

Anesthesia in Day Care Surgery

M. M. Begani
Dheeraj V. Mulchandani
Shagufta Choudhary
Editors

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*I would like to first and foremost dedicate this book to my mentor, the late **Shri. Dr. P. K. Jhavar**, who always encouraged me to be an academic person and trained me to be an independent surgeon.*

*My parents, **Smt Manik Devi** and **Shri Manikchand Begani**, and my brother **Jaichandlal** who always wished me to be a good doctor and a successful and kind surgeon.*

*My wife, **Naina**, and my children, **Sonali** and **Abhishek**, who missed me during my early career but nevertheless supported me through everything to see me become what I am today.*

To all my students and trainee doctors who always kept me updated and on my toes.

*To **Dr. Dheeraj** and **Dr. Shagufta**, who worked hard and long to complete the book with their able editing skills. They put aside a lot of their time and pushed all along to get this done well and done in time.*

Lastly, to all my patients who have bravely fought through all the diseases to teach us something new every day in order to build me up to what I have achieved today.

M. M. Begani

Foreword I



Successful day surgery depends on teamwork across the patient pathway from the surgeon, anaesthetist and surgeon. Day surgery is not new and is possible to achieve, using a large variety of anaesthetic methods, both old and new. However, there is no doubt that the newer agents we now have available make day surgery possible for an increasing number of longer and more invasive procedures and for patients with more comorbidities.

However, the skill of the anaesthetist is vital in ensuring that the patient is prepared, anaesthetised but not over-dosed with the chosen anaesthetic agent and provided with analgesia so they wake up comfortable and with minimal side effects such as postoperative nausea and vomiting. This is the true skill and requires the anaesthetist to change from obsolete practice used for inpatient anaesthesia. Once skilled in day surgery anaesthesia, the anaesthetist uses those skills in all his patients—all patients deserve the attention to detail required for day surgery.

Therefore, anaesthesia now plays a crucial role in day surgery, and this book is a timely addition to the available textbooks on this topic.

Ian Jackson
Immediate Past President
International Association for Ambulatory Surgery
Past President, British Association of Day Surgery
London, UK

Foreword II



Ambulatory surgery is one of the few win-win medical activities, meaning it is advantageous to both patient and organisation in all the different aspects of its management: safety, quality, efficiency and sustainability.

Uncountable scientific works have already demonstrated at least equal safety for numerous surgical procedures performed in the setting of ambulatory surgery (AS). This refers to expected and non-expected, immediate and late medical complications. In fact, the number of ambulatory surgical procedures accounts for more than 75% of all non-urgent surgeries performed in developed countries like those of Northern Europe and the United States. This results, of course, in high savings for health care systems but also on the availability of more surgical hospital beds and faster recovery of surgical waiting lists.

General surgery, urology, gynaecology, orthopaedic, ophthalmic, dental and ENT surgical specialities have all developed minimally invasive techniques that cause less tissue trauma and pain that allow better and faster control of all the variables that are involved on a safe discharge from the AS units. More and more procedures are included each year in the “basket” of AS in face of this evolution.

Anaesthesia protocols for AS must always target to quick recovery of preoperative status at a minimum imbalance of the hemodynamic, respiratory and neurologic functions of the patient. Selected drugs must be of rapid metabolism/elimination and be easily titrated or antagonized. Pain and PONV are the main concerns that guide the clinical conduct of the anaesthesiologist. The cornerstone of a successful AS programme is patient selection and patient/caregiver education. Focus must always be on the patient himself and not the surgical procedure that he is being submitted. It is of fundamental importance that a thorough preoperative evaluation includes not only the clinical but also the social aspects of patient’s normal daily life. Postoperative recovery and rehabilitation strategies should be, as early as possible discussed, understood and consented by patient and caregiver.

Expected level of pain or postoperative nausea and vomiting (PONV), for example, should be in the mind of every member of the multidisciplinary surgical team, as soon as surgical and anaesthetic technique is decided. Severe pain and PONV are

among the most common causes of late discharge, unexpected patient admission and readmission after discharge home and should be always avoided as they can trigger other unwanted complications as chronic pain and thrombosis.

Every AS unit must have well-defined discharge criteria and some kind of post-operative quality control checkout. Phone calls at 24–48 h can be a useful tool, as it may identify early signs of morbidity. Anonymous enquiries will also have an important role in defining what different actions may be undertaken to improve the organization's efficiency and patient satisfaction.

This book will bring you not only the highlights of many of these topics but a deeper insight to details that make a big difference when you want excellence in your clinical practice. This will be noticed not only on fewer complications but also on increased patient and staff satisfaction.

Congratulations to Professor Begani for this important initiative!

Vicente Vieira
Anaesthesiologist
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Ambulatoria Board member and IAAS
General Assembly Member
Padova, Italy

Words of Appreciation

Congratulations to Dr Begani and his team, Dr Dheeraj and Dr Shagufta, for organizing the outstanding new manual *Anaesthesia for Day Case/Ambulatory Surgery*. The publication provides up-to date information on all aspects of ambulatory anaesthesia and surgery practice. Congratulations on this excellent endeavour.

Beverly K. Philip, MD—USA
President, IAAS

The *Handbook of anaesthesia in Day Care Surgery* is a very practical book, compiled by a surgeon who is, by his own experience, convinced of the great importance of the individual and personal approach of every single Day Care patient. The use of different anaesthetic methods focusing on the enhanced recovery of the Day Care patient, is basic in the concept of ambulatory surgery. Teamwork is the future in the spirit of James H. Nicoll.

Dr. Luc Van Outryve
General Surgery, Day Surgery
Treasurer IAAS
Belgium

Overall a very good book. Well compiled and informative. This should help everyone involved in day care surgery at all levels.

Dr. Girish Joshi
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About the Editors

M. M. Begani has been working at Bombay Hospital Institute of Medical Sciences, Mumbai, for the past 40 years. He completed his Master's in Surgery from Sardar Patel Medical College, Rajasthan (earlier known as Bikaner Medical College), and subsequently worked as a post-doctoral fellow at St. Mark's Hospital, UK. He has published many research papers on general surgery in reputed international journals, participated in many international scientific conferences and has been a guest editor for the *Bombay Hospital Journal* twice with special issues on day care surgery. He has received several international and national awards and his work experience surpasses thousands of surgeries. He is a member of many national and international scientific societies.

Dheeraj V. Mulchandani is currently a consultant general and laparoscopic surgeon at Abhishek Day Care Centre, Mumbai. Prior to this, he worked at P. D. Hinduja National Hospital and Medical Research Centre and at Saifee Hospital, both in Mumbai. He completed his Master's in Surgery at the University of Pune. He has published numerous research papers on general and bariatric surgery in reputed national and international journals. He is a member of several national and international medical societies.

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Introduction

Jai Jinendra!

My journey in local anaesthesia started in 1980 when the late Dr. K. K. Datey (Padma Vibhushan awardee)—eminent cardiologist of India—referred a 50-year-old male patient suffering from a massive hernia with an ejection fraction of only 25%. He came to our unit headed by the late Dr. P. K. Jhaver, my mentor and teacher, and told us that we have to operate this patient under local anaesthesia. We did the same and fortunately he tolerated the procedure well and had an uneventful recovery. The family was indebted to us and always remembered us on the holidays. I told Dr. Jhaver that if we could do such a massive hernia under local anaesthesia then why not try the same for other routine surgeries. Today, at my day care centre, we perform over 80% of all procedures under local anaesthesia. It only helped that I had done a 2-year rotating post in anaesthesia training before starting my career as a surgeon.

I feel that this handbook will be helpful to all surgical specialities as most modalities involving all regions of the body are covered. In developing countries, there are many small towns and villages where there is an acute shortage of anaesthetists. Performing surgeries in such remote locations could now be attempted under local anaesthesia provided the due precautions are taken. The situation is such that there are certain villages in India where there is just one anaesthetist catering to many surrounding villages. This handbook should play an important part of the healthcare scenario in such places.

In view of our current prime minister's vision of health for all by 2022, I feel that day care surgery is the only way forward to achieve this. The socioeconomic gains obtained by day care surgery are perfectly suited for developing countries to take advantage of this phenomenon.

With this handbook on anaesthesia for day care surgeries, especially since the focus is on almost all specialities possible in day care, the aim will be to empower the clinicians in their efforts to adapt to the latest trends and technology to make day care surgery possible in each and every situation and location. Our book with the point guidelines, along with expert advice and hugely experienced authors giving their in-depth knowledge on their respective fields of speciality, will surely form a platform through which new and old surgeons would find it easier to dive into local/regional anaesthesia for day care procedures and hopefully change the possibilities of the variety of cases that can be done under the ambulatory surgery umbrella.

I do wish to emphasize that this is merely a handbook and not a textbook on day care surgery. These are mere guidelines obtained by years of experience by the individual authors compiled into one easy-to-use and easy-to-understand handbook for the benefit of those willing to delve into the day care surgery space. Due caution is advised particularly with the selection of cases for ambulatory surgery and their predicted outcomes. Any new suggestions and critique will be welcomed not only by our editing team but by the authors themselves who were carefully selected keeping in mind their experience in day care and ambulatory surgery.

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Fast Track Recovery

1

Beverly K. Philip

The goal of ambulatory anaesthesia is to maximize the quality of patient care. We must provide anaesthesia with a smooth onset, good intraoperative conditions, and rapid recovery with minimal symptoms, culminating in our patient's return to normal function. "Fast tracking" embodies an enhanced, overall anaesthesia care and recovery process, focusing our efforts even more on the return to normal function as rapidly as possible. This requires the integration of preoperative, intraoperative and postoperative care elements.

1.1 Preoperative Issues

Patients' cooperation is essential in all stages of the ambulatory surgical experience, from preparation through recovery at home. Also, patients' expectations about what will happen must be appropriate so that they are satisfied with their care. This requires good preoperative and postoperative education. Education must address the patients' educational needs (what they want to know) and informational needs (what they want to know). The patient has become the focus of the ambulatory surgical experience, and should be invited to participate in all decisions that are not truly medical judgment issues.

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1.2 Choice of Maintenance Anaesthetic Agents

How can the choice of intraoperative agents contribute to the goals we want to achieve with fast tracking? Some general conclusions can be drawn. Both desflurane and sevoflurane show faster early and intermediate recovery and fewer side effects than isoflurane when used for maintenance. However, times to facility discharge were not significantly different; this may reflect the need to change recovery care protocols in order to actualize the drug differences. When the two newer volatile agents are compared with propofol maintenance for ambulatory anaesthesia, propofol infusion has slower recovery indices. In studies that compare desflurane with sevoflurane directly, there appear to be no significant recovery time differences between them for cases approximately 1-h duration. Remifentanyl infusion provides good hemodynamic and autonomic control without prolonging recovery, but increases risk of postoperative hyperalgesia. However, the use of opioid-neuromuscular blocker combination anaesthetics without a volatile appears to increase the risk of intra-operative awareness.

Using “better” agents only for the end of the anaesthetic is, in general, not effective. Giving 30 min of desflurane after 90 min isoflurane produces recovery indices that are indistinguishable from an isoflurane-only group. Computer simulations of this anaesthetic show that the low-solubility agent washes out promptly, and the remainder of anaesthetic elimination and clinical recovery are attributable to the residual isoflurane. A related observation has been made concerning the use of a propofol “sandwich” technique to reduce PONV. Propofol induction-isoflurane maintenance anaesthetics with the final 30 min of either propofol infusion or isoflurane have similar postoperative nausea/vomiting rates and similar levels of sedation. Monitored anaesthesia care (anaesthesiologist’s sedation) can successfully promote fast tracking if: the surgeon gives effective local anaesthesia or field block; side effects with sedation are less if the anaesthesiologist gives sedation and not general anaesthesia; and if both surgeon and patient understand that goal is sedation and not completely “out”. Interscalene regional anaesthesia for shoulder surgery can provide lower pain VAS scores, less nausea, and faster times to ambulation, fluids intake, and home readiness.

1.3 Pain and Nausea: Intertwined Challenges

The two major recovery challenges for ambulatory procedures are management of postoperative pain and management of postoperative nausea. For both, it is important to plan for recovery from the beginning of the anaesthetic.

Management of postoperative pain is best addressed by a multimodal approach. The cornerstone of fast-tracking pain control is the consistent use of pre- or intra-operative local infiltration and regional blocks. These can be used alone or as adjuncts to general techniques, and preferably with long-acting agents. Whenever possible, nonsteroidal anti-inflammatory analgesics should be given to improve analgesia, such as oral celecoxib preop or IV ketorolac given so that the drug will

be effective by the end of the operation. Operationally, small boluses of opioids such as fentanyl 25–50 µg should be given near the end of the operation to maximize their effect for postoperative pain management. It is also important to educate patients that the abolition of pain after surgery is not a realistic goal.

Nausea and vomiting [N/V] remains the most common reason for admission after ambulatory anaesthesia and surgery. It is a multifactorial problem, and therefore has no single solution. Each potential contributing cause should be assessed and addressed, with a systematic and cost-conscious approach.

N/V is affected by hydration and food intake. It is important to instruct patients about an appropriate duration of preoperative fasting. The American Society of Anaesthesiologists (ASA) recommends that most patients of all ages may have unlimited amounts of clear fluids until 2 h before surgery, human milk until 4 h, and nonhuman milk or light solids until 6 h. Patients who have disease processes that delay gastric emptying or have positional gastroesophageal reflux should continue to be treated with “full stomach” precautions and have a complete fast after midnight. At the Brigham and Women’s Hospital, we have administratively interpreted these recommendations to permit clear liquids until 4 h (2 + 2) preoperatively, and no solids after midnight; this permits us to maximize flexibility of the operating schedule.

Oral preoperative hydration is usually supplemented by intravenous fluid administration. Consider the patients’ 24-h fluid requirement in these assessments. ASA Post Anaesthesia Guidelines now recommend that patients should not be required to drink fluids before discharge. Do not push patients to eat solid foods in the ambulatory surgical facility. Over 35% of postoperative N/V occurs after discharge from the surgical facility, and often in patients who have not had symptoms before. Anecdotes from postop telephone contacts have suggested that the car ride home frequently precipitates N/V.

Another major factor in the control of N/V for ambulatory patients is the appropriate use of opioids. Literature suggests that the conventional use of 75–100 µg of fentanyl at the time of anaesthesia induction is ineffective for postoperative pain, because of the short duration of action of fentanyl at these doses. However, when compared with the peri-induction administration of ibuprofen PO or ketorolac IV, patients who received fentanyl experienced more postoperative pain and more postoperative nausea. These patients also required more rescue emetics, had longer times to ambulation and discharge readiness, and had more pain at home. Furthermore, the effects are dose related. The severity of nausea in PACU-2 has been shown to be proportional to the total fentanyl dose, and the efficacy of ondansetron or metoclopramide treatment is inversely proportional to the intraoperative fentanyl dose. Therefore, we recommend that the dose of opioids given to ambulatory surgery patients be limited to the amount that is needed after administering local/regional anaesthesia and nonsteroidal analgesics. These opioids should be given in small increments beginning near the end of the procedure, rather than peri-induction, to maximize analgesic benefit and minimize N/V.

Opioid alternatives should be considered. Both local anaesthetics and NSAIDs have been shown to reduce opioid dose and reduce the opioid side effects nausea

and vomiting. Beta-blockers can be used to address autonomic responses instead of opioids. They reduce anaesthesia drug requirements (MAC); in ambulatory patients, esmolol has been shown to decrease heart rate and BP response to intubation, hasten emergence, decrease postop analgesic requirement postop. Alpha-2 adrenergic agonists such as clonidine and dexmedetomidine can result in a limited (20%) but significant reduction in pain VAS after laparoscopic tubal ligation, but have uncertain impact on PONV and are long-acting; their benefits related to sedation with little respiratory depression have primarily been used for long cosmetic surgery. Low-dose ketamine 10–20 mg can reduce postoperative pain, and complementary pain control techniques such as acupuncture or TENS may also help. Long acting opioids should in general be avoided, to limit long acting side effects.

The first step in antiemetic therapy is to determine patient and surgical risk factors for PONV. Antiemetic drug prophylaxis should be considered for medium-high risk patients. A discussion of the pros and cons of antiemetic drugs can be found in the 2014 SAMBA “Consensus Guidelines for the Management of Postoperative Nausea and Vomiting”. The clinical application of this information is an incremental approach to PONV treatment based on effectiveness and cost. Routine antiemetics include dexamethasone 4 mg IV postinduction, ondansetron 4 mg preawakening, and preoperative transdermal scopolamine patch for patients with medium-high risk. Ephedrine 35–50 mg IM and droperidol 0.6–1.25 mg are highly effective; metoclopramide 20 mg IV may also be used. Serotonin antagonists such as ondansetron and dolasetron are useful as treatment drugs if they have not been given for prophylaxis; treatment doses appear to be 1/4 the prevention doses. Promethazine 6.25 mg is more sedating but can be used at that low dose for ambulatory patients postop if an additional antiemetic of another class is needed.

1.4 Recovery and Discharge

Recovery and discharge care can be enhanced by the use of routine orders, forms and checklists to reduce unnecessary work. Standardized, outcome-based recovery criteria should be used to assess and document readiness for both PACU Phase 1 (medical discharge) and Phase 2 (physical discharge). Formal scoring systems are also available—the Modified Aldrete Post Anaesthesia Recovery Score for Phase 1 and the Modified Post-Anaesthesia Discharge Scoring System for Phase 2. The final phase of ambulatory anaesthesia care is post discharge patient follow-up, to assess medical outcome and patient satisfaction. While major adverse outcomes are rare, minor side effects are common after ambulatory surgery and anaesthesia (86%). These side effects are not complications but rather occur commonly enough to be expected. Drowsiness is the most common effect persisting after discharge. Aches and sore throat are common in intubated patients. Headache and dizziness also occur, but nausea and vomiting after discharge are less common. Patients may take 2–3 days before being able to resume their usual activities. Information about these known side effects should be incorporated into the preoperative patient education and into an anaesthesia consent form.

A final factor is patient satisfaction. Postoperative patients have identified factors that determine satisfaction with Ambulatory Surgery care. #1 was Friendliness of staff, and #2 was Surgeon's postop visit in PACU—above all other issues.

When ambulatory care is provided in hospitals, freestanding surgery centres (ASCs) and offices, the quality of healthcare is important to many stakeholders. Specific quality indicators for ambulatory practice can be found in the ASA "Outcome-Indicators-For-Office-Based-And-Ambulatory-Surgery" and the Society for Ambulatory Anaesthesia/SAMBA Clinical Outcomes Registry (SCOR). In the USA, the national Centres for Medicare and Medicaid Services (CMS) has developed several quality initiatives that are integrated with the payment system. There are programs for physician quality and for inpatient hospital quality, outpatient hospital quality (including outpatient surgery), and ASC quality. Details of the CMS programs can be found at <https://www.cms.gov/Medicare/Medicare.html> → Quality Initiatives.



Dr. Beverly K. Philip is an anesthesiologist in Boston, Massachusetts and is affiliated with Brigham and Women's Hospital. She is the director for Ambulatory Anaesthesia as well as the director of the day surgery unit at her hospital.

She received her undergraduate degree from Queens College, City University of New York, N.Y., her medical degree from Upstate Medical Center, State University of New York, Syracuse, N.Y., and completed the anesthesia residency at the Peter Bent Brigham Hospital, Harvard Medical School, Boston, Mass. Dr. Philip's subspecialty focus is ambulatory anesthesia. Dr. Philip has published numerous research papers, review articles and book chapters on various aspects of ambulatory anesthesia science and practice, and she has spoken widely, nationally and internationally on the subject.



Innovations in Anaesthetic Techniques for Same-Day Surgery

2

Sunita Goel, Lia Michos, and Ashish Sinha

2.1 Introduction

The care for Same-Day Surgery (SDS) patients has become increasingly important for the twenty-first-century physician, especially anaesthesiologists and surgeons. With the advent of The Patient Protection and Affordable Care Act in the USA, physicians are being forced to adapt to a value-based care model that is putting emphasis on efficient, quality care. In parallel, hospitals are seeing a steady increase in outpatient surgeries. The American Hospital Association reports that outpatient surgeries in community hospitals own an approximate 60% share of the total surgical volume, up from 54% in 1992. Clearly, the need for Anaesthesiologists who can appropriately handle the SDS patient is essential.

The most effective SDS care plans take into careful consideration the preoperative, intraoperative, and postoperative periods. White et al. details key elements for each of these periods:

1. Preoperative Period
 - (a) Stabilize co-existing disease
 - (b) Minimize anxiety and discomfort
 - (c) Develop prophylactic measures to impede postoperative complications
 - (d) Ensure adequate rehydration

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2. Intraoperative Period
 - (a) Optimize anaesthetic technique to surgical condition with a focus on reduction of undesirable effects and rapid and most favourable recovery
 - (b) For postoperative pain control, utilize local anaesthesia methods such as wound infiltration, peripheral nerve blocks, and overall local anaesthesia instillation
 - (c) Employing a multimodal approach with analgesics and antiemetics is most effective in preventing complications
 - (d) Reduce operative complications by restricting such procedures as fluid overload and nasogastric tube insertions
3. Postoperative
 - (a) By implementing the fast-track approach for those patients who meet the criteria, there is increased potential for improved recovery time and surgical outcomes
 - (b) Reduce opioid exposure by introducing a well-designed non-opioid multimodal pain control approach postoperatively, with a focus on effectiveness, without delaying discharge or increasing risk for readmission
 - (c) Ensure early ambulation and promote rapid return to activities of daily living (ADLs) as part of the fast track standards

The following sections aim to explore the most recent innovations that optimize the anaesthetic care of the same-day surgery patient.

2.2 Neuromuscular Blockade

The steady increase in SDS cases has led to the prediction that more complex procedures requiring endotracheal intubation and neuromuscular blockade may be done in the outpatient setting. Current short and intermediate neuromuscular blocking agents (NMBA) used in SDS procedures include succinylcholine, mivacurium, cisatracurium, and rocuronium. These agents present with various complications such as succinylcholine-associated myalgia and postoperative residual curarization (PORC)-especially after the use of intermediate-acting agents. Thus, there is pressure to find a suitable NMBA that can be used in the SDS setting and:

1. Maximize patient safety.
2. Minimize comorbidities related to the neuromuscular block.
3. Speed recovery from the neuromuscular block (allowing for early extubation).
4. Optimize neuromuscular blockade for intubation and surgery duration.

Gantacurium, a fumarate compound, has been developed as an ultra-short acting, non-depolarizing neuromuscular blocker. The prospect of Gantacurium replacing Succinylcholine as an ultra-rapid neuromuscular blocking agent is promising. Gantacurium is metabolized via chemical degradation by either the adduction of cysteine or pH sensitive hydrolysis.

The inactivation via cysteine adduction has proven to be an effective mechanism for complete, rapid neuromuscular blockade reversal. Furthermore, Gantacurium possesses an extremely fast onset of action, 60–90s, and early studies suggest favourable hemodynamic profiles in comparison to mivacurium and succinylcholine.

CW002 is another fumarate compound that yields similar pharmacodynamic and pharmacokinetic properties as Gantacurium. The difference being the CW002 length of action is intermediate and it possesses higher potency.

2.3 Neuromuscular Blockade Reversal: Sugammadex

Another approach to speedy recovery from neuromuscular blockade (NMB) is to utilize an NMB reversal agent. Currently, neostigmine and edrophonium are the most commonly utilized reversal agents. These are anticholinesterases that aim to increase the levels of acetylcholine at the neuromuscular junction and out-compete the blocking agent. Although widely used, they can cause a variety of parasympathetic mediated side effects like gastrointestinal hypermobility and cardiovascular issues. Consequently, there has been a push to develop reversal agents with more favourable drug profiles.

Sugammadex, a α -cyclodextrin, is a selective relaxant binding agent, for rocuronium and vecuronium, that rapidly encapsulates these steroidal NMBAs and prevents their binding to acetylcholine receptors. Various studies have demonstrated that Sugammadex safely and effectively reversed rocuronium and vecuronium-induced neuromuscular blockade, even at the level of a deep block. Further, Sugammadex reversed patients have demonstrated better post-operative oxygenation levels, and one case study reported safe use in a 23-year-old woman with Wolff-Parkinson White syndrome, an atrioventricular-conduction pathology where neostigmine use would be contraindicated. The use of Sugammadex is particularly attractive for the SDS patient where a rapid, complete recovery is necessary for discharge.

2.4 Managing both Post-operative and Post-discharge Nausea and Vomiting (PONV and PDNV, Respectively): Novel Approaches to Management

PONV and PDNV is a major side effect of general anaesthesia and opioid usage and continues to negatively influence patient satisfaction scores. Additionally, the continual push toward cost-effective, quality care has stimulated physicians to seek alternative management for PONV and PDNV. Aromatherapy has been presented as a novel option for the management and reduction of PONV. Hunt et al. conducted a study where patients experiencing PONV were given a gauze soaked with an aromatherapy agent. Compared to the patients given saline or alcohol, patients given the aromatherapy agent experienced a significant reduction in nausea and requested fewer antiemetics. As further studies are conducted, aromatherapy may present as a

safe method to reduce PONV or PDNV, expedite SDS discharge, and improve patient satisfaction.

In parallel to aromatherapy treatment, acustimulation has been investigated as a possible therapy to reduce PONV. According to the Susan G. Komen Cancer Foundation, acustimulation involves applying mild electrical stimulation to acupuncture points. A small number of studies have explored the effects of acustimulation on the incidence of PONV. In one prospective, observer-blind, randomized control trial, women undergoing vaginal hysterectomy were subjected to 24 h acustimulation. Women in the acustimulation group experienced significantly lower incidence in PONV compared to the Sham group, 33% vs. 63% ($p < 0.001$), and there was also a 39% reduced need for rescue therapy in the acustimulation group vs. 61% ($p = 0.001$) in the Sham group. Ertas et al. did a similar study in female patients undergoing gynaecological laparoscopy. Women at a high risk for PONV given acustimulation therapy reported lower PONV scores, fewer doses of antiemetics, and significantly higher patient satisfaction scores compared to women given the Sham treatment. Although acustimulation is considered an alternative mode of therapy to control PONV/PDNV, its use needs to be considered as a viable approach to improve SDS outcomes.

2.5 Spinal Anaesthesia in the SDS Patient

Spinal anaesthesia in the SDS patient has been cautiously explored due to the risk of transient neurologic symptoms, post-operative urinary retention, motor blockade, and unplanned hospital admission. Ideally, SDS spinal anaesthetics will minimize side effects; possess rapid onset, and a short duration. The short-acting spinal anaesthetics include chloroprocaine and prilocaine. Although not in the United States, chloroprocaine and prilocaine have been indicated and used for spinal anaesthesia throughout Europe. Chloroprocaine is indicated for short surgeries, <30 min, and prilocaine is indicated for longer ambulatory procedures. As more clinical trials are done, these short-acting spinal anaesthetics may provide another route for the optimization of SDS patient care.

2.6 Ambulatory Care Pain Specialist: A New Focus in SDS Anaesthesia

The advent of an ambulatory care pain specialist is a relatively new idea for the care of SDS patients. These physicians assume their traditional role as operating room anaesthesiologists; however, they serve as a specialist to optimize the care for SDS patients. Namely,

1. Managing preoperative chronic pain
2. Reduction of opioid exposure
3. Prevention of hyperalgesia, and
4. Minimization of side effects and risks from nonopioids

Pain has been well-documented to have a very complex aetiology. Besides the obvious delay in return to normal function, inadequate pain control suspends hospital discharge, increases susceptibility to nosocomial infections, and is a major determinant for hospital readmissions. For the Ambulatory Care Pain Specialist, identification of high-risk patients (those with a high baseline for chronic pain, high levels of anxiety, females, younger patients) and development of a preoperative pain history is extremely useful. Questions such as the site of pain, the frequency of pain, duration of pain, current medications and dosages for pain, substance abuse history, depression and anxiety, sleep issues, and patient expectations are all critical for developing an effective care plan. Thus, an extensive and accurate preoperative history facilitates appropriate management of preoperative, intraoperative, and postoperative pain.

According to the ASA (American Society of Anaesthesiologists) Task Force for managing acute pain, a multimodal approach to pain control is crucial for expedient discharge from the ambulatory setting. The American Society of Anaesthesiologists details that regional block, in conjunction with Cox-2 inhibitors, non-selective NSAIDs, and acetaminophen are an effective regimen. These guidelines target the goals for how Ambulatory Care Pain Specialists can optimize the care for their SDS patients.

Kappa–Opioid Agonists

A reduction in opioid exposure originates from the numerous side-effects from opioid administration—mainly euphoria, sedation, respiratory depression, nausea, higher mean costs, and greater length of stay. Kappa-opioid receptors are located both centrally and peripherally and modulate anti nociceptive activity. Recent drug development has targeted peripheral activation in an attempt to mitigate centrally mediated side effects. Currently, two kappa-opioid drugs are being tested for their efficacy, CR665 and CR845. CR665 was demonstrated to be effective in visceral pain management; however, 61.1% of patients reported central nervous system paraesthesia. CR845 showed minimal opioid-related side effects and effective analgesic activity for women undergoing laparoscopy. Further trials are still underway. With further drug development, kappa-opioid agonists may serve as another tool for SDS anaesthesiologists to effectively control post-operative pain.

As mentioned above, regional nerve blockade provides an alternative to traditional opioid-based analgesia and is being recommended by the American Society of Anaesthesiologists as a component of a multimodal pain regimen. Nerve block provides excellent post-operative analgesia and facilitates a faster discharge. Regional anaesthetic blocks in the SDS setting include but are not limited to paravertebral, lumbar plexus, ilioinguinal/iliohypogastric, transverse abdominis plane, femoral, and saphenous blocks.

2.7 Technology into the Future

As technology continues to advance, new devices are continually introduced into the anaesthetic environment.

Computer-Assisted Personalized Sedation (CAPS): SEDASYS

In the past decade, a new sedation delivery system has been developed and introduced called computer-assisted personalized sedation (CAPS). The system is intended for endoscopic procedures and utilizes a variety of patient monitors to deliver light to moderate propofol sedation. Since propofol has demonstrated improved recovery profiles—i.e. quicker return to baseline within 24 h—compared to traditional anxiolytic/analgesic regimens, propofol sedation has become desirable in the outpatient setting. The SEDASYS system—a semi-automated propofol delivery system for moderate sedation of ASA I and II patients—was one of the first CAPS devices approved for Upper and Lower GI Endoscopy procedures. Nonetheless, there was considerable concern over SEDASYS use—i.e. patients experiencing surgical complications that may need an immediate dose of propofol sedation. Further, there were concerns whether the SEDASYS system was really saving costs for hospital systems due to anaesthetic reimbursement protocols and the cost to run the system. As of March 2016, Johnson & Johnson withdrew the system from the market. If CAPS is aiming to facilitate larger, safe workloads for SDS Anaesthesiologists, studies need to be done to ensure that unanticipated anaesthetic or surgical complications can be properly handled.

Google Glass

Due to the physical arrangement of some operating rooms, anaesthesiologists have reported the inability to properly monitor vital signs, especially when performing procedures, administering drugs, or tending to cases in other rooms. With the push for new technology in the operating room, Google trialed its Google Glass technology, a head-mounted device that projects into one's field of view, for anaesthesiologists to monitor the vital signs of their patients. The results were promising, as no anaesthetists elected to remove the device, 90% of participants agreed the device was comfortable to wear, and 86% found the device easy to read. With the gradual increase in SDS volume and the increasing top-down pressure for anaesthesiologists to manage multiple outpatient cases, a technology that permits anaesthetic providers to safely monitor their patients is on the near horizon.

Conclusion

As hospitals continue to see an increase in same-day surgical volume, techniques that optimize efficient, cost-effective, quality care will become increasingly important. Anaesthetic techniques in the SDS setting aim to minimize side-effects that lead to longer hospital stays, increased readmissions and lower patient satisfaction scores. The prospect of an ultra-short acting NMBA is promising with the development of Gantacurium. Further, Sugammadex provides SDS Anaesthesiologists with a rapid and complete NMB reversal agent. Finally, as patient satisfaction scores become the focus of hospital reimbursements, a

holistic approach to patient care will continue to be emphasized by healthcare executives. Multimodal approaches to pain management, as well as the incorporation of new anaesthetic devices that maximize patient comfort and safety, will transform the standard of care protocol for SDS Anaesthesiologists.



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Ketorolac—A double blind controlled study," in February 2000, in Mumbai. She has published over 20 articles and is part of three books that are due for publication soon.



Saurabh Jain and Zimpu Mehta Jain

As physicians, we are often requested to assess a patient prior to a procedure. The purpose of a preoperative evaluation is to evaluate and to identify high risk patients before surgery. Better preparedness pre-operatively helps in faster recovery. It is important that the physician understand the risks associated with the planned surgery and should be able to relate these risks to the patient's underlying acute and chronic medical problems.

The goals of the pre-operative evaluation are to note the associated risk factors and to find out any occult medical condition, before it throws us a surprise and to suggest measures to minimize the perioperative risk.

The Pre-operative assessment includes

1. Detailed medical overview of medical records
2. Review of current physical status
3. Order additional tests/consultation required for surgical fitness.
4. Optimize the patient with regards to his coexisting medical condition.

Assessment of the patient is done by the following

1. *Medical history:*

Detailed medical history of the presenting complaints should be obtained. This should also include

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- (a) *Age*—It should be noted, though there is no age limit for day-care surgery.
- (b) *Exercise capacity*—assessment of exercise capacity helps to assess cardio pulmonary wellbeing. If the patient can climb four flights of stairs or brisk walk for 15 min or walk for 2 km, they have a good cardio-respiratory reserve.
- (c) *Medication used*—Complete list of current medications should be obtained. The patient should be asked to take their routine medications up to 2 h before the procedure with a sip of water.
- (d) *Personal history*—Should include history of alcohol consumption (special mention if it's above the permissible limits), smoking (quantification in pack-years). It's also worthwhile to mention about the usage of illicit drugs. Personal or family history of drug allergies or anaesthetic complications should be noted.
- (e) *Past surgeries/illnesses/chronic medical conditions*—It is often ignored but is actually an important aspect of pre-operative evaluation as these factors if not adequately managed keep on throwing surprises during the procedure.

2. *Physical examination:*

- (a) *ASA Status:* ASA grade is not a useful assessment for day surgery, patients with lower grades do no less than the better grades
- (b) *Vital signs:* Resting heart rate and blood pressure should be checked. Resting tachycardia raises a suspicion of any underlying infection, one should always look for hyperthermia or clinical signs suggesting infection. Such patients benefit with suitable antibiotic coverage prior to the procedure. A possibility of hyperthyroidism should be considered (if proptosis is noted). If confirmed by labs, these patients should be started on propranolol prior to the procedure, as this helps to reduce the risk of arrhythmias. Baseline oxygen saturation should be checked.

In general examination a note should be made of pallor, icterus, lymphadenopathy, calf tenderness etc.

- (c) *BMI:* Obese patients are definitely a higher risk and technically challenging, use of short-acting anaesthetics and early mobilization benefits a lot. Even morbid obesity is not considered a contraindication to day surgery.

3. *Lab evaluation*

Basic lab evaluation includes the following

- (a) CBC
- (b) G6PD levels
- (c) Renal function with electrolytes
- (d) Random blood glucose
- (e) Coagulation profile
- (f) Liver Function Test (in chronic alcoholics)
- (g) Pregnancy testing (in young females planning pregnancy or amenorrhea >1 month)
- (h) ECG

- (i) Chest radiograph
- (j) Pulmonary function test—(for asthmatic patient).

3.1 Optimization of the Patient with Co-Morbid Conditions

Patients with stable chronic medical conditions such as diabetes, asthma, or epilepsy are often better managed with minimal disruption to their daily routine as facilitated by day surgery.

Patients with unstable medical conditions such as unstable angina or labile diabetes are unlikely to be appropriate for day surgery. However, the question should be asked whether anything other than the most urgent surgery is appropriate in this patient group. If these patients do require urgent surgery, inpatient management is required for perioperative monitoring.

1. *Hypertension*

If systolic BP is persistently more than 160 mm of Hg, initiation or modification of antihypertensive medications is done. Calcium channel blockers like amlodipine or cilnidipine are agents of choice in drug naive patients. It is worthwhile to give these patients a low dose anxiolytic the night before surgery. Antihypertensive medications belonging to the class of Beta-blockers and calcium channel blockers can be given on the day of surgery, however angiotensin converting enzyme (ACE) inhibitors and angiotensin receptor blockers should be used with caution as they have an increased incidence of intraoperative hypotension.

2. *Diabetes Mellitus*

Anti-diabetic drugs should be withheld as the patient has to be in a fasting state prior to surgery. In patients with recently detected impaired blood sugar levels, it should be managed with short acting insulin like regular insulin or insulin analogues (Insulin Aspart & Lispro). Peri-operative HGT monitoring should be done and insulin should be administered to keep blood sugar levels below 150 mg%.

3. *Coronary Artery Disease*

Regular cardiac medication should be continued. As most day care surgeries present low bleeding risk, the current trend in day care procedures is to continue antiplatelet drugs throughout the perioperative period. Further, it is suggested that only if significant bleeding is expected, discontinuation of the medications should be done. Coverage, during this period, with blood thinners like low-molecular-weight heparins is not recommended.

If the patient has a low ejection fraction, it is advised to keep the patient in a negative fluid balance, this can be achieved by careful administration of diuretics pre-operatively, as the risk of hypotension always remains.

Infective Endocarditis prophylaxis should be given in patients having valvular heart disease.

4. *Hyper-reactive airways*

In conditions like Asthma and COPD, it is prudent to nebulise the patient with beta agonists like Salbutamol/Levosalbutamol and short acting steroids like Budesonide before the procedure. Pre-operative injectable deriphylline can be administered in cases where bronchospasm is anticipated intraoperatively.

Patients with active cough should be given antibiotics and antitussives to ideally make them cough free before surgery. Smoking cessation is advisable.

5. *Renal Impairment*

Baseline creatinine and patient's creatinine clearance should be calculated pre-operatively and the dosage of drugs should be appropriately adjusted. Patients on haemodialysis may continue with their routine HD schedule.

Nephrotoxic drugs and NSAIDs must be avoided in these patients.

6. *G6PD deficiency*

Only G6PD compliant drugs should be used if G6PD deficiency is documented.

7. *Epilepsy*

Anti-convulsant medication should be continued as per prescription.

8. *Liver Impairment*

Baseline LFTs should be checked and the dosage of drugs should be appropriately adjusted. Universal precautions should be maintained in chronic infective hepatitis. Bowels should be regularized and patients with cirrhosis should be given a lactulose-based laxative as a prophylaxis for hepatic encephalopathy.

Hepatotoxic drugs and alcohol must be avoided in these patients.

Conclusion

The advantages to the patient of a minimal hospital stay from the physician's viewpoint are as follows:

1. Patients with significant cardio-respiratory disease who might be unfit for a general anaesthetic, can undergo procedures and surgeries in local or loco regional anaesthesia.
2. Extensive investigation to assess medical fitness in the elderly population would be unnecessary when minimal anaesthesia is needed for day care procedures. This would help in reducing the cost burden to the patient of the overall procedure.
3. Short hospital stay would prevent the patient from infection with multiple resistant hospital bugs and decrease the overall incidence of nosocomial infection.
4. It is suitable for young, working, active patients as short stay in the hospital prevents disturbance in their daily routine, leading to their continued proficiency and productivity.

5. Patients on multiple pills can continue with their routine medication as before, as opposed to prolonged hospital stay which may cause a change in prescription or alteration in the timings or dosage of their routine drugs, making it difficult for them to readjust to the new schedule.



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4.1 Introduction

Day-care surgery, also known as outpatient or ambulatory surgery, is described as a planned operation or procedure carried out in an office or outpatient setting, where the patient is admitted, operated upon and discharged on the same calendar day and not admitted to the hospital as an inpatient (according to the *International Association of Ambulatory Surgery*). The rates of these surgeries are accelerating throughout the world, with 65% of all surgeries being done on an outpatient basis in the U.S. The patient, hospital and insurance companies are at an advantage with day-care surgeries because the outcomes include both an excellent safety record and improved quality of care that is cost-effective.

We are seeing more day-care surgeries because of technological advances with surgical techniques and monitoring devices, as well as advances in anaesthesia and pain control. Now, more complex surgeries can be performed on patients with multiple co-morbidities. Patients who were previously considered high risk for outpatient surgery are no longer in that category due to the pharmacological advances in anaesthesia and pain control. Thus, such conditions as obesity, hypertension, diabetes, sleep apnoea and age are no longer necessarily deterrents for outpatient surgery. It is important to explore the impact of patient selection and what improvement areas optimize day-care surgery advancements.

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4.2 Patient Selection: Anaesthesia, Analgesia, and Other

Anaesthesia

The patient selection process for outpatient surgery includes guidelines for anaesthesia risks, medical conditions as well as social factors. The American Society of Anaesthesiologists (ASA) classification of Physical Health provides a guide for anaesthesiologists to determine the risk factors for surgery; and thus, this classification process is one of the major indicators for determining a candidate for outpatient vs. inpatient surgery. The five ASA categories entail a subjective assessment of a patient's overall health:

- I. Patient is a completely healthy fit patient.
- II. Patient has mild systemic disease.
- III. Patient has severe systemic disease that is not incapacitating.
- IV. Patient has incapacitating disease that is a constant threat to life.
- V. A moribund patient who is not expected to live 24 h with or without surgery.

However, the anaesthesiologists must assess the patient medically as well. For day-care surgery, patients are typically at a level of ASA I, ASA II, or medically stable ASA III. Those procedures, that still tend to be less suitable for outpatient surgery, include patients at risk for severe haemorrhage, or cardiovascular instability, and patients who are morbidly obese or infants who fall within certain gestational limits. Major surgeries are still done on an inpatient basis and those patients classified as ASA III or IV and long duration post-operative monitoring.

The following list indicates the typical exclusions for outpatient surgery:

All Patients

- At risk for major blood loss
- Major and lengthy surgeries requiring complex monitoring postoperatively such as intrathoracic, intraabdominal, or intracranial.
- Patients assessed at ASA III or IV levels
- Morbidly obese patients
- Any patient with a recent upper respiratory infection is evaluated

Infants

- Less than 56 weeks post-conceptual age and <32 weeks post-gestation when born
- Less than 54 weeks post-conceptual age and <35 weeks post-gestation when born
- History of severe anaemic disorders, apnoea, or cardiovascular disease or congenital cardiac anomalies

As opposed to prior complications with anaesthesia, many newer drugs are changing the postoperative status with patients. Currently, post-operative pain and nausea and vomiting are decreased by the use of combination of multi modal intravenous and oral medications and use of long lasting local anaesthetics.

When selecting anaesthetic agents, the following factors must be addressed for outpatient surgeries:

- Patient experience must include a rapid onset and offset of anaesthesia and emerge with clear-headedness
- Reduction or elimination of patient postoperative nausea and vomiting (PONV), dizziness, and drowsiness
- Patient needs to have a rapid return of full cognitive function
- Another defining factor for outpatient procedures is the need for a patient to resume oral intake within a few hours after the procedure and also be able to carry out some independent mobility prior to discharge.

For day-care surgery a patient's anaesthesia should invoke minimal stress and provide maximum comfort with minimal residual effects, which is often accomplished by a multimodal approach to pain management. Total intravenous anaesthesia (TIVA) or inhalational anaesthesia is the recommended option for general anaesthesia, whereas neuraxial blockade or other blocks are recommended for regional anaesthesia.

TIVA with Propofol and sometimes with Remifentanyl is used in day-care surgery because of the rapid clear headed post-operative recovery of patients. It also avoids the risks of block failure as well as decreases post-operative nausea and vomiting, although this still may occur with increased use of N₂O.

Inhalation anaesthesia is advantageous in that it is safe in patients who have multiple allergies, as well as its positive amnestic effects. An advantage of inhalation anaesthesia over TIVA is that the depth of anaesthesia can be assessed, and inhalation anaesthesia can have a more rapid emergence aspect.

Central neuraxial blockade is advantageous because of rapid onset as well as relatively rapid offset and has been shown to have a fivefold reduction in post-operative nausea and vomiting compared to general anaesthesia. However, it is not without side effects such as headache and some neurological symptoms have been recorded varying with surgical positioning. Benefits of regional anaesthesia include less post-operative pain as well as decreased nausea and vomiting. There is also a correlation with minimal cognitive dysfunction, which proves useful, especially in elderly patients. For patients receiving regional spinal anaesthesia, it is important to assess the patient's recovery of sensation before discharge as well as provide adequate instructions on the duration of the block and protection of whatever limb or body part may have been blocked.

Advancements in anaesthesia have proven to contribute to major advancements in the implementation of day-care surgeries.

Analgesia

In addition to a rapid recovery and reduction of nausea and vomiting, the other key component is pain management. As previously reviewed under the section on anaesthesia, pain management is multimodal in approach, particularly because there is such variation in degrees of pain with procedures themselves, as well as the individual patient's pain behaviours.

In summary, approaches for pain control might include:

- Avoid using long-acting opiates and consider cautious use of short-acting opiates
- Regular oral analgesia combined with acetaminophen or long-acting non-steroidal anti-inflammatory drugs (NSAIDs), if not contraindicated
- Use of local or regional anaesthesia when possible

There have been new advancements with pain control in the ambulatory surgical arena, but it remains to be a critical indicator of quality improvement outcomes and focal area for anaesthesia research.

Other Factors with Patient Selection Include Psychosocial

In addition to determining the medical stability of a patient with a focus on anaesthesia and pain control, there are psychosocial factors to consider with outpatient surgeries. One question to ask is: Will there be any benefit to admitting this patient to the hospital that could not be done at home (e.g. complications with alcoholism or mental illness). Another question to ask: Is the patient's home environment conducive to day surgery discharge? For example, if the patient is elderly, lives alone, and at a remote location, far from rapid medical care, outpatient surgery might not be optimal.

4.3 Optimization for Day-Care Surgery

The advantages of outpatient surgeries are numerous and include such factors as minimal psychological disturbances, especially for children, reduced risk of nosocomial infections, and less risk for venous thromboembolism (VTE). Patients prefer to convalesce in their own homes and give positive feedback about less wait time and cancellations than inpatient surgeries. Outpatient surgery is also less costly with the reduction in nursing and medical supervision and overall hospital services. Also, more patients can be treated with less waiting time.

For optimal success with day-care surgeries, a key component is rapid recovery from anaesthesia because the results include faster turnarounds, positive patient experiences and reduced cost. A patient also wants good pain control. This improves the patient experience as well as the recovery since eating, mobilization, and other daily activities will take place quicker if a patient is not in pain.

As the processes improve with outpatient surgeries, more surgical options can be performed. Some samples of previously considered advanced procedures only designated for inpatient and are now being done as day-care surgeries are:

- Laparoscopic major gastrointestinal surgery (e.g. appendectomies)
- Laparoscopic major gynaecology surgery (e.g. hysterectomies)
- Hernia Repairs
- Orthopaedic Procedures (e.g. laminectomies, joint repairs)
- Major plastic surgeries such as breast reduction, liposuction
- Selective breast cancer surgery

Patients have better outcomes if they are prepared for the outpatient surgical steps. This preparation helps to reduce complications and cancellation. Some key patient preoperative education points are:

- Explain the surgical pathway (everything that is expected to happen) to the patient and caregivers
- Include the patient and caregivers with decision-making in regard to the procedures and the postoperative care during the preoperative preparation
- Encourage the patient to provide a complete history to identify medical risks and conditions perhaps not revealed on his/her medical record

The anaesthesia preoperative evaluation is critical in providing better quality of care for day surgery patients as well as eliminating unnecessary and costly lab tests and consultations.

Evaluation

While there are many benefits to outpatient surgeries, the major challenge is the limited time available for a prompt recovery. In addition to the focus on patient selection, suitable surgical procedures, and the day-surgery organization, the key areas of concentration include postoperative pain and nausea, as well as the unforeseen major adverse events.

As a result of quality reviews, it is recommended that hospitals develop a dedicated day-surgery unit that models the medical care team with the inpatient surgical units. It is also beneficial to include similar equipment and it is imperative that identical monitoring standards be utilized as in inpatient procedures.

Major adverse events such as intraoperative cardiovascular or respiratory events can prolong patient's stay and can be improved by careful patient selection. While there have been many improvements in reducing postoperative nausea, vomiting, and pain for day-care surgery patients, the occurrence of these minor events is still common and can lead to longer hospital stays and readmission. As quality improvement measures address these boundaries, there will be a likely trend of not only increased quantity of outpatient procedures, but also increases in quality of care and decreases in cost.

Finally, another area of growth to consider with ambulatory surgery is the actual location of outpatient surgical centres. Currently throughout this country and worldwide, day surgeries are being done predominantly in metropolitan areas and in large hospitals. The challenge in this field is to be able to expand to rural areas and include smaller facilities with the same safety parameters as the larger metropolitan centres.

Conclusion

Innovative approaches to anaesthesia and pain control, along with new surgical methods, like minimal access surgeries will continue to open doors to more patients and will result in more procedures being done on an outpatient basis. The occurrence of the minor adverse events, such as pain and PONV, are the target areas of quality assessment for improvement of the day-care surgery experience. The solution appears to include the multimodal approach with peri-operative analgesics, use of NSAIDs, judicious use of opiates and local anaesthetics. Since outpatient surgery has proven to be safer, more convenient, and less costly, more patients and providers will continue to look to expanding and improving measures for day-care surgery.



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Snehalata Dhayagude

5.1 Introduction

The popularity of day care surgery under anaesthesia in children can be attributed to minimal morbidity due to advances in the field of anaesthesia and surgical techniques. However, it is essential to adhere to strict selection criteria for patients and surgical procedures as *SAFETY* should never be compromised in the name of “Fast tracking and Cost containment”.

Dr. James H. Nicoll, a surgeon from Glasgow first presented and published his 10 years’ experience of 8988 operations as day care procedures in 1909. Although it has been in practice from days of Crawford Long, who used open ether technique in 1842 for short procedures in his clinic, the last three decades have seen increasing number of surgical procedures under anaesthesia being carried out as day care. The success of these is mainly contributed by availability of safe, short acting anaesthetic drugs, monitoring devices and the most important knowledge of physiology and pharmacodynamics, pharmacokinetics of anaesthetic agents in children.

5.2 Advantages of Day Care Procedures

- Minimal separation of child from parents
- Early return of child to comfortable and familiar surroundings
- Diminished risk of nosocomial infections
- Financial benefits for the family
- Shorter surgical waiting lists with increased turnover of patients
- Cost reductions for the hospital
- More beds and personnel available for hospitalized patients

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Anaesthesia for day care surgery demands highest standard of professional skill and organization. Appropriate patient selection is critical to the success of day care surgery.

5.3 Selection of Patient

It is advisable to operate the children with physical status of ASA grade I and II. ASA physical status III may be considered only if the patient is stable and well controlled for pre-existing medical condition for at least 3 months prior to surgery. Morbidly obese child (BMI > 40 kg/m²) may be considered if adequate precautions are taken and if appropriate facilities exist.

5.4 Special Risk Factors and Exclusion Criteria

- *Upper respiratory infection*-(URI) Children with URI are at risk for perioperative respiratory adverse events. Children with constant runny nose, wet cough, wheezing, rales, malaise and high fever should be excluded for planned surgery under anaesthesia. Waiting 4 weeks after URI, provides an adequate clinical safety margin. Peri-operative respiratory adverse events are more likely in the presence of underlying respiratory problems such as asthma, prematurity, associated chronic lung disease and passive smoking. Preoperative medication with salbutamol in children with recent URI have decreased incidence of laryngospasm, bronchospasm, oxygen desaturation and severe coughing.

5.5 Previous Studies Have Shown

1. Children less than 1 year of age have increased risk of respiratory adverse events intra and post- operative period
2. Symptomatic infants with URI have decreased time to desaturation during apnoea
3. Endotracheal intubation has been major risk factor for hypoxemia, bronchospasm, atelectasis in children with URI
4. Temporary airway hyper reactivity is known to exist for 6 weeks after viral infection
5. High incidence of adverse events in children undergoing airway surgery- e.g. tonsillectomy, adenoidectomy, laryngoscopy, bronchoscopy
6. Risk for bronchospasm is tenfold higher in children exposed to tobacco smoke
 - *Asthma*—Children with poorly controlled asthma alone or with URI or lower respiratory infection should be excluded for day-care surgery. Children with well controlled asthma without any symptoms can be considered, however their routine medication should be continued.
 - *Apnoea risk in infants*—Premature infants are at increased risk of respiratory and cardiovascular complications. Associated factors which increase the risk

of apnoea in premature infants include gestational age <55–60 weeks, growth and development, anaemia, bronchopulmonary dysplasia, subglottic stenosis, residual lung disease, heart disease, endocrine or metabolic diseases. Peri-operative complications such as hypoxia, hypoglycaemia, hypocalcaemia, hypothermia, sepsis also increase the risk of apnoea.

- *Sudden infant death syndrome (SIDS)*—The history of SIDS in the family or other siblings is a contraindication to day care surgery in the infant <60 weeks post conceptual age (PCA).
- *Sleep apnoea and tonsillectomy*—Overnight admission is advisable for monitoring after tonsillectomy in children <3 years of age with obstructive sleep apnoea. They have increased sensitivity to opioids.
- *Heart condition*—Children with heart murmurs should be investigated prior to surgery. Functional murmurs require no special precautions. Children with asymptomatic congenital heart disease (e.g. small ventricular septal defect) or full anatomic repair with good cardiac function can be considered for day care surgery. Prophylactic antibiotic therapy should be given as per guidelines.
- *Seizures*—Children with history of seizures can be considered for day care surgery as long as their condition is well controlled and stable and medication is continued in the peri-operative period.
- *Mentally challenged children*—e.g. Autism. Stable autistic children without any associated pathological condition are eligible for day care surgery.
- *Diabetes Mellitus*—Children with diabetes are not suitable for outpatient surgery.
- *Sickle cell disease*—Children with sickle cell disease under haematologist's care should be treated as inpatients. Children with only sickle cell trait carry much smaller risk as long as meticulous attention is given to their hydration, oxygenation, and temperature control. For orthopaedic procedures, the use of surgical tourniquet is controversial, but should probably be avoided.
- *Syndromic babies*—They are excluded from day care surgery as they may have metabolic disorders and difficult airway.
- *Undiagnosed hypotonia*—These children need special peri-operative care, so they are excluded. Trigger free technique is necessary when anesthetizing these patients. These children are at risk of developing malignant hyperthermia. Peri-operative hyperkalaemic cardiac arrest and rhabdomyolysis is a recognized risk of succinylcholine administration in patients with muscular dystrophy.
- *Malignant hyperthermia-(MH)* With the advent of improved and short acting intravenous anaesthetic drugs, the susceptible patients for MH are suitable candidates for day care surgery. However, it is important to avoid triggering factors.

5.6 Procedures Commonly Performed as Day Care

- *General surgery*—Circumcision, hernia repair, orchidopexy, excision of lumps, incision and drainage of abscesses, tongue tie release, distal hypospadias repair, cystoscopy

- *Ear, Nose, Throat*—Tonsillectomy, adenoidectomy, myringotomy, tube insertion, close reduction of nasal bone fracture
- *Dental*- Extraction of teeth, restoration
- *Ophthalmology*—Examination under anaesthesia, lacrimal duct probing, strabismus repair, trabeculectomy, excision of chalazion or cyst
- *Plastic surgery*—Otoplasty, cleft lip repair, tissue expander placement, scar revision, surgery for syndactyly, polydactyly
- *Diagnostic and therapeutic procedures*—Laryngoscopy, tracheo-bronchoscopy, oesophagoscopy, gastroscopy, colonoscopy, imaging studies (CT, MRI), radiation therapy, cardiac catheterization
- *Orthopaedic procedures*—Closed reduction of fractures, arthroscopy, cast changes, removal of pins and plates

Above mentioned surgical and diagnostic procedures involve minimal or no physiological disturbances such as major fluid shifts or blood loss. There is minimal risk of anaesthetic and surgical complications and simple nursing care required can be taken by parents. There is no major restriction on child's activities and the child may require only oral analgesics and antibiotics.

5.7 Preoperative Evaluation

In many cases, preoperative visit to the anaesthesiologist is neither practical nor necessary. These children are often under the care of paediatrician and are in the optimal condition. Screening by the operating surgeon and coordination and communication with the surgeon can obviate the preoperative visit. However detailed check up by the anaesthesiologist can review and confirm their findings on the day of surgery. Parents need to be given fasting instructions by the surgeon or by telephonic communication by anaesthesiologist (Table 5.1).

5.8 Preoperative Fasting Recommendations (Table 5.1)

Both the amount and type of food ingested must be considered when determining an appropriate fasting period.

The basic screening laboratory investigations include complete blood count, Prothrombin time, PTT, INR (for suspected bleeding disorders), HIV and HBsAg. Routine urine analysis need not be performed on healthy children.

Table 5.1 Pre operative fasting recommendations

Ingested material	Minimum fasting period
Clear liquids- water, fruit juices without pulp	2 h
Breast milk	3–4 h
Infant formula milk, non-human milk	6 h
Light meal- toast, cereal, liquids	6 h
Full meal with fried food	Minimum 8 h

5.9 Premedication

Sedative premedication is quite effective in reducing preoperative anxiety, post-operative recall, and easier separation from parents. Oral midazolam in the dose of 0.5 mg/kg is commonly administered at least 15–20 min before planned induction. Other medication which can be used in conjunction with midazolam or alone is ketamine. It can be given orally in the dose of 5–6 mg/kg alone or in reduced dose 3 mg/kg with midazolam. The combination is extremely useful in exceptionally anxious, uncooperative child. Painless venepuncture can be facilitated by prior application of analgesic cream like EMLA about 1 h before planned induction. Non-pharmacological anxiolysis can be achieved to some extent by parental presence during induction, music, videogame, humour and distraction.

5.10 Anaesthetic Techniques

They are basically aimed at rapid return to baseline function with minimal untoward effects, so that patients can be effectively discharged home. Primary decisive factors while choosing an anaesthetic plan include the operative procedure, underlying condition of the patient vis a vis clinical indication.

5.11 Important Guidelines

- Day care surgical procedure in any child requires the same basic equipment as inpatient for delivery of anaesthetic drugs, monitoring and resuscitation. Perioperative standard monitoring should include an ECG, non-invasive blood pressure, pulse oximeter, and capnograph.
- Inhalational induction is widely used in children and the most suitable agent being sevoflurane and halothane. Sevoflurane is preferred for hemodynamic stability and quicker recovery. Halothane at higher concentration may produce bradycardia and myocardial depression which can be avoided by intravenous atropine.
- Isoflurane is not tolerated due to its pungent smell and desflurane is not preferred for its irritant property.
- Intravenous (IV) induction is the ideal choice in children with IV cannula in situ or in older cooperative children with prior application of local anaesthetic cream.
- Intravenous propofol is preferred agent over thiopentone for its rapid action, quicker smooth recovery due to shorter half-life and antiemetic property. The pain on injection with propofol can be minimized by giving lignocaine- 1 mg/kg IV prior or mixing with propofol.
- Maintenance of anaesthesia can be carried out by using short acting IV or inhalational agents in titrated concentration, analgesics and muscle relaxants when appropriate. For total IV anaesthesia, propofol can be used as infusion with the rate of 300–500 µg/kg/min. Propofol when used for imaging procedures or other painless procedures, a dose of 100 µg/kg/min effectively prevents children from

moving. Analgesics, commonly used include fentanyl or remifentanyl. Intermediate acting muscle relaxant (NMB) such as atracurium is more popular as its elimination does not depend on the function of liver or kidney. Mivacurium or cisatracurium are also being used. Whenever muscle relaxant is used, the adequacy of reversal must be ensured before shifting the patient to recovery area.

- Airway management- there are numerous options which include conventional mask for short procedures, supraglottic airway device (SGD), or endotracheal tube (ETT) for longer procedures. ETT or SGD can be introduced under deep anaesthesia with propofol or sevoflurane and fentanyl without the use of NMB, but requires skilful judgement of anaesthetic depth. This eliminates the need for reversal of NMB. SGD causes less laryngeal irritation than ETT and can be placed without visualization of airway. Laparoscopic procedure for herniorrhaphy may still benefit from the placement of ETT.
- Regional anaesthesia(RA) is almost always carried out in combination with general anaesthesia or adequate sedation. RA provides intraoperative and postoperative analgesia and also helps in reducing depth of general anaesthesia, thus speeding early recovery. Other reported advantages of RA include decreased intraoperative blood loss and improved operating conditions during hypospadias repair. Commonly performed nerve blocks are caudal block for surgery below umbilicus, penile block for circumcision, ilioinguinal and iliohypogastric nerve blocks for herniotomy, brachial plexus block for surgery on upper limb, sciatic and femoral or three in one blocks for lower limb surgery. Strict attention to the aseptic technique and limits of local anaesthetic (LA) dose must be observed with any block and aspiration test should precede injection of LA. Additional margin of safety may be gained by using less toxic levo-bupivacaine or ropivacaine instead regular bupivacaine. Field block or local infiltration of incision site with LA for lumps greatly alleviates postoperative pain.
- Fluids- It is essential to provide adequate IV hydration not only to correct fluid deficit of fasting period but also current maintenance, intraoperative loss and cushion for postoperative period. Isotonic fluid such as ringer's lactate with addition of dextrose 25%—25–50 mL should be administered and IV catheter can be kept until the child starts taking oral feeds.
- Postoperative analgesia is often achieved by non-opioid drug regimen. Ketorolac, parenterally administered NSAID has been shown to have advantages over opioids. There is significant reduction in nausea and vomiting and duration of analgesia is for about 6 h. Most of the children receive RA and analgesia provided by RA gets continued in the immediate postoperative period. As multimodal therapy for pain rectal medication with diclofenac 1–2 mg/kg or paracetamol 20–40 mg/kg suppositories are excellent options. Paracetamol can be given as rectal loading dose of 40 mg/kg followed by 20 mg/kg every 6 h. It can be given orally in the dose of 10–15 mg/kg every 4–6 h after child starts oral feed and it can be continued for 3–4 days after discharge.
- Emergence delirium may be decreased with a single IV dose of dexmedetomidine 0.5 µg/kg given slowly, 5 min before the end of surgery. This facilitates smoother transition to recovery area.

5.12 Complications

Major complications are rare in children after day care surgery under anaesthesia. Minor complications if any are transient and can be managed before discharge.

- If inadequately treated, pain can have long-lasting psychological disturbances in children.
- Postoperative nausea and vomiting (PONV) can be very distressing to the child and parents. The use of volatile agents, opioids, nitrous oxide, and cholinergic drugs for the reversal of NMB increase the risk of PONV. This complication can even warrant hospitalization again. Ondansetron in the dose of 0.1 mg/kg IV is the commonly administered prophylactic antiemetic. Dexamethasone in the dose of 0.15 mg/kg IV during anaesthesia markedly decreases vomiting in children after tonsillectomy.
- Sore throat and headache are usually transient.
- Croup or laryngeal spasm begins usually immediately after extubation or within 2–3 h after extubation. Humidified oxygen is often sufficient as treatment. For more severe cases, racemic epinephrine (0.5 mL diluted in saline 4.5 mL) is nebulized via a face mask.
- Excessive somnolence can be due to excessive narcosis, sedative or opioid drug errors, unusual sensitivity to inhaled anaesthetics and drug interactions.

5.13 Discharge Criteria

Following surgery and emergence from anaesthesia patients are shifted to recovery area after ensuring complete recovery of protective reflexes and motor activity. Monitoring of vital parameters is continued in the recovery area till the time patients are awake or in light sleep but comfortable. Later patients are shifted to day care ward. They are discharged home when patients can ambulate appropriate for their age, drink fluids and void urine. The Post Anaesthesia Discharge Scoring System can be followed (Table 5.2).

5.14 Post Anaesthesia Discharge Scoring (Table 5.2)

Post Discharge Instructions

- Child should be accompanied home by parents or responsible person
- Written instructions given to parents about nursing care and what to expect
- Written instructions given about oral medication for pain and antibiotics
- If analgesia persists over operated limbs after regional block, child should be protected from injury
- Parents should be provided with telephone numbers of the surgeon, anaesthesiologist and hospital for any emergency

Table 5.2 Post anaesthesia discharge scoring

<i>Vital signs</i>	
• Within 20% of preoperative baseline	2
• 20–40% of preoperative baseline	1
• 40% of preoperative baseline	0
<i>Activity level</i>	
• Steady gait, no dizziness, consistent with preoperative level	2
• Requires assistance	1
• Unable to ambulate/assess	0
<i>Nausea and vomiting</i>	
• Minimal or mild: No treatment needed	2
• Moderate: Treatment effective	1
• Severe: Treatment not effective	0
<i>Pain</i>	
• VAS = 0–3 minimal or no pain prior to discharge	2
• VAS = 4–6 moderate pain	1
• VAS = 7–10 severe pain	0
<i>Surgical bleeding</i>	
• Minimal: Does not require change of dressing	2
• Moderate: Required up to two dressing changes, no further bleeding	1
• Severe: Even after three or more dressing changes bleeding continues	0

Note: Max 10 Score, ≥ 9 fit for discharge

5.15 Summary

To achieve efficiency and safety in day care surgery and other procedures in children, systematic approach to organization offering appropriate facilities, proper communication amongst surgeon, anaesthesiologist and hospital staff are required. Careful case selection, both on the basis of child's clinical condition and type of surgical procedure is critical in ensuring the success of day care surgery and parents' satisfaction.



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Geriatric Patient in a Day Care Setting

6

Aparna Deshpande

Day care surgery is defined as any surgery performed on a patient who does not have to stay overnight. It is also known as “office based surgery” or “ambulatory surgery” or “non–operating room surgery”. A Geriatric patient is one who is more than 65 years of age. Day care surgery is now popular because of cost reduction and better turnover in hospitals. There are many advantages of day care surgery especially with respect to geriatric patients

1. Emotional—Geriatric patients hate to stay for long periods in hospitals. They like familiar surroundings and their family around them as much as possible.
2. Financial—Less expensive for pension dependent old patients. More turnover for day care centre.

6.1 Patient Selection

ASA grade 1 and 2 geriatric patients are usually selected for day care surgery. Any co-morbid disease like cardiac, diabetes and hypertension should be well controlled prior to surgery.

Certain age-related changes occur in the geriatric population which need special attention in terms of anaesthesia.

Cardiovascular System

Natural aging process-associated changes in the cardiovascular system, such as alterations in autonomic regulation, decreased elasticity of vessels and the heart, a higher

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baseline of sympathetic tone and relatively depleted intravascular volume, could lead to a greater fluctuation of blood pressure perioperatively. Meanwhile, elderly patients usually have complex cardiovascular conditions, including hypertension, arrhythmias, hypertrophy of the myocardium, dilated heart chambers and valvular heart diseases, which would make these patients much less tolerable to volume shifts during surgery and liable to suffer from either acute volume overload or hypovolemia.

- (a) ECG and echocardiography is a must even for a minor procedure.
- (b) Many old patients have diastolic dysfunction which can be detected by 2D Echo.
- (c) They often forget to take antihypertensive pills.
- (d) Decreased cardiac reserve may lead to severe hypotension with the induction of general anaesthesia.
- (e) Arm brain circulation time is prolonged which leads to delay of IV drug onset but it speeds up inhalational anaesthetic induction.

Respiratory System

Age decreases elastic recoil of the lungs and there is a greater tendency for airways to collapse. Although the total lung capacity remains constant, there is a decrease in the vital capacity and the residual volume increases with age.

Geriatric patients are at an increased risk of pneumonia than their younger counterparts due to various reasons like general depression of the immune system and decreased muco-ciliary clearance. Bedside spirometry and breath holding exercises before and after surgery can help to reduce these complications.

Renal

There is an age-related decrease in GFR and creatinine clearance due to a decrease in the number of glomeruli with age. Tubular function also declines with age and hence there is a slow deterioration of concentrating and diluting ability of the kidneys. So, there is an increased tendency towards dehydration and hyponatremia. The prostate is enlarged in males and the capacity of the bladder is reduced. Decreased urge to urinate may lead to overflow incontinence.

GI System

There is atrophic gastritis and decreased GI motility in the elderly. Gastric emptying time is increased and the risk for aspiration is greater thereby leading to a need to accurately document the last meal and drink time.

Hepatic System

There is a decrease in the appearance, amount or distribution of smooth endoplasmic reticulum in liver cells. This leads to reduced hepatic metabolism of different drugs and the dosage must be adjusted accordingly.

Central Nervous System

Due to atherosclerosis, cerebral functions are reduced. Patients are prone to prolonged recovery time and post-operative delirium. The definitive mechanism causing delirium is not yet clear; many hypotheses agree that delirium is the final clinical consequence of complicated neurotransmitter abnormalities such as overproduction of norepinephrine, dopamine or glutamate, decreased cholinergic activity, or abnormal serotonin and GABA. However, many risk factors for postoperative delirium have been determined: advanced age, preoperative functional or cognitive impairment, immobility or poor physical condition, sleep deprivation, visual or hearing impairment, dehydration, malnutrition, imbalance of electrolytes, depression, anticholinergic medications, and alcohol abuse.

Musculoskeletal System

Musculoskeletal mass is reduced in old age. Decreased bone mass leads to osteoporosis and increased chances of fractures. Patient handling on table and during transport require greater care than normal. Veins are frail and arteries are sclerosed. Bruising is common and must be explained to the patient. Atlantoaxial movement is reduced on extension of the neck and difficulty in intubation is common.

Endocrine

The combination of abnormal beta cell function with peripheral insulin resistance leads to increased glucose intolerance. Diabetes Mellitus has to be well controlled before any surgery. Thyroid and adrenergic disorders are quite common in the elderly.

6.2 Peri Operative Management

1. Fitness from family physician or cardiologist should be taken.
2. On the day of surgery, the anaesthetist must check blood reports, X Ray, ECG, 2D Echo, urine, NBM duration, any loose dentures, neck movements, position of larynx.

3. Reassurance and presence of close relatives is a must. Aged people are very insecure, frail and require emotional support of their relatives. They are more afraid of anaesthesia than surgery. A good night's sleep before surgery is a must and a small dose of an anxiolytic before surgery can assure this.
4. The elderly patient should be scheduled for surgery in the morning in order to allow for a prolonged observation period before discharge.
5. Avoiding a prolonged (>2 h) fluid fast may reduce the risk of postoperative confusion.
6. Minimising opioid use and whenever feasible, using regional anaesthesia techniques, may reduce the risk for Post-operative cognitive dysfunction and facilitate rapid and safe discharge.
7. The dose required for induction of local and general anaesthesia is reduced. Minimum alveolar concentration (MAC) values are reduced. Lower levels of proteins viz. albumin allow more free drug in blood, hence lower doses of propofol, pentothal and muscle relaxants should be used. Metabolism and excretion is slower in the elderly and recovery may be somewhat prolonged. Prolonged action of spinal and epidural anaesthesia is also expected in the elderly.
8. The elderly patient is prone to a more pronounced decrease in body temperature during surgery and anaesthesia and appropriate actions should be taken to avoid a fall in core temperature.
9. Elderly patients often exhibit minor cardiovascular events intra-operatively and vigilant monitoring in order to allow the management of minor changes in heart rate, blood pressure and saturation should be available.
10. The elderly usually experience less PONV and complain less about the pain experienced postoperatively. However, effective pain relief should be provided. Multi-modal pain management should be used. Potential risk factors such as cardiovascular disease and renal impairment should be kept in mind. Local anaesthesia should be infiltrated in the wounds at the time of closure. Paracetamol and short-term use of the lowest effective dose of a NSAID may, in many elderly patients, be a safe and valuable option.

Recovery

Emergence is delayed due to age. Chances of inhalational pneumonia due to delayed gastric emptying is high. Postural hypotension is common in elderly patients. They are also at a high risk for delirium so they should be transferred to a familiar environment as early as possible. Evaluation of cognitive function is of vital importance in this particular age group. Adequate fluid intake should be ensured and urinary voiding seems reasonable although not mandatory. It is necessary that the elderly have a responsible escort and relatives at home at least in the early post-operative period. The fact that these patients may require readmission for surgical, anaesthetic or social reasons should always be kept in mind.

Conclusion

In conclusion, with rapid progress in the spectrum of cases being performed in day care, the number of geriatric patients coming for day care surgery is ever increasing. Thorough planning and execution of protocols and team work approach goes a long way in providing optimum health care to this mature albeit dependent subset of patients.



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The scope of day care surgery is continuously increasing as a result of improved surgical instruments and techniques and better anaesthetic drugs. Urological surgery is most suitable for ambulatory surgery with a large number of procedures meeting the criteria for ambulatory surgery. With advancing life span, most people need some urological interventions adding to healthcare costs both for the individual and the nation. There has been a lot of progress in instrumentation in the last 20 years and their skilful use has helped to deliver quality care to the patients.

7.1 Introduction

Urological operations are infra umbilical procedures. From the anaesthesia point of view this puts them at a natural advantage for two reasons. There is less disturbance to the respiratory system, and it is possible to do most of the operations in epidural and spinal anaesthesia. From the surgical point of view there has been tremendous progress in endourology in the last two decades. Most procedures are done through the endoscope. Open prostatectomy, pyelolithotomy, uretero-lithotomy which were common operations at one time are hardly done today. This minimum scar approach aids quick recovery and offers much less post-operative pain. As a result, more and more urologic operations come under the ambit of day care surgery. The young urological surgeon is picking up these skills early and easily and is bound to be more inclined to include more procedures in this group in the years to come. With ever improving anaesthesia drugs, the future of Day care Urology is very bright.

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7.2 Common Procedures Conducted on Day Care Basis

- Cystoscopy
- Retrograde pyelography
- Double J stenting
- D J removal
- Uretrorenoscopy
- Cystolithotripsy
- Hydro distention of bladder
- Prostate and bladder biopsy
- Circumcision
- Vasectomy and reversal of vasectomy
- Botox injection of overactive bladder

These above-mentioned operations can be done very easily on a day care basis. If a urinary catheter is inserted it can either be removed after a few hours and patient can go home after passing urine once in the hospital. Alternately, patient can go home with the urinary catheter. Extracorporeal shock wave lithotripsy is not mentioned in this list as it is an outpatient procedure.

Some operations that may be possible under day care depending on the nature of lesion, patient's medical condition and surgical skill are:

- TUR bladder tumour resection
- Orchidectomy
- Orchidopexy
- PCNL - without a nephrostomy drain
- TURP
- Laparoscopic nephrectomy

For these patients to go home on the same day it is important that they do not have haematuria and do not have a surgical drain. There should not have been excess blood loss during the operation. There is an emerging trend to not leave behind a nephrostomy after PCNL and these patients can be considered for same day discharge in an otherwise painless procedure. There are reports of Transurethral benign resection of prostate gland of small to moderate size and no co morbidities being discharged on the same day. The advent of LASER has revolutionized the management of even large prostates in day care setting. Transurethral resection using bipolar cautery and normal saline irrigant is also a significant addition to the armamentarium of today's ambulatory urologist. The fluid absorption is more physiological with less electrolyte disturbance and easier to treat. The possibility of day care for laparoscopic nephrectomy for non-functioning kidney in an otherwise healthy patient is also being explored.

7.3 Anaesthesia Considerations

The general guidelines for patient selection for ambulatory anaesthesia are applicable to urological patients. ASA class 1 and 2 can be safely taken up. ASA class three patients who are medically stable can also be considered. Full term infants older than 1 month and preterm infants more than 60 weeks' post conception are fit for day care anaesthesia.

While most patients can be done under spinal anaesthesia it should be reserved for patients who have a contraindication for general anaesthesia. Modern drugs have a short half-life and are fully eliminated from the body in a few hours. The common drugs such as fentanyl, midazolam and propofol enable the patient to return to street fitness in a couple of hours. Remifentanyl which is not available as yet in India is an ideal drug.

Operations lasting for 15–20 min can be done with face mask anaesthesia or LMA using N₂O/O₂ and sevoflurane or TIVA using propofol. Longer operations such as TURBT or URS are best conducted with an endotracheal tube and balanced GA.

7.4 Specific Concerns of Urological Anaesthesia

1. Ureteric injury due to sudden movement under anaesthesia is a dreaded complication and has to be prevented at all costs.
2. Desflurane should be used with closed circuit and soda lime due to possibility of Compound A formation with sevoflurane. While the nephrotoxicity of Compound A remains a debate when available desflurane should be used as a safer option. If sevoflurane is to be used, very low gas flows may be avoided.
3. PCNL is done in prone position and the specific concerns of prone position have to be kept in mind
4. Transurethral resection of bladder tumour may have episodes of adductor spasm which can cause bladder perforation. Hence, General Anaesthesia with muscle relaxant is preferred
5. Hydro distention of the bladder requires deep inhalational anaesthesia and the patient may sometimes have tachycardia, hypertension and arrhythmias. The pain and discomfort is more than other cystoscopic procedures and needs to be adequately addressed.

7.5 Regional Anaesthesia

The use of lignocaine jelly insertion should not be underestimated. It is possible to do a cystoscopy, RGP, DJ etc. by giving the local anaesthetic 5 min to act. This simple step significantly reduces anaesthesia requirement.

Epidural and Caudal are excellent options and should be used commonly in urology operations as there is complete recovery, no possibility of headache and good post-operative pain relief.

Regional blocks such as cord block, penile block, peri prostatic block and para-vertebral blocks can be used. All regional blocks have an added advantage of post-operative pain relief.

Spinal Anaesthesia is recommended with lower dose 25 mcg of fentanyl and 5–10 mg bupivacaine aiming at a saddle block. Most patients are expected to have complete recovery after spinal anaesthesia in 2–3 h. However, in case of delayed recovery the patient should have normal perianal sensation, ability to plantar flex foot to pre-operative level and proprioception of big toe in order to be considered fit to be sent home.

Conclusion

Urology is a speciality that has a huge scope for day care surgery. Endourology is a standard practice today. Laparoscopic surgery is also on the rise. With the advent of robotics even major surgery may come under the ambulatory group in the not so distant future. Anaesthesia drugs today are delivered in a target controlled fashion leading to speedy recovery. Advances in monitoring has made modern anaesthesia very safe and precise. All this has set a great scenario for day care urology procedures.



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Anaesthesia for Orthopaedics in Day Care

8

Sharmila Nair

8.1 Introduction

Ever since the establishment of SAMBA, ambulatory surgeries have grown from 10% to more than 70% for all effective surgical procedures. The availability of improved anaesthetic and surgical techniques allows more extensive procedures to be performed on an ambulatory basis. Orthopaedic patients can be particularly challenging. These patients represent a broad scope of problems ranging from an elderly patient with multiple comorbid conditions to a young deceptively healthy trauma patient who may have associated injuries that can have significant impacts on the type of anaesthesia administered.

The role of anaesthesiologists has evolved from that of a physician primarily concerned with providing optimal surgical conditions and minimizing pain immediately after surgery, to that of a peri-operative physician responsible for ensuring that patients with co-existing medical conditions are optimally managed before, during and after surgery.

Federated Ambulatory Surgery Association (FASA) has observed that there is no significant relationship between pre-existing diseases and incidence of postoperative complications in an ambulatory setting. Even the extremes of age are not seen as a deterrent for ambulatory practice, provided proper attention is paid to discharge planning.

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8.2 Criteria for Patient Selection

Selection of Procedure

Surgical procedures suitable for ambulatory surgery should be accompanied by minimal post-operative physiologic disturbances and an uncomplicated recovery.

Following are the surgeries which can be done in the day care, in orthopaedics:

1. Non-Surgical Day Care Cases
 - (a) Closed reduction and immobilization of fractures and dislocations (E.g. Supracondylar, Humerus etc.)
 - (b) Manipulation of: knee, shoulder, cervical or lumbar spine, Congenital Talipes Equino Varus
2. Surgical Day Care Cases
 - (a) Minimally Invasive:
 - Local Hydrocortisone injection
 - Joint aspiration
 - Needle biopsy
 - Skeletal traction
 - (b) Endoscopic procedures
 - Discectomy
 - Arthroscopy: Diagnostic/Therapeutic
 - Epidural injection
 - (c) Open procedure
 - Trauma: Fracture fixation (radius-ulna)—External fixator application—Implant removal
 - Infective: Incision and drainage—Wound wash
 - Open Biopsy: Infection, tumour
 - Excision biopsy: Bursa, ganglion, lipoma
 - Contracture release: Polio, Cerebral palsy
 - Soft tissue release: Carpal tunnel syndrome, Trigger finger, Tenosynovitis, Transfer of ulnar nerve

Duration of Surgery

The duration of day care surgery was originally limited to procedures lasting less than 90 min in the early days but surgical procedures lasting 3–4 h are now routinely performed under the ambit of ambulatory surgery.

Patient Characteristic

- ASA I and II patients.
- ASA III and IV patients are considered acceptable candidates if their disease is well controlled pre-operatively and at no higher risk for post-operative complications.

- The surgical procedure must be associated with minimal post-operative physiological disturbances.

8.3 Pre-Anaesthetic Evaluation

The goals of pre-anaesthetic evaluation must be to resolve preoperative problems well in advance, thereby minimizing the numbers of both cancellations and complications. Ideally, the patient should visit Pre-Anaesthetic Evaluation (PAE) clinic and undergo an assessment to avoid last minute cancellations. Basic minimum laboratory investigations can be conducted during the above period and appropriate counselling should be provided to the patient.

The patients are allowed clear liquids up to 2 h before surgery, without increasing residual gastric volume. Administration of H₂ blockers and metoclopramide can reduce both residual gastric volume and acidity. The intake of oral fluids may actually dilute gastric secretions and stimulate gastric emptying, resulting in lower residual gastric volumes. The patients should take all chronic oral medications up to 1 h before the procedure. As most ambulatory surgical procedures present low bleeding risk, the current attitude in ambulatory settings is to maintain aspirin therapy and possible antiplatelet drug inhibitors throughout the perioperative period. Further, it is suggested that in all surgical situations under the ambulatory setting, antiplatelet therapy should be maintained, and if bleeding is likely to threaten either the patient's life or the success of the surgical procedure, the discontinuation protocol must be established in conjunction with the cardiologist and the antiplatelet therapy resumed as soon as possible. Bridging with low-molecular-weight heparins is not recommended.

Preoperative sedation, amnesic and anxiolytic drugs can be administered safely without any clinically significant delay in recovery times even after short ambulatory procedures.

8.4 Techniques

Monitored Anaesthesia Care

The goal of MAC is providing analgesia, sedation, and anxiolysis and ensuring rapid recovery without side effects. Vigilant monitoring is required as patient may progress from light levels of sedation to deep sedation which can slowly progress to anaesthesia.

Few points that should be considered before giving sedation are:

1. Sedation should be given before the noxious stimulus.
2. Drugs should be given in small boluses and slowly according to peak effect of drug.
3. Patient selection, monitoring, recovery and discharge protocol should be followed.
4. All emergency equipment and drugs, oxygen and suction should be present and in working order.

Several drugs are used for sedation but a combination of benzodiazepines (midazolam) and opioids (fentanyl) is the most commonly used. Midazolam provides sedation, amnesia and anxiolysis. The cardiorespiratory depression is more common when it is combined with opioid.

Propofol has a rapid onset of action, short duration, is noncumulative and leads to early discharge. It also has antiemetic action which improves patient satisfaction.

Ketamine can be used especially in paediatric patients.

Sub anaesthetic concentration of inhaled anaesthetic agents like Nitrous Oxide and Sevoflurane are also used.

Dexmedetomidine is also getting popular due to its sedative and analgesic properties and minimal effect on ventilation.

General Anaesthesia

With the availability of newer inhalation agents like sevoflurane and desflurane and intravenous anaesthetics like propofol one can achieve goals of day care anaesthesia. Both sevoflurane and desflurane can be used for maintenance. Although propofol can also be used for maintenance of anaesthesia, the requirement of neuromuscular blocking drugs is lower with inhalational agents. The concentration of anaesthetics should be titrated to prevent light anaesthesia causing awareness or deep anaesthesia leading to delayed recovery.

Endotracheal intubation is well accepted as the standard airway device for procedures but LMA is evolving fast as it is easy to place and can be inserted without the use of muscle relaxants. Less sympathetic response, less time required for device placement and decreased incidence of post-operative sore throat are the listed benefits over endotracheal intubation.

Total intravenous anaesthesia with propofol or other intravenous anaesthetics can also be used for the induction and maintenance of anaesthesia as well as to provide sedation and analgesia. However, TIVA has certain limitations. It requires infusion pumps capable of delivering variable flow rates for proper titration of anaesthetics. The shorter delivery line should be assured and three-way stopcock should be used to prevent back flow of the drug into the main infusion line.

Regional Anaesthesia

Regional anaesthesia techniques are ideal for outpatient surgery as they keep the patient alert, free from pain, nausea and vomiting and permit them to be ambulatory quickly. The benefit of post-operative analgesia can be extended by the use of perineural catheters and additives.

Upper extremity surgery can be performed under brachial plexus block which provides excellent anaesthesia and analgesia without interfering with ambulation.

For procedures below the shoulder, supraclavicular or infraclavicular block is preferred. For hand and forearm surgeries, axillary block is ideal and if the patient is discharged with the arm still numb, he should be instructed to keep the arm in a sling to protect it from injuries.

Intravenous regional anaesthesia (IVRA) is another simple and cost-effective block. When used, it provides rapid onset of anaesthesia and is ideal for superficial procedures like ganglion excision and carpal tunnel release. Tourniquet pain can be troublesome and to prevent it, a double tourniquet technique is recommended.

Although lower limb surgeries are usually performed under spinal, epidural or a combination of both, peripheral nerve blocks can also be used. They provide the advantage of prolonged post-operative analgesia as the duration of blocks in lower limbs is twice as that of upper limb blocks. Femoral nerve block can provide excellent analgesia for knee arthroscopy and has been reported to result in faster discharge. This can also be combined with sciatic nerve block for knee surgery. The Sciatic nerve can also be blocked in the popliteal fossa for surgeries on the foot. Ankle block can be used for surgery on foot but requires multiple injections to block all nerves supplying the foot.

Continuous catheter technique can be used with any of these blocks and the patient can be sent home with the catheter in situ.

Central neuraxial block in the form of spinal, epidural and caudal blocks are ideal as the patient is alert, comfortable and does not complain of nausea and vomiting. Spinal anaesthesia is the simplest and the most cost-effective block. With the advent of smaller gauge pencil point needles, the incidence of PDPH has considerably reduced and there is a resurgence of CNBs in outpatient setting.

Local Infiltration

Of all the anaesthetic techniques available for day care procedures, local infiltration of the operative site with dilute solutions of local anaesthetics is the simplest and safest approach to reduce post-operative pain and the need for post discharge opioid containing analgesics. Infiltration of local anaesthetics at the surgical site should be a component of all ambulatory anaesthetic techniques.

8.5 Post Operative Management

Dispensing appropriate analgesia with clear instructions for the patient is crucial. Giving patients pre-packed analgesics for anticipated mild, moderate and severe pain with clear instructions has the potential for improving patient comfort at home. New portable PCRA are becoming available which provide effective and safe analgesia at home for several days. Small disposable pumps pre-loaded with local anaesthetics with pre-set hourly infusion rates or self-administered bolus infusions can also provide effective analgesia at home.



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She currently consults with a wide range of reputed institutes in South Bombay, primarily, Saifee Hospital Department of Laparoscopic Surgery & Orthopaedics (since 2008), and frequents Breach Candy Hospital, Cumballa Hill Hospital, and Elizabeth Hospital.

With a keen interest in teaching and academia, she has conducted an international workshop on “Minimally Invasive Coronary Artery Surgery” at Sir H.N. Reliance Foundation Hospital, and a real time Bariatric Surgery Training Workshop. She’s also an active member of Indian Association of Cardiovascular Thoracic Anaesthesiologists, Anaesthesia Society of Obesity, & Association of Medial Consultants to name a few.

With her quirky and slightly offbeat sense of humour and ever engaging smile, she’s a pleasure to be around, may it be work or a social setting.



Anesthesia for Ambulatory Gynaecologic Surgery

9

Shagufta Choudhary

As described by Kevin Jones, ambulatory gynaecology is a concept that combines ‘one stop’ clinics and ‘day surgery’ operations as an alternative to traditional outpatient consultations and in-patient surgery. It combines a “see and treat” management philosophy in the outpatient clinics with minimal access surgery in the day surgery unit. This management philosophy shortens the care pathway for patients and saves resources. With the advances in gynaecologic endoscopy and minimally invasive surgery, even major surgical interventions can be carried out in an ambulatory setting. The recovery is fast and the patients can return back to their normal life as early as possible.

9.1 Suitable Gynaecological Procedures for Day Care Surgery

- Dilatation and Curettage
- Termination of Pregnancy
- Hysteroscopy
- Diagnostic laparoscopy
- Laparoscopy Sterilization
- Examination under Anaesthetic and Vaginoscopy
- Separation of Labial Adhesions
- Laparoscopic ovarian cystectomy
- Myomectomy
- Biopsy
- Bartholin cyst excision

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- Endometrial ablation
- Endometrial polyp excision
- Office based continence procedures.

9.2 Preoperative Evaluation and Preparation

Most of the patients coming for ambulatory gynaecologic surgery are otherwise healthy females within the reproductive age group. Those having comorbid conditions like hypothyroidism, high blood pressure, diabetes, asthma, obesity etc. need to be evaluated and optimized before surgery. Patients coming for hysteroscopy and laparoscopy usually undergo bowel preparation before surgery. Fasting instructions should be given beforehand and written informed consent taken. Standard fasting guidelines should be followed, allowing oral intake of clear fluids up to 2–3 h before surgery and avoiding excessive fasting which decreases incidence of postoperative side effects including dizziness, drowsiness, thirst and nausea.

9.3 Anaesthesia Technique

Many of the ambulatory gynaecologic procedures can be performed in an office without anaesthesia or local anaesthesia alone. Those requiring sedation or general anaesthesia should be carried out in an operation theatre with all the appropriate management facilities. Diagnostic laparoscopy and the management of any pathology discovered thereby in the same setting are cost effective, saves time and avoids repeat anaesthesia. Laparoscopy especially in gynaecologic cases is simple and brief. The amount of air insufflated is also less and so is the respiratory compromise. Therefore, these cases can be done under spontaneous respiration with newer generation supralaryngeal devices like proseal LMA, as the risk of aspiration is small. Thus, administration of general anaesthesia without the use of muscle relaxants hastens recovery. Use of short acting agents like propofol, dexmedetomidine, desflurane etc. is ideal in day care surgery. Short acting muscle relaxant like atracurium in lowest possible doses should be used whenever needed.

9.4 Pain Relief

Ambulatory surgery advocates aggressive pain management strategies to bring the patient back to normal life as early as possible. Instillation of local anaesthetic in the peritoneal cavity and along the port sites provides good quality pain relief. Multimodal analgesia using local anaesthetics, paracetamol, NSAIDs and opioids is the standard protocol. Nowadays, the concept of “opioid free” anaesthesia is emerging. If opioids cannot be avoided altogether, they should be used in minimum possible doses and in combination with other analgesics.

9.5 PONV

This particular subgroup of patients itself is a high-risk factor for PONV.

Risk factors of PONV

1. Female gender
2. Non-smoking status
3. History of motion sickness and/or PONV
4. Postoperative use of opioids.

Managing PONV in these patients involves first reducing the baseline risk by

1. Using loco regional techniques whenever possible.
2. Avoiding inhalational agents
3. Avoiding nitrous oxide
4. Avoiding or limiting the dose of opioids.

In patients with moderate risk of PONV, 1 or 2 first line anti emetics should be used (Table 9.1).

In patients with high risk, 3 or 4 first line antiemetics should be used for prophylaxis. Use of TIVA should be considered whenever possible. Three classes of antiemetic drugs, serotonin antagonists (e.g. ondansetron), corticosteroids (e.g. dexamethasone), and dopamine antagonists (e.g. droperidol) have similar efficacy against PONV, with a relative risk reduction of ~25%. Moreover, they act independently and when used in combination, have additive effects. Antiemetics administered as rescue treatment should be of a different class than the drug administered as prophylaxis. The rescue treatment provided for ambulatory patients should be in oral form or a patch. (e.g. transdermal scopolamine).

Table 9.1 Drugs and Dosage for PONV along with administration timings

	Generic name	Mode of administration	Dose (mg)	Timing of administration
First class	Dexamethasone	I.V.	4–8	Induction
	Droperidol	I.V.	0.625–1.25	End of surgery
	Ondansetron	I.V.	4	Induction
	Palonosetron	I.V.	0.075	Induction
Second class	Dimenhydrinate	I.V.	50	Induction
	Scopolamine	Transdermal	1	The night before/day of surgery
	Metoclopramide	I.V.	25–50	Induction

9.6 Recovery and Discharge

Patients are monitored similar to any other ambulatory patient with standard monitoring. Other side effects like headache, dizziness, drowsiness, sore throat should be watched for and treated appropriately. Patients should be discharged when there is complete recovery from the effect of anaesthetic agents without any drowsiness, the patient is mobile with no dizziness, is able to eat and drink i. e. no PONV, no excessive bleeding from operation site and able to void. All the instructions should be given in writing as well as explained to them and they should have a responsible person accompanying them.

9.7 The Future

With the advances in anaesthesia and minimally access surgery, more and more gynaecological surgeries which were traditionally carried out in an in-patient setting are now being done on an ambulatory basis. This helps in better utilization of resources. A multidisciplinary team approach can transform health care services for women in this way.



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Anil Parakh and Jhanvi Jalindar Pol

10.1 Introduction

Neurosurgery is a technology driven medical speciality. The introduction of steroids in neurosurgery along with development of advanced imaging and localization techniques such as functional MRI, diffusion tensor imaging, operation theatre technology, operating microscope, microsurgical techniques and neurological corridors have all contributed to the growth and acceptability of day care neurosurgery. The modern era of minimally invasive approaches, image guided navigation, retractor-less surgery, neuroprotective adjuvants, increasing dependence on peri-operative neurophysiological monitoring and improvements in anaesthesia have resulted in faster, simpler and safer surgery with good perioperative recovery and better outcomes.

10.2 Surgeries That Can Be Conducted in Day Care

- Paediatric neurosurgical procedures
 1. Craniotomies for brain tumours
 2. Brain biopsies
 3. VP shunt
 4. Excision and repair of spina bifida
 5. Spinal decompression (Minimally access surgery)
 6. Endoscopic third ventriculostomy (ETV)
 7. Endovascular management of vascular lesions
 8. Excision of encephalocele
 9. Repair of depressed skull fracture
- Adult neurosurgical procedures
 1. Navigation aided biopsies of all brain tumours
 2. Craniotomies for excision of small brain tumours

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E.g.: Meningioma, Metastasis, Glioma etc.

3. Anterior cervical discectomies and fusion
4. Lumbar spinal decompression
5. VP shunt
6. Endoscopic Third ventriculostomy (ETV)
7. Clipping of up-ruptured ACOM aneurysm
8. Skull bone fractures reduction
9. Cranioplasty
10. Neuroradiological procedures both diagnostic and therapeutic

10.3 Pre-Anaesthetic Evaluation

The general guidelines for patient selection for ambulatory anaesthesia are also applicable to neurosurgical patients. ASA 1 and 2 patients can be safely taken up. Full term infants >1 month and preterm infants >60 weeks post conception are also fit. The evaluation also involves full assessment of the patient's co-morbidities which should be optimized before the surgery and preoperative neurological status (GCS, features of raised ICP, seizures type and frequency, neurological deficits etc). Basic laboratory investigations should be conducted and appropriate counselling should be provided to patient.

10.4 For the Patient Posted for Day Care Neurosurgery

- Inclusion criteria
 1. Patients should have telephone access to day care surgical unit.
 2. Patient should live maximum 1 hour drive to the hospital in peak traffic.
- Exclusion criteria
 1. High ASA status
 2. Poor anaesthetic risk
 3. Serious co-morbidities (bleeding disorders, severe anaemia, CVS illness, obesity)
 4. Patients requiring emergency surgery
 5. Long duration surgery
 6. No availability of capable caregiver to nurse at home

10.5 For Outpatient Brain Tumour Cases in Specific

- Inclusion criteria
 1. Supratentorial tumour
- Exclusion criteria
 1. Already an inpatient
 2. Significant cardiorespiratory morbidity
 3. Airway management concerns (e.g., sleep apnoea)

4. Uncontrolled seizures or poor neurological status
5. Long duration surgery (>4 h)
6. Psychological unsuitability

10.6 Anaesthesia Techniques

Monitored Anaesthesia Care (MAC)

According to ASA, MAC is a planned procedure during which the patient is administered local anaesthesia (LA) along with sedation, analgesics and anxiolytics. This is mainly used for diagnostic neuroradiological procedures. The commonly used drugs are midazolam, fentanyl, sedative dosages of propofol, dexmedetomidine, subanaesthetic concentrations of inhaled anaesthetic agents like nitrous oxide and sevoflurane. Ketamine can be used in paediatric patients.

General Anaesthesia

All newer anaesthetic drugs have short half-life and are fully eliminated from the body within few hours. Propofol, sevoflurane and desflurane (MAC < 1), fentanyl, dexmedetomidine and neuromuscular blocking agents can be safely used. TIVA can be also utilized. Endotracheal tube is the safest airway device but second generation LMA's (e.g., Proseal LMA, Supreme LMA, I-Gel) that have gastric drainage ports can be inserted for brain biopsies, neuroradiological procedures, etc. to lessen sympathetic response and postoperative sore throat.

Awake Techniques

This entity is an important technique used for brain tumour excision from eloquent cortex, epilepsy surgery and deep brain stimulation surgery. The benefits are increased lesion removal, improved survival benefit, minimum damage to eloquent cortex and less postoperative neurological dysfunction. Other advantages include shorter hospitalization time, decreased cost of care and decreased incidence of complications like PONV.

10.7 Contraindications for Awake Craniotomies

- Absolute
 1. Patient refusal
 2. Inability to lay still for any length of time
 3. Inability to co-operate
- Relative
 1. Patient cough

2. Learning disabilities
3. Patient anxiety
4. Language barriers
5. OSA
6. Very young age

10.8 Common Techniques

- Sedation only awake throughout
Propofol and remefentanyl TCIs are used in UK. Dexmedetomidine and fentanyl can be used in India.
- Asleep-awake-asleep technique

This involves awakening the patient for cortical mapping and resection of lesion and perioperative neurological assessment and re-anaesthetizing after assessment for closure.

Bilateral scalp block is given for pain relief which is an anatomical block given by infiltration of LA to seven nerves of scalp on either side as shown in diagram below (Fig. 10.1). A mixture of 2% Xylocaine with epinephrine and 0.25% Bupivacaine or 0.2% Ropivacaine is used. The total LA available for use with or without epinephrine must be calculated for individual patients to avoid toxicity.

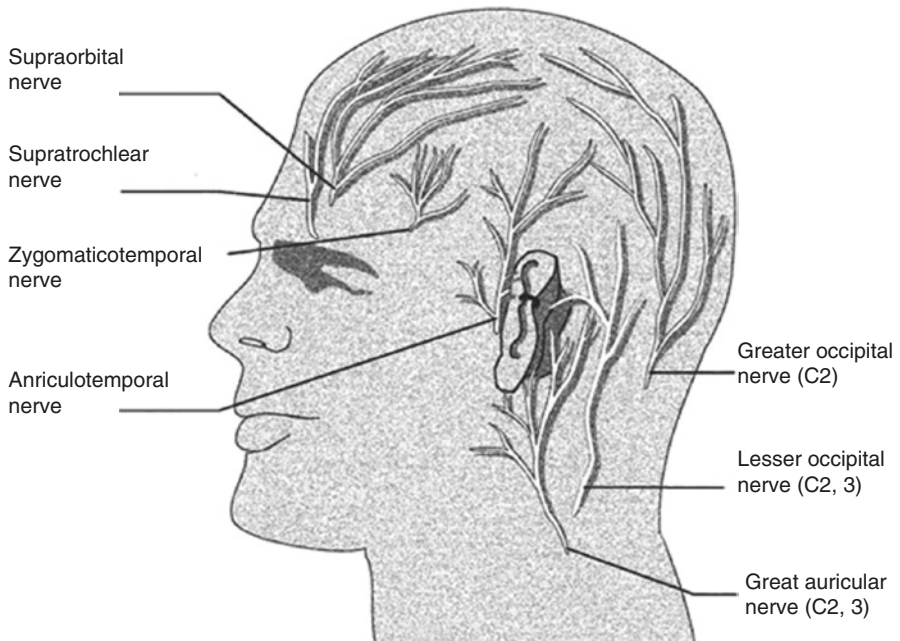


Fig. 10.1 Bilateral scalp block

This block may be inserted with the patient sedated or after the induction of anaesthesia. The skin is cleaned using either chlorhexidine or betadine. The amount inserted at each site will be dependent upon the concentration and local anaesthetic used and whether it is mixed with epinephrine. Using sterile gloves and a 23-gauge needle, the local anaesthetic is infiltrated into the following sites:

10.9 Supraorbital Nerve, a Branch of the Trigeminal Nerve, V1 Distribution

It innervates the forehead, anterior part of the scalp, and top part of the head. Palpate the supraorbital notch and insert needle perpendicularly and inject.

10.10 Supratrochlear Nerve, a Branch of the Trigeminal Nerve, V1 Distribution

It innervates the forehead and anterior part of the scalp. Just medial to the supraorbital nerve injection site, above the eyebrow line, inject local anaesthetic to spread the block medially.

10.11 Zygomaticotemporal Nerve, a Branch of the Trigeminal Nerve, V2 Distribution

It innervates a small area of the forehead and the temporal area. The nerve passes through the temporalis muscle to enter the temporalis fascia. Therefore, the local anaesthetic needs to be infiltrated deep and superficial to the temporalis muscle. Infiltration begins at the lateral edge of the supraorbital margin and continues to the distal aspect of the zygomatic arch.

10.12 Auriculotemporal Nerve, a Branch of the Trigeminal Nerve, V3 Distribution

It innervates the temporal areas, lower lip, lower face, auricle, and the scalp above the auricle. Inject local anaesthetic about 1 cm anterior to the auricle, above the level of the temporomandibular joint. This nerve crosses over the root of the zygomatic process of the temporal bone and lies deep to the superficial temporal artery, which should be palpated to avoid intra-arterial injection.

10.13 Lesser Occipital Nerve, a Branch of the Second and Third Cervical Spinal Nerve

It ascends along the posterior border of the sternocleidomastoid muscle. It innervates the scalp in the lateral area of the head posterior to the auricle. Infiltrate local anaesthetic subcutaneously behind the auricle starting from the top-down to the

auricular lobule and then continue to infiltrate along the superior nuchal line to the greater occipital nerve.

10.14 Greater Occipital Nerve, a Branch of the Second Cervical Spinal Nerve

It arises from the first and second cervical vertebrae. It ascends to innervate the skin along the posterior part of the scalp. It can also innervate the scalp at the top of the head and over the auricle. It is located by initially palpating the occipital artery, which is found about 3–4 cm lateral to the external occipital protuberance along the superior nuchal line and then we inject the local anaesthetic, medial to the occipital artery.

10.15 Greater Auricular Nerve, a Branch of the Second and Third Cervical Spinal Nerves

It is the largest of the ascending branches and emerges around the posterior border of the sternocleidomastoid muscle. It divides into an anterior and a posterior branch and provides sensory innervation for the skin over the parotid gland and mastoid process and the auricle. Inject the local anaesthetic about 2 cm posterior to the auricle, at the level of the tragus.

10.16 Postoperative Care

As per general guidelines of ambulatory anaesthesia, post anaesthetic Aldrete recovery score is used for discharge of patient from PACU (Total score should be 10; minimum of 9 is needed). For discharge of patient to their home, PADS (Post-Anaesthesia Discharge Scoring system) is used for which score $> =9$ is required. The criteria for home readiness in paediatric day care neurosurgery is-

- Full wakefulness
- Absent/minimal pain
- Ability to ambulate
- Absence of nausea vomiting.

Evaluation by a consultant neurosurgeon is mandatory before discharge.

10.17 Scope of Day Care Neurosurgery

In Conclusion, adverse events will and do occur despite advances in the field. Some of them are: haemorrhage, seizures, oedema, new neurological deficits, CSF leak, wound infection, etc. Day care spinal neurological procedures still have medicolegal hurdles. The cranial procedures that could be done with acceptable risks are yet

to be ascertained. A consensus must be reached among neurosurgeons regarding the procedures that could be done as ‘day care procedures’ and those will depend on the expertise of the neurosurgeon and the institution. This day care revolution will need a dedicated team of neurosurgeons, neuro-anaesthetists, neuro-nurses and counsellors who will make sure no mishaps occur. As per further improvements in technology and experience, there will be a better categorization of neurosurgery patients into two streams—those requiring day care surgery and those needing prolonged in-patient stay in the hospital.



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Anaesthesia for Plastic Surgery in Day Care

11

Shagufta Choudhary

According to the reports of 2016 plastic surgery statistics of American Society of Plastic Surgeons, in 2016, 45% of all cosmetic surgery procedures were performed in physicians' offices and 14% in freestanding ambulatory surgery facility. This constitutes 59% of all procedures. A majority of plastic surgery procedures are performed outside of a hospital-based setting. These figures are ever increasing.

11.1 Special Concerns for Plastic Surgery

1. Majority of cases performed in this speciality are elective
2. The patients are self-paying, without insurance assistance.
3. Patients prefer office-based and ambulatory surgery as it offers greater privacy.
4. Ambulatory surgery has a lesser psychological impact than in patient-based surgery.

Aesthetic cases that can be done in an ambulatory setting.

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Face	Facial rejuvenation
	Neck lift
	Face lift
	Neck and face liposuction
	Fat grafting of face
	Blepharoplasty
	Brow lift
	Ear correction
	Rhinoplasty
	Lip enhancement/correction
	Botox injection
Injectable fillers	
Breast	Augmentation
	Mastopexy
	Reduction
	Asymmetry
	Nipple areola issues
Body	Liposuction
	Tummy tuck
	Arm reduction
	Hand rejuvenation
	Butt augmentation
Skin lesions	Scar excision/correction
	Keloids

11.2 Anaesthetic Management

Preoperative Evaluation and Optimization

There should be a thorough preoperative assessment of the patients especially in the obese patients coming for liposuction. They may be having various comorbid conditions like obstructive sleep apnoea, diabetes, high blood pressure, heart disease, gastric reflux and deep vein thrombosis. Since plastic surgery cases are elective cases, patients should be optimized adequately. Chronic diseases like hypertension, diabetes, hypothyroidism, coronary artery disease should be well controlled.

Obstructive Sleep Apnoea

A significant number of patients coming for plastic surgery suffer from OSA. All patients should be screened by common screening methods like STOP-BANG score, sleep apnoea clinical score and Berlin questionnaire. OSA is associated with increased probability of both intra operative and post operative complications like desaturation requiring intubation and acute cardiac problems. Those patients screened positive in the above-mentioned questionnaires should undergo a sleep

study or preferably a sleep endoscopy. In patients with OSA, the severity should be assessed. The patient should be asked about the current treatment, whether they are on BiPAP and whether their other diseases are controlled or not. If the patients are otherwise well controlled in regard to their comorbid conditions and agree to comply with postoperative positive airway pressure therapy if needed, then they can be taken up for low-risk day care surgery. However, if the patients are predicted to have a substantial narcotic requirement postoperatively, they should be operated in a setting where prolonged postoperative monitoring is possible and if needed it can be converted into a hospital stay.

Preoperative Investigations and Instructions

Routine investigations like CBC, urine routine, ECG, chest x-ray, serum creatinine and blood sugar levels should be done. NPO instructions are given according to the standard guidelines. Written informed consent was taken.

Anaesthesia Management

Anaesthesia for plastic surgery varies from local anaesthesia with or without sedation for small surface area surgery to regional nerve blocks, spinal and general anaesthesia for liposuction or breast surgery cases.

Local Anaesthesia with/without Sedation

Surgery on the face like Botox injections, fat fillers and facial rejuvenation can be done under local anaesthesia. Surgery on the face can be carried out using nerve blocks of the face like supraorbital nerve, infraorbital nerve, zygomaticotemporal nerve, zygomaticofacial nerve etc. Similarly, hand surgeries can be performed using the locoregional techniques. Liposuctions of smaller areas can be done under local anaesthetic infiltration. If the patients do not tolerate local anaesthesia injections, they can be supplemented with slight doses of short-acting sedatives. The recovery time is short and the patient can be discharged early. This technique, however, requires clinical expertise to ensure that the local anaesthesia is given adequately to the entire operating area or the patient may end up getting excessive sedation.

General Anaesthesia

General anaesthesia is usually preferable for liposuction and breast surgery cases. In an ambulatory setting, Propofol is the induction agent of choice as it has a favourable recovery profile and antiemetic characteristic. The patient can be intubated with an endotracheal tube or an LMA can be inserted with or without muscle

relaxants. For analgesia, multimodal techniques can be implemented. Local anaesthetic infiltration, commonly employed in most of the plastic surgery cases help to reduce the overall anaesthetic requirement.

Special Considerations in Liposuction Cases

A varying amount of wetting solution, consisting of local anaesthetic and adrenaline is injected into the subcutaneous space to facilitate plane formation. The amount of wetting solution depends on the surgeon's technique. In the wet technique about 200–300 mL of wetting solution is infiltrated, whereas, in the tumescent technique, 3–4 mL solution is infiltrated for each ml of aspirate planned. The amount of wetting solution should be carefully monitored since injecting large quantities of local anaesthetic solutions can lead to significant metabolic changes as well as volume overload. Susceptible patients may even land up in pulmonary oedema. Fluid management is of utmost importance. A record of all the fluid administered should be kept. While measuring the output, the volume of aspirate should also be counted along with blood loss and urine output. The patients in whom tumescent techniques are used are benefitted by an extended observation and if possible a diuretic administration. The total dose of lignocaine used should also be kept in mind.

Although there are reports of doses up to 50 mg/kg of lignocaine given safely, it is better to limit the dose up to 35 mg/kg. In cases where general anaesthesia or regional anaesthesia is used, the surgeon can skip using lignocaine in infiltrating solutions or use lowest possible doses.

Addition of adrenaline to the wetting solution helps in haemostasis and delays the absorption of local anaesthetic. However, it should be used with caution in patients with cardiovascular and peripheral vascular disease.

When combining local infiltration with general anaesthesia, the requirement of analgesics, as well as relaxants, is relatively less.

Subarachnoid Block

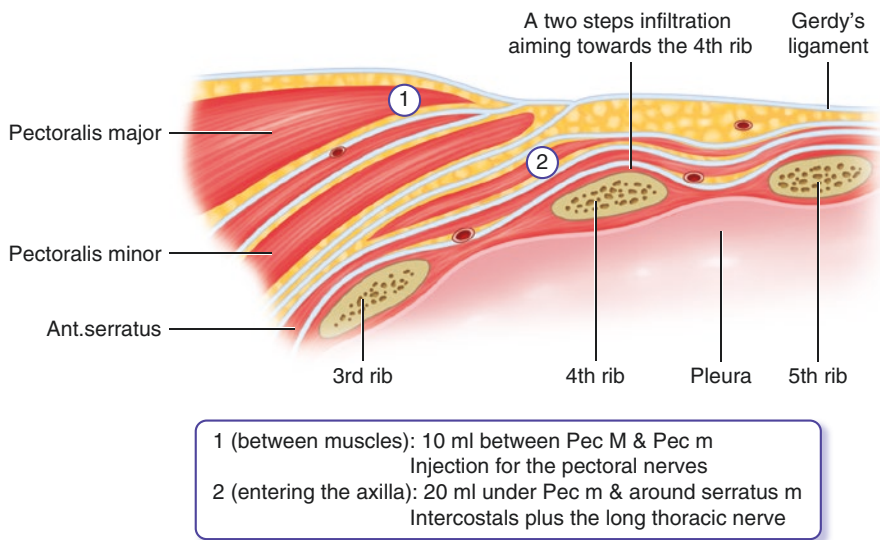
Though liposuction in infraumbilical areas can be managed with spinal anaesthesia, it is not recommended by the American Society of Plastic Surgeons Practice Advisory in the office-based setting. If needed, a low dose spinal with a short-acting drug like chlorprocaine can be given for low volume liposuction of thigh and buttocks.

Regional Nerve Blocks

Nowadays more and more cases are being done under nerve blocks. With the help of ultrasound, specific nerves can be blocked. These blocks are administered directly under local or after giving sedation or general anaesthesia. Nerve blocks provide good quality analgesia of longer duration and help to reduce the requirement of analgesics, especially opioids in the postoperative period.

Breast Surgery

Usually, general anaesthesia is preferred for aesthetic breast surgery. “Awake breast augmentation” has been reported and is being done in some parts of the world, though not preferable by most of the patients. Various regional techniques like thoracic epidural, paravertebral and intercostal nerve blocks have been used. However, they are more invasive and have their own complications. The pectoral nerve blocks (PEC) are less invasive and have fewer complications. They are, therefore, preferable in a daycare setting.



There are two types of pectoral nerve blocks.

PEC -I is administered between the pectoralis major and minor muscles at the level of the third rib using 10 mL local anaesthetic. This easy and reliable technique is mainly used for superficial surgeries limited to pectoralis major. For more extensive operations requiring deep dissection, PEC 2 block is given i.e. another 10 mL local anaesthetic is injected in the plane between pectoralis minor and serratus anterior at the third rib level. This blocks the lateral branches of thoracic spinal nerves (T2, 3, 4).

Postoperative Monitoring and Discharge

Standard ambulatory discharge criteria are followed. Patients should be discharged when there is a complete recovery from the effect of anaesthetic agents without any drowsiness, the patient is mobile with no dizziness, is able to eat and drink i.e. no PONV, no excessive bleeding from operation site and able to void. All the instructions should be given in writing as well as explained to them and they should have a responsible person accompanying them. It should be the aim of the ambulatory

team to provide a pleasant experience to plastic surgery patients who come for these elective cosmetic procedures. Postoperative complications and readmissions are highly undesirable.

Conclusion

The demand for non-hospital-based procedures is increasing every year and so is the need for developing novel anaesthesia techniques. The aim of anaesthesia in day care surgery is to provide safe, precise anaesthesia with minimal postoperative complications and readmissions. Successful conduct of a case in ambulatory setting needs a dedicated team. To ensure smooth and safe discharge, there should be a close coordination between the surgeon, anaesthetist and all the staff involved in ambulatory patient care.



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Anaesthesia for ENT Procedures in Day Care

12

Krishna Vora

Day care surgery in otolaryngology is gradually gaining popularity all around the world and the scope of day care surgery has improved significantly in recent years. As the cost for healthcare continues to escalate, day care surgeries are an option that are available to patients who need to undergo ENT surgeries without compromising the quality of service provided. A large number of ENT cases are done on a day care basis.

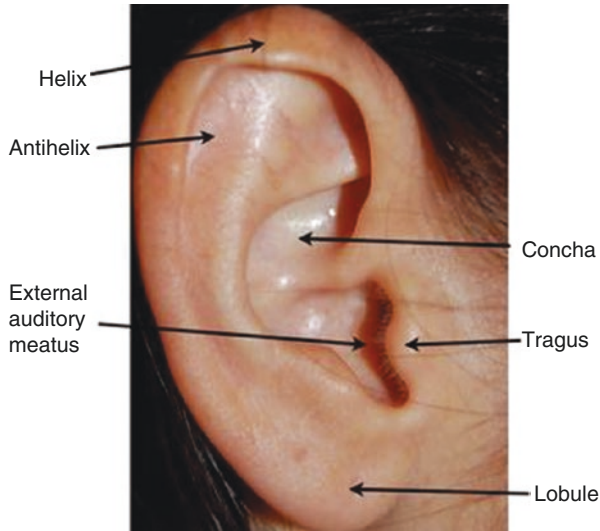
12.1 Anaesthesia for Ear Surgeries

The ear is divided into three parts:

1. External Ear- Pinna, External Auditory Canal
2. Middle Ear- Middle ear cleft, ossicles, muscles, eustachian tube
3. Internal Ear- Cochlea, Semi-circular canals

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For the purpose of anaesthesia, it is important to know the nerve supply of the pinna, external auditory canal and tympanic membrane. These are the nerves which are blocked while giving local anaesthesia to the ear during ear surgeries.



12.2 Anatomy of the Pinna

Nerve Supply

1. Greater Auricular Nerve (C2, C3) supplies the skin of the lower third of the lateral (anterior) surface and lower two-thirds of the medial (posterior) surface
2. Auriculo-Temporal Nerve (Vth Cranial Nerve) supplies the rest of the lateral (anterior) surface.
3. Lesser Occipital Nerve (C2) supplies the rest of the medial (posterior) surface

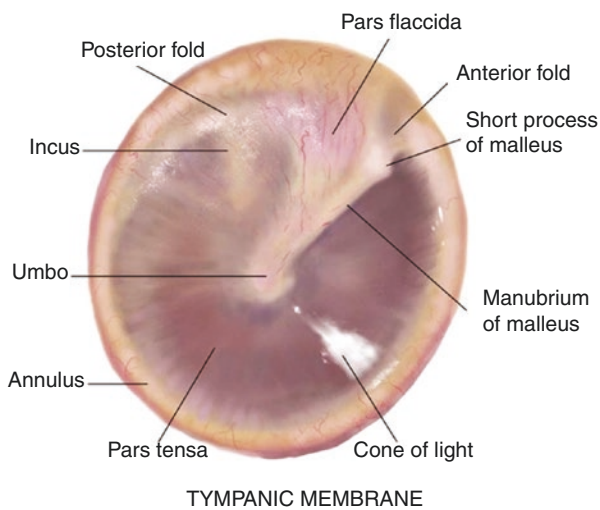
12.3 External Auditory Canal



External auditory canal nerve supply

1. Auriculo-Temporal Nerve (Vth Cranial Nerve) supplies the anterior half
2. Auricular branch of Vagus (Arnold's, Alderman's Nerve) supplies the posterior half

12.4 Tympanic Membrane



12.5 Nerve Supply of Tympanic Membrane

- Internally—Tympanic Plexus (IX Cranial Nerve)
- Externally—Auriculo-Temporal Nerve (V) in the anterior half and Auricular branch of Vagus (Arnold's, Alderman's Nerve) in the posterior half

Anaesthetising the ear may be required in the following situations:

- Suture of a large laceration of the ear or the skin surrounding the ear
- Foreign body removal from the ear
- Removal of wax granuloma
- Auroplasty
- Myringotomy
- Myringoplasty
- Tympanoplasty
- Mastoidectomy
- Stapedectomy
- Ossiculoplasty

12.6 Anaesthesia

Topical anaesthesia using 4% xylocaine maybe used for procedures like Foreign body removal from the ear, removal of wax granuloma, myringotomy. four percent xylocaine is introduced into the ear canal and kept there for 10–15 min to anaesthetise the ear canal and ear drum,

Infiltration Local anaesthetic agents (E.g. 2% Xylocaine, Bupivacaine 0.25% or 5%) may be used.

12.7 Duration of Action

In most otologic procedures, the time frame usually does not exceed 3 h, so the commonly used agents like xylocaine should suffice. The duration of action of xylocaine with adrenaline is about 4 h—more than enough time to complete most ear procedures.

12.8 Maximum Dose

For 2% xylocaine the maximum dose should not exceed 4.5 mg/kg, and used with adrenaline this maximum dose can be as high as 7 mg/kg.

A very important factor to account for in choosing a local anaesthetic is a patient's sensitivity to, or history of allergic reactions to, a given anaesthetic agent.

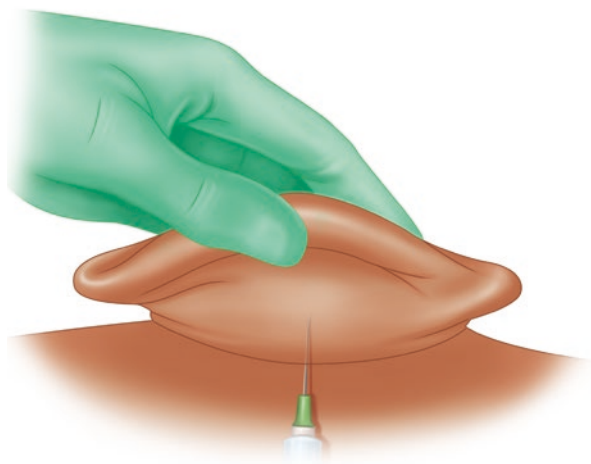
Preoperative or intraoperative sedatives or anxiolytic agents can be used in combination with local anaesthesia.

12.9 Advantages of Local Anaesthesia in Ear Surgery

Local anaesthesia is an accepted method by which to perform otologic surgery, is used routinely, and has many advantages over general anaesthesia.

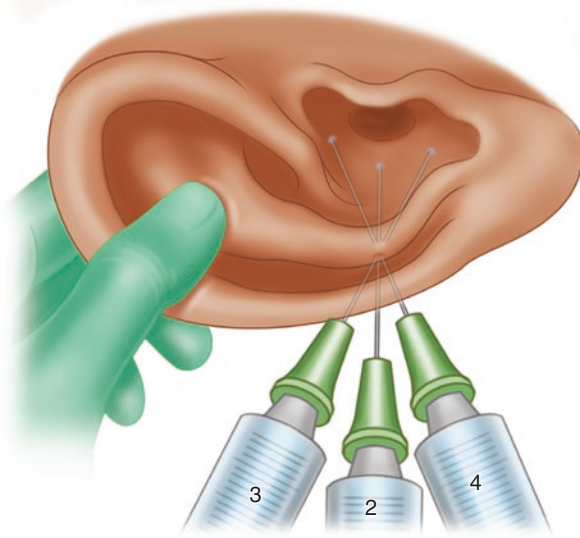
- Safety is superior to that of general anaesthesia. This includes avoidance of intubation and elimination of the remote possibility of laryngotracheal complications as well as removal of any potential for cardiopulmonary complications related to general anaesthetic agents.
- Less bleeding (although most surgeons still use injectable and topical local anaesthesia during general anaesthesia)
- Ability to assess a patient's hearing and detect any vertigo during surgery (especially valuable during stapedectomy)
- Avoidance of a potentially lengthy and/ or disruptive emergence from anaesthesia (advantageous in stapes surgery and ossicular reconstruction procedures)
- Less postoperative nausea and vomiting
- Less expensive

12.10 Technique [1, 3]

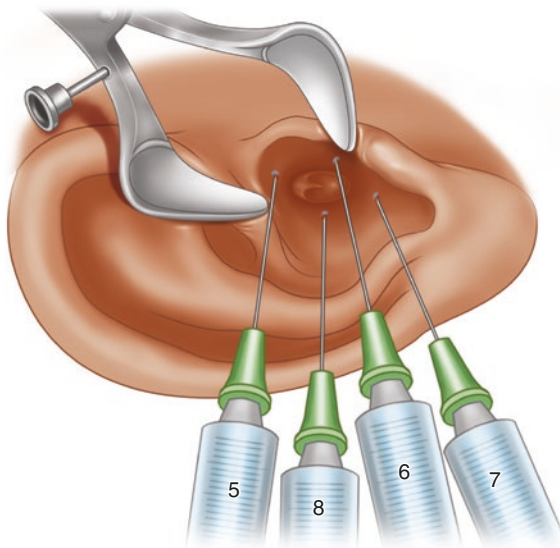


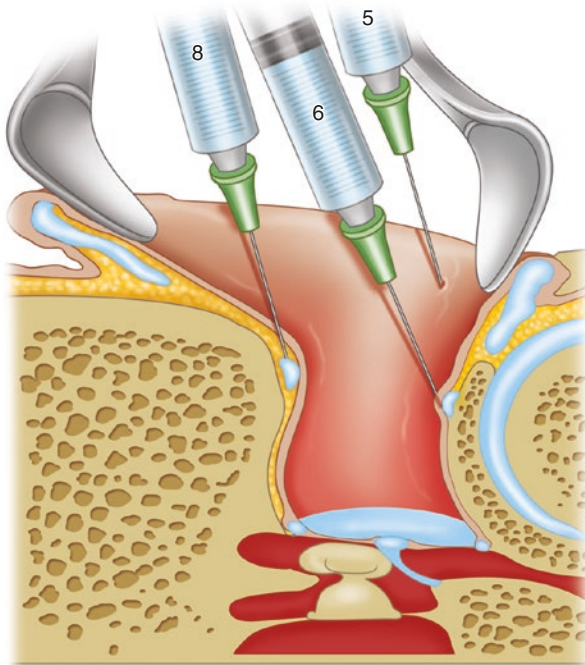
Step 1: Inject the region of the postauricular fold.

Steps 2–4 Without removing the needle in Step 1, advance the needle in three vectors: directly toward the posterior external ear canal, superior to the external ear canal and inferior to the external ear canal.



Steps 5–8: Inject the four quadrants of the ear canal in a stepwise fashion. This anaesthetises the external ear canal while at the same time achieving haemostasis of the skin of the ear canal and tympanic membrane. Take care during each of the canal injection steps to avoid the formation of haematomas or vesicles that could impair healing or obscure the tympanic membrane during surgery.



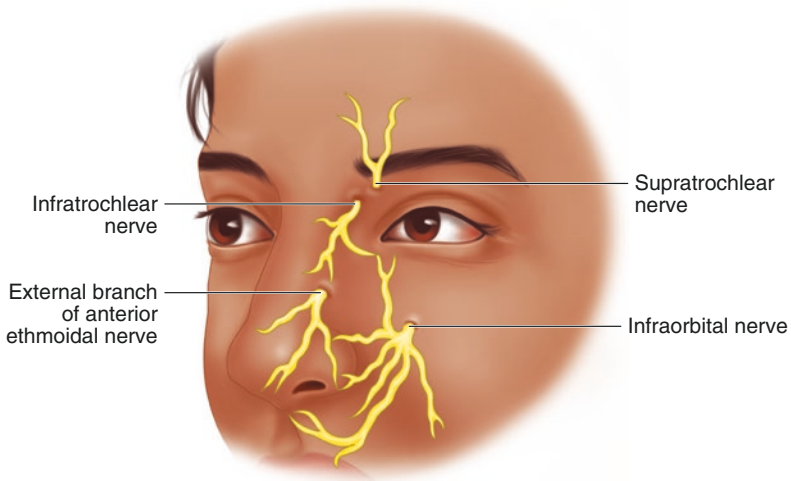


12.11 Anaesthesia for the Nose and Nasal Cavity [2]

Some of the day care indications for administering nasal anaesthesia are as follows:

1. Nasal endoscopy
2. Reduction of Fracture nasal bone
3. Septoplasty
4. Nasal packing
5. Foreign body removal
6. Incision and drainage of Septal Abscess
7. Incision and drainage of Septal hematoma
8. Functional Endoscopic Sinus Surgery
9. Endoscopic Dacryocystorhinostomy

12.12 Nerve Supply of Nose



It is important to know the sensory nerve supply of the nose in order to give adequate local anaesthesia.

It is divided into-

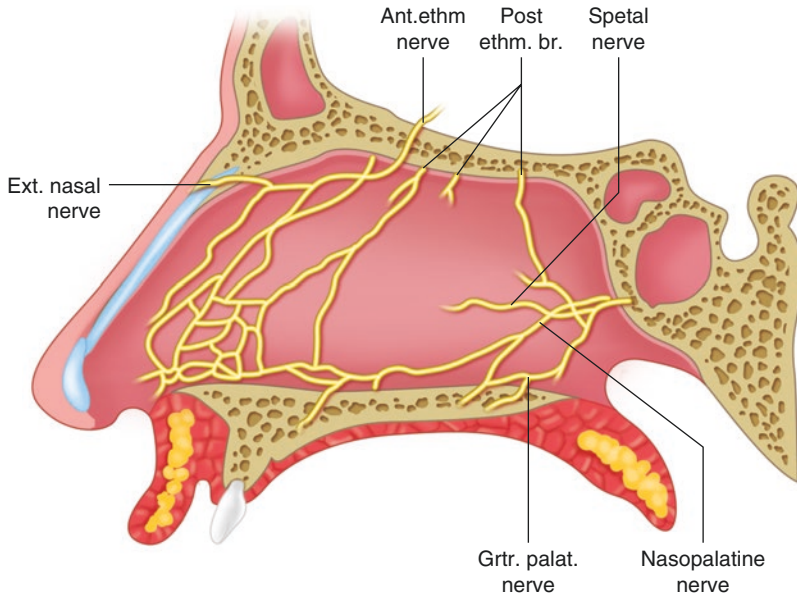
1. Nerve supply of the nasal mucosa
2. Nerve Supply of the external nose

Nerve Supply of the external nose:

External nose and its skin lining is innervated by ophthalmic and maxillary divisions of trigeminal nerve.

Superior aspect of the nose is supplied by—Supratrochlear and Infratrochlear nerves (branches of trigeminal nerve) and external nasal branch of anterior ethmoidal nerve.

Inferior and lateral parts of the nose—is supplied by infraorbital nerve.



Nerve Supply of the Nasal Mucosa:

1. Superior inner aspect of the lateral nasal wall is supplied by anterior and posterior ethmoid nerves
2. Sphenopalatine ganglion present at the posterior end of middle turbinate innervates the posterior nasal cavity
3. Nasal septum is supplied by anterior and posterior ethmoidal nerves. Sphenopalatine ganglion also contributes to the sensory supply to the nasal septum via its nasopalatine branch.
4. Cribriform plate superiorly holds the olfactory special sensation fibres.

12.13 Different Methods of Administering Nasal Anaesthesia

1. Topical/Surface anaesthesia

This is done by using 4% topical xylocaine solution or 10% topical xylocaine spray.

- The effect of 10% xylocaine nasal spray lasts for about 45 min. Hence it is used for diagnostic nasal endoscopy, nasal packing.
- Roller gauze/nasal patties soaked in 4% xylocaine is used for minor nasal surgeries. The packing is started by first packing the floor of the nasal cavity, then the middle meatus area and finally the frontal recess area. Adrenaline may be added to the xylocaine solution. This shrinks the nasal mucosa and prolongs the duration of action.

2. Infiltration anaesthesia

This is done by using 2% xylocaine with or without adrenaline. It is given while performing surgeries within the nasal cavity such as Septoplasty, FESS, etc.

3. A combination of both these is sometimes used to improve the compliance of the patient during nasal surgery

12.14 Precautions

Maximum volume of 4% Topical Xylocaine should not exceed 7 mL. The mucosa of the posterior pharyngeal wall gets anaesthetised along with the nasal cavity during nasal packing. Hence the patient may aspirate blood and secretions during the surgery. Hence it is very important to do periodic suction of the oral cavity during nasal surgery.

12.15 Anaesthesia for the Oral Cavity and Laryngeal Procedures

- Tonsillectomy and adenoidectomy can usually be done as day care procedures. It is done under general anaesthesia except sometimes in co-operative adults, local anaesthesia maybe considered. The most important consideration from the anaesthesia point of view is that both the surgeon and anaesthetist are working in the same region and hence utmost care must be taken not to dislocate or extubate the endotracheal tube during surgery. Also, once the surgery is over, the endotracheal must be removed only after ensuring complete haemostasis is achieved and also the patient is totally awake so that he will not aspirate any secretions or blood.
- Oral biopsies, buccal leucoplakia excision and other such minor surgeries are done by local infiltration of 2% xylocaine.
- Direct laryngoscopy, micro laryngoscopy is done under general anaesthesia. These are usually short procedures for diagnosis, biopsy, and therapeutic excision of small lesions from the vocal cords or foreign body removal and do not entail much bleeding. A smaller sized endotracheal tube is used in order to facilitate maximal viewing of the larynx. Hence the cuff must be fully inflated and care must be taken such that there is no trickling of blood into the lungs.
- Diagnostic fibreoptic laryngoscopy, stroboscopy is done by topical spraying of 10% xylocaine.
- Laryngeal framework surgery such as thyroplasties are done under local anaesthesia in order the assess the voice during surgery.

12.16 Post-Operative Care

After surgery, the patient is discharged only after the vital signs (blood pressure, heart rate, and temperature) are stable, the patient is alert, can hold fluids without vomiting and has passed urine.

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Day Care Anaesthesia in Ophthalmic Procedures

13

Sushil Chouhan

In this day and age, ophthalmic surgery is routinely being done as a day care procedure. From young adults to the elderly population with comorbidities, safe ophthalmic day care surgery is a reality today. Good planning, standard operating protocols, detailed history and attention to detail make it possible for procedures like cataract surgery, glaucoma correction, eyelid surgery etc. to be carried out without any problems.

Anaesthesia techniques play a vital role in day care surgery. Regional blocks, topical anaesthesia and nerve blocks, using combinations of local anaesthetic agents and adjuvants make daycare ophthalmic surgery possible.

Comprehensive monitored anaesthesia care (CMAC) is usually given to all ophthalmic surgical procedures being performed under regional anaesthesia.

There are several intricacies of ophthalmic anaesthesia which the anaesthesiologists should be aware of for the successful conduct of ophthalmic anaesthesia. These include the regulation of IOP, prevention of oculocardiac reflex and its management, the control of intraocular gas expansion and the knowledge of the systemic effects of all the drugs used in ophthalmic practice.

13.1 Anatomy of the Eye

The orbit is an irregularly shaped pyramid in the skull with the base at the front and the apex pointing posteromedially. The walls on the medial side of the right and left orbits are parallel to each other. The eye sits in the orbit of the globe occupying the anterior part of the orbit. The globe sits high and lateral in the orbit.

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The muscles of the eye are four recti and two obliques. The recti muscles superior, inferior, medial and lateral are responsible for the movement of eye up, down, in and out. The oblique muscles (superior and inferior) help in rotation of the eye. The four recti muscles insert into the globe just forward of equator and forms a cone forming a boundary between the two compartments (a) Central compartment (Retrobular), and (b) Peripheral compartment (peribulbar).

Within the cone, the structures present are optic nerves, ophthalmic artery and vein, and the ciliary ganglion.

The ophthalmic division of trigeminal nerve provides sensory nerve supply to the eye. The motor supply is through the third, fourth and sixth cranial nerves. The facial nerve supplies secretomotor parasympathetic fibres to the lacrimal glands, nasal and palatine mucosal glands. Blood supply is by the ophthalmic artery which is a branch of the internal carotid artery.

13.2 Intraocular Pressure

The IOP should be maintained in the normal range while operating within the globe. Any rise in the IOP during surgery can cause impaired operating conditions and expulsion of intraocular contents. There are several factors which affect the intraocular pressure.

The factors which raise the IOP are:

1. An increase in the arterial or venous pressure,
2. Hypoxia,
3. Hypercarbia,
4. Anaesthetic drugs like suxamethonium and ketamine and
5. Laryngoscopy and intubation.

The factors which decrease the IOP include:

1. A fall in the arterial or venous pressure
2. Hypocarbica
3. Intravenous anaesthetic agents except for ketamine,
4. Inhalational agents,
5. Non depolarizing muscles relaxants.
6. Drugs like acetazolamide and mannitol.

13.3 Challenges for the Anaesthetist

1. Akinesia
2. Analgesia
3. Minimal bleeding
4. Awareness of drug interactions
5. Regulation of intraocular pressure

6. Prevention and Management of the oculocardiac reflex
7. Control of intraocular gas expansion
8. Smooth emergence

13.4 Techniques of Ocular Anaesthesia

- (a) Local anaesthesia
 - Topical
 - Subconjunctival
- (b) Regional
 - Facial nerve block
 - Retrobulbar block
 - Peribulbar block
 - Subtenon/Parabulbar block
 - Intracameral block

- (c) General anaesthesia

The aim of any anaesthesia should be complete anaesthesia of globe and conjunctiva; and a normal or soft eye. If akinesia is not required, topical and subconjunctival injections are sufficient. If akinesia of the globe, eyelids, and orbicularis oculi muscle are required then akinetic methods, retrobulbar, peribulbar or subtenon's block is used.

13.5 General Versus Local Anaesthesia

The factors affecting the choice of general versus local anaesthesia are as follows:

1. The duration of the surgery
2. Relative risk of the technique to be employed as well as benefits
3. Patient preference.

13.6 Preoperative Evaluation

1. Eye surgery patients are a high-risk group
2. Extremes of age
3. Comorbidities such as diabetes, hypertension and coronary artery disease are common
4. History of previous hospitalizations and any past history of surgery, allergies and drug interactions.
5. Current medications must be known
6. Conditions such as restless leg syndrome, tremors, claustrophobia may cause difficulties during the procedure. Language difficulties in terms of hearing loss,

speech impairment, difficulty in communication should be known prior to surgery. Similarly, conditions like dementia and OSA may increase the risk of the procedure.

7. Factors that may cause difficulty in obtaining the correct position on the operation table deserve special attention. For e.g. severe scoliosis or orthopnoea
8. Strategies to reduce risk preoperatively include stopping tobacco, treatment of any obstruction to the breathing with bronchodilators or steroids and antibiotics for concomitant infections.
9. Anticoagulants may cause haemorrhagic complications but are a relative contraindication depending on the degree and potential of bleeding.
10. Any wide fluctuation in sugar levels in diabetics is unwarranted.
11. Patients on long-term steroid therapy should be given their normal steroid dose on the day of surgery.

Preferred anaesthetic technique for various procedures:

- (a) *Local anaesthesia*
 - Pterygium
 - Cataract
 - Glaucoma
 - Keratoplasty
 - Dacryocystorhinostomy
 - Refractive surgery
 - Minor extraocular plastic surgery
 - Minor anterior segment procedures
- (b) *General anaesthesia*
 - Paediatric surgery
 - Squint surgery
 - Orbital trauma repair
 - Vitreoretinal surgery
 - Major oculoplastic surgery

13.7 Topical Anaesthesia

For the success of topical anaesthesia, a very careful patient selection and a very skilled surgeon are both prerequisites. There are several benefits to this technique:

- No physiological disturbance,
- No PONV,
- Economical.

This technique is non-invasive and has no complications. This technique is increasingly becoming popular for phacoemulsification of cataract surgery. The commonly used drugs are 1% Amethocaine, 4% lignocaine and 0.75% Bupivacaine. In addition sedation, IV access, supplemental oxygen, topical NSAID and hydration are also used.

About 20–30 mins before surgery, 2–3 drops of the local anaesthesia is instilled every 5 min. The effect lasts for 30 min.

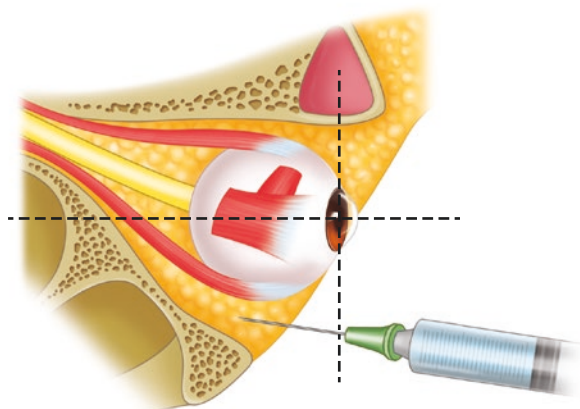
13.8 Subconjunctival Injection

Topical anaesthesia combined with a small volume of LA (0.5 mL) injected under the conjunctiva near the superior limbus constitutes this method. There is no effect on the motor nerves to the globe or periorbital structures. This procedure is simple and safe.

13.9 Peribulbar Block (Most Popular) (Fig. 13.1)

- Injected in peribulbar space. Spreads to the lid and other spaces.
- Produces globe and orbicularis akinesia and anaesthesia
- Agents
 - Lignocaine 1%
 - Bupivacaine 0.75%
- Along with
 - Hyaluronidase 5–7.5 IU/ml
 - Adrenaline 1:200000
- Volume: 8–10 mL approximately
- Insertion point: The first injection is given at the junction of medial 2/3rd and lateral 1/3rd of lower lid adjacent and parallel to the orbital floor. second just inferomedial to supraorbital notch or just medial to the medial canthus
- Position of patient: Supine and in primary gaze
- Used in: Cataract, Glaucoma, Keratopathy, Vitreoretinal surgery, Strabismus surgery

Fig. 13.1 Peribulbar block



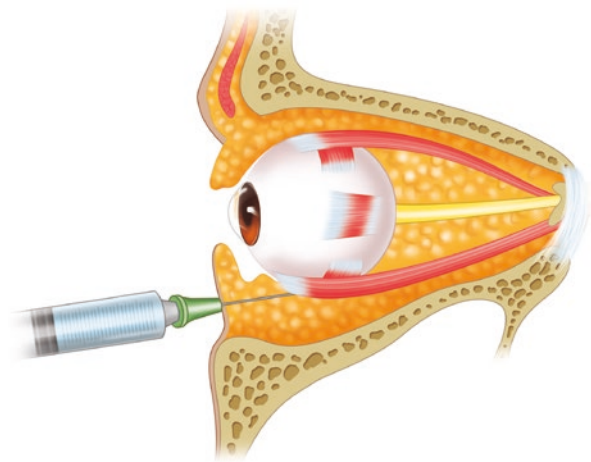
Peribulbar block
Needle outside the muscle cone

- Advantages: Less chance of globe injury, less chance of optic nerve damage.
- Disadvantages: Pain, Conjunctival Chemosis, less akinesia than a retrobulbar block.

13.10 Retrobulbar Block (Fig. 13.2)

- Injected in muscle cone to block
 - Ciliary nerve and ganglion
 - Third, fourth and sixth cranial nerves
 - Provides—Akinesia and Anaesthesia of the globe.
- Position of patient: Supine and in primary gaze
- Site of injection: In the lower lid margin just above a point between medial 2/3rd and 1/3rd of lower orbital margin.
- Direction of needle: Backward, upwards and medially towards apex of orbit
- Volume: 2–4 mL
- Advantages: complete akinesia, dilatation of the pupil, adequate and quicker anaesthesia, a minimal amount of agent required.
- Complications: Retrobulbar haemorrhage, globe penetration, optic nerve sheath injury, optic nerve atrophy, decreased visual acuity, retinal vascular occlusion, brainstem anaesthesia, frank convulsion, extra ocular muscle palsy, trigeminal nerve block, oculocardiac reflex, respiratory arrest.
- Contraindication:
 - Bleeding disorder (risk of retrobulbar haemorrhage)
 - Extreme myopia (globe perforation)
 - An open eye injury (may cause expulsion of intraocular contents)
 - Posterior staphyloma

Fig. 13.2 Retrobulbar block



13.11 Parabolbar or Subtenon Block

- Advantages:
 - Avoids vascular and optic nerve injury
 - Requires lower volume of anaesthetics
 - Better anaesthesia to iris and anterior segment
- Disadvantages:
 - Subconjunctival haemorrhage
 - More post-operative morbidity

13.12 Frontal Block

- To block supraorbital and supratrochlear nerve supplying the upper lid.
- Use: Ptosis surgery
- Site of insertion: Just below midpoint of supraorbital margin transcutaneously directed towards roof of orbit
- Volume: About 2 mL

13.13 Intracameral Anaesthesia

- Agent: Lignocaine 1% (without preservative or adrenaline)
- Use: used for phacoemulsification

13.14 Facial Block

- Aim: To block the action of orbicularis oculi.
- Use: As an adjunct to retrobulbar block.
- Types:
 - Van Lint
 - O'Brien
 - Nadbath & Rehman
 - Atkinson

13.15 Complications of Regional Anaesthesia

- Intravascular injections of LA
- Anaphylaxis
- Retrobulbar haemorrhage
- Subconjunctival oedema
- Penetration/Perforation of the globe
- CNS spread

- Brainstem anaesthesia
- Injury to optic nerve

13.16 General Anaesthesia for Ocular Surgery

Indication:

1. In children and infants
2. Anxious & uncooperative patient
3. Mentally retarded adult or
4. Patient's preference

Objective:

1. Analgesia
2. Amnesia
3. Loss of consciousness
4. Adequate skeletal muscle relaxation

Advantages:

1. Safe operative environment
2. Complete akinesia
3. Controlled intraocular pressure
4. For bilateral surgery
5. Avoiding complications of LA

Complication of GA

1. Hypoxia
2. Laryngospasm
3. Respiratory depression
4. Aspiration pneumonitis
5. Cardiac arrhythmia
6. Hypotension/Hypertension
7. Convulsion
8. Restlessness

13.17 Oculocardiac Reflex

This is a trigeminovagal reflex. The afferent pathway is provided by the long and short ciliary nerves to the ciliary ganglion and Gasserian ganglion along the ophthalmic division of the trigeminal nerve, to the main sensory nucleus in the fourth ventricle. The vagus nerve provides the efferent pathways. The factors that trigger this

reflux are traction on the muscles and pressure on the globe (muscle surgery, RD repair, Enucleation). The side effects include bradycardia, bigeminy, ectopics, nodal rhythm, AV block, and cardiac arrest. Other contributory factors are preoperative anxiety, lighter planes of GA, hypoxia, hypercarbia, old age (increase vagal tone). ECG monitoring is mandatory. The management is by stopping the stimulus, maintaining adequate ventilation and depth of anaesthesia and by injection atropine.

13.18 Intraocular Gas Expansion

In the surgery for correcting the retinal detachment, the surgeon injects a gas bubble which keeps the retina in place by pressure effect. This air bubble will get absorbed in 5 days. N₂O, used in GA, is much more soluble and diffuses into the air bubble increasing its size, thereby increasing the IOP. In some centres, Sulphur hexafluoride (SF₆) and Carbon octafluoride are used instead of air because they are less soluble than N₂ or N₂O and have a longer duration of action (10 days). These are inert gases which are insoluble in water and poorly diffusible. In all these surgeries, N₂O has to be stopped at least 20 min before the injection of the gas. These patients have a risk of loss of an eye during air travel.

Conclusion

Anaesthesia for ophthalmic procedures include certain intricacies which have to be kept in mind by the anaesthetist like

- Maintaining of IOP
- Prevention of OCR
- Control of intraocular gas expansion and need to deal with systemic effects of ophthalmic drugs

In addition, each patient has to be dealt with as an individual basis keeping in mind the unique nature of each case.



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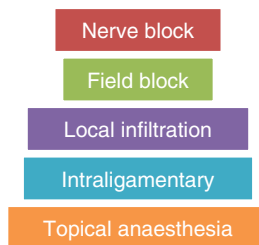
Anaesthesia for Dental Procedures in Day Care

14

Amit Jagtap and Veni Jagtap

The most widely used method for pain control during operative dental procedures in day care is regional analgesia and local anaesthesia. This not only calms the patient but also allays the most important aspect of dental care—The fear of the patient.

Local Anaesthesia for dental procedures can be divided into:



1. Nerve Block:

This is a method of securing regional anaesthesia by injecting a local anaesthetic solution within the close proximity of a main nerve.

2. Field Block:

Local Anaesthetic is injected in proximity to the larger terminal nerve thereby causing the entire field supplied by that nerve to be anaesthetized.

3. Local Infiltration:

A small area is anaesthetized by injecting local solution into the terminal nerve endings only.

4. Intraligamentary technique:

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This provides anaesthesia to a single tooth at a time. The local anaesthetic is infiltrated under pressure into the periodontal ligament space of either maxillary or mandibular teeth.

5. Topical Analgesia:

This method renders free nerve endings incapable of stimulation by application of a topical agent directly to the surface area like an intact mucous membrane or abraded skin.

14.1 Maxilla Anaesthesia Techniques

Intraoral techniques

- Local infiltration
- Block of terminal branches
- Infraorbital nerve block
- Posterior superior alveolar nerve block (PSA)
- Nasopalatine nerve block
- Anterior palatine nerve block
- Maxillary nerve block

Extraoral techniques

- Infraorbital (anterior and middle superior alveolar nerves)
- Maxillary nerve block

14.2 Intraoral Techniques

Local Infiltration

This is indicated when only the mucous membrane and underlying connective tissues are to be anaesthetized. This technique can be used for incisions or before insertions of other needles.

Technique: A 1 inch 25-gauge needle is inserted beneath the mucous membrane into the connective tissue in the area to be anaesthetized and the anaesthetic solution is infiltrated slowly throughout the area.

Block of Terminal Branches

This technique is indicated for providing analgesia for one or two maxillary teeth or for a limited area of maxilla. The block is confined to the maxilla because of the porosity of the maxilla bone. Larger terminals in the mandible would not be anaesthetized by this technique because of the denseness of the bone.

Techniques: There are 5 ways to achieve anaesthesia in the terminal branches.

Paraperiosteal Technique

This is also known as supraperiosteal block. The anaesthetic solution is injected along the periosteum. A 1 inch 25-gauge needle is inserted through the mucous membrane and underlying connective tissue until it gently comes into contact with the periosteum. The solution is now injected at this space. The needle can also be inserted into the mucobuccal or mucolabial fold to make contact with the periosteum opposite and just above the apex of the tooth root and approximately 2 mL of solution is injected very slowly. Any of the incisors, canines and premolars can be anaesthetized by this technique.

Interosseous Technique

In this technique, the anaesthetic solution is injected directly into bone. The main drawbacks of this technique are the fact that it is quite painful and there is a fear of breakage of the needle. Therefore, this technique is not commonly used. This process can be used only when PSA and infraorbital blocks fail.

Technique: The tissues over the apex of the root are anaesthetized and an incision is made to reach the bone. The bone is drilled and a 1 inch 23-gauge needle is inserted into the bony opening. The solution is deposited in this space.

Interseptal Technique

This is the most effective technique for use in children and young adults. A 23–25 gauge needle is pressed gently onto the thin porous interseptal bone on each side of the tooth that needs to be anaesthetized.

Intraligamentary Technique

This is used to anaesthetize a single tooth by injecting solution into the periodontal ligament (PDL). A 25/27/30 gauge needle is introduced through the gingival sulcus and into the PDL. This is an against the pressure technique.

Intrapulpal Technique

In this method, once the pulp chamber is exposed, a 25 gauge needle may be introduced directly into the operative site and solution injected. For convenience, the needle can be bent to achieve a proper angle of approach to the chamber.

Infra Orbital Nerve Block

In this block, the nerves anaesthetized are the infraorbital, anterior and middle superior alveolar nerves, inferior palpebral nerve, lateral nasal and superior labial nerves. The areas anaesthetized by this technique are the incisors, cuspids, bicuspids and mesiobuccal root of the first molar, bony support, soft tissue, upper lip, lower eyelid and portion of the nose on the same side.

This block is indicated for any procedures to be performed on five anterior maxillary teeth on the same side of the median line. The needle pathways for this block

can be done using a bicuspid approach or a central incisor approach during insertion.

Technique

The patient's head is tilted so that the maxillary occlusal plane is at a 45° angle to the floor. The supraorbital and infraorbital notches are palpated. An imaginary line is drawn through these notches which should pass through the pupils of the eyes, the infraorbital foramen, bicuspid teeth and mental foramen. 0.5 cm below the infraorbital notch, a depression is felt which is the infraorbital foramen. The left thumb of the operator is placed on the foramen, the index finger is used to retract the lip thus exposing the mucolabial fold. 1 5/8-inch 25-gauge needle is inserted parallel to the above imaginary line (in case of a bicuspid approach), 5 mm parallel to the labial plate, to pass over the canine fossa.

In case of a central incisor approach, the needle should bisect the crown of the central incisor from the mesioincisal angle to the distoangle angle, 5 mm from the mucobuccal fold. The needle should not penetrate more than 3/4 inch and 2 mL is slowly infiltrated. The subjective symptoms of tingling and numbness of upper lip, lower eyelid and side of the nose will be affected.

PSA: Posterior Superior Alveolar Nerve Block

The nerve anaesthetized is the PSA nerve affecting the maxillary molars except the MB root of the first molar, buccal alveolar process and the overlying structures. The indications for this approach are the operative procedures of molar teeth and supporting structures. The needle pathway penetrates the mucosa, alveolar tissue, buccal pad of fat and the posterior fibres of the buccinator muscle. The needle lies posterior to the posterior surface of maxilla, anterior and lateral to the anterior margin of the external pterygoid muscle and anterior to the pterygoid plexus of veins.

Technique

Place the maxillary occlusal plane at a 45° angle to the floor. Move the forefinger over the mucobuccal fold in a posterior direction from the premolar area until the zygomatic process is reached. Rest the fingertip in the concavity of the mucobuccal fold and rotate the fingernail so that it is adjacent to the mucosa and bulbous portion in contact with the posterior surface of the zygomatic process. The finger should now be at right angles to the occlusal surfaces of the maxillary teeth. The index finger is parallel to the needle insertion pathway. 1 5/8-inch, 25-gauge needle with pen grasp is inserted 1/2-3/4 inch going upward, inward and backward. Aspiration is done in both planes and the solution is then injected slowly. There are no subjective symptoms for this block.

Nasopalatine Nerve Block

The areas anaesthetized by this block are the anterior portion of the hard palate and the overlying structures back to the bicuspid area. The indication for this method is palatal anaesthesia. This could also be used to supplement infraorbital nerve block

and to augment analgesia of the 6 maxillary incisors as well as to complete anaesthesia of the nasal septum.

Technique

It is an extremely painful method and therefore, a preparatory injection is given using a 1 inch 25 gauge needle into the labial intraseptal tissue between the maxillary central incisors. The needle is at right angles to the labial plane until resistance is met and then 0.25 mL of LA is deposited there. Now, the needle is reinserted into the crest of the papilla in line with the labial alveolar plate and advanced into the incisive foramen and thereon 0.5 cm into the canal where 0.25–0.5 mL is injected. The subjective symptoms include feeling of numbness in the palate.

Anterior Palatine Nerve Block

This block is indicated for palatal anaesthesia used with PSA or middle superior alveolar nerve block. It is also used for surgery of the posterior portion of the hard palate.

Technique

The greater palatine foramen is approached from the opposite side. A 1 inch 25-gauge needle is placed at right angle to the curvature of the palatal bone. 0.25–0.5 mL of LA is injected. The subjective symptoms include numbness in the posterior part of the palate.

Maxillary Nerve Block

This is indicated when anaesthesia of the entire distribution of the maxillary nerve is required for extensive surgeries. This could also be used when local infection makes blocks of terminal branches unfeasible. It is also used for diagnostic and therapeutic purposes such as tics/neuralgias of maxillary division of the trigeminal nerve.

Techniques

- (a) High Tuberosity technique: Same as PSA technique except the needle is injected to a previously marked depth of 1 ¼ inch
- (b) Greater Palatine Canal technique

14.3 Extraoral Techniques (Uncommonly Used)

Infraorbital Block

This is used when intraoral approach is not feasible which could be due to infection or trauma. Or when attempts to secure anaesthesia by intraoral methods are ineffective.

Maxillary Nerve Block

This is indicated when anaesthesia of the entire distribution of the maxillary nerve is required for extensive surgeries. This could also be used when local infection makes blocks of terminal branches unfeasible. It is also used for diagnostic and therapeutic purposes such as tics/neuralgias of maxillary division of the trigeminal nerve.

Mandible Anaesthesia Techniques

Intraoral techniques

- Classical inferior alveolar nerve block
- Mandibular nerve block
- Lingual nerve block
- Long buccal nerve block
- Mental nerve block
- Incisive nerve block
- Block of terminal branches
- Local infiltration

Extraoral techniques

- Mandibular nerve block
- Mental and incisive nerve block
- Local infiltration

14.4 Intraoral Techniques

Classical Inferior Alveolar Nerve Block

This is indicated for analgesia over all the mandibular teeth and for surgical procedures on the mandibular teeth and supporting structures anterior to the first molar and posterior to the premolar. This can also be used for certain diagnostic and therapeutic procedures.

Technique

The position is given to the patient such that the mandible is parallel to the floor. With the left index finger or thumb, the mucobuccal fold is palpated. Move posteriorly till contact is made with the external oblique ridge of the anterior border of the ramus of mandible. Keep moving until the greatest depth is identified which is the coronoid arch. Now, move lingually, across the retromolar triangle and internal oblique ridge, then to the buccal side taking with it the buccal sucking pad to give a better exposure to the internal oblique ridge, the pterygomandibular raphe and pterygotemporal depression. Hold the ramus extra orally with the index finger. 15/8" 25-gauge needle is inserted parallel to the occlusal plane of the mandibular teeth

from the opposite side of the mouth, penetrating tissues of the pterygotemporal depression into the pterygomandibular space. Half the needle length is inserted while asking the patient to keep the mouth wide open. When the internal surface of the ramus is contacted, 1 mm of the needle is withdrawn, aspiration done and 1–2 mL of solution is injected. Withdraw half of the needle, change the direction bringing it to the same side at the corner of the mouth and inject the remaining Local Anaesthesia to anaesthetize the lingual nerve. The subjective symptoms include numbness of the lower lip and tip of the tongue.

Mandibular Nerve Block (Gow Gates Block)

This is indicated for operative and surgical procedures on the mandibular teeth along with buccal and labial soft tissue anaesthesia or lingual soft tissue anaesthesia.

Technique

An imaginary line is drawn from the corner of the mouth to the intertragic notch of the ear. The anterior ramus of the mandible is palpated to identify the tendon of the temporalis muscle. The needle is inserted through the mucosa just medial to the tendon directed towards the imaginary line just parallel to the flare of the ear. The needle is inserted till the fovea region of the condylar neck is contacted and local injected (max 25–27 mm). In case bone contact is established, the needle is withdrawn.

The primary advantage of this technique is that it produces anaesthesia over the entire distribution of the mandibular nerve with a single needle penetration.

Lingual Nerve Block

This block is indicated for surgical procedures over the anterior 2/3rd of tongue, floor of the oral cavity and mucous membrane on the lingual side.

Technique

The position is given to the patient such that the mandible is parallel to the floor. With the left index finger or thumb, the mucobuccal fold is palpated. Move posteriorly till contact is made with the external oblique ridge of the anterior border of the ramus of mandible. Keep moving until the greatest depth is identified which is the coronoid arch. Now, move lingually, across the retromolar triangle and internal oblique ridge, then to the buccal side taking with it the buccal sucking pad to give a better exposure to the internal oblique ridge, the pterygomandibular raphe and pterygotemporal depression. Hold the ramus extra orally with the index finger. 15/8" 25-gauge needle is inserted on the same side at the corner of the mouth and Local Anaesthesia is injected to anaesthetize the lingual nerve. The subjective symptoms include numbness of the lower lip and tip of the tongue.

Long Buccal Nerve Block

The indications for this block include surgery on the mandibular buccal mucosa and for supplementing the inferior alveolar nerve block.

A 1 inch 25-gauge needle is inserted into the buccal mucosa distal to the third molar where 0.25–0.5 mL of the anaesthetic solution is injected.

Mental Nerve Block

This block is indicated in surgery of the lower lip or mucous membrane or in the mucolabial fold anterior to the mental foramen.

Technique

The apices of the premolars are estimated. A 1 inch 25-gauge needle is inserted into the mucolabial fold. The tissue is penetrated until the periosteum of mandible is gently contacted slightly anterior to the apex of the second premolar. 0.5–1 mL of the local anaesthetic is injected. The subjective symptoms include tingling and numbness of the lower lip on the injected side.

Incisive Nerve Block

This block is indicated for procedures on the mandible and labial mandibular structures and structures anterior to the mental foramen. The technique is similar to the mental nerve block except it should penetrate into the mental foramen in this case.

Block of Terminal Branches

This is used for securing anaesthesia of the 6 anterior teeth. The method includes Paraperiosteal and interosseous techniques done in the maxilla.

Local Infiltration

Local infiltration is used when anaesthesia of a restricted area of mucous membrane is required for limited soft tissue surgery. It is also used as a precursor for other needle insertions which may otherwise be painful.

Technique

A 1 inch 25-gauge needle is inserted beneath the mucous membrane into the underlying tissue and the area is infiltrated.

14.5 Extraoral Techniques

These are not commonly used and are only indicated when the entire mandibular nerve and its subdivisions are required to be anaesthetized with one needle insertion.

This can also be used when infection or trauma make anaesthesia difficult or unpredictable.

14.6 Conscious Sedation

Philosophy: Because of fear and anxiety or apprehension, many patients are psychologically unable to withstand dental care even though local anaesthesia is administered. “Fear of the needle”, endless degree of apprehension, paediatric patients etc. call for the use of conscious sedation.

Objectives: The patient’s mood must be altered. The patient must remain cooperative. The pain threshold should be elevated while all protective reflexes must remain active. There should be minor or no deviation in the vitals but there may be a varying degree of amnesia.

14.7 Routes of Administration

1. Inhalation

The advantages here are that it is a dependable method while being convenient and having a very rapid onset with a short recovery period. The only disadvantage is that it is the weakest of all routes.

2. Oral Administration

Most convenient method but at the same time least reliable

3. Parenteral Administration

This can be given either intravenous, intramuscular or subcutaneously. It generally has a rapid onset and effect with minimum equipment required and appropriate drug dose can be controlled.

Choice of Agents and techniques

- (a) *Nitrous Oxide*—Inhalation technique. Not greater than 50% concentration required.
- (b) *Barbiturates*—Ultra short acting barbiturates are used. The agents commonly used are sodium pentothal, thiamylal sodium (Surital), methohexital sodium (Brevital). Route of administration is solely intravenous.
- (c) *Short acting barbiturates* include Pentobarbital (Nembutal) and Secobarbital (Seconal) may also be administered orally, rectally or intramuscularly in addition to intravenously.

(d) *Psychosedative Drugs*

Chlorpromazine or Promazine, Perphenazine/lompazine/Prochlorperazine
Equanil/phenaglycodol
Valium/Diazepam/lorazepam/oxazepam

These can have depressing effects on the Central Nervous System causing sedation. They can be given orally, subcutaneously, intramuscular or intravenously.

(e) *Narcotics*

Opiates, heroin, meperidine, fentanyl—These are not commonly used.



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Common Nerve Blocks in General Surgery

15

Shagufta Choudhary, M. M. Begani,
and Dheeraj V. Mulchandani

The last few years have seen a dramatic development in the field of anaesthesia, especially nerve blocks. With sound anatomical knowledge, specific nerves can be blocked to impart selective anaesthesia to the area of surgery. There has been a progress from blind localization of nerves based on anatomical landmarks to the use of peripheral nerve locators and now the use of ultrasound guidance. Ultrasound can identify individual nerves, their anatomic variants and can help us to give real time injections as well as document them. These developments have opened up new horizons allowing us to administer nerve blocks to even the most morbid and high-risk patients without disturbing the rest of the anatomy as well as physiology. This technique of “selective anaesthesia” has been our principle at Abhishek Day Care Institute.

We carry out most of our surgeries under local anaesthesia with/without mild sedation. This technique, however, requires patient cooperation. The patient is counselled beforehand and explained that he may remain awake during the surgery. This avoids giving excessive sedation which in turn may delay recovery. Sedation is titrated according to the needs of the patient.

Whenever possible, prior application of EMLA (eutectic mixture of local anaesthetics) cream, 3–4 h in advance helps to reduce the intensity of pain of local injections. We advise the patients to apply the EMLA cream at the site of surgery before reporting to our centre.

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While administering the local anaesthetic, following a few simple steps like using a fine gauge needle (27 G) and gentle handling of the area causes less pain and trauma to the patient. However, this may not be possible or tolerated especially in sensitive areas like the anal canal. This is facilitated by giving a mild sedative, anxiolytic and short acting hypnotic like propofol in titrated doses till the patient tolerates the injection. Once the local anaesthetic has acted, patients allow surgery although they may be awake by the end of it.

Some of the common nerve blocks given at our centre are as follows:

15.1 Anal Ring Block

As the name suggests, it is a subcutaneous block around the anus. This block is administered to the patient in either the lithotomy position or jack knife position when he is sufficiently deep under sedation to allow the block. Using about 20 mL of local anaesthetic with a 27 G needle, injections are made at 3, 6, 9 and 12 o'clock positions. At the time of injecting, to protect the rectal mucosa from perforating, a finger can be inserted into the rectum.

15.2 Pudendal Nerve Block

Derived from S2, S3 and S4 nerve roots, pudendal nerve is the largest nerve of the pudendal plexus. It is a sensory, autonomic and motor nerve. It gives off three branches, namely rectal, perineal and penile or clitoral branch. The inferior rectal branch supplies the external anal sphincter and the skin around the anus.

Pudendal nerve block: In lithotomy position, the ischial spine is palpated and 5–10 mL of local anaesthetic is injected percutaneously just posterior to the ischial spine. The needle is then passed about 1–1.5 cm through the sacrospinous ligament, about 5–10 mL of local anaesthetic is injected on each side after negative aspiration. Similarly, pudendal nerve on the other side is also blocked (Fig. 15.1).

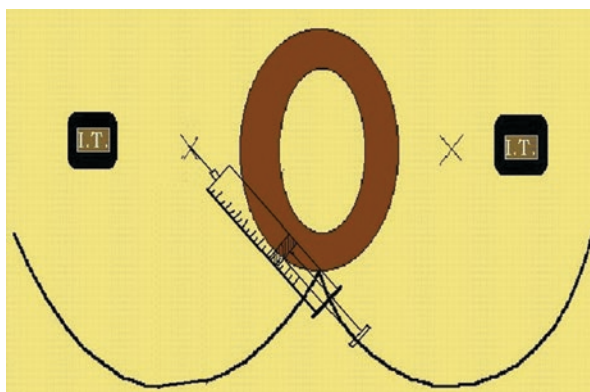


Fig. 15.1 Site of injection for Pudendal nerve block

15.3 Hernia Block

The principle of the hernia block is to block the iliohypogastric and ilioinguinal nerves along with a block of the cord structures to allow sufficient anaesthesia to perform open hernia surgery. Five mL of local anaesthetic is injected sub dermally along the line of the incision with a 27 gauge, one and half inch needle. The tip of the needle is then withdrawn to the intradermal level and infiltration is continued. The needle is then withdrawn and deeper subcutaneous tissues are infiltrated with 10 mL of local anaesthetic. The iliohypogastric and ilioinguinal nerve block is started at a level 2 cm above and medial to the anterior superior iliac spine. A fan shaped infiltration of 5 mL of local anaesthetic is done just deep to the external oblique muscle, advancing further to pierce the internal oblique muscle as well to infiltrate a further 2–3 mL of anaesthetic. The cord block is achieved by infiltration of 5 mL of anaesthetic directly into the cord being pinched at the superficial ring as it exits the inguinal canal. A further 2–3 mL of anaesthetic may be injected into the pubic tubercle and is said to offer good pain relief post operatively in meshplasties. Additional local anaesthetic may be required deep to the external oblique during the course of the surgery depending on the depth of the tissue and penetration of the anaesthetic prior to incision.

15.4 Ankle Block

This simple block can be used for various surgeries on the feet and toes (Fig. 15.2).

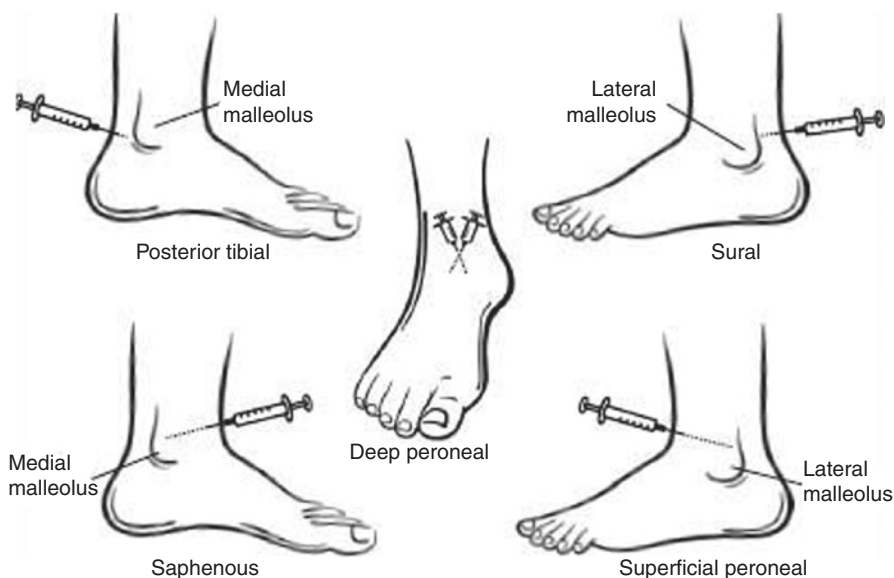


Fig. 15.2 Various nerve blocks at the ankle joint

Four branches of sciatic nerve i.e. superficial and deep peroneal nerves, posterior tibial nerve, sural nerve and saphenous nerve are blocked.

Superficial Peroneal Nerve Block

The injection is given at the ridge of the tibia with the needle directed towards the lateral malleolus with 5 mL of local anaesthetic.

Deep Peroneal Nerve Block

This injection is carried out in the groove lateral to the extensor hallucis longus tendon. The needle is withdrawn by 1 mm on reaching bone and 2 or 3 mL of local anaesthetic is injected.

Posterior Tibial Nerve Block

The needle is inserted in the groove behind medial malleolus. When bone is reached, the needle is withdrawn by 1 or 2 mm and 2–3 mL of local anaesthetic is injected.

Sural Nerve Block

The needle is inserted at the level of the lateral malleolus and 5 mL of local anaesthetic is injected superficially towards the tendo Achilles.

Saphenous Nerve Block

The needle is inserted at medial malleolus and directed towards the tendo achilles injecting superficially. Similar injection is given from medial malleolus towards the ridge of the tibia. Five mL of local anaesthetic is used.

15.5 Penile Nerve Block

Although it can be used for other procedures as well, the most common surgery requiring a penile nerve block is circumcision. The important point to remember while administering a penile nerve block is to avoid any injury to the dorsal vessels. The way to achieve this is to insert the needle towards the symphysis pubis and then pass below it while injecting the anaesthetic anteriorly. This is then repeated ventrally and injections are made on either side of the shaft completing a sort of ring.

It is extremely important that adrenaline is not used due to the risk on vasoconstriction leading to ischaemic necrosis.

15.6 Superficial Cervical Plexus Block for Lymph Node Excision

With the patient in the supine position, slightly head up, the patient is made to face the opposite side. Under all aseptic precautions, the needle is inserted just behind the posterior border of sternocleidomastoid muscle. The landmark is the point midway between the mastoid process and transverse process of C6 vertebra. Injection is made in a fan shaped manner at the depth of about 1 cm with the needle directed cephalad, caudad and perpendicularly. Small doses of sedatives may be given to facilitate the injection as it may cause slight discomfort. Superficial cervical plexus block provides anaesthesia to the anterolateral aspect of the neck and area behind the ears. Surgeries in these areas like the cervical lymph node excision can be done using this block. However, the surgeon may need to supplement with local anaesthesia if the block is inadequate.

15.7 Field Blocks

Apart from these nerve blocks, we administer various field blocks for removal of cysts, lumps etc. For field block, individual nerves are not anaesthetised but the entire field of surgery is blocked using local anaesthetic infiltration. Once the local anaesthesia has acted well, the patient allows surgery. However, care has to be taken to handle the tissues gently as the patient is usually awake and not under complete general anaesthesia. Although the technique may seem simple but practically it is the art of injection that makes it acceptable to the patient even when awake. Also, certain points should be kept in mind when loco regional anaesthesia is the mainstay technique. The following dos and don'ts are a must.

15.8 Do's and Don'ts of Local Anaesthesia

Do's

1. **EXPLAIN** the patient about the technique. Patient cooperation is of utmost importance. Patients not willing to co-operate are not good candidates for local anaesthesia.
2. **ASK** about **ALLERGY**: Although allergy to local anaesthetics are rare, it should always be considered. There is no harm in giving a small test dose of local anaesthetics prior to surgery.
3. Adequate **MONITORING** and **BACKUP** for resuscitation and conversion to general anaesthesia should be available during the procedure.

4. Be GENTLE.
5. ASPIRATE before injecting.
6. Keep a watch on the total DOSE of the local anaesthetics being injected. Giving injections in small aliquots as and when needed also helps to reduce the total dose administered.
7. WAIT for the local anaesthetic to act before commencing the procedure.
8. In cases of scar tissue try and add either Sodium Bicarbonate or Hylase to facilitate better diffusion into the surrounding tissues.
9. SUPPLEMENT with sedation or IV analgesics if required.

Don'ts

1. Don't inject into a vessel. Always aspirate before injection.
2. Don't be in a hurry. Check action before incision
3. Don't rule out the possibility that the anaesthetic didn't work. A bad batch may not act desirably.
4. Don't inject beyond the required area of local anaesthesia.
5. Don't operate beyond the area of anaesthesia.
6. Do not hesitate to supplement anaesthesia where required.

With these precautions, we carry out most of our ambulatory surgeries under local anaesthesia supplemented with mild sedation. This leads to better pain relief and bypasses the side effects of general anaesthesia like dizziness, nausea and vomiting and hence better patient satisfaction.



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Dr. M. M. Begani has been working in Bombay Hospital Institute of Medical Sciences, Mumbai for the past 40 years. He completed masters in surgery from Sardar Patel Medical College, Rajasthan (earlier known as Bikaner Medical College) and has worked as post-doctoral fellow at St. Mark's Hospital, UK. He has published many research papers in reputed international journals in area of general surgery, participated in many international scientific conferences and has been a guest editor for the Bombay Hospital Journal twice with special issues on day care surgery and coloproctology. He has received several international and national awards and his work experience crosses 100,000 surgeries. He is a member of many national and international scientific societies.



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Shagufta Choudhary

The aim of doing cases in day care is to minimize the hospitalization time of the patient. The focus is on a smooth and fast recovery without any complications and side effects. There should be a smooth transition of the patient from operative to post-operative period and discharge. This leads to minimal disruption of the physiology and a comfortable experience for the patient. This comes into effect only if we have a dedicated protocol-based management in the peri-operative period.

Recovery from anesthesia and surgery depends on many factors like:

1. **Type, extent and invasiveness of surgery.** Recovery is faster in short duration and minimally invasive surgeries
2. **The type and the amount of anesthesia used.** Recovery is definitely faster in local and regional anesthesia as compared to general anesthesia. It also depends on the anxiety level of the patient. For a mentally prepared patient who is calm, the anesthesia requirement is also less, leading to faster recovery.
3. **Associated comorbid conditions of the patient.** Patients with comorbid conditions will have a slower recovery as compared to a fit patient.

Recovery from surgery and anesthesia consist of the following three phases:

1. **First stage recovery:** This phase is complete when the patient awakens with return of protective reflexes. During this phase, the patient is transferred from the operation theatre to PACU (post anesthesia care unit). This is usually a high dependency unit with continuous monitoring and adequate staff. Transfer of patients from here to phase two recovery can be undertaken using the modified Aldrete score.

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Chart 16.1 The 'modified' Aldrete Scale

Respiration	2	1	0
	Able to take deep breath	Dyspnea/Shallow Breathing and cough	Apnea
O ₂ Saturation	2	1	0
	Maintains >92% on room air	Needs O ₂ inhalation to maintain O ₂ saturation >90%	Saturation <90% even with supplemental O ₂
Consciousness	2	1	0
	Fully awake	Arousable on calling	Not responding
Circulation	2	1	0
	BP \pm 20 mmHg pre op	BP \pm 20–50 mmHg pre op	BP \pm 50 mmHg pre op
Activity	2	1	0
	Able to move four extremities voluntarily or on command	Able to move two extremities voluntarily or on command	Able to move 0 extremities voluntarily or on command

A score $>= 9$ is required for discharge from PACU

Aldrete JA. The post-anesthesia recovery score revisited. *J Clin Anesth.* 1995;7(1):89–91

Modern drugs and techniques have fastened the recovery process and allow the patients to undergo the first stage recovery by the time they leave the operation theatre. In such patients and the patients undergoing surgery under local anesthesia, the first stage recovery can be bypassed and fast tracked into second stage recovery.

Nevertheless, those patients who need a first stage monitoring should be observed in PACU or recovery room.

2. **Second stage recovery** is complete just before the discharge from the hospital. Second stage recovery area should not be far away from the day care operation theatre and have appropriate monitoring facilities. It should also be able to tackle emergencies like hemorrhage and cardiovascular events. It is not mandatory for the patients to tolerate oral fluids as well as to void. Low risk patients undergoing minor surgery can be discharged without fulfilling these criteria. Patients and their caretakers should be given clear verbal and written instructions. They should be well informed about when to contact and whom to contact in an emergency. Facility should be available in case the patient needs readmission especially in standalone units of day surgery. The patients should be guided and managed appropriately.
3. **Late recovery:** This is complete when the patient has made a complete recovery from the surgery in physical, physiological as well as psychological terms. This may range from a few weeks to several months.

16.1 Discharge After Day Care Surgery

Earliest possible discharge without any complications marks the success of a day care surgery. The entire purpose of doing surgery in a day care setting is forfeited if the discharge is delayed due to complications like pain, dizziness, nausea, vomiting, bleeding etc. or if the patients require readmission for the same. These problems

delaying discharge should be anticipated right from the preoperative period and managed aggressively by the day care surgery team. This leads to patient satisfaction and a smooth transition of the patient from hospital to home. Following written criteria for discharge enables nurse led discharge. Most commonly the PADS scoring system is followed. Traditional criteria like mandatory oral intake and voiding before discharge are no longer necessary. These criteria have been removed from the earlier version of the PADS scoring system.

The PADSS is based on five criteria: vital signs, ambulation, nausea/vomiting, pain, and surgical bleeding.

Vital signs

Vital signs must be stable and consistent with age and preoperative baseline

BP and pulse within 20% of the preoperative baseline	2
BP and pulse 20–40% of the preoperative baseline	1
BP and pulse >40% of the preoperative baseline	0

Activity level

Patient must be able to ambulate at preoperative level

Steady gait, no dizziness or meets preoperative level	2
Requires assistance	1
Unable to ambulate	0

Nausea and vomiting

The patient should have minimal nausea and vomiting before discharge

Minimal: Successfully treated with PO medication	2
Moderate: Successfully treated with IM medication	1
Severe: Continues after repeated treatment	0

Pain

The patient should have minimal or no pain before discharge

The level of pain that the patient has should be acceptable to the patient	
Pain should be controllable with oral analgesics	
The location, type and intensity of pain should be consistent with anticipated postoperative discomfort	
Acceptability	
Yes	2
No	1

Surgical bleeding

Postoperative bleeding should be consistent with expected blood loss for the procedure

Minimal: Does not require dressing change	2
Moderate: Up to two dressing changes required	1
Severe: More than three dressing changes required	0

Maximal score is 10. Patient score ≥ 9 are fit for discharge

Chung F. Recovery pattern and home readiness after ambulatory surgery. *Anesth Analg* 1995;80:896–902

16.2 Complications

Pain

It is the most common complaint. Use of multimodal analgesia helps to alleviate pain by acting through different mechanisms. Use of multi modal analgesia helps to reduce the dosages of opioids and hence the side effects related to them. There is less sedation, nausea and vomiting. Thus, delay of discharge due to these problems can be avoided. Intravenous paracetamol can be given preemptively. Loco regional techniques offer good quality pain relief and lessen the need for systemic analgesics.

PONV

Prevention and aggressive management of PONV is very important in a day care setting.

As mentioned above, simple measures like incorporating loco regional techniques whenever feasible, ensuring adequate hydration and using multimodal approach for pain management reduce overall opioid dose. Similarly, use of TIVA, avoidance of nitrous oxide and inhalational agents also help to reduce nausea. Non-pharmacologic techniques like acupressure can also be tried.

Patients who are prone (high risk) for PONV should be prophylactically given serotonin antagonist (ondansetron). Droperidol and dexamethasone can also be added depending on the level of risk which in turn depends on several factors like female gender, past history of PONV or motion sickness, non-smoking status etc. Combination therapy is additive.

Dizziness

Dizziness can usually be avoided by ensuring adequate hydration. The patient should not fast for more than the recommended hours and ample intravenous replacement should be given if not contra indicated.

Bleeding

Patient and the caretaker should be asked to observe the soakage of the dressings and clear instructions should be given regarding the number to be contacted in case of emergency.

16.3 Discharge After Ambulatory Surgery

After ensuring that all the discharge criteria are fulfilled, patients and their caretakers are explained regarding any symptoms they may experience after going home. Proper written instructions regarding medication and the number to be contacted in an emergency should be handed over to the patient. Patients should be instructed not to drive, operate machinery, drink alcohol or get involved in any major mental activity for at least 24 h after receiving general anesthesia or sedation. This is especially important in ambulatory surgery since the patient is not under direct observation after discharge. There should be dedicated helpline for the patients to contact in case of an emergency. The patients should be followed up telephonically the next day. This helps to evaluate the post-operative condition of the patient and enforces patient satisfaction.



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Dwarkadas K. Baheti

17.1 Introduction

The thought of undergoing a surgery itself is the main cause of anxiety, concern and fear for patients and their families. The next comes hospitalization, which brings with it a fear of pain and anaesthesia; recovery from anaesthesia and surgery, PONV and most importantly expenses to be incurred. That is why the idea of day care or ambulatory surgery has become popular with patients and health care providers.

Day care or ambulatory surgery has many benefits such as rapid recovery, pain relief, early mobilization, discharge with minimum psychological trauma and cost effectiveness both for the patient and the health care industry. In addition, there is a reduced risk of acquired hospital infections, thrombo-embolic phenomena, nausea, vomiting and fatigue.

Multi modal analgesia is using a combination of analgesics from different groups so that they act at different levels of the pain pathway and provide an additive effect. As the dose of individual drugs is reduced, side effects are also less especially of the opioid drugs. The strategy is to use multi-modal or balanced analgesia to achieve an opioid sparing pain management. The source and degree of nociceptive stimulation differs among individuals and surgeries so a multimodal analgesic approach is preferred.

Essentials before choosing a modality—The following criteria are of vital importance in choosing the modality of pain relief:

- Minimum or no disturbance in vital functions;
- Hemodynamic stability;
- No PONV;
- No psychological disturbances and
- Patient being able care for himself at the end of surgery

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Any modality that fulfills the above criteria can be labelled as the ideal modality. Unfortunately, no single agent can achieve this, therefore a strategy of multi modal approach is the way forward.

Modalities of pain management in day care surgery can be classified as Pharmacological pain management and Interventional pain management.

17.2 Pharmacological Pain Management

Paracetamol—In an ambulatory set up, paracetamol is used routinely both pre-operatively as well as post operatively. One-gram IV injection, used for pre-emptive analgesia is well tolerated by patients, though it is weaker as compared to NSAIDs and COX2 inhibitors.

NSAIDs and COX2 inhibitors—help to reduce the post-operative pain and subsequent opioid requirement. The short-term use of these analgesics is relatively safe and especially useful in ambulatory surgery.

Combination of NSAID and Paracetamol—Diclofenac and paracetamol combination can also be used. These combinations provide better and sustained analgesia as compared to individual drugs.

Tramadol—This centrally acting mu receptor agonist is also used commonly for post-operative analgesia. Though not a preferred drug in ambulatory surgery, it can be used in combination with other analgesics when greater post-operative pain is expected or observed.

Analgesia adjuvants—Although these drugs by themselves are not analgesics, they enhance the analgesic efficacy of other analgesic drugs.

Dexamethasone—Inj. Dexamethasone 0.1 mg/kg given pre-operatively is known to have an analgesic effect in addition to having antiemetic effects.

Ketamine—Although Ketamine was not previously used regularly in ambulatory surgery, of late its use in small doses (0.15–0.5 mg/kg) and in combination with propofol has increased. The analgesic property of ketamine can be utilized by giving a single small dose. It acts as a safe alternative to opioids in spontaneously breathing patients. It has an added advantage in patients with opioid tolerance, neuropathic pain or hyperalgesia.

Clonidine and Dexmedetomidine—These alpha 2 agonists have sedative and analgesic properties. They are used in premedication to reduce the overall anaesthetic requirements. Their role in ambulatory surgery at present is limited to use in paediatric patients in prevention of emergence delirium. Dexmedetomidine is highly selective and preferred over clonidine. Given intranasally in the doses of 1 µg/kg 45 min prior to surgery, it reduces the incidence of emergence delirium as well as the post-operative opioid requirement in paediatric ambulatory surgery cases.

Dexmedetomidine is also being used as an adjunct to local anaesthetics in nerve blocks to prolong the duration of action and shorten the onset time.

Others—use of gabapentin, pregabalin and intravenous magnesium sulphate has been studied for reducing post-operative pain with positive results. Their use is still in the experimental stage.

17.3 Interventional Pain Management Procedure (IPMP)

The medications used for IPMP are local anaesthetic agents such as Lignocaine, Bupivacaine and Ropivacaine which have intrinsic vasoconstricting properties. Various drugs such as Clonidine, Dexmedetomidine, Epinephrine, Buprenorphine, Fentanyl, Dexamethasone, Sodium Bicarbonate, Tramadol and Midazolam have been used along with local anaesthetic agents in nerve blocks in order to prolong the duration of analgesia in the post-operative period.

Pain Management Procedures

Infiltration Block

It includes the infiltration of local anaesthetic around the surgical incision site or infiltration in the pain sensitive planes, so that afferent impulses from the site of incision and injury are reduced. It also reduces the sensitization and consequent hyperalgesia. In addition, the risks associated with parenteral administration of analgesics, risks associated with central neuraxial block and the injury and injection to surrounding structures in nerve and plexus blocks are avoided. The use of ring blocks for surgeries on digits/toes or circumcision and wound infiltration for small incisions are often done under monitored anaesthesia care.

Peripheral Nerve Blocks

The common ones are as follows:

- Interscalene block, for surgery on the shoulder or arm
- Brachial Plexus nerve block, for surgery on the arm, elbow, or hand
- Thoraco lumbar paravertebral block for hernia repair (inguinal)
- Blocking the Lumbar Plexus along with the Femoral and Sciatic nerve (3 in 1) block for surgeries on the lower limb.
- Popliteal Fossa nerve block, for surgery on the lower leg or foot

Ultrasound Guided Blocks

Introduction of Ultrasound guidance for peripheral blocks is a recent trend. Most of the peripheral blocks such as brachial plexus, sciatic or femoral, transverse abdominis blocks can be done under ultrasound guidance. Ultrasound guidance provides accuracy with less possibility of vessel puncture along with a balanced anaesthesia with effective post-operative analgesia. The dosage of anaesthetic drugs is also subsequently reduced. If used efficiently, it can replace the need for general anaesthesia in many day care surgeries.

Epidural Analgesia

Caudal epidural analgesia is the mainstay of paediatric analgesia and if properly performed it can be as effective as local anaesthesia infiltration both qualitatively and in duration.

The use of interventional pain management procedures has provided great advantages to multi modal approach in day care surgery.

Conclusion

Perioperative care in ambulatory surgery needs an aggressive pain management protocol. The patient should have adequate and controllable pain relief in order to enable him to be discharged on the same day of surgery. Multi-modal analgesia as a concept is popular and has been in use for quite some time now. The use of local anaesthetics along with NSAIDs and opioids lead to effective pain relief, speedy recovery and early discharge. Nowadays, the concept of “opioid free” anaesthesia and analgesia is emerging, where opioids are either eliminated or used in lesser doses in selected surgeries and patients. Multi-modal analgesia i.e. combination of pharmacological and interventional pain management procedures especially done ultrasound guided has proved to be a specific analgesic strategy as it provides effective analgesia, less side effects, improves quality of care, reduces PONV, early discharge and is cost effective too.



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Medicolegal Issues in Day Care/ Ambulatory Surgery

18

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Day surgery is the technique of choice for treatment of many clinical conditions in today's time. The numbers of surgery done as day care are only increasing every day. The world is shifting to a day care format where 23 h seems to be the goal. The obvious advantage would appear to be a reduction in the risk of acquiring hospital-related infections and having complications after the surgery, however, it has its own challenges during the post-operative period. Meticulous care must be taken to ensure that the patient is genuinely fit for day care surgery and if so, fit for discharge after the procedure. Documentation at all levels, along with clear, legible communication, form the cornerstone of avoiding medicolegal issues in an ambulatory or day care setting. Almost all the responsibility of the centre falls on the anaesthetist in charge. It isn't surprising to see most day care centres being led by anaesthesiologists worldwide.

From the time the appointment of the patient is scheduled, the responsibility of the centre begins. A clear preferably electronic record of the appointment with the full name, age, sex, contact details, and accompanying person details must be obtained at the outset itself.

As the patient progresses to having their history documented, the paperwork must be accurate, in a legible handwriting if written or electronically entered without errors. A detailed history which is well documented can avoid many a pitfall in things go downhill in the future. Once the history is complete, the patient must progress to a full and complete physical examination. Basic etiquette such as having a female attendant in case of female patients being examined by a male doctor, requesting permission before touching the patient, allowing privacy in case of disrobement are simple measures that avoid issues later on.

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Once the examination is complete, an accurate depiction of the findings must be made on paper, or entered electronically, to accompany the detailed history taken earlier. The entire case record is now complete and further action should be contemplated only after checking the above at this point.

Depending upon whether the patient requires a surgical intervention or not, appropriate instructions must be given in writing to the patient. If this is a simple prescription, please ensure to explain the medication in detail along with generic alternatives (in case trade names are prescribed), along with a small note stating which medication is for what purpose. This avoids any mistake in ingestions of the wrong medications and at the wrong time. A clear time frame must be noted along with a follow up schedule. The prescription should be in the prescribed medical council format of the region where it is written. This includes the name, age and sex of the patient, the date on which it was written, the medication, the doctor's name and registration number, clinic/institution name and address along with the contact details.

In case of preoperative instructions, these should be given in writing/print form along with a clear and thorough discussion on the same. The entire set of instructions must be explained to the patient clearly in the language understood best by the patient. Any queries must be answered promptly and contact details may be provided in case there are any other questions prior to the day of surgery. The patient is then free to go with precise instructions on returning on the scheduled day of surgery with all the documents given and with all instructions followed correctly.

On the day of admission, the first check point must be the reception. The file must be complete with all documents in order along with all investigations required for the concerned surgery. The patient is then directed to the admissions wherein they are given the appropriate room and changes. The admitting nurses then do a due check and take the written informed consent along with making the mandatory pre operative check list. The anaesthetist must see the patient (if not seen before) and satisfy themselves of the fitness for surgery if not obtained previously. The operating surgeon then checks the pre operative check list and the patient is then ready for surgery. Both the anaesthetist and the surgeon must confirm the site and nature of surgery before the decision is taken to wheel the patient into the operating room.

Once the patient is taken in the operation theatre, all necessary protocols must be followed as per standard operating protocols of the institution. Most newer protocols include a nurse call out detailing the nature of procedure, identification of the patient and the doctors involved, any significant medical findings as well as the confirmation of surgery and site. The anaesthetist must maintain a record of all drugs and medications administered and procedures carried out under their supervision. The procedure and OT notes must be completed by the operating surgeon with due care to list all significant findings in a clear and legible manner. Any prosthesis or foreign materials placed or used on the patients must be documented. The scrub nurse and attending nurse must keep a record of all instruments used and swab counts etc. must be maintained. Once the procedure is over, the patient is to be shifted back to the room provided all vital signs are stable and the go ahead has been given by the anaesthetist.

The recovery room nurse keeps a regular check on the vital signs and maintains a record of the same as per the recovery room chart. The patients is monitored carefully right up to the point of discharge.

For discharge, the patient must be accompanied by a responsible person who may or may not be a relative. The discharge instructions must be handed over to them along with a detailed instruction on the same along with any questions being answered. A discharge check list must be created to assess the fitness for discharge. This is a vital cog in the wheel of day care or ambulatory surgery because only if the patient can be discharged without any risk or complication can the procedure be considered as a true day care case.

The patients must be made aware of the warning signs that could mean that they require further medical attention. This is the duty of the operating surgeon. The fact that the patient is discharged the same day make these instructions vital.

Some of the important talking points should be instructions on caring of the wound, specific instructions about the use of medication prescribed, clear follow-up advice and clear and honest discussion about any post-treatment risks or complications that may arise, including statistically remote but serious ones. There should be one point of contact for all issues arising after discharge so as to avoid confusion in terms of who is to be contacted.

Ways to mitigate risk of issues arising out of discharge:

- Advance information to be given about making arrangements for travel with a responsible person accompanying the patient with the warning that the procedure may not be carried out if this is not adhered to. This must be documented in writing.
- If appropriate preparations are not in place on the day of treatment, alternatives must be considered including possible admission into a hospital, postponement of the procedure or even cancellation if the above is not possible.
- Discharge criteria previously formulated need to be strictly adhered to before considering discharge of the patient. Due consideration must be given to affecting factors such as the type and complexity of the surgery, intraoperative or post-operative untoward events, and overall condition at the time of discharge.
- Information must be disseminated to the patients just before discharge about any difficulties encountered during the surgery, any possibility of complications post-operatively, any special devices removed or inserted and the care required for these devices.
- Information also needs to be given about any special precautions required to be taken after the procedure (e.g. specific wound care techniques, use of prescribed medication, follow-up schedule etc); any events that may require them to seek medical attention along with a list of contacts for such events.
- Documentation of all of the above aspects of treatment given should be clearly made.

18.1 In Conclusion

Day Care surgery is different from routine surgery in that the medico-legal liability is primarily connected to the quality and amount of communication with the patient and whether this communication was documented, understood clearly and followed to the letter. The liability of the organisation begins when the facility is first

authorised by the patient to offer treatment. Various rating agencies the world over have come up to maintain superior standards (NABH, ISO) for the institutions engaging in Ambulatory surgery. Apart from these, it is the responsibility of each institution/organisation/ambulatory centre to form their own SOP's and adhere to them rigidly in order to achieve the highest standard of care and avoid any impending medico legal issues to the institution or their doctors.

Annexures

Annexure 1: Pre Operative Check List

Abhishek Day Care Health Service Pvt. Ltd.

O.T. pre operative check list

Name:

IPD no: _____ Bed no: _____ Sex: _____ Age: _____

Weight:

Surgery:

Attributes	Yes	No	NA
Consent for surgery and anaesthesia			
BP			
Temp			
Pre existing condition—DM, HTN, BA, thyroid			
Shaving			
Voided urine			
Enema			
Pre Op medication			
Nail polish removed			
Jewelery removed			
Identification of site			
BT/CT/allergies			
Dentures/metal fillings			
Contact lenses/glasses			
CBC			
Blood sugar			
G6PD			
HIV			
HBsAg			
HCV			
Urine			
ECG/2D echo			
X ray chest			
Medical fitness			
Accompanying relative			
Approved by			
Anaesthetist	Surgeon	OT Incharge	

Annexure 2, 3, 4 and 5: (In Our Case It Is A Booklet) Informed Consent, Anaesthesia Record, Intraop Monitoring and OT Notes and Post Op/Recovery Record and Materials Used



ABHISHEK DAY CARE HEALTH SERVICES PVT. LTD.

Regd. No. : A/17

ISO 9001 : 2008

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Cooperage, Mumbai - 400 021. • Tel.: 2204 1142 / 2202 2288 • Fax : 2204 1141
E-mail : abhishekdaycare9@hotmail.com • Website : www.abhishekdaycare.co.in



INDOOR No. _____

A.C. CLASS / A/B _____

Name in Full _____	Sex _____	Age _____
Occupation _____	Caste _____	Tel. No. _____
Address in full _____		

Mob. No. _____	E-mail _____	

Admitted on _____ at _____ A.M. / P.M. Discharged _____ A.M. / P.M.

DIAGNOSIS

OPERATION

ANAESTHESIA - LA / SA / GA

INFORMED CONSENT

"I hereby agree and consent to the performance of such operation as may be found necessary to be performed upon myself and also to the administration of any anaesthesia for the purpose of such operations. I shall not hold the doctors & hospital responsible in whatever manner, for any consequences that may arise out of and in the course of such operation and / or administration."

The doctor has fully explained to me the nature and the anaesthesia needed for the purpose of the operations he / she will perform and has answered my questions about my condition and the procedure to my satisfaction. The doctor has also explained the risks and consequences involved in the procedure and anaesthesia and I understand those risks and am willing to undergo the procedure under the required anaesthesia. This I consent to by my own free act and will.

I hereby agree and consent to having photos and video taken of me and the operative procedure for educational purposes with the explicit understanding that this will be used only for training and furthering medical education and for no other purpose. This consent is given for all and any pre operative, operative and post operative procedures that may be involved during my stay at the day care centre. I also consent to the use of such pictures and videos in medical conferences and presentations provided my identity is safeguarded and kept strictly confidential. I shall not hold the doctors, nurses, staff or any other person responsible for any consequences that may arise out of the same.

Signature on this form indicates (1) That I have read and understood the information provided in this form. (2) That the operation or procedure set forth above has been adequately explained to me by my physician. (3) That I have had a chance to ask questions. (4) That I have received all of the information I desire concerning the operation or procedure and the anaesthesia. (5) That I authorise and consent to the performance of the operation under the required anaesthesia.

Signature of Patient

Date :

Signature of Guardian

Witness

ANAESTHESIA RECORD

Name _____ Age _____ Sex : Female / Male Reg. No. _____

Surgeon : **Dr. M. M. Begani** / _____ Anaesthesiologist **Dr. Shagufta Choudhary** Date _____

PRE-OP. assesment airway spine / _____ OPERATION _____

Consent _____ NBM _____

Pre-Medication _____ Previous Drugs / Operations / Family History of Anesthesia _____

PRE-OP. FINDINGS: Smoker Alcoholic Diabetic HT WT INV.

G.C. C.V.S. Time in : _____

R.S. C.N.S. Time out : _____

Hepatic Renal Misc. Allergy _____

Anaes. Technique : Spinal/G.A.: O₂-N₂O-Isoflurane Resp : Spont / Assist / Contr / LA/MAC
Mask / Nasal Prongs / Oro / Naso Tracheal - LMA Cuff - Tube Size mm-Pack-Difficulty
AE BE RT

Time																
B.P.	210															Monitors : HR / Pulse Sat SpO ₂ NIBP ECG EtCO ₂ Pt. Position Eye Protection IV Site Size
VA	190															
Pulse	170															
•	150															
Resp	130															
O	110															
Start	90															
Anaes	70															
⊕	50															
Start	30															
OP	20															
X	10															
End																
Anaes																
⊖																
End																
OP																
XX																
Time	Min	5	5	30	45	55	5	15	30	45	55	5	15			
O ₂	100%															
Saturat	90%															
Etco ₂	80%															

DRUGS GIVEN TOTAL DOSE

Pentazocine _____ Propofol _____ Vec/Atra _____ Neostigmin _____ Emeset _____ 5% D R.L.

Midaz _____ Succinyl Chol _____ Ket. Hyd _____ Atropine _____ Others _____ D.N.S. SUMOL

Status at End Op.: Extubated-Satisfactory-Awake Restless-Resp. Depr / Obstr / Spasm. Antibiotic _____
Vomiting-Brady / Tachycardia-Shock-Reflexes Pain

Remarks _____

Signature _____

Recovery Room

Charting

	½	½	½	½	½	½
P						
BP						
Sat						
RR						

Consciousness

reading

Pain - VAS



Nausea / Vomitting :

Giddinees / bleeding / headache / others

O2 supplementation

Urine

Time : Oral

Discharge :

F/U next day : _____

F/U before travelling : _____

Late follow up : _____

O/T Notes

MEDICINE & MATERIAL**NURSES' DAILY RECORD**

Hours	T	P	R	B.P.	Treatment and Note
8 A.M.					
9 A.M.					
10 A.M.					
11 A.M.					
12 Noon					
1 P.M.					
2 P.M.					
3 P.M.					
4 P.M.					
5 P.M.					
6 P.M.					
7 P.M.					
8 P.M.					
9 P.M.					
10 P.M.					
11 P.M.					
12 A.M.					

NURSES' DAILY RECORD

Name		Bed No.
Age/Sex		Ward



Dr. Dheeraj V. Mulchandani is working as a Consultant General, Day Care and Laparoscopic surgeon and Medical Administrator at Abhishek Day Care Centre, Mumbai and is also attached to St. Elizabeth General Hospital, Mumbai. Prior to this, he worked at P. D. Hinduja National Hospital and Medical Research Centre, Mumbai and Saifee Hospital, Mumbai. He has a combined experience of over 17 years in his field. He has published numerous research papers in reputed national and international journals in areas of general surgery, ambulatory surgery and bariatric surgery. He was part of the editing team for the special issue of the Bombay Hospital Journal on Day Care Surgery and Coloproctology in 2017. He is a member of national and international medical and surgical scientific societies. He also runs an active blog at <http://drdj.blogspot.com>.



Potential of Day Care/Ambulatory Surgery

19

Dheeraj V. Mulchandani

19.1 What Is the Big Deal Really?

The term “day surgery”, or “ambulatory surgery”, refers to the practice of admitting carefully-selected and prepared patients into the hospital, for a planned, non-emergency surgical procedure and their discharge within hours of that surgery, all in the same working day. “True” day-surgery patients are those who require full operating theatre facilities. A surgical day case is a patient who is admitted for an operation on a planned non-resident basis and who nonetheless requires facilities for recovery. The whole procedure should not require an overnight stay in a hospital bed. Day surgery has now become routine in the treatment of many clinical conditions.

In the last few years, the numbers are only rising. What was once the domain of minor surgeries, has now been adapted to suit almost all specialities ranging from general surgery to orthopaedics, gynaecology, plastic surgery along with ENT and Ophthalmology cases which were traditionally more suited to day care in any case.

With the increase in the number of specialities indulging in day care surgery and ambulatory surgery centres, the potential for growth in this specific sector is at its peak today. All over the world, ambulatory centres and surgeons are becoming more and more organised with the International Association of Ambulatory Surgery (IAAS) leading the way towards a well-organized substratum of surgery. Numerous localised medical bodies in day care (e.g. Indian Association of Day Surgeons) are being formed in almost every country throughout the world who then link up with the IAAS as their parent body to promote and propagate day surgery and centres as the way forward in affordable and efficient healthcare.

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19.2 History

The earliest reference for day surgery dates back to 1903 when Dr. James Nicoll, a Glasgow Surgeon performed almost 9000 outpatient operations on children. In 1912, Dr. Ralphwaters from Iowa, USA, described “The Down Town Anaesthesia Clinic” where he gave anaesthesia for minor outpatient surgery. In 1960, the first hospital based ambulatory unit was developed. Clearly, this concept has existed since a very long time. It is only now that we are beginning to realise the full potential of this entity. Over the past few years, the concept of day care surgery, the world over, but especially in India has exploded to unprecedented heights.

The following is a list of terminologies used in day care surgery settings (Table 19.1).

19.3 Why Is this Happening Now?

Recent advances in medical, anaesthetic and surgical techniques and technology along with specific training are driving day care or ambulatory surgery to greater heights. Minimally invasive procedures seem to be the surgery of choice nowadays not only for the surgeons but even for patients. Most educated patients today demand minimally invasive surgery after doing some research. This is the case even at regular

Table 19.1 IAAS terminology for day care

Terminology	Synonyms and definitions
Day surgery (DS)	Ambulatory surgery (AS), same-day surgery, day only
Day surgery centre (DSC)	Ambulatory surgery centre (ASC), day-surgery unit (DSU), ambulatory surgery unit, day clinic A centre or facility designed for the optimum management of on ambulatory surgery patient
Extended recovery	23 h, overnight stay, single night Treatments requiring an overnight stay before discharge
Short stay	Treatments requiring 24–72 h in hospital before discharge
Outpatient	A patient treated at a hospital who is not admitted for a stay of 24 h or more
Inpatient	A patient admitted into a hospital, public or private, for a stay of 24 h or more
Office-based surgery/ office procedure	An operation or procedure carried out in a medical practitioner’s professional premises, which provide an appropriately-designed, equipped service room(s) for its safe performance
Day surgery procedure, ambulatory surgery procedure	An operation or procedure which is not outpatient- or office-based, where the patient is discharged on the same working day

Source: Toftgaard C, Parmentier G. International terminology in ambulatory surgery and its world-wide practice. In: Lemos P, Jarrett P, Philip B, editors. Day surgery—development and practice. London: International Association for Ambulatory Surgery (IAAS); 2006. p. 35–59.

Internationally agreed terminology, abbreviations and definitions as proposed by the International Association for Ambulatory Surgery (IAAS)

hospitalisations. Taking this ideology forward, day care surgeons have modified their approaches to surgical problems to suit the patients demand for minimally invasive surgery. This has a dual advantage. The patient gets what he wants while at the same time, with the use of advanced technology and machinery we are able to operate on patients with minimal tissue handling and abuse leading to quicker recovery times and faster return to work and home. Advances in the field of anaesthesiology are the foremost in this regard without which this could not have been made possible. The use of multi-modal analgesic techniques along with quick and complete induction and reversal allow for the safe discharge of patients without the need for an overnight stay. Local anaesthetic techniques and nerve blocks allow for minimal sedative techniques of anaesthesia with the same result. Lastly, patient education and information allows the surgeons to motivate them further for instilling confidence in day care procedures and centres.

19.4 How Is it Better for the Future?

Day care surgery is a necessity going forward, especially in developing countries like India. The many advantages include but are not limited to economy of time, money and manpower. High quality surgery delivered by specially trained day care surgeons under the guidance of specialist day care anaesthetists provide the impetus for increased surgical turnover and efficient utilisation of manpower and infrastructure. Surgical bed turnover is increased which directly benefits the entire population by decreasing waiting times for surgery, promoting proactive healthcare decisions while at the same time being economically feasible. Day surgery bears fewer risks of nosocomial infections and cross infections. A separate day care centre or ward affords the patient more personalised attention as compared to conventional wards. In general, a carefully selected patient would have a much lower rate of post-operative complications in day care. A true day surgery is estimated to reduce healthcare costs for amenable diseases by 30%. It is also estimate to free up true hospital bed occupation by about 30%. All this, with a faster turnover, will lead to a savings for the government exchequer in terms of healthcare costs over time.

19.5 Is it Really Required?

Apart from the savings in costs and time for surgery, one of the unseen advantages of day care surgery is patient compliance. Keeping in mind today's lifestyles especially in metro cities, everyone is always in a hurry, with no time to waste, fear of long duration of hospitalisation, huge operative costs and a generally faster lifestyle, day care surgery ticks all the prerequisites for patient adaptability. They are easily convinced about lower costs and decreased duration of surgery as well as an early return to their familiar home environment. An earlier return home is also linked to better post-operative outcomes in terms of mental health following stressful surgery. In over populated countries and cities, this increased turnover is just the thing to reduce the healthcare burden on the public and private sectors. Day care surgery has truly become the need of the hour.

19.6 Levels of Ambulatory/Day Care Surgery

There are three main levels of ambulatory surgery

1. Minor surgery under pure local anaesthesia
2. Major Ambulatory surgery under local anaesthesia with or without sedation or with nerve blocks and other modalities of day care anaesthesia
3. In patient day care surgery (requiring admission up until but not beyond 23 h)

Day Care centres could be stand-alone ambulatory centres or could be part of a bigger multispecialty hospital or set up.

Standalone centres would be those that deal only in day care cases and have no facility for admission of patients overnight. A point to note is that these centres must have a referral centre in close proximity in order to be able to shift patients in case the need ever arises.

When the day care centre is part of a bigger hospital setup, ideally it should have its own space and beds along with specially trained staff and administrative workers to make the process as free flowing and smooth as possible. A separate admission, discharge and billing counter go a long way in making it feel like a true day care centre which plays a major role in the psychology of the patient attending day care surgery.

It is vital to know that a majority of the success of the day care centre depends on the satisfaction of the patient in understanding that it is different from regular hospitalisation. A happy and satisfied patient will promote the day centre and day surgery further than any marketing plan could ever do.

19.7 What Is the Scope of Day Surgery?

Day surgery covers a wide spectrum of surgical procedures across the specialties and across anaesthetic techniques. Almost 80% of general surgeries can be safely and effectively performed under day care. A tentative list of surgeries that can be performed under day care are listed as follows:

General Surgery in Day Care

- Hernia: Inguinal/Epigastric/Umbilical/Inscisional
- Hydrocele excision
- Varicocele
- Lymph node bx.
- Hydradinitis suppurativa
- Breast lump ex.
- Lipomas ex.
- Sebaceous cyst ex.
- Orchidopexy
- Cystocele/Rectocele Repair

- Circumcision
- Vasectomy
- Varicose vein ligation/injection
- Corn excision
- Nail excision
- Ear lobule repair
- Muscle/nerve biopsy
- Mucosal/skin biopsy
- CLW suturing
- Incision and drainage of abscess.
- Appendicectomy (Lap/Open)
- *Piles:*
 - Haemorrhoidectomy
 - Sclerotherapy
 - Cryosurgery
 - Infra red coagulation
 - Stapler Excision of Piles
 - Fistulectomy
 - Fissurectomy
 - Anal dilation
 - Abscess drainage
 - Wart excision
- Lap. Cholecystectomy
- Lap. Antireflux Surgery
- Skin tag excision
- Cryptectomy
- Rectal biopsy.
- Pilonidal sinus excision
- Abdominoplasty
- Gynaecomastia Excision
- Polypectomy
- Endoscopies

Ophthalmology in Day Care

- Cataract excision
- Chalazion removal
- Conjunctiva repair
- Ectropion repair
- Entropion repair
- Enucleation
- Lacrimal duct probing
- Ptyrigium excision
- Tarsorrhaphy
- Foreign body removal
- Lasik

ENT in Day Care

- Adenoidectomy
- Mastoidectomy
- Myringotomy/plasty
- Tonsillectomy
- Septoplasty
- Nasal Submucosal Cauterization
- Vocal Cord Biopsy
- Vocal Cord Nodule Excision

Urology in Day Care

- Circumcision
- Cystoscopy
- Hydrocelectomy
- Litholapaxy
- Meaplasty
- Meatotomy
- Vasectomy
- Dilatation

Plastic Surgery in Day Care

- Lipectomy
- Basal Cell Carcinoma
- Excision
- Brachioplasty
- Browlift
- Capsulectomy
- Chemical peel
- Breast Implant
- Implant removal
- Other implants

Gynaecology in Day Care

- Laparoscopic Cystectomy
- Diagnostic Laparoscopy
- Bartholin cystectomy
- Cervical conization
- Cervical dilatation

- Cervical polypectomy
- Colpotomy
- Colporrhaphy
- Colposcopy
- D & C

Indian Scenario

In India, the approximate number of registered hospital and nursing home beds stands at 1.37 million. Unfortunately, out of these only about 50% are fully functional and relevant. The hospital bed to patient ratio stands at 1.5 per 1000 and the doctor to patient ratio is 1:1722. The operation theatre (OT) to population ratio is 1:100,000. In addition to these glaring numbers, only about 30% of the population is covered by either public or private insurance. A staggering 70% of the population pays for healthcare out of pocket.

The impact of an increased presence of day care surgery in our country would be to free up precious beds in tertiary centres, increase the bed to patient ratio, as well as OT to patient ratio and cause a savings in healthcare costs. We have a potential to establish at a minimum of 15,000 such centres in Tier 1 and 2 cities. With specialised training, efficient staff and willing Doctors and patients, this would lead to effective, world class quality and affordable healthcare. This would be true not only for our citizens but also for the medical tourism industry which is already growing at a breakneck pace.

The only way to achieve this is to consider day surgery as the norm for all elective suitable procedures. Academic and training programs must be conducted to produce skilled manpower in day care. Regular audits, honest critique and feedback and continuous improvement is the way forward.

Resistance

Any change to the normal will always invite resistance from a certain section of society. Health authorities, quality assurance agencies and some doctors still resist the concept of day care surgery. A large part of this is because of the various resource variations that are required along with inequity in the quality of healthcare delivery. Being a relatively new concept, standard operating procedures and guidelines are still being developed every day. Most centres are forced to adapt their own guidelines and define their own methodologies to achieve standard operating procedures.

Insurance providers offer another avenue of resistance but thankfully this problem is already starting to abate. Previously, insurance providers would require a minimum admission of 24 h in order to settle a claim. This would lead to a form of 'forced hospitalisation' even when it was not required. With the entry of private insurance operators over the past few years, this trend too is changing. Many of the

private insurance providers who are partnered with international entities do cover day care procedures. Some new age plans also now cover Maternity and OPD procedures. Disease specific plans are the latest trend with example such as Diabetes specific plans and Cardiac Health Insurance.

Conclusion

In most developing countries, the world over, day care surgery is now gaining acceptability at a rapid pace. The many advantages offered over conventional surgery and hospitalisation are prompting key opinion leaders in the medical industry to endorse day care as the wave of the future. A greater patient acceptance and compliance is the key to its success and we as doctors have the responsibility to promote and propagate day care surgery every chance we get for it to reach its true potential as a game changer in the field of surgical medicine. A rather bold prediction would be insurance companies mandating certain procedures to be done as day care (as they would benefit from the economy) and asking for explanations for hospitalisation and long duration of stay.



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Data from a Pioneer Day Care Centre: Our Experience over 16 Years of Day Care Surgery

20

M. M. Begani

20.1 Our Experience

Abhishek Day Care Institute and Medical Research Centre, which recently completed 16 years in this field, is a dedicated Day Care Surgery Centre. We have an experience in Ambulatory Surgery of around 15,000 cases, over a period of 16 years, which have been done at our institute (Table 20.1). Cases mostly include day care general surgery cases like hernia repair, hydrocele repair, lumpectomy, haemorrhoids, pilonidal sinus excision, circumcision, appendectomy etc. We have also recently started performing Day Care Minimal Access Surgeries including Laparoscopic Appendectomy and Laparoscopic Cholecystectomy along with Laparoscopic Varicocele Repair etc.

20.2 Type of Anaesthesia for Various Surgeries

- 14,931 patients were operated at our centre
- 48.22% patients were operated under local with sedation
- 45.57% were operated under local anaesthesia
- 1.76% underwent surgery under general anaesthesia
- 4.44% patients underwent surgery under regional anaesthesia.

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Table 20.1 16 year data from Abhishek Day Care

Years	L.A	LA + sedation	General anaesthesia	Regional anaesthesia	Total
2010	560 41.5%	756 56.5%	13 0.8%	19 1.1%	1348
2009	547 44.2%	650 52.3%	26 2.1%	13 1.1%	1236
2008	506 42.8%	626 53.0%	20 1.7%	27 2.3%	1179
2007	542 49.2%	514 46.7%	15 1.4%	28 2.5%	1099
2006	419 44.3%	495 52.0%	15 1.7%	15 1.7%	944
2005	365 41.7%	451 51.6%	34 3.9%	23 2.6%	873
2004	295 44.8%	329 50.2%	20 3.1%	12 1.7%	656
2003	302 50.4%	268 44.8%	9 1.5%	19 3.125%	598
2002	205 42.0%	244 50.6%	20 4.3%	14 2.9%	483
2001	147 36.0%	213 52.0%	25 6.4%	22 5.4%	407
2011	472 52.97%	204 22.89%	7 0.78%	44 4.93%	727
2012	503 56.07%	293 32.66%	8 0.89%	93 10.36%	897
2013%	507 45.8	472 42.7	19 1.71	107 9.68	1105
2014%	620 50.44%	510 41.49%	14 1.13%	85 6.91%	1229
2015%	593 54.5%	394 36.2%	10 0.91%	91 8.36%	1088
2016%	617 58.09%	386 36.34%	8 0.75%	51 4.80%	1062
16-year total	7200 48.22%	6805 45.57%	263 1.76%	663 4.44%	14,931

Conclusion

There is an increasing shift of cases which were previously performed with 24 h or more stay at the hospital, which are now carried out as day care surgeries or ambulatory surgeries. Keeping with the trend, the choice of an anaesthesia for these cases has also changed or been modified accordingly. Cases that previously needed general anaesthesia or spinal anaesthesia are now being done under local anaesthesia with monitored anaesthesia care i.e. administration of sedation only if required and titrating it to individual needs. As compared to 2001, where 36% of cases were done under local anaesthesia, in 2015, we have done about 55% of our cases under pure local anaesthesia. Ambulation is earlier because the patient is fully awake. Thus, the side effects of general anaesthetic drugs are bypassed. The patient is ready to go home in a couple of hours. This has led to cost effectiveness as well as excellent recovery profile for the patients.



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