the impression material.

(c)

(d)

**Figure 13.16** (*continued*)

## Insertion of the trays

Each impression is mixed, loaded, inserted and removed one at a time. The insertion technique is as follows:

- The patient wears a waterproof bib, and sits upright in the dental chair
- The patient is instructed to relax the lips and to breathe at a normal rate through the nose while the impression is in the mouth

(e)

**Figure 13.16** (*continued*)

- The lower impression is inserted while standing in front of the patient, by angling the loaded tray so one end passes through the oral aperture first and then swung over to that side of the dental arch – this brings the other side of the tray through the oral aperture and over the other side of the dental arch
- A right-handed dental nurse will find the process easier if the right side of the tray is inserted first, and the left hand is used to gently retract the lips as the left side is inserted later (and the opposite for a left-handed dental nurse)
- Once the full tray is hovering over the full lower arch it is gently pushed down onto the teeth, ensuring that the teeth are in the centre of the tray all around the arch (so not too close to either the buccal or lingual side of the tray)
- The lower lip may be pulled out and 'rolled' up over the front of the tray, to ensure the labial sulcus is fully recorded
- The tray is held evenly in this position with the fingers until setting occurs, in particular it must be held firm if the patient swallows as the tray would lift up otherwise
- The patient is asked to waggle the tongue from left to right, and then touch the outer surface of the upper lip with it – this moulds the inner edge of the impression and avoids the tongue being recorded in the impression, instead of the teeth
- The upper impression is inserted while standing behind the patient, to the right (for a right-handed dental nurse) or to the left (for a left-handed dental nurse)
- Again, the tray is inserted by angling first one side and then the other through the oral aperture while retracting the lips with the other hand (right side first for right-handed dental nurse, as previously)
- Once the full tray is hovering below the full upper arch, it is gently pushed up onto the teeth, from the back forwards to prevent material being pushed into the patient's throat
- Again, ensure that the teeth are in the centre of the tray all around the arch

- The upper lip may be pulled out and 'rolled' down over the front of the tray to ensure the labial sulcus is fully recorded
- The tray is supported evenly in this position with the fingers until setting occurs

## Removal of the trays after setting

Any excess impression material can be squeezed to determine if setting has occurred – that in the patient's mouth will have set quicker still because the oral cavity has a warmer environment. Otherwise, the impression material lying in either labial sulcus can be touched to determine if it has fully set – it should feel firm and not leave any impression material on the gloves when the finger is pulled away.

Once set, the trays are removed by exerting a firm upward pressure on the tray handle of the lower tray, and a firm downward pressure on the tray handle of the upper tray. Sometimes, a finger run around the buccal and labial sulci will be necessary to break the suction force around the edges of the impression before it can be dislodged. The impression can then be gradually eased over the teeth and out of the mouth, reversing the angle and swing action of the insertion process so that the patient's soft tissues are not uncomfortably stretched.

On removal, the impression should be checked for accuracy before being sent for disinfection – if it is not adequate, then the impression taking must be repeated. For example, the impression shown in Figure 13.17 has well-rolled edges and no air blows, but the upper right molar tooth has not been fully recorded in the impression, and this may require a retake.

If the impressions are acceptable they are disinfected in the usual manner – rinsed, soaked, rinsed, packaged with damp gauze in a sealed bag, and correctly labelled.

## Monitoring and handling of the patient

Suitable personal protective equipment must be provided and worn by the patient, and the dental nurse must wear clinical gloves throughout the whole procedure. The dental

**Figure 13.17** Example of an upper alginate impression

nurse must always be aware of the fear and trepidation that some patients may exhibit when told they require impressions to be taken, and they should be empathetic to the patient's concerns. Any patient who is overly anxious should be referred to the dentist.

Some patients prefer to know what is involved in the procedure beforehand, others prefer not. Where possible a short and simplified explanation should be given to all patients; in particular the following points should be mentioned:

- The material sets relatively quickly, and the impressions will be removed as soon as possible
- Stay calm and breathe at a normal rate through the nose throughout the procedure
- If they begin to panic and try to remove the trays, their mouth will be covered in unset impression material which is difficult to remove – they must concentrate on their breathing and allow the procedure to continue
- Allow the lips to remain relaxed so that they can be retracted and manipulated as necessary by the dental nurse
- Follow the tongue instructions carefully
- Once the impressions are in place, they may tip their head forwards if they wish – this reduces the choking fear
- Do not worry if they begin dribbling while the impression is still inserted and setting – the waterproof bib will prevent any clothing damage
- Some considerable effort may be required to remove the impressions in some patients (because they have undercuts which 'lock' the impression in place), but it is *not* enough to pull their teeth out
- Give a distraction technique if necessary to overly anxious patients – for example, ask them to concentrate and count backwards from three hundred in 3s in their mind once the trays are in place (so 300, 297, 294, 291, and so on)

During the procedure, the dental nurse should also remain calm and in control of the situation. Make encouraging comments throughout ("you're doing really well", "we've nearly finished now", "well done", and so on).

Once the impressions are removed, help the patient to have a rinse and then check and remove any extra-oral impression material from their facial area – never send the patient away looking a mess. Also check if any impression tags are stuck between their teeth, and provide floss for the patient to dislodge it. Congratulate them on 'surviving' the ordeal and reiterate how well they did.

## CONSTRUCTING BLEACHING TRAYS

Bleaching trays, mouth guards, and vacuum formed retainers are constructed in a similar process to each other, the difference being the material used for each one. The technique used to construct bleaching trays is described. These are devices made for patients to use at home when carrying out tooth whitening (see Chapter 12). Mouth guards are worn by patients who have a bruxing habit (tooth clenching and grinding habit) that is causing tooth wear and/or tooth fracture, or jaw joint discomfort, and vacuum formed retainers are the gum shield-type retainers worn by patients after completing a course of orthodontic treatment (see Chapter 11).

Each device is made by pulling a warmed sheet of varying thickness EVA tray material (Figure 13.18) over a stone model of the patient's dental arch, which is then sucked tightly


**Figure 13.18** EVA tray material pack

onto the model under vacuum. Bleaching trays are made from very thin EVA sheets, while orthodontic retainers and mouth guards are constructed from thicker materials.

Once the tray has been removed from the model and carefully trimmed, a unique device is produced which is a perfect fit over the patient's own teeth. As the fit is so accurate, it cannot be placed into the mouth in any but the correct position (so it is easy for the patient to wear), it fits tightly but comfortably onto the teeth (so it does not fall out or become loose), and the material used is transparent so the device is not obvious.

An example of a vacuum machine used for the tray construction is shown in Figure 13.19.

The technique of producing the bleaching tray is as follows:

- The stone models of the dental arches to be bleached are provided by the laboratory, or cast up on site
- They are trimmed to remove the sulci areas, and upper models have the palate removed or a hole placed through so that the suction under vacuum can be applied to all sides of the model
- The teeth to be bleached (this varies between patients) have a spacer material present on the labial surfaces, so that a well is formed during tray construction for the application of the bleaching gel – the spacer in the images used is blue wax
- The model is placed on the base of the machine and a sheet of EVA loaded and locked into the tray reservoir above it (Figure 13.20)
- The heater above the material is switched on to warm the sheet – it is ready to be pulled over the model when the warmed sheet hangs about 1.5 cm below the reservoir (Figure 13.21)
- The tray reservoir is pulled sharply down to the bottom of the machine so that it lies over the model, and the vacuum is switched on immediately (the heater can be switched off at this point)
- The suction produced pulls the sheet tightly over the model to produce the tray – the vacuum should be left to run for a minimum of 30 s


**Figure 13.19** Example of a vacuum tray machine

**Figure 13.20** Machine loaded with model and tray material

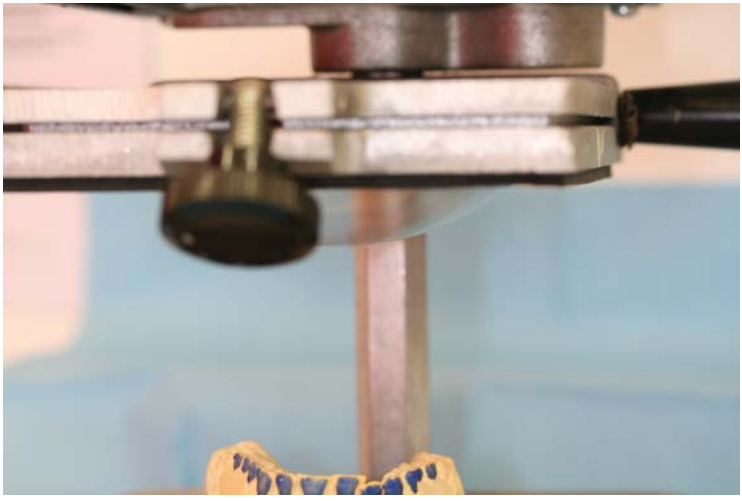


**Figure 13.21** Warmed EVA sheet ready for use

- Once the construction is complete, the machine is switched off and the model and tray are left to cool before handling
- Bleaching trays are carefully trimmed to follow the gingival line of the teeth, producing a scalloped edge (Figure 13.22)
- Orthodontic retainers and mouth guards are trimmed to leave a 2 mm extension beyond the gingival margins, so that the tray edge lies on the gingivae
- The trimmed edges are smoothed to avoid any soft tissue trauma – an emery board or similar file is ideal

**Figure 13.22** Bleaching tray trimmed and ready for use

## INTRA- AND EXTRA-ORAL PHOTOGRAPHY

Photographs are an important diagnostic and assessment tool for the clinician, as well as being a powerful method of convincing patients that a dental problem exists or of showing them the before and after appearance of suggested dental treatments. Digital images in particular are extremely useful when a second opinion is required about a case (especially potentially suspicious soft tissue lesions), as they can be securely emailed to a specialist. Away from the hospital environment, photographs are used a great deal to assist in orthodontic assessments and to provide before and after views once orthodontic treatment has been completed. A suitably trained dental nurse can be tasked to take both intra- and extra-oral photographs for these purposes.

Old style clinical photography involved the use of 'instamatic' type cameras, which produced a hard-copy 'polaroid' image within a few minutes. Digital imagery produces instant images without the need for film, and these can be loaded directly onto a computer and also downloaded as a hard copy if required. Once on the computer screen, they can be 'zoomed in' so that the image (or a section of it) can be enlarged, although the clarity of the picture deteriorates after a certain point.

An example of a suitable camera and attachments for clinical photography is shown in Figure 13.23.

The particular features of the camera and its potential uses are as follows:

- The camera body has interchangeable lenses, the one required for intra-oral (close up) photography is a macro lens


**Figure 13.23** Digital camera and ring flash

- The ring flash shown provides sufficient diffuse light directly at the object, rather than a bright burst of intense light in the surroundings as produced by an ordinary flash – it is simply screwed onto the camera body top and to the lens with a ring adapter
- The mode dial on top of the camera body allows the camera to automatically set itself to take images in the selected mode – so on this camera, close-up shots are taken with the dial set to a flower pictogram, while portrait images are taken with it set to the head pictogram
- The lens focus mode switch on the side of the lens is used to change between automatic focus (AF) and manual focus (MF) – usually AF is used, but when intra-oral images are taken looking into the mouth, sometimes the camera automatically focuses onto the lip or an anterior tooth, when the image required is more posterior – in these cases MF should be used and the lens focused manually by the operator onto the required focal point
- When taking intra-oral images, the soft tissues often need retracting either by hand, with a mouth mirror, or using specific lip retractors (Figure 13.24)
- Difficult to see areas such as the upper arch or lingual to the lower incisors can be viewed more easily with the use of oral mirrors (see Figure 13.24) – these are best run under cold water before use to prevent them misting while the patient breathes
- Figure 13.25 shows a typical portrait style view, while Figure 13.26 shows an intra-oral view of a prepared cavity in a tooth – the lens focus mode was set to MF to avoid the camera automatically focusing on the anterior teeth
- Images can be viewed immediately on the camera viewer or loaded onto the computer for a larger and more detailed image
- The memory card from the camera is removed and inserted into the correct entry port of a card reader device – an adapter may be necessary for some card types (Figure 13.27)
- A USB cable connects the card reader to the computer and the images are present in the 'removable disk device' option – they can then be uploaded *en masse* as a file to the computer, or individually as a JPEG
- As the images are accessible immediately, any that require retakes can be carried out while the patient is still present

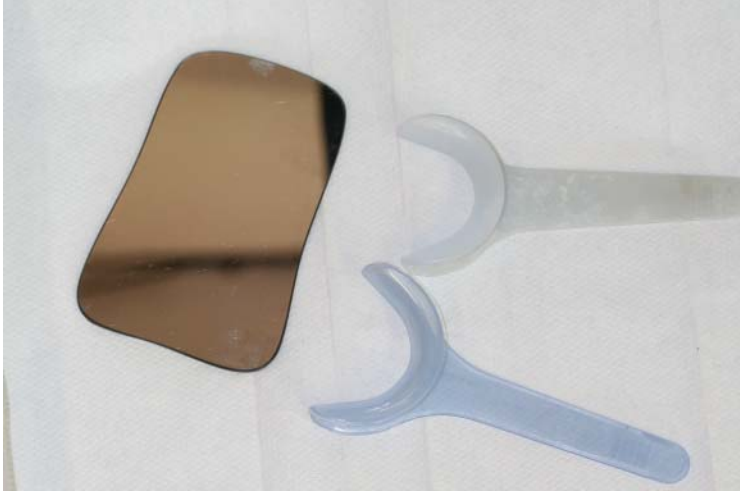


**Figure 13.24** Lip retractors and intra-oral mirror

**Figure 13.25** Portrait view

**Figure 13.26** Intra-oral view

## REMOVING SUTURES

Sutures are used to close a surgical site and hold the edges of a flap of soft tissue in position while the tissues heal, after surgery or trauma. Once the site has been checked by the dentist to ensure that full healing has occurred without any inflammation or infection present, the sutures can be carefully removed by a suitably trained dental nurse.

The procedure is often time consuming because care must be taken not to pull the healed surgical area as it will hurt the patient, and often there are several sutures to be removed.


**Figure 13.27** Examples of memory card readers and adapters

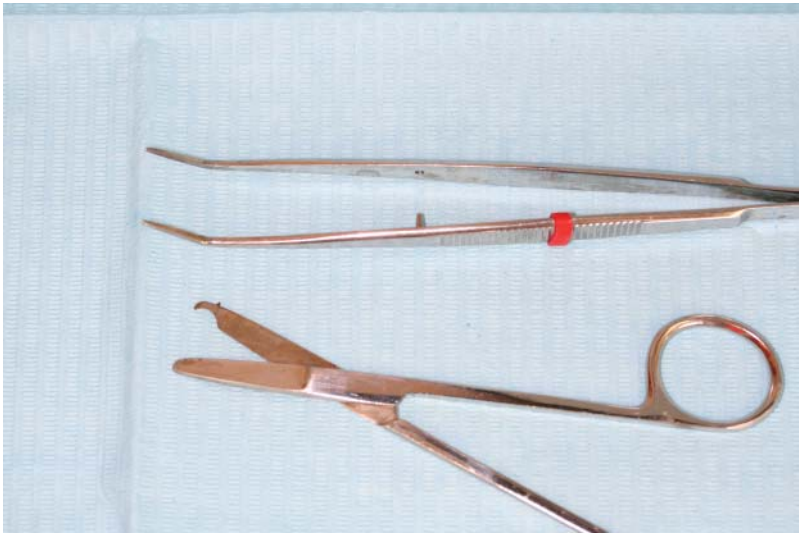


**Figure 13.28** Suture removal instruments

The sterile instruments required for suture removal are a mouth mirror, a pair of college tweezers and a pair of suture removal scissors (Figure 13.28). The scissors have a half-moon cut out of one blade so that the suture loop can be located here and held while being cut (Figure 13.29) – with an ordinary pair of scissors the loop would ride along the blade during cutting and pull uncomfortably on the wound.

**Figure 13.29** Holding suture end taut while cutting through the loop

The technique of suture removal is as follows:

- The dental nurse and the patient wear appropriate personal protective equipment
- Angle the dental chair and light to provide easy access to the sutures
- Use the mouth mirror to retract soft tissues if necessary – sometimes a second dental nurse may be required to carry this out when the sutures lie posteriorly
- Remove any food debris from the sutures with a small bore aspirator if necessary
- Count the number of sutures present and check with the procedure notes that they tally – if not, ask the patients if they were aware of losing any sutures (black braided silk is often used and may appear as a piece of black cotton to the patient) and refer back to the dentist for advice
- Gently find and hold one tied end of the suture with the tweezers, and then pull to hold it taut
- This should lift the top of the suture loop off the soft tissues, allowing the suture scissors to be placed beneath it with the cut out blade closest to the surgical tissues
- The suture loop needs to be located in the half-moon cut out of the blade so that the suture thread remains in place during cutting
- When correctly positioned, make the cut while holding the suture end with the tweezers
- Once cut through completely, the suture is removed from the mouth and placed on a tissue
- Repeat the process for all the sutures
- Count the number removed again, and then check that each one has been fully removed – they should each appear as a cut loop of thread with a knot and two tied ends present
- If any problems occur, seek the advice of the dentist – do not undertake any further tasks than the training allows

## Post-operative advice

The patient should be advised to continue hot salt water mouth washes for the next few days to assist the area to heal completely now that the sutures have been removed. They can carry out their routine oral hygiene techniques in this area without fear of catching the sutures, and they can eat and drink as normal. They should not touch the area with their fingers, as they may introduce infection.

# Assessment sheet

Example of an impression taking assessment sheet

| | |
|---|---|
| PATIENT IDENTIFIER | 1963 |
| DATE | 4th February 2014 |
| REASON FOR IMPRESSION(S) | Upper tooth whitening tray |
| MATERIALS USED | Alginate and water |
| TRAY(S) USED | Upper boxed single use tray – perforated |
| EQUIPMENT AND OTHER MATERIALS USED | Mixing bowl, spatula, water measure and scoop<br>Tray handle, disinfection and packaging items |
| MIX DETAILS AND TRAY LOADING | Smooth mix with no residual powder<br>Tray fully loaded from posterior edge forward, with full coverage and no excess material |
| ANY COMPLICATIONS | Pt wary of gagging, therefore nervous but compliant |
| QUALITY OF IMPRESSION | Correctly set throughout on removal, no air blows or defects<br>Full arch recorded |
| ASSESSED BY | CH |
| POST-OPERATIVE CARE GIVEN | Pt congratulated<br>Assisted with providing mouth rinse and carried out removal of material from around pt lips |
| DISINFECTION AND PACKAGING DETAILS | Rinsed in dirty sink<br>Immersed in impression disinfectant solution for 10 minutes<br>Rinsed and wrapped in damp gauze<br>Sealed in air tight bag with completed laboratory docket, marked as 'disinfected' |

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| | |
|---|---|
| SATISFACTORY OR NOT YET SATISFACTORY | Satisfactory |
| NOTES | Fully prepared for procedure<br>Good communication with pt throughout<br>Good mixing and loading technique<br>Correctly determined when impression had set<br>Removed without tearing impression<br>Good pt care afterwards<br>Correct disinfection and packaging carried out |

Example of a suture removal assessment sheet

| | |
|---|---|
| PATIENT IDENTIFIER | 1745 |
| DATE | 12th January 2014 |
| PREVIOUS SURGICAL PROCEDURE | Surgical extraction of grossly carious UR6 (16)<br>Flap raised |
| SITE CHECKED BY | CH |
| INSTRUMENTS SET OUT | College tweezers, mouth mirror<br>Suture scissors |
| NUMBER AND TYPE OF SUTURES | 3 black braided silk |
| PRESENTATION AT ROS APPOINTMENT | Site healed, no inflammation present<br>Some food debris on suture ends |
| NOTES OF ROS PROCEDURE | Sutures aspirated with narrow bore to remove food debris and make ends clear<br>End of each suture found and gently held taut while sutures cut and removed<br>Assisted by second nurse to retract right cheek |
| ANY COMPLICATIONS | None once retraction assistance provided |
| POST-OPERATIVE INSTRUCTIONS GIVEN | Pt told to carry out HSWMW again today to prevent soreness<br>Pt told to carry out routine OHI in the area from now, and return if any problems before the pre-set review appointment next month |

| | |
|---|---|
| ASSESSED BY | CH |
| SATISFACTORY OR NOT YET SATISFACTORY | Satisfactory |
| NOTES | No problems with set up<br>Accurate observation of surgical area re; healing<br>Handled instruments competently and realised assistance with retraction was required<br>Did not proceed with ROS until happy with retraction and visibility |

# Glossary of terms

**Abrasion cavity** a self-inflicted worn area produced at the neck of a tooth by over-vigorous toothbrushing

**Acid etch** an acidic material used in dentistry on the enamel of a tooth to chemically roughen it, allowing greater adhesion of some fillings and cements

**Acute infection** an infection of sudden onset, and therefore associated with pain and swelling

**Aesthetics** relating to a pleasing appearance, as in the aesthetics of a veneer for instance

**Aligners** a set of pre-formed, gum shield-like orthodontic devices which are worn sequentially to gradually allow tooth movement to occur, resulting in well-aligned dental arches

**Amalgam** a malleable filling material used to fill cavities in posterior teeth, and composed of various metal powders mixed with liquid mercury

**Apex locator** an electronic device used during root treatment to determine the full length of a root canal, by giving off a signal when the apex has been located

**Apicectomy** the surgical removal of a root apex and any associated pathology, and involving access to the root via the jaw bone

**Articulating paper** thin carbon paper used to detect high spots on new restorations, by being placed between the teeth and leaving coloured marks when the patient occludes

**Articulator** a three-dimensional jig device that mimics occlusion and jaw movements when a set of study casts are accurately placed within

**Bitewing radiograph** a posterior intra-oral radiographic view, taken to show interdental caries or restoration overhangs

**Bonding** the technique of 'glueing' the brackets and tubes of a fixed orthodontic appliance to the patient's teeth using special adhesive dental materials

**Bone resorption** the natural process that occurs to the jaw bones after tooth extraction, so that a smooth ridge contour is produced

**Bridge** a dental device used to replace a missing tooth (or teeth) by the construction and insertion of a device made up of several crowns (units) joined together in a single span

**Bruxism** the habitual clenching and grinding of the teeth, often causing excessive tooth wear or tooth fracture

**Calculus** minerlised deposits of plaque that form at the gingival margins causing inflammation, it is also referred to as tartar

**Caries** a bacterial infection of the hard tissues of the teeth causing cavities, also referred to as tooth decay in lay terms

**Cephalograph** a specialist radiographic view used mainly in orthodontics to determine the severity of a patient's jaw discrepancies

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**Chronic infection** an infection of very slow but persistent onset, and therefore usually painless

**Composite** a malleable filling material used to fill cavities in anterior and posterior teeth, and which gives a tooth-like appearance to the completed filling

**Conscious sedation** an anxiety control technique using the administration of drugs to relax the patient sufficiently for treatment to proceed, while they remain conscious (awake) throughout the procedure

**Crown** a dental device used to cover the whole of a tooth with a pre-constructed 'cap' made of precious metals or porcelain, to strengthen the remaining tooth structure or to improve the aesthetics

**Demineralisation** the action of acids on the tooth enamel to produce weakened areas that are more prone to carious attack

**Dental impression** a device used to record the patient's tooth positions in the dental arch using an impression material in a tray, so that the set material remains accurate while a cast (study model) is made

**Dental pantomograph (DPT)** a radiographic view taken to show all of the teeth and their surrounding bony structures in one image, and used in orthodontics and complicated case diagnoses

**Dentine** the inner living tissue forming the bulk of the tooth structure, it contains nerve endings and therefore allows sensation in the tooth

**Disclosing tablet** a coloured tablet of vegetable dye which stains plaque when chewed in the mouth; it is used during oral hygiene instruction to show patients where their plaque has accummulated and to assist them in its full removal

**Distal surface** the surface of any tooth which lies furthest away from the midline of the dental arch (the 'back' of the tooth)

**Edentulous** the condition of having no natural teeth present

**Enamel** the outer surface of the erupted crown of a tooth, it is a mineralised, non-living tissue

**Extended duties** in the United Kingdom, those additional duties that may be performed by a dental nurse following appropriate and recorded training, over and above those skills acquired at basic certification

**Extraction** of a tooth, the procedure of permanently removing a tooth from its socket

**Fissure** a natural anatomical cleft in the occlusal surface of a tooth, between the cusps

**Fissure sealant** a resin-like material used to seal over the tooth fissures and prevent food debris from lodging there and causing cavities

**Fluoride** a compound of the chemical fluorine which is added to oral health products (tooth paste, mouth wash, and so on) to help prevent dental cavities from forming in the teeth

**Gingival crevice** a 2mm deep crevice around the necks of all healthy teeth, where plaque accumulates when oral hygiene standards are poor

**Gingival margin** the edge of a restoration (such as a crown) that lies at the gingival crevice

**Gingivitis** inflammation of the gingivae, or gums

**Glass ionomer** a malleable dental material which can be used to fill cavities or cement items such as crowns, veneers, and orthodontic brackets onto the teeth

**Gutta percha point** a natural rubber material used to root fill a tooth, and provided in various length and diameter points

**Haemostasis** the arrest of blood flow in an area, especially after tooth extraction

**Immediate replacement denture** a denture which is inserted at the time of tooth extraction, to replace missing teeth immediately

**Implant** a threaded titanium cylinder which is surgically screwed into the jaw bone to support an artificial tooth, teeth, or a denture; it is a method of tooth replacement

**Inlay** a solid dental device used to close a cavity in a tooth, using a material such as gold or porcelain and made out of the mouth by a technician

**Intensifying screen** a device used within extra-oral radiographic cassettes to reduce x-ray exposure to the patient

**Interdental area** the area at the point where two adjacent teeth touch together

**Intra-oral radiograph** one that is exposed to x-rays while within the patient's mouth

**Labial surface** the outer surface of an anterior tooth that lies against the lips

**Lens focus mode switch** a control button on a camera which allows the operator to choose between automatic focus (controlled by the camera) and manual focus (controlled by the operator) when taking intra- and extra-oral dental images

**Lingual surface** the inner surface of any lower tooth that lies against the tongue

**Lining** a material used in the base of a cavity before filling, to protect the underlying pulp tissue

**Luting cement** a cement mixed to a creamy consistency and used as an adhesive in crown and bridge cases

**Malalignment** the uneven, out-of-line positions of teeth in a dental arch, often caused by crowding

**Mastication** the correct term for the act of chewing of food

**Matrix band** a thin strip of metal or acetate used in a holder to separate adjacent teeth during filling

**Mesial surface** the surface of any tooth which lies closest to the midline of the dental arch (the 'front' of the tooth)

**Minor oral surgery** a variety of surgical procedures carried out in the mouth which do not necessitate hospital admission, and which are usually carried out under local anaesthesia

**Mode dial** a control dial on a camera which can be altered by the operator for different types of photographic view (portrait, landscape, close-up, action, and so on) which allows the camera to automatically set itself to take the ideal image for that particular setting

**Moisture control** the act of removing fluid contamination from the oral cavity during dental procedures, often involving the use of suction equipment and absorbent materials

**Non-milk extrinsic sugars** those sugars other than lactose which have been added to foods and drinks during food processing, and that are responsible for causing tooth decay

**Non-vital tooth** one that has died

**Occlusal surface** the biting surface of a posterior tooth

**Occlusion** the tooth positions achieved when the jaws are closed together and the upper and lower teeth are contacting

**Overdenture** a denture constructed to attach to and fit over the top of implant abutments

**Periapical radiograph** an anterior or posterior radiographic view, taken to show a full tooth including its root and the bone immediately surrounding it

**Periodontal disease** an infection of the supporting structures of a tooth in its socket, by one of several bacterial microorganisms

**Periodontal ligament** the tough connective tissue that holds a tooth in its socket

**Plaque** a sticky film of food debris and bacteria (biofilm) that forms on the teeth causing caries and gingivitis if not removed

**Plaque index** a numerical score given to the presence of plaque in the patient's mouth at the time of checking, which is used to help monitor their oral hygiene levels before, during, and after treatment

**Pulp chamber** the inner hollow chamber of a tooth, containing nerve tissue and blood vessels (pulp)

**Pulpectomy** the removal of the whole tooth pulp from the pulp chamber; it is also referred to as root canal treatment or root canal therapy

**Pulp exposure** the breaching of the pulp chamber and exposing its contents to the oral cavity

**Pulpotomy** the removal of the pulp tissue from the top of the pulp chamber only, leaving that in the root of the tooth intact

**Pulse oximeter** a machine used to help monitor a patient during conscious sedation therapy, which records their oxygen saturation and pulse, and sometimes their blood pressure

**Refined sugar** a sugar not naturally present in a food but added during manufacture, and highly cariogenic

**Root apex** the very tip of a tooth root, where nerves and blood vessels enter and leave the tooth

**Rubber dam** a sheet of rubbery material used to isolate a tooth during dental procedures to provide good moisture control

**Saliva** the watery fluid naturally produced by the salivary glands and emptied into the oral cavity to provide lubrication, amongst other functions

**Scaler** an instrument used to remove calculus from teeth and roots

**Short-term orthodontics** a type of orthodontic treatment carried out for cosmetic reasons and usually only involving the anterior teeth, which can be completed in a much shorter time frame than conventional orthodontics

**Stagnation area** any area in the oral cavity that allows the accumulation of plaque to occur, either occuring naturally such as the fissures of the teeth, or such as overhanging filling edges

**Stock tray** a plastic or metal standard shaped tray used for taking initial impressions or study model casts

**Supine** lying horizontal, as in the usual working position of the dental chair during procedures such as restorations

**Suture** the correct medical term for a 'stitch' – a piece of tied material (such as silk) which is used to hold the cut ends of a wound together while tissue healing takes place

**Vasoconstrictor** a chemical added to local anaesthetic solutions to prolong anaesthesia by constricting the surrounding blood vessels

**Veneer** a dental device used as a 'false front' to a tooth, usually to hide discolouration or to alter the shape of a tooth

**X-ray cassette** a specialised case containing intensifying screens, used for extra-oral radiography such as orthopantomographs

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