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## Paediatric Ambulatory Surgery

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### Introduction

The International Association for Ambulatory Surgery (IAAS) defined Ambulatory surgery in 1995 as a “surgical or diagnostic interventions, currently performed with traditional hospitalisation, that could, in most cases, be accomplished with complete confidence without a night of hospitalisation. Among other things, these procedures require the same technically sophisticated facilities as when done on an inpatient basis, rigorous pre-operative selection procedure and post operative follow up of for several hours”.

There has been a tremendous push for day care surgery especially in the last two decades. With the objective of developing day care procedures, Society for Ambulatory Anaesthesia (SAMBA) came into force in 1984. As in adults; paediatric surgical practice is no exception in popularising this concept. The obvious benefits like minimising healthcare costs, optimal utilization of resources at the face of shrinking healthcare resources (maximizing efficiency with fewer costs), less disruption of family schedule and decreased exposure to nosocomial infections (particularly beneficial in Oncological and immune compromised patients) has further made day care procedure more acceptable.

Ambulatory surgery is much favoured in children since they are usually healthy with no major co morbidities and many of the procedures are superficial without significant haemodynamic disturbances. There are many factors which contributed to the rapid growth of this concept like the psychological and emotional advantage of avoiding inpatient admission for the family, the newer anaesthetic and analgesic agents with rapid recovery profile, judicious use of regional anaesthesia and improvements in surgical techniques [1]. In fact, the European Charter of children's rights states that “children should be admitted to hospital only if the care they require cannot be equally well provided at home or on a day basis [2]”. But for the anaesthesiologist to decide upon whether to take up for a day case or not depends on many factors like the control of any coexisting diseases, extent of surgical procedure and the available home support system. However there are challenges in organizing the structure especially in a set up with scarcity of resource [3].

### Design

Paediatric ambulatory units are usually customized and specially designed setups with toys, cartoon pictures and games to reduce their anxiety. A well designated day care unit increases the efficiency,

patient satisfaction and cost cutting for the organization. These advantages are not achieved when the day care procedure in children are mixed with adults or with more complicated paediatric populations.

But most of the time due to resource and space constraints, we are forced to mix-up adults and paediatric populations in the same surgical unit. In such scenarios, special considerations should be given to the needs of paediatric populations.

Committing for an ambulatory surgery is in no way a compromise from the requirements for the inpatient surgical population. In fact the sterility, record keeping and specifications for the anaesthetic and recovery areas should be of the same quality as for any in - hospital patients. Standard resuscitation equipments specific to paediatric patients of all ages and difficult airway cart should also be available. Facility for prolonged recovery, observation and if need arises for overnight stay must be fulfilled by the ambulatory centre.

Free standing ambulatory unit is an autonomous centre. Here the ambulatory surgical unit may be in association with a hospital, but in a separate building that share no space or patient function. These are basically autonomous units which do all the preoperative evaluation, surgery and recovery within the unit [5].

Office based procedures are done in conjunction with physicians office, wherein they carry out limited ambulatory procedures.

### **Procedures**

Some of the usual day care procedures include Myringotomy, grommet insertion, herniotomy, dental extractions, upper and lower gastrointestinal tract endoscopy, cystoscopy, circumcision, orchidopexy, chemotherapy, nail bed repair, radiological imaging, intra thecal medications, lacrimal duct probing, examination under anaesthesia, laparoscopic appendicectomy, radiotherapy, tendon repair, incision and drainage, wound debridment etc. But with the advances in surgical and anaesthesia techniques and with the introduction of newer anaesthesia drugs with good recovery profile, more and more complex surgical procedures are now carried out in a day care unit.

If you look into the basic characteristics of the procedures, they are all the same. That is of limited duration, minimal physiological alterations, no requirement for prolonged post operative care or observations, low risk of surgical/anaesthesia complications, expected minimal or moderate post operative pain that can be easily managed by simple oral analgesics [6].

The decision regarding accepting the procedure must also include the comfort level of the assigned anaesthesiologist in handling the expected peri operative events and the specific environment in which the procedure is to be done.

### **Patient selection**

The paediatric population in general are good candidates for ambulatory procedures. But the screening should ensure child to be healthy with no co existing uncontrolled medical illness and the operation is not complex and not prolonged. Proper selection of patients is the first and foremost thing for the successful delivery of ambulatory surgery [7]. The historical limitations of day care procedures like body mass index, ASA status and age are now questioned [6]. The goals of patient selection is achieved by satisfactorily answering the following questions [6]: 1) Is the surgery appropriate for day care procedures? 2) Is there any benefit of overnight admission which could not be done at home? 3) Is the patient's home circumstances adequate for day surgery? (Reliable caregiver, distance from hospital, communication and conveyance facilities at home etc).

Contrary to popular belief, patients with chronic medical conditions like asthma or epilepsy can be safely managed in a day care unit with minimal disruption to their routine activities [6] provided the disease is well controlled before procedure.

Geographical proximity of the home to the surgical unit is an important factor. Some of the centres consider a traveling time more than one hour as a relative contra indication for certain procedures like tonsillectomy [8].

There is a lower cut off age in many institutions such as 56 weeks post conceptual age in former premature infants and 4 to 6 weeks for term infants. These children are scheduled as early morning cases with extended period of observation.

Anaesthesiologist must be aware of conditions/co-morbidities that require special considerations for a day care surgery like prematurity/ex prematurity, obese children, uncorrected or haemodynamically significant congenital heart disease, difficult airway, obstructive sleep apnoea, inborn errors of metabolism, history of delayed emergence from anaesthesia, known coagulation disorders etc.

### **Preoperative evaluation and Preparation**

It is imperative to have a thorough discussion with the family about the sequence of events that are likely to be faced during anaesthesia and recovery. Surgery on a child is always a stressful event for entire family. Children with anxious parents can display an exaggerated signs of preoperative anxiety themselves. So the preparation of parents is crucial and they should be encouraged to clarify. For grown up children the procedures can be explained in simple language.

Parental presence at induction is encouraged by some centres to reduce the separation anxiety [9]. The anaesthesiologists must explain the parents very clearly what to expect at the time of induction and they must agree to leave the area immediately when asked to do so [10]. Unduly anxious or hysterical parents should not be encouraged to be present for induction because they can be counterproductive increasing their children's anxiety [10]. But this is a very controversial topic and there is a strong school of thought which believe that parental presence does not reliably alleviate the anxiety of children nor parents. Ambulatory surgery in fact diminishes the trauma of separation by minimizing the separation time between parents and children. But most proven methods to relieve anxiety for children are the use of short acting sedative premedication and specific pre surgery preparation programs for the children as well as for the parents.

A written information about planned procedure, pre operative and post operative care must be given to the parents to take informed decision for the surgery. Preoperative assessment should be done as soon as the decision for surgery is taken to stabilize medical condition and to avoid last minute cancellations.

Paediatric literature supports lab investigations only in selected cases [3]. Need for blood investigations depend upon magnitude of surgical procedure as well as patient's clinical condition. Optimization of preoperative hydration and prophylaxis for post operative nausea and vomiting (PONV) are important considerations in ambulatory surgery. Optimally hydrated children are less likely to have intraoperative hypotension and hypoglycaemia.

### **Anaesthetic agents and techniques**

A sedative premedication effectively reduces preoperative anxiety and peri operative recall and post operative agitation. Establishing a protocol driven approach and maintaining a proper

communication between the pre operative area and operating room will facilitate timely administration of premedication and avoiding delays in patient induction.

Midazolam remains the most popular anxiolytic premedication for paediatric patients. After receiving an oral dose of 0.5 mg, children can be separated from their parents within 30 minutes and has not shown to prolong discharge time [11]. Midazolam given as premedication can also blunt the emergence agitation after Sevoflurane anaesthesia and mental functions are found return to normal within four hours [12].

Both rectal Etomidate (3-6mg/Kg) and Ketamine (5-10mg/Kg) produces rapid onset of hypnosis without cardio respiratory depression. Ketamine in doses of 2 to 4mg/Kg is a useful drug for intra muscular induction in an uncooperative or mentally challenged child. But home readiness is often delayed with a larger dose (more than 5mg/Kg) [13]. Low dose Ketamine has hypnotic, analgesic and amnesic effects.

Dexmedetomidine is a more selective alpha 2 agonist and a recent study comparing trans nasal dexmedetomidine at one microgram/Kg dose showed more sedation scores than 0.5mg/Kg of oral Midazolam [14] when the children are taken for procedure. But there is no difference in behaviour scores at separation; induction and wake up score at extubation between these two groups [14].

Major advances in day care anaesthesia practice happened with the introduction of Propofol and inhalational agents which allowed rapid induction and emergence (Sevoflurane, Desflurane) [15,16]. Judicious use of local anaesthetics has got opioids sparing effects. (Eg. Digital blocks, Caudal blocks, wound infiltration with local anaesthetics or even combining with non steroidal anti inflammatory agents [16]. Low dose Ketamine is a time tested analgesic with short duration of action. But there is serious apprehension of combining an anti cholinergic with Ketamine due to fear of temperature rise [17]. Round the clock analgesics (not as needed) should be given for the post operative pain and at the time of discharge. Depending on the age and maturity of the child different types of pain scales can be used (Eg: Wong-Baker, CHEOPS). Parental presence at the time of recovery is believed to reduce the analgesic requirements. Acetaminophen remains the gold standard for most of the minor procedures. The initial large dose can be given rectally in the operation theatre [16].

There is lack of evidence with regard to superiority of specific technique {Gas Anesthesia (GA) vs Total Intravenous Anesthesia (TIVA)} with regard to discharge criteria [16,18].

The introduction of short acting opioids like Fentanyl and Remifentanyl resulted in a paradigm shift with regard to the use of opioids for day care procedures. A comparative study between these two agents showed Remifentanyl has better analgesia and haemodynamic stability compared to Fentanyl (19). But an addition of proper antiemetic is a must along with opioids.

Post-operative nausea and vomiting (PONV) is one of the main causes for unplanned readmission after day care procedure. As per Society for Ambulatory Anaesthesiology consensus guidelines, various classes of drugs can be used for the management of PONV (20). Dexamethasone is usually given at the time of induction of anaesthesia. Other agents can be administered at the end of surgery. For the treatment of PONV, different class of pharmacological agent from the prophylaxis drug initially given is used. If no prophylaxis is used, a low dose 5-HT<sub>3</sub> antagonist is the drug of choice [20]. Use of Propofol, optimal hydration, short acting opioids and minimal use of narcotics also reduces the incidence of post operative nausea and vomiting.

Early post operative ambulation and timely discharge are the dictum in ambulatory surgery. There are different discharge scoring systems (Eg: Modified post anaesthesia discharge scoring system or PADSS) [21]. Presence of parents in the recovery room will reduce the recovery time and the need

for high nurse to patient ratio [22]. It is also known to reduce the negative behavioural changes in the post operative period [23].

### Complications of outpatient anaesthesia

Unplanned readmission, chances of negligence in pre op assessment (for eg if carried out by telephone), lesser compliance to preoperative fasting instructions and intake of preoperative medications are some of the drawbacks of day care procedures. Inability to control problems like post operative pain, nausea and vomiting, lack of expert opinion if need arises are practical challenges. Of course, there should be a knowledgeable care giver who can carry out the preoperative and post operative instructions effectively. Clear verbal and written instructions regarding pre-operative and post operative plans specific to anaesthesia and surgery must be given to the care givers.

### Conclusion

Children are excellent candidates for ambulatory surgical procedures. As in any scenario, the preoperative assessment should include a good history taking and pre operative examination to exclude cases with significant co morbidities and anticipate peri operative complications. Scientific advances in anaesthesia and surgery made a tremendous positive impact for the rapid growth of this concept. The extend of surgical procedure, previous surgical complications, comfort level of anaesthesiologist and proximity of patients home to the centre are significant factors to be considered before listing the patient as a day care procedure. Anaesthetic techniques employed should ensure smooth emergence and recovery with the patient free of pain and vomiting.

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