INDIAN ASSOCIATION OF PAEDIATRIC ANAESTHESIOLOGISTS

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Allaying Pre-operative Anxiety in Children – The Art Behind the Science

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Introduction

Preoperative anxiety and fear is experienced by 65% to 80% of children undergoing surgery, especially during separation from the parents and anesthesia induction. This vulnerable group require to be cared for by a discerning anesthesiologist who understands the psychology and emotions of a child under stress. Developing the abilities to assess, build a rapport and tackle a difficult situation is an art-form the pediatric anesthesiologist learns over a period of time from mentors and experience. The smaller physical frame of a child may tempt an inexperienced anesthesiologist to overcome a reluctant and screaming child with physical restraint and overpowering behaviour. The long-term distressing psychological impact and the legal implications of rough handling of children, make it imperative for anesthesiologists to develop the art of dealing with preoperative anxiety in children.

Factors that contribute to preoperative anxiety

Some children are at higher risk than others for being more anxious.[1,2,3,4] Predicting which child is likely to be more distressed helps to plan options in advance and avoid unnecessary delays. Preoperative anxiety in children can manifest in different ways, the child may appear to be fearful and agitated, breathing deeply, shivering, crying, may stop talking or playing or be aggressive and protest, may fight or try to escape, altogether an emotionally traumatic experience for the child and parents. Factors that worsen the state of preoperative anxiety include; i) *Age and the level of mental and physical development:* children aged 1-5 years are the most anxious and those that lack social adaptive abilities are more at risk. ii) *The baseline anxiety level of parents* contributes to high anxiety levels in the child. iii) *Previous unpleasant medical experiences e.g.,* previous surgery, hospitalization, previous frightening experience in a doctors' clinic and fear of being in a strange threatening environment. iv) *The fear of the operation and anesthesia e.g.,* fear of a pain, of being awake during the procedure and fear of separation from parents.

The importance of preventing preoperative anxiety in children

A stormy preoperative period and significant preoperative anxiety is known to contribute to postoperative problems. These include: emergence delirium and increased postoperative pain perception. Postoperative behavioural abnormalities (a form of post-traumatic stress disorder) may present as general anxiety, separation anxiety, temper tantrums, aggression towards authority, eating disturbances, apathy and withdrawal, enuresis, night-time crying, sleep anxiety and nightmares. These negative behavioural patterns may be seen in 60% of children 2 weeks postoperatively and may persist for almost one year.[2,3]

Reaction to stress of surgery and anesthesia in children at different ages

Anxiety and the response to stress varies widely with age, especially in children with pre-existing behavioural and psychological disorders or with conditions that require multiple surgical procedures.While planning for a smooth induction of anesthesia, the anesthesiologist can anticipate varying reactions depending on the age of the child.[1,4] *Infants aged < 1 year of age* are less likely to experience separation anxiety, they respond to soothing voices, gentle rocking and swaddled in warm sheets or blankets. *Children aged 1-3 years,* exhibit separation anxiety, may not follow what is happening to them in the hospital and are more at risk of a stormy induction. However, appropriate distraction with toys, stories, mobile phones or tablets may help. *Children aged 3-6 years* develop anxieties about body mutilation, removal of underwear and wearing ill-fitting hospital clothing. Reassurance, simple explanations of the surgery and the anesthesia procedure help towards reducing anxiety. Play therapy is also useful. *Children aged 7-12 years* require explanation and need to be involved in decision making. Toys, books, video games and videos are useful for distraction.

Adolescents can be a particularly anxious group and have heightened body awareness and the need for independent decision making as well as privacy. They often have concerns regarding

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pain, awareness and loss of control of events around them. Some may be able to cope with explanations of the procedure and some may not. However, involving them with the anesthetic plan helps gain their confidence and trust and reduce anxiety.[5] Children aged above 7 years of age have several questions uppermost in their mind *e.g.,* will I experience pain and how severe will it be? How long will the operation take? Responding appropriately to these questions and discussing pain management options, the anesthesia process, surgical procedure and its implications postoperatively goes a long way. Explaining to children who have undergone surgery in the past may be necessary, as they may have total amnesia of the previous experience.[8]

Strategies for interviewing and dealing withchildren before an operation

Preoperative interview: Often, anesthesiologists talk to parents during the preoperative interview, with less attention given to the child. The production pressure of a busy operation theatre schedule, contributes to the lack of attention, given to this aspect of preoperative care. Speaking to children in a non-condescending, friendly, age appropriate manner, in a quiet and reassuring voice, addressing them by name and getting down to the eye level of the child, are methods worth using and contribute considerably to gaining confidence and trust.[4] One should give the impression that the child and her/his feelings are important. Teasing, laughing and using terms that may alarm the child should be avoided. The anesthesiologist should observe how the parent is coping with the situation and depending on that, provide information. Some parents may actively ask for all details and others may try to avoid information about unpleasant situations.

Training medical personnel and parents in techniques and attitudes can help them recognize the difference between 'distress-promoting behaviours' and 'coping-promoting behaviours. 'Distress-promoting behaviour' includes making comments that appear to be reassuring and well-meaning that are actually the opposite of the child's perception *e.g.,* making a personal joke about the child. 'Coping-promoting behaviours' include distraction techniques like humorous stories, make believe acting, magic tricks and pretend games like pretending the anesthesia machine is a robot or a rocket ship.[7] How the child will listen, interpret and respond to the distractive technique can be inconsistent *e.g.,* a child who is unfamiliar with soft animal toys may be fearful and think it is a real animal.[8]

Preoperative anxiety and legal issues

The Children's Act in the United Kingdom in 1989 and the United Nations Convention on the Rights of the Child in 1990, stress the concept of child-centered care and the importance of listening to children and considering their views when planning and making decisions. [9,10] This would also include respecting the viewpoint of children who prefer not to be informed in detail. Children over 7 years of age are required to give their assent for anesthesia and surgery and therefore, need to be provided appropriate information.

Preoperative Psychological interventions

Preoperative psychological programs

Many pediatric hospitals offer programmes to children and their parents. These programmes help in developing coping skills. Watching a video of the operating room experience, orientation tours of the operating room, puppet shows, coping skills instructions and printed material are common methods. These programmes are more effective when carried out about a week earlier to older children rather on the day of surgery as they have time to assimilate the information.[11]

Play opportunities, including provision of toys, access to a playroom, distribution of colouring books, tricycles and small cars help facilitate anxiety relief. Digital art, listening to music and watching cartoons may also lower anxiety scores.[13] There are however, concerns related to infection control and it may be safer for a child to bring along a favourite toy. Given the widespread availability of handheld media devices *e.g.*, cell phones, music players and electronic tablets, use of these helps manage waiting anxiety. Video glasses during induction have also been found to be effective non-pharmacological alternative.[14] Delays and longer preoperative waiting time contribute considerably to preoperative anxiety.

Parental presence during induction of anesthesia

In the 1980s, several hospitals in the West allowed the presence of parents during induction of anesthesia to smoothen the process. Benefits include: minimum need for premedication, avoiding a screaming and struggling child because of separation from the parent, reduced anxiety during induction and long term negative behavioural effects. However, parental presence in the operating room (OR) can cause problems *e.g.,* disruption of the OR routine, crowding of the OR, possible excitable reaction of the parent in response to the child becoming nonresponsive and fainting of the parent. Parents should be therefore psychologically prepared for what they will be

Table 1. **Drugs to manage preoperative anxiety in pediatric patients.** [17]

Drug	Route	Dose	Onset (minutes)	Dis-advantage	Advantage
Midazolam	Oral	0.25-0.75 mg.kg^{-1} (max 20 mg)	20	Paradoxical reaction <1%)	Reliable onset
	IV	0.1 mg.kg^{-1}			Antegrade amnesia
	Nasal	0.3 mg.kg^{-1}	10		Less emergence delirium
	Rectal	0.5 mg.kg^{-1}	10		
Clonidine	Oral	4 µg.kg^{-1}	45	Slow onset Erratic nasal absorption Prolonged sedation	Predictable effect Less PONV Anesthetic and analgesic sparing
	Nasal	2-4 µg.kg^{-1}	30		
	Rectal	2.5µg.kg^{-1}	20		
Dexmedetomidine	Nasal	1-2 µg.kg^{-1}	20-40	Slow onset Prolonged sedation	Cooperative Arousable sedation
	IV	0.4 µg.kg^{-1} diluted in 10 mL			
Ketamine	Oral	3-6 mg.kg^{-1}	10-20	Emergence delirium Agitation Salivation Vomiting	No respiratory depression Analgesia Combination with midazolam preferred
	Nasal	3-5 mg.kg^{-1}	<10		
	Rectal	5-6 mg.kg^{-1}	20-30		
	IM	4-8 mg.kg^{-1}			
	IV	1-2 mg.kg^{-1}			
Fentanyl	Oral Trans-mucosal	15-20 µg.kg^{-1}	15-20	Respiratory depression Vomiting Pruritis No reduction in anxiety	Sedation Analgesia

witness to. There is increasing evidence that presence of a parent during induction of a child does not actually treat the anxiety of the child and routine presence is not always beneficial.[15,16]

Altering preoperative sensory stimuli

Once the child enters the OR, the presence of several other 'strangers' during induction of anesthesia, loud noises, having to lie down on the operating table, blinding over-head lights, visualizing monitors and loaded syringes, attachment of monitors, placement of intravenous cannula (without using distractive techniques and local anesthesia), sudden placement of the face mask are all frightening experiences. Creating a calm and reassuring atmosphere goes a long way. Dimming OR lights, soft background music, keeping the child cosy with warm sheets or blankets, having only one person mainly handle the child during induction helps towards having a less anxious child and a smoother induction process.[16]

Pharmacological interventions

Pharmacological measures against preoperative anxiety in children include use of sedative premedication. The oral route is preferred, a sweet taste and flavour is usually preferred and may be administered by the mother. A child with a previous unpleasant experience with a mask induction may allow intravenous access with local anesthetic application. Nasal, rectal routes or intramuscular injections, may be the only alternative in an uncooperative child who refuses to swallow. Commonly used premedication drugs with routes and dosages are given in *Table 1*. Future trends in pharmacological management include discovery of better, safer, more tolerable drugs, for instance melatonin is being currently evaluated. Transdermal application of drugs with iontophoresis is being investigated as a painless form of injection.

Conclusion

Developing a rapport and gaining the trust of the child and parents is an art form that all anesthesiologist who deal with children are required to learn. However, dealing with preoperative anxiety in a child and the parents still remains a challenge. Psychological and pharmacological methods together can ensure a smooth and atraumatic anesthesia experience.

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Paediatric Laryngoscopes Quiz

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Q1. Identify the laryngoscope and name the person who invented this?

Q2. Identify the laryngoscope blade and mention its use?

Q3. Identify the laryngoscope blade and mention why it was effective for pediatric patients?

Q4. Identify the laryngoscope blade and mention its special feature?

Q5. Identify the laryngoscope blade and mention its unique feature?

Find answers on Page 11

Efforts of IAPA for Patient Safety and Quality Improvement

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Although great strides have been made in anaesthesia safety, patients continue to experience unintended harm related to anaesthesia and surgical care, both in adults and children. Because these events of harm are relatively rare, it is difficult for any one institution to learn enough from any single occurrence. Thus, the Society of Paediatric Anesthesia, USA, undertook the development of a multi-institutional system for reporting and analysing these events. Wake Up Safe (WUS) is the initiative designed to fill these gaps in knowledge and to find ways to reduce or eliminate these harmful events.

The Society for Paediatric Anesthesia (SPA), in the United States, sponsors Wake Up Safe, which has been certified by the Agency for Healthcare Research and Quality (AHRQ) as a Patient Safety Organization. Wake up Safe contains a registry of serious adverse events reported on a voluntary basis by participating institutions. Names of patients, individuals involved in the event, and institutions will not be identified and are confidential. Each institution reports the event and a structured analysis of why the event occurred. From a review of the reports, WUS hope to find ways to improve care of children in the perioperative environment through quality improvement initiatives. WUS are also developing a program of peer visitation where anaesthesiologists visit other institutions and critique their processes of care, looking for areas for improvement and trying to find best practices.

IAPA wants to bring this practice of reporting and analysing adverse events with the help of WUS of USA. In this regard, Prof. Charles Dean Kurth, Head of Department of Anaesthesia and Perioperative medicine at Children's Hospital of Philadelphia, has been a pioneer of Quality improvement in Children. He has over 150 publications and in the last 10 years dedicated his time to WUS and quality improvement. He has consented to bring all these best practices from WUS to India in affiliation with IAPA, including sharing the software on which reporting is done. The data accumulated from here in India will not be shared with WUS of USA, but we have the option of inviting them to view it while analysing the inputs.

Mission Statement

The purpose of Wake up Safe is to improve processes of care and outcomes for newborns, infants, and children in the perioperative environment.

The Goals of Wake up Safe are:

- To define quality in paediatric anaesthesia care.
- To develop ways of measuring quality in paediatric anaesthesia care.
- To develop robust Quality Improvement Systems within Departments of Paediatric Anaesthesia.
- To provide data to allow research about adverse events in paediatric perioperative care.

The Objectives of Wake up Safe are:

- To develop a registry of adverse events in paediatric perioperative care.
- To analyze adverse events and to determine common causes for these adverse events.
- To devise strategies to prevent adverse events.
- To gather data to allow departments to compare their data with national norms.

Participating Institutions of WUS in USA Include

- Arkansas Children's Hospital
- Children's Hospital Boston
- Children's Hospital Los Angeles
- The Children's Hospital of Philadelphia
- Children's Hospital of Pittsburgh
- Children's Medical Center, Dallas, TX
- Children's National Medical Center, Washington DC
- Cincinnati Children's Hospital Medical Center
- Colorado Children's Hospital
- Emory Children's Center
- Johns Hopkins Children's Center
- Kaiser Oakland Medical Center
- Lucile Salter Packard Children's Hospital at Stanford
- Morgan Stanley Children's Hospital of Columbia University Medical Center
- Nationwide Children's Hospital
- Phoenix Children's Hospital
- Seattle Children's Hospital
- St. Jude Children's Research Hospital
- Texas Children's Hospital
- University of Michigan C. S. Mott Children's Hospital

Proposed Institutions in India

- Rainbow Hospitals, Hyderabad
- Apollo Children's Hospital, Chennai
- Kanchi Kamakoti Child's Trust Hospital, Chennai
- Christian Medical College, Vellore
- All India Institute of Medical Sciences, New Delhi
- Post Graduate Institute of Medical Education and Research, Chandigarh

Benefits of Participation

- Demographic profile of perioperative cases by age, specialty, and physical status of child and comparison with average of group.
- Report of occurrence of serious adverse events and comparison with group averages.
- Root causes of serious events for each hospital and compilation of root causes of events for the group of participating hospitals.
- Recommendations for prevention of the serious adverse events.
- Education sessions to learn Safety Analytics and Quality Improvements methodology.
- Participation in Quality Improvement and Peer Evaluation initiatives

GOAL

The Goal of the Initiative is to make Paediatric Anaesthesia even safer than it is currently. We will accomplish this goal by learning from analysis of rare, but serious, adverse events, making recommendations about ways to prevent them, and developing Quality Improvements to prevent future events.

REASONS TO JOIN WAKE UP SAFE

- Participation is the best way currently available to learn from shared experience in order to reduce the occurrence of serious adverse events and improve care in Paediatric Anaesthesia.
- Each institution will regularly receive demographic reports about your anaesthetic practice and how it compares to all initiative members as a whole.
- Each institution will regularly receive reports of their incidence of serious adverse events and a comparison with the group's overall incidence.
- Institutions will also receive expert opinions about steps your institution can take to reduce the incidence of serious adverse events.
- Your hospital will participate in Quality Improvement Initiatives to prevent adverse events and participate in peer reviews of your processes of care.

Requirements for Participation

- Approval of the Chair of Anesthesia or other qualified leadership as designated by the institution.
- Execute a Participation Agreement with the Society.
- Pay the joining fee and yearly fee.
- Agree to share de-identified adverse event data as well as demographic data.
- Obtain IRB approval for data collection.
- Assurance that your individual departmental Quality Improvement data collection process can be coordinated with the methods established by the Wake-up Safe initiative. (see below)
- Appoint an individual anaesthesiologist who will be responsible for your Wake up Safe participation.
- Agree to periodic audits of institutional data gathering activities as recommended by the Managers of the Program.
- Allocate resources necessary for Quality Improvement Initiatives arising from Wake up Safe. For example, this may include safety training for an anaesthesiologist and additional equipment needed for Quality Improvement.
- Member anaesthesiologists must meet defined responsibilities including completion of the orientation program, attend 50% of meetings, enter data in a timely manner, and continuing education in quality and safety.

Steps taken so far

The preliminary meeting of the safety initiative was attended by Drs Kurth and Rajeev Subramanian at the annual conference of IAPA at Hyderabad. Later the IAPA executive has offered to fund up to Rs. 5 lakhs on this project to take it forward nationwide. Subsequently, Dr. Sandhya Yaddanapudi was designated as the lead for this initiative. Dr Subrahmanyam, Secretary IAPA, visited CHOP (Children's Hospital of Philadelphia) in May 2018 and was shown the working model of the system and was introduced to various members of the safety team there. Prof Kurth hosted a dinner and in that meeting said they would hold a safety workshop in the next IAPA conference at Delhi. They would also lend their software (reporting system) to us.

Thus, we are embarking on a revolutionary trend of a society-based quality improvement and will be a pioneering organization doing this work in India. We can in future also approach State and Central Governments to participate and fund this process.

Browse through IAPA guidelines
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Find IAPA Fasting guidelines and Monitoring guidelines
More guidelines soon……

Figure 1 X Ray Spine AP and Lat view
Spina bifida occulta

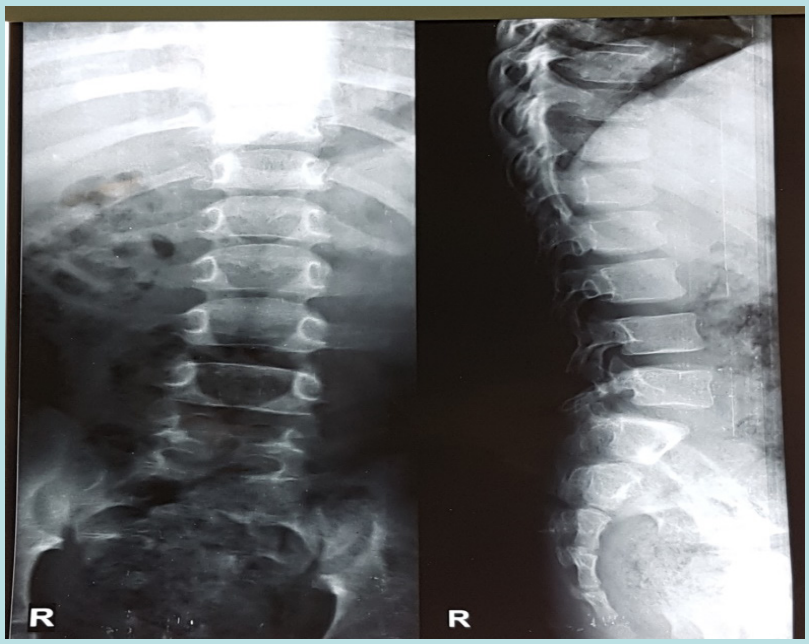
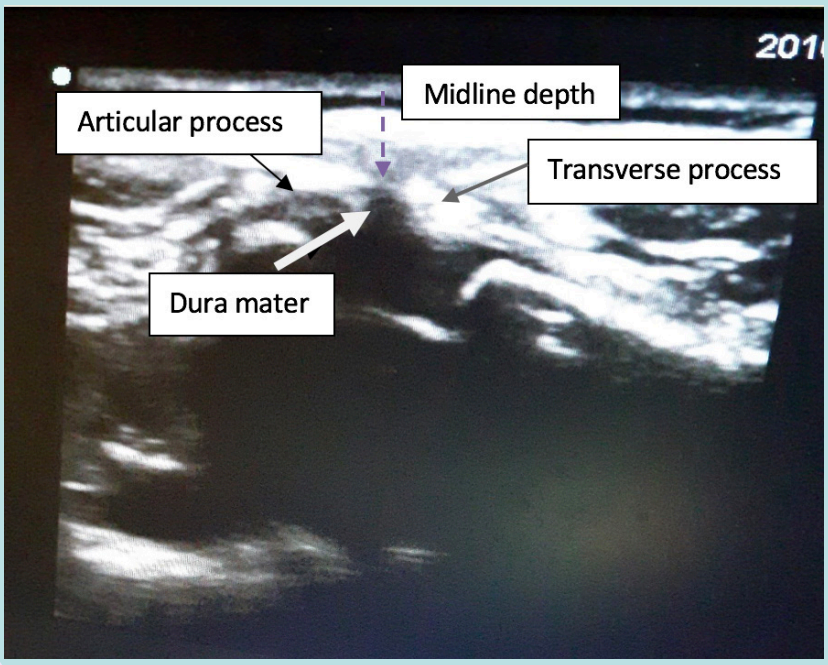


Figure 2 USG image of the lumbar spine showing parts of spine and depth of lumbar epidural space from skin



Ultrasound-guided Epidural Analgesia in Arthrogryposis Multiplex Congenita with Spina Bifida Occulta – A challenge

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Introduction:

We report a case of a 5-year old male child, follow up case of Arthrogryposis multiplex congenita (AMC) with congenital dislocation of knees with Spina bifida since birth weighing 16 kgs and height 100 cms. Distal femoral extension osteotomy was done as 3 years ago and now the patient was scheduled for bilateral corrective osteotomy of both legs. The anticipated duration of surgery was 3-4 hrs. On examination she had lumber lordosis with flexion deformity of the hip. Knee and patella was laterally subluxated by 20^0. Patient was having genu valgum in both limbs. Blood investigations were normal and radiograph of the back showed spina bifida at L4-L5 and L5-S1 level. On anaesthetic evaluation patient was ASA grade 2 with no other congenital anomalies than those mentioned. The child had appropriate motor and sensory development and no neurological deficits. After discussing all the pros and cons, we decided in favour of regional anaesthesia. We report for the first time the use of ultrasound (US) guided epidural block in a patient of AMC with Spina bifida occulta posted for prolonged lower limb surgery. The patient`s father has consented to allow publishing this case report. Informed consent and assent was obtained for general and regional anaesthesia. In the operating room routine monitors were attached, an intravenous cannula (20G) was inserted and Ringer's lactate was started. After premedication with intravenous Inj. fentanyl (2ug/kg), patient was induced with Inj. propofol (2mg/kg) and muscle relaxation with Inj. rocuronium (1mg/kg) was given. Patient was intubated with uncuffed 5.0 mm endotracheal tube. He was maintained on nitrous oxide: oxygen at 60:40, halothane (1%) and on controlled ventilation. Scout scan of lumbar spine was performed using 2-5 MHz 60 mm curved array probe (Fujifilm Sonosite, Inc. Bothell, WA) in the left lateral position. The midline depth of the epidural space and the inclination angle 100-105 were determined at intervertebral space (L1-L2, L2-L3, and L3-L4) with the aid of sterile protector. Under all aseptic precaution, a 19 G, 5cm Tuohy needle (Smith medical) was introduced at the L3-L4 interspace and the epidural space was identified at 0.5 cm using a loss of resistance technique. Thereafter, a 20 G epidural catheter was inserted and fixed at 4 cm. A test dose of 1.2 ml 1% lidocaine with 1;200,000 epinephrine was given through the catheter. After confirming a negative response, a bolus dose of 3 ml of 0.25% plain bupivacaine was administered and patient turned supine. Further 3 ml of 0.25% bupivacaine was given and vitals monitored. Good pain relief for the whole duration of surgery was attained and vitals remained stable. At the end, patient was reversed and a top up dose of 0.25% bupivacaine was given for post-operative pain relief. The surgery lasted 4 hours and the child was transported to the recovery room for further monitoring. Postoperative period was uneventful and child was transferred from recovery to post-operative ward. Epidural catheter removed and discharged home on postoperative day 3. There were no complains of postoperative dural puncture headache.

Conclusion:

There is paucity of literature on AMC with spina bifida and ultrasound guided epidural anaesthesia. In these patients neuraxial blockade is both potentially difficult and hazardous as the bony and the ligamentous structures in the spine as well as underlying neural structures are highly anatomically variable.[2]

(Continued on Page 10)

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Anaesthetic Management of Microstomia in a 6-month old child

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Introduction:

Paediatric microstomia can be rarely congenital and more often acquired after chemical ingestion or thermal injury. The surgical management includes commissurotomy, mucosal advancement flaps, and mandibular vestibuloplasty. Successful difficult airway management may require multiple modalities in addition to flexible fibreoptic larnygoscopy during initial and subsequent reconstructive procedures. We report a case of acquired paediatric microstomia in which corrosive oral burns made tracheal intubation by conventional, fibreoptic, and blind techniques, impossible. However, tracheostomy was averted and commissurotomy was done under total intravenous anaesthesia with meticulous precautions.

Case Report:

A 4-month old, 5 kg male child presented to casualty with inconsolable cry, copious secretions, black discoloration, and severe edema of lips and oral cavity. History and clinical features were suggestive of corrosive intake. Patient was immediately admitted to intensive care unit. After initial resuscitation, patient was posted for emergency rigid direct laryngoscopy and bronchoscopy to assess airway damage and elective intubation in anticipation of progressive airway edema. After premedication with inj. glycopyrrolate 4 mcg/kg iv, induction was done with inj. fentanyl 1 mcg/kg, and inj. propofol 2 mg/kg slow iv bolus titrated to maintain spontaneous respiration. Vocal cords were sprayed with inj. lignocaine 1% spray (0.5 ml) and rigid direct laryngoscopy was done which revealed charring of lips, tongue and gingiva with severe edema of oral cavity and oropharynx up to the epiglottis. Anesthesia was maintained on Total Intravenous Anaesthesia (TIVA), with intermittent bolus doses of inj. propofol (0.4 - 0.5 mg/kg/dose) titrated to maintain spontaneous respiration for direct laryngoscopy. At the end of the procedure, trachea was intubated with endotracheal tube no. 3.5 mm ID (Image 1). The child was electively ventilated for 36 hours, extubated after the edema subsided, and discharged after 5 days with advice to follow up after a week (Image 2).

The patient presented after 2 months with severe microstomia of <4 mm mouth opening, due to fibrosis and healing by secondary intention (Image 3). He was now 6-month old and weighed 6.5 kg, and was planned for bilateral lingual commissurotomy. On the day of surgery, after adequate operating room preparation for difficult airway, emergency tracheostomy consent, and ENT surgeon standby, the patient was premedicated with intramuscular inj. ketamine 3 mg/kg and inj. atropine 20 mcg/kg. Once the patient was adequately sedated, patient was taken to the operating room (OR), and venous line was secured. Induction was done with inj. midazolam 0.05 mg/kg iv, inj. ketamine 1 mg/kg iv, and inj. propofol 1 mg/kg slow i.v bolus, titrated to maintain spontaneous respiration. Rigid bronchoscopy with side port ventilation was ready in OR as an emergency backup plan. Intraoperatively oxygen supplementation was given via nasal cannula (Image 4). Local infiltration was done with inj. bupivacaine 0.25% (3.5 ml), and inj. lignocaine 2% with adrenaline (1.5 ml). Total intravenous anaesthesia was maintained with intermittent bolus doses of inj. propofol (0.5 – 1 mg/kg/dose) and inj. ketamine (0.5 mg/kg/dose) guided by clinical judgement, while bilateral lingual commissurotomy was done (Image 4). Intraoperatively respiration was monitored by side stream capnography taped near nostril and by visual assessment of chest movement with respiration. Surgery was completed successfully under TIVA. Inj. ondansetron 0.5 mg, and inj. paracetamol 75 mg was given to prevent post op nausea vomiting and for analgesia. Postoperatively, patient was nursed in lateral position, and shifted to ward once awake and pain free.

Discussion:

Accidental ingestion of caustic agents may cause devastating injury in children. Anaesthetists may encounter such patients both at first presentation and subsequently for management of sequelae. Acids cause coagulative necrosis and alkalis cause liquefactive necrosis. Types of injuries inflicted by corrosive ingestion can be divided as [1] :

Figure 1 Corrosive injury and airway secured with endo-tracheal tube

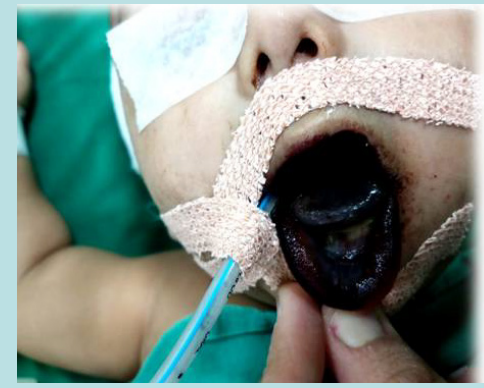

Figure 2 After extubation

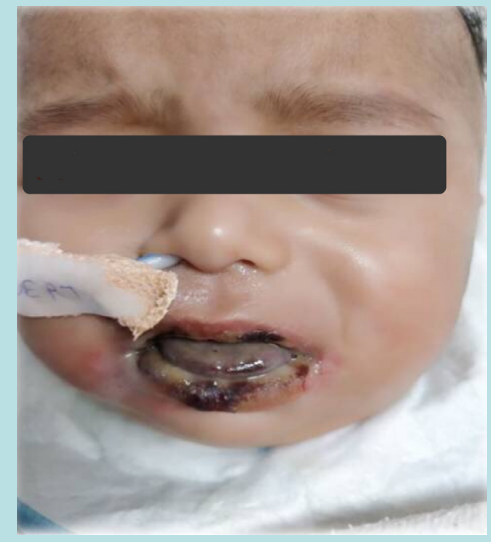

Figure 3 Delayed presentation showing severe microstomia

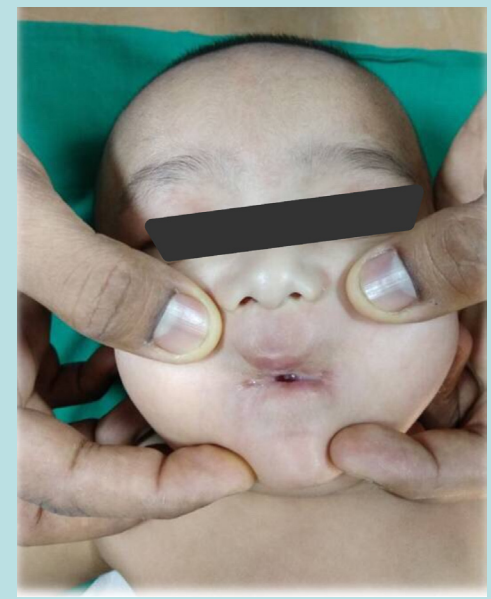

Figure 4 Commissurotomy under TIVA

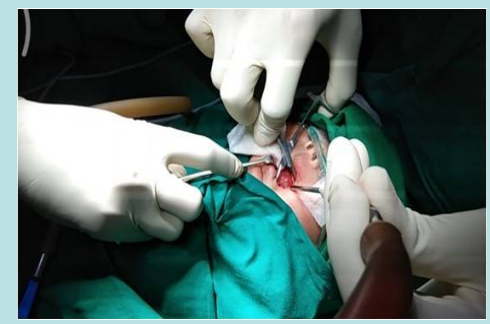

Table 1 Types of corrosive injury and interventions

Type of corrosive injury	Clinical features	Urgent intervention
AIRWAY AND FACIAL BURNS	• Burning pain • Swelling of the lips • Oesophageal and pharyngeal oedema • Dyspnoea stridor	✓ Admission to intensive care ✓ Early intubation ✓ Diagnostic procedures such as oesophagoscopy, gastroscopy and bronchoscopy ✓ Chest radiograph
OESOPHAGEAL AND GASTRO-INTESTINAL BURNS	• Vomiting • Hematemesis • Hypersalivation • Dysphagia	✓ Stomach washout or lavage and induction of vomiting are contraindicated ✓ Neutralizing chemicals should never be used ✓ Blind placement of a nasogastric tube is controversial
SPLASH INJURIES	• Ocular burns	Ophthalmology opinion

Table 2 Possible airway options and limitations

POSSIBLE AIRWAY OPTIONS	LIMITATIONS
• Flexible fibreoptic laryngoscopy for nasotracheal intubation (4,5) • Fibreoptic laryngoscope through the other nostril to provide direct visual guidance • Optical stylet • Blind nasal intubation techniques - obsolete • Paediatric tubular pharyngolaryngoscope • Surgical tracheostomy	• Availability: commonly available flexible fibreoptic laryngoscopes will not pass through endotracheal tubes with an internal diameter of <5 mm. • Anatomical distortion and burn scar contractures leading to obliteration of landmarks • Age of the child and the calibre of the endotracheal tube selected • Inadvertant nasal bleeding due to blind nasal instrumentation and possible fatal aspiration

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- airway and facial burns
- oesophageal/ gastrointestinal
- splash injuries

Anaesthetic concerns in patients with corrosive intake:

- Difficult intubation
- Airway injury during instrumentation
- Risk of aspiration
- Broad-spectrum antibiotics
- Stress ulcer prophylaxis
- Nutrition strategies: parenteral feeding long-term venous access
- May need jejunostomy or gastrostomy feeds

Microstomia is the reduction in the size of the oral aperture that is severe enough to compromise quality of life, nutrition and cosmesis. It can be more often acquired (trauma, electric, thermal or chemical burns) and rarely congenital (whistling face syndrome). It can lead to difficulty in feeding, speech production and psychological stress. Severe regurgitation and aspiration can be fatal. Surgical management includes separation of fused lips, cosmetic and functional lip reconstruction. The most important feature of microstomia complicating airway management is limited mouth opening.[2,3] As our plan of surgery was limited to bilateral lingual commissurotomy, total intravenous anaesthesia with maintenance of spontaneous respiration was a feasible option with rigid bronchoscopy and emergency surgical airway as backup. A good working suction, and an operating table allowing head low position, are imperative to prevent aspiration.

Conclusion: Intubation by flexible fibreoptic laryngoscopy may not be always possible in infants with severe acquired microstomia. Alternative airway management methods may avert a tracheostomy. Adequate planning in anticipated difficult airway is the cornerstone of safe anesthetic management.

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Anaesthetic Challenges in Neonates with Huge Nasal/oral Teratomas: Case Reports

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Teratomas are the most common extra-gonadal germ cell tumors occurring in childhood.[1] The incidence of teratomas is 1 in 4000 live-births with predominance in females.[2] 90% of head and neck teratomas (Incidence: 1-9%) occur in neonatal and infantile period.[1] Oropharyngeal teratomas are extremely rare and represent 2% of all teratomas.[2] Though mostly benign in histology, they possess great morbidity and mortality due to their size and location, causing airway obstruction, respiratory distress,[1] feeding difficulties and failure to thrive.

We describe anaesthetic challenges faced during successful management of neonates with large oropharyngeal teratomas in the peri-operative period.

CASE 1:
A 2.5 kg female baby delivered at term by normal vaginal delivery with multilobulated huge mass protruding from her mouth (Figure 1) and from the nasal septum. The mother did not undergo ultrasonography examinations during her pregnancy. The child was referred to our hospital on Day 1 for the mass and with inability to feed. The child underwent pre anaesthetic evaluation and check laryngoscopy for airway examination which could visualise glottis. No other systemic abnormalities or other airway/midline masses were noted. Relevant blood investigations were within normal limits.

After pre–oxygenation, premedication Inj. glycopyrrolate 0.01 mg/kg was given. Awake sedated intubation was done using Inj. fentanyl 1 µg/kg and Inj. midazolam 0.05 mg/kg as mask ventilation was difficult due to large teratoma. Laryngoscopy was performed using Miller blade carefully through the right side of the mouth with an assistant gently retracting the tumour to the left side to make room for the passage of endotracheal tube (ETT). Vocal cords were visualised and intubation was done with size 3.0 mm ID uncuffed ETT, followed by insertion of a pharyngeal pack. Controlled mechanical ventilation was done by modified Jackson- Ree's circuit and maintained with sevoflurane, N_2O and O_2 and Inj. atracurium (loading: 0.5 mg/kg, maintenance: 0.1 mg/kg top up) for adequate muscle relaxation. Wide local excision of the teratoma was done. Intra-operative fluid 10 ml/kg/hr Inj. D10 + ¼ NS was given and 30 ml packed red cells were transfused for the blood loss.

Following surgery, after complete reversal of neuromuscular blockade, extubation was performed. Rest of the perioperative period was uneventful.

CASE 2:
A 3 kg male baby delivered at term by normal vaginal delivery was referred to our hospital in view of respiratory distress on Day 1. Baby was intubated on the same day in NICU using Miller blade with 3.0 mm ID uncuffed ETT without any sedation by the neonatologist. Antenatal check-ups were normal. The child was born out of a non-consanguineous marriage with no history of similar problems in previous children or any family members. MRI and CT scan revealed the presence of nasopharyngeal teratoma with mass extending into bilateral nasal cavities. Preanesthetic evaluation revealed no other systemic involvement with normal routine investigations. The child had come to us from NICU on Day 35 with 3.0 mm ID uncuffed ETT in situ.

After pre–oxygenation, premedication Inj. glycopyrrolate 0.01 mg/kg was given. Induction was done with Inj. thiopentone 5 mg/kg and Inj. succinylcholine 2 mg/kg. Intubation was done using AirTraq Optical laryngoscope and uncuffed ETT was replaced with microcuff ETT size 3.0mm ID and pharyngeal packing was done. Controlled mechanical ventilation was done by modified Jackson- Ree's circuit and maintained with sevoflurane, N_2O and O_2 and Inj. atracurium (loading: 0.5 mg/kg, maintenance: 0.1 mg/kg) for adequate muscle relaxation. Endoscopic (Figure 2) mobilisation and removal of the mass through nasal cavity (nasal part of the mass) and oral cavity (nasopharyngeal part) was done. Intra-operative fluid 8 ml/kg/hr (for maintenance) 5% Dextrose balanced salt solution, blood was transfused based on the amount lost (80 ml packed red cells). Inj. dexamethasone 0.25 mg/kg iv was given to reduce airway edema.

Extubation was done on post-operative day 5 as bilateral nasal cavities were completely packed and in view of anticipated aspiration due to possible post-operative bleeding.

Figure 1 Case 1 baby with multilobulated huge oral teratoma

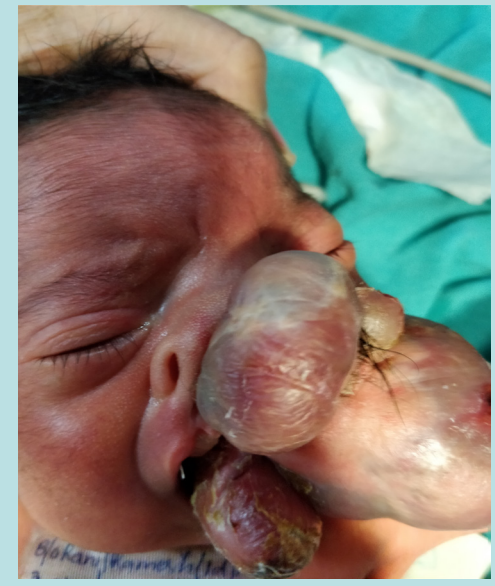
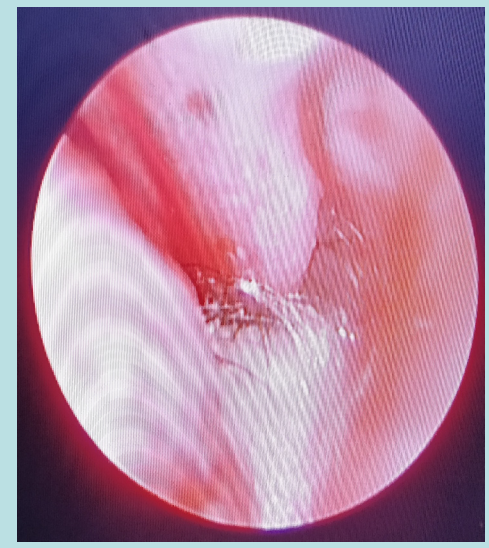


Figure 2 Case 2 endoscopic mobilization and removal of nasal teratoma



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Discussion:

Teratomas arise from totipotent germ cells that are normally present in the ovary and testis and sometimes also found in abnormal midline embryonic nests.[3] Hence, oropharyngeal teratomas are also associated with midline anomalies like tongue hamartoma, choristoma and encephalocele. The most common site of teratoma is sacrococcygeal region, followed by gonads, retro peritoneum. Most common site of origin in oral cavity is palate followed by posterior pharyngeal wall. Large teratomas can interfere with foetal swallowing and produce polyhydramnios, cause severe respiratory distress at birth, and may lead to stillbirth.[2] If diagnosed antenatally, can be managed by EXIT procedure if they are huge and causing airway obstruction in the foetus. Oropharyngeal teratomas have a higher incidence of preterm birth.[2] The common presenting complaints are dyspnoea and difficulty in feeding. CECT provides information about the site of origin of the tumour and its anatomical extent.[2] Typical finding of teratoma is heterogeneous mass with presence of calcifications.4 Differential diagnosis includes haemangioma, rhabdomyosarcoma, encephalocele, gliomas and Von Reckling-hausen's disease.[2] The biggest concern as an anaesthesiologist in such patients is airway management. The goals of management include:

- Careful assessment of airway and provision for emergency surgical airway
- Exclusion of other congenital lesions
- Check laryngoscopy if possible
- Establishment of reliable airway with muscle paralysis.

Case 1: Various methods of intubation are described which include conventional intubation (Miller blade / optical or video assisted) and fibre-optic nasal intubation. Nasal intubation is preferred as there is better working space available for surgeon. Limitations include unavailability of proper size and expertise of anaesthesiologist. In our case, we did not plan for nasal fibre-optic intubation as the tumor was also arising from the nasal septum and negotiation of fibre-scope through nostrils was not possible and check laryngoscopy revealed enough space to have access to glottic opening. Bag and mask ventilation was not possible in this child, hence induction via intravenous / inhalational route was not carried out. Following preoxygenation using Jackson Ree's circuit by placing the patient end close to the child's nostrils without using facemask, intubation was done by awake- sedated technique using Inj. Midazolam and Inj Fentanyl, keeping surgical airway as a standby in case of inability to secure airway.

Case 2: In this child had a nasopharyngeal mass and hence we did not plan for nasal fibre-optic intubation. Since the child had already been intubated in NICU without any difficulty, we performed laryngoscopy using AirTraq Optical laryngoscope and replaced 3.0 mm ID uncuffed ETT with microcuff ETT size 3.0 mm ID.

Ultrasound-guided Epidural Analgesia in Arthrogryposis Multiplex Congenita with Spina Bifida Occulta – A challenge

(Continued from Page 6)

However, in a patient with spina bifida occulta the possibility of spinal dysraphism should always be kept in mind.(3)

In our case as the anticipated surgical duration was 4 hours epidural was planned at a level higher up at L1 - L2 Attempting epidural puncture at the level of the lesion may result in dural tap and spinal cord injury because of the absence of the epidural space.(5) US guidance has established its role in facilitating placement of epidural block in anticipated difficult procedures. Pre-procedural US of spine is valuable in these patients to delineate relevant anatomy, determining epidural depth, midline, and adequate window for procedure and inclination angle. This will reduce the puncture attempts and increase success rate. In our case US guidance helped ensure atraumatic epidural with minimum puncture attempts.

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Paediatr Anaesth. 2018 Jun 7.

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https://www.rcoa.ac.uk/system/files/GPAS-2018-10-PAEDIATRICS.pdf

Prevention of perioperative venous thromboembolism in pediatric patients: Guidelines from the Association of Paediatric Anaesthetists of Great Britain and Ireland (APAGBI).
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Cardiopulmonary Resuscitation in Infants and Children With Cardiac Disease: A Scientific Statement From the American Heart Association.
Circulation. 2018 May 29;137(22):e691-e782.

Answers to Crossword on Page 12

Across
1. Plasmin
3. Croup
5. Renin
7. Xenon
10. Goldenhar
12. Vein of Galen
13. Third
14. OCR
15. Lordosis
17. Elwyn

Down
2. Norwood
4. Pyeloplasty
6. Hypoxia
8. Brachial
9. Liver
11. Coronal
16. Sunset

Answers to Paediatric Laryngoscopes Quiz on Page 4

A1: Shadwell laryngoscope invented by Gillespie in 1936. It is a modification of Chevalier Jackson laryngoscope. Image source: Internet.
A2: Oxford infant blade suitable for intubation in premature infants and small children with cleft palate. There is sufficient overhang on the open side to prevent the lips from obscuring vision and the broad, flat surface is a help in the small child with an extreme degree of cleft palate Image source: OR SUPPLY.com
A3: Robert Shaw fiberoptic blade. Its wide & large flange blades allow the wide tongue of small child to be flattened during laryngoscopy. Image source: Internet.
A4: Oxiport Miller blade. It has a built-in tube that allows delivery of oxygen or other gases during intubation. The tube also may be used for suction. Image source: Hull anaesthesia.inc.
A5: Cardiff Pediatric laryngoscope blade. It combines elements of both curved and straight blades. It has Z-shaped in cross-section, so no part of the blade can obscure the line of sight and it provides more room inside the mouth. Image source: Internet.

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Can you solve this Crossword?

Dr Basanth Rayani
Hyderabad

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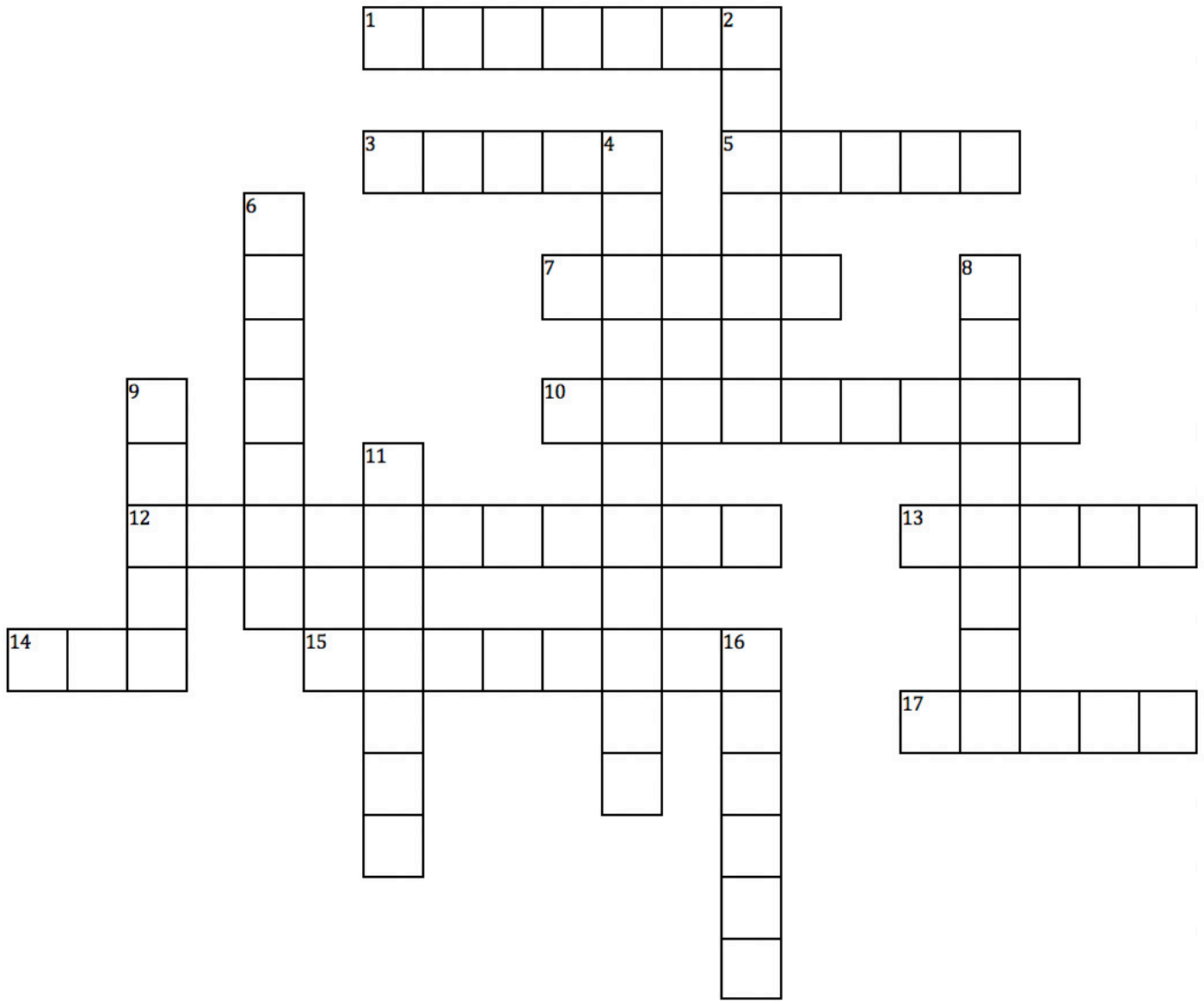

Across

1. This dissolves fibrin clot by cleaving at lysine and arginine sites

3. Clinical condition with triad of hoarseness, barking cough and stridor

5. Production of angiotensin 1 from angiotensinogen is stimulated by

7. Noble gas whose mechanism of action is NMDA receptor antagonism

10. Name the oculo-auriculo-vertebral syndrome

12. A congenital malformation with arterio-venous shunting of cerebral vessels, sometimes causing high output cardiac failure

13. Common carotid arteries develop from this aortic arch

14. A Reflex causing bradycardia on extra-ocular muscle handling

15. Secondary curvature of spine

17. The third inventor of RAE tube along with Ring and Adair

Down

2. Procedure done for hypoplastic left heart syndrome within the first two weeks of life

4. Surgical procedure for uretero-pelvic junction obstruction

6. Most common cause of bradycardia in children

8. The artery commonly deferred for cannulation due to poor collateral circulation

9. Erythropoiesis in the second and early third trimester occurs here

11. Brachycephaly occurs due to premature closure of these sutures

16. A sign seen with raised intracranial pressure causing occulomotor palsy

(Find answers on Page 11)