

Editorial

Dr Elsa Varghese
Bangalore



Greetings for the year 2020

We look forward to this year and especially to be able to meet again in February 2020 at our annual meeting in Varanasi.

Looking back at the previous year, it is heartening to observe the tremendous enthusiasm and interest shown by many of our members. IAPA state branches of West Bengal, Telangana and Maharashtra have been very active and held several CMEs and workshops. We look forward to other states also showing interest and creating their own state branches this year.

The IAPA Pediatric Anesthesiology Fellowship Programme is now underway in seven hospitals and other institution have also shown interest and are in the process of being recognised for the course. We thank the IAPA Academic Committee who have ensured that the centralised examination process is held twice a year. We congratulate all the candidates who have shown interest in training for these fellowships and for the individual faculty for ensuring that the process of training is a true learning experience.

IAPA is now affiliated to the Asian Society of Paediatric Anaesthesiologists. The ASPA Paediatric Perioperative Life Support (PPLS) and Train the Trainer (TTT) programme was organized in Bangalore under the guidance of Dr Agnes Ng from KK Hospital, Singapore. Fifteen enthusiastic IAPA members were trained from across the country. With these trainers we were able to organize two more PPLS programmes in Hyderabad and Kolkata. The IAPA now has trained 37 trainers and the aim is to provide these courses in as many states as possible so that our anaesthesiologists can confidently and effectively handle perioperative paediatric crises. I thank all our IAPA-ASPA trainers who have volunteered so readily and enthusiastically at their own expense. We are very grateful for your support.

The process for affiliation of IAPA to the journal *Pediatric Anesthesia* is in the pipeline. Unfortunately, less than one third of our members have paid the subscription, regardless we are proceeding with this affiliation in the hope that all our members understand the wealth of knowledge they will have easy and cheap access to which is bound to have a positive impact on their practice. Considering what an incredible academic resource *Pediatric Anesthesia* is, we will eventually pay only Rs 1000.00 per year per member, if all our members join. Believing in the democratic process we have not made subscribing for the journal mandatory. The *journal Pediatric Anesthesia* is otherwise well beyond the reach and means of most of our pockets.

The IAPA in collaboration with the Society of Pediatric Anesthesiologists (SPA), USA under the leadership of Dr Dean Kurt and Dr Rajeev Subramanyam have initiated the process of the IAPA WakeUpSafe Programme in India. Dr Subrahmanyam Maddirala along with them has painstakingly helped the IAPA to initiate this process in five institutions and many other institutions have evinced interest as well. I look forward to working with these teams. Our nation is sadly lacking in the process of data entry and analysis, without which it is impossible to identify the incidence of adverse events and help identify correctable causes. This is a giant and positive step towards our aim to reduce perioperative morbidity and mortality in our children.

Looking forward to the year 2020, the Annual Meeting of the IAPA, hosted by the Department of Anesthesia, Banaras Hindu University, Varanasi, under the able stewardship of Prof Pushkar Ranjan, has an enriching and interesting academic programme. This year we have encouraged younger faculty who have contributed to our field to participate. I encourage all our members to attend. We urge more members to be proactive and initiate their state branches as well as becoming proactive in our various IAPA committees.

Thank you for placing so much confidence in our Association and the Executive Committee members over the years. We as a team look forward, to taking our association forward with big strides, focusing on the aim of providing safe perioperative care for our precious children and passing on the passion for our profession.

Prof Dr Elsa Varghese

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ACTIVITIES: 2019 - 2020**Report on ASPA IAPA PPLS Workshop, August 18th 2019, Hyderabad**

The third ASPA IAPA PPLS course in India was conducted as a part of the South Zone ISACON 2019 annual meeting on August 18th 2019 at Niloufer Hospital for Women and Children, Hyderabad. This followed the first ASPA IAPA PPLS course, conducted in the Indira Gandhi Institute of Child Health, Bangalore in January 2019 and PPLS with TTT course in West Bengal. Thirty delegates attended this one-day course to familiarize themselves with the recognition and management of perioperative paediatric crises. Dr Sandhya Yaddanapudi, Dr Chandrika Y.R, Dr Ekta Rai, Dr Aavula Muralidhar and Dr Vibhavari Naik were the faculty for this course.

In addition to the delegates, the IAPA Telangana State Branch office bearers and Dr Prabhavati the renowned senior paediatric anesthesiologist, attended the entire programme to encourage the delegates. The organizers of South-Zone ISACON 2019 also attended to overview the conduct of the workshop. Dr Vibhavari Naik introduced the objectives of the program and the programme started on the auspicious note with the rendering of the Saraswativandana and lamp lighting. The program was conducted as per ASPA regulations which included the sequence of talks, small group interactive discussions and skill-based stations. All the three halls were well equipped with audiovisual and facilities. The delegates were divided into three groups for rotations. The interactive case discussions for the small groups resulted in vibrant discussions which spilled over the breaks. In addition to the enthusiastic discussions and active learning of skills, hot tea, coffee and Hyderabad special 'Osmania Biscuits' were served during tea breaks and tasty local cuisine served for lunch. Dr MSRC Murthy invited the faculty and IAPA Telangana State Branch office bearers for a delicious Hyderabad biryani dinner.

**Paediatric Airway Update, PGIMER, August 18th 2019, Chandigarh**

'Paediatric Airway Update' was organized under the aegis of Indian Association of Paediatric Anaesthesiologists on 18th August, 2019 by the Paediatric Anaesthesia Group of the Department of Anaesthesia and Intensive Care, PGIMER, Chandigarh. Prof Neerja Bhardwaj, the Organizing Chairperson and Prof Indu Sen, Organizing Secretary, organized the event which was attended by 78 delegates from Chandigarh and the neighbouring states.

The keynote lecture on 'Paediatric Airway' was followed by a panel discussion on 'Airway challenges: how to be prepared, which focused on specific airway issues in neonatal emergencies, paediatric ENT, plastic surgical, neurosurgical procedures and paediatric trauma.

The much anticipated aspect of the update was the airway workshop which included four basic and four advanced airway skill stations. The anatomy station had 3-dimensional display of the airway anatomy using cadaveric specimens and airway models. The skill stations ensured that the participants practiced using several types of specialized airway equipment on paediatric manikins or models. These included airway adjuncts, oxygenation devices, supraglottic airway devices, conventional and video-laryngoscopy, flexible fiberoptic bronchoscope, guided intubation tracheal intubation and front of the neck airway management. Ultrasonography of the airway was demonstrated and practiced on volunteers. Delegates participated in simulation sessions of peri-operative airway scenarios held on high-fidelity paediatric simulation manikins.

Research papers on paediatric anaesthesia were presented by postgraduate students with award of prize to the best two. The program ended with a quiz on paediatric airway.





WFSA SAFE Course, 1st-3rd November 2019, New Delhi

The SAFE (Safer Anaesthesia From Education) courses are conducted in various parts of the world by the WFSA with an aim to provide safe health care in low income or low resource settings areas.

The SAFE Paediatric Anaesthesia course was conducted in New Delhi from 01-03 Nov 2019. This was the first such course in any north Indian state. The previous courses were held in Telangana from 2017-2019 and they had a good response from the local health care providers from the state.

This course in New Delhi was directed by Dr (Col) Rakhee Goyal, Lead Consultant Anaesthesia, Madhukar Rainbow Children's Hospital, Delhi. The WFSA Projects Officer, Amal Paonaskar, provided all assistance and support required for the course. This included the course material, liaison with the faculty, logistics support, funding, and assistance during the conduct of the course.

The course was conducted at the India Habitat Centre, New Delhi, in association with the World Federation of Societies of Anaesthesia (WFSA), Indian Association of Paediatric Anaesthesiologists (IAPA), Association of Anaesthetists (AAGBI), Madhukar Rainbow Children's Hospital, Delhi and the Indian Society of Anaesthesiologists (ISA)

The Training of Trainers (TOT) course was held on 01 Nov 2019 at the Cypress hall, India Habitat Centre. The faculty included six paediatric anaesthesiologists who had taken the ToT course earlier and included Dr Gita Nath (Hyderabad), Dr Lowri Bowen (Cardiff), Dr Adele King (Glasgow), Dr Rakhee Goyal (Delhi), Dr Sandhya Yadanapuddi (Chandigarh), and Dr Sapna Bathla (Delhi). There were seven new trainers from Delhi for the TOT. The programme included talks, presentations, group discussions, skills training sessions, demo scenario presentation and a talk by each new participant on a topic of his/her choice.

Thirty two qualified anaesthetists attended the SAFE course. The participants were, working in a range of set-up such as: teaching hospitals, non-teaching government hospitals, corporate hospitals, military hospitals and small private nursing homes. They were divided into four groups and the sessions were taken by two trainers for each group. This included small group discussion on the assigned topic. Each session was divided into four sub-topics and the groups rotated on the four tables at the scheduled time. There were a few talks, demo scenarios and video demonstrations in between various sessions. The participants got a chance to clarify their doubts and concerns with the experts. They had the opportunity to practice resuscitation and other emergency scenarios hands-on on Laerdal paediatric and neonatal mannequins. The role-play scenarios were educative and enjoyable. The faculty from the UK brought in a newer perspective to the existing clinical understanding of the domestic audience. In return they were enlightened by the indigenous ways by which our clinicians sometimes work with limited resources.

A multiple choice questions test was taken before and after the course. The average pre-test score was 36 out of 50. The average post-test score was 44 out of 50.

All the participating delegates found the course enjoyable and relevant and both oral and written feedback was very good for lectures, breakout sessions and the course on the whole. They especially enjoyed the interactive nature of the course.



Neonatal Crisis Management Workshop, December 8th 2019, Hyderabad

This unique workshop on Neonatal Crisis Management was conducted by the Department of Anaesthesiology, Niloufer Hospital, Osmania Medical College, Hyderabad & IAPA Telangana State Branch on December 8th 2019. The main objective of this work shop was to help delegates understand and early recognition of perioperative neonatal crises, trouble shooting and treatment of complications. The hands-on stations included, failed vascular access, airway crisis management and cardiovascular challenges

Enthusiastic delegates registered for the work shop from several states; Delhi, UP, Gujarat, Kolkata, Bihar, Kerala, Karnataka, Tamil Nadu and Andhra Pradesh. Faculty of workshop included, Dr P V Shiva, Dr Aavula Muralidhar, Dr. Jayanthi, Dr MSRC Murthy, Dr Manish Gupta, Dr CH Sunil Kumar, Dr N Srinivas Reddy, Dr L Swapna, Dr Suneedhara Reddy, Dr. Gayatri Sashi Kumar, Dr. Damodara Rao M, Dr Y V S Ravi Naga Prasad and Dr Vibhavari Naik. All aspects of neonatal anaesthesia were covered. The work shop started auspiciously with the Ganapathi and Saraswathisthothram, followed by an introductory speech by Prof Dr P V Shiva. Organizing Chairperson

The first session included lectures 'Airway management in the neonate' by Dr. Aavula Muralidhar, 'Difficult air way management' by Dr Jayanthi, 'Cricothyroidotomy' by Dr MSRC Murthy, 'Tracheostomy' by Dr Manish Gupta (ENT Surgeon) followed by hands on training on goat's tracheal specimens and neonatal intubating mannequins. The workshop was formally inauguration by the Director of Medical Education, Telangana State Dr K Ramesh Reddy, ISA National President Dr. Muralidhar Joshi, senior paediatric anaesthesiologist Dr K Prabhavati and the National IAPA Secretary, Dr MSRC Murthy and the Organizing Secretary, Dr. Aavula Muralidhar. The second session, mainly focused on venous access lectures: peripheral venous access with hands-on training on mannequins and bones and eggs for IO access. Post-lunch Session 3, included five lectures and six work stations on overcoming challenges in upper airway obstruction and hypercarbia, management of neonatal apnoea. Action plan for the accidental extubation and blocked endotracheal tubes, when and how to handle major blood loss and lastly taming the rhythm in cardiac arrhythmias. Hands on practice for CPR on mannequins satisfied the delegates.

IAPA Bengal State Chapter CME 'Paediatric anaesthesia - Going Beyond Clinics', January 2020

In today's technologically interconnected world, the ubiquitous smart phone has led to significant awareness and advocacy on health issues. However, easy access to misinformation on the internet is a menace that a medical practitioner encounters on a regular basis. Apart from being a good clinician, it is essential that we establish a good rapport with children and their caregivers. Transparent communication, accurate and precise documentation, ethical practice and legally sound approach is absolutely the need of the hour. To highlight these issues, the IAPA Bengal State chapter, organised their 4th CME since its inception in mid-2019 on the novel topic " Paediatric anaesthesia- Going Beyond Clinics" on January 12th 2020 at the Calcutta National Medical College & Hospital, Kolkata. The primary aim was to provide insights on the existing issues we face real time on a day-to-day basis and discuss solutions in an open and educative atmosphere.



This program specifically targeted issues of attitude, practice, communication skills, documentation, ethics and medico-legal issues concerning the practice of Paediatric Anaesthesia. Invited Faculties included Paediatric Anesthesiologists and professionals from allied disciplines; Paediatric Surgeons, Paediatric Intensivists, Paediatricians, Paediatric Trauma Specialists, Paediatric Psychiatrists and lawyers who regularly deal with medico-legal cases.

The key note address "Soft skills in Paediatric anaesthesia: need of the hour- Why learn and Train?" by IAPA National President, Dr Elsa Varghese was much appreciated. Lectures were on "Attitude and practice in Paediatric anaesthesia" by IAPA Founder President, Dr Snehalata Dhayagude and "Improving on communication skills" by Dr Soumitra Dutta, a renowned Paediatric Psychiatrist respectively were well appreciated by the delegates. Panel Discussions on "Medicolegal Issues" and "Ethics And Consent" were truly eye openers. The carefully chosen panelists were able to highlight in a very lucid manner problems faced in real cases and how one could have handled them differently. The discussions were in-depth, the expertise of the panelists were very evident and the discussions truly enlightened all who attended. A highlight of the day was a role play, simulating real life scenarios where poor communication, negative attitudes and practice emphasized how these are issues we need to improve on. The actors received lots of accolades!

The Inauguration Ceremony was conducted by the IAPA Bengal State President and the Organizing Chairperson Dr Indrani Mitra. The lamp lighting ceremony by the National and State IAPA office bearers and senior state anaesthesia veterans and patrons of Paediatric anaesthesia. The IAPA Bengal Secretary and CME Organizing Secretary Dr Anisha De, delivered the vote of thanks.

During the post-lunch session four Interactive Workshops were conducted to encourage small group interactive discussions. The topics included i) Paediatric Catastrophe: case scenarios of sudden cardiac arrest, respiratory arrest and anaphylactic shock, ii) Regional/ Local anaesthesia, General anaesthesia and iii) Trauma and Emergency. These discussions centered on the non-clinical and medicolegal aspects related to these topics. The interactions with the multidisciplinary faculty were highly beneficial.

The participants were a mixed group of anesthesiology postgraduates, practicing Paediatric anesthesiologists, Paediatric surgeons, Paediatricians and intensivists. They recognised the need and importance of the non-clinical aspects of medicine which go hand in hand with clinical management. They agreed that the contents of the CME were aligned to their expectations and actually a need of the hour and expressed the necessity of such programs as the interaction with speakers was enlightening and professionally helpful.

GOOD READ

Dr Ekta Rai

1. Ultrasound guided lung sliding sign to confirm optimal depth of tracheal tube insertion in young children. Br J Anaesthesia 2019,123(3) : 309-315.
2. BJA : Incidence of risk factors for venous thrombosis in children with percutaneous non-tunnelled CVCs Br J Anaesthesia 2019 123(3):316-324
3. Clonidine added to bupivacaine in neonatal spinal anaesthesia. Paediatr Anesth 15(12):1072-7
4. HI Hee, BT Balamurali, A Karunakaran, D Herremans, O H Teoh, K P Lee, S S Teng, S Lui, J M Chen. Development of Machine Learning for Asthmatic and Healthy Voluntary Cough Sounds: A Proof of Concept Study. Appl. Sci. 2019; July, 9(14): 2833
5. Propofol: A Review Of Its Role In Paediatric anaesthesia And Sedation . CNS Drugs. 2015 July ; 29(7): 543-563

Ventilation Strategies for a Neonate in the Operating Theatre

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Ventilatory support of the newborn is more frequently required during sedation and anaesthesia compared to children and adults and represents one of the major challenges for the anesthetist, not only because of the anatomical and physiological characteristics of the neonate but also for the lack of appropriate equipment and devices suitable for this treatment. The ventilation support of the neonate during anaesthesia requires adequate skills and expertise considering the peculiarity of the newborn, the different types of anaesthesia that can be required and the complexity of surgery to be carried out.

The newborn should be classified according to the gestational age as term, pre-term (near term 34-37 weeks of gestational age (GA), at high risk <30 weeks GA), and post-term. Neonatal age ranges from birth to 28 day of age when the adaptation to extra-uterine life is mostly completed. The incomplete anatomical development of terminal bronchioles and alveoli and the prevalence of diaphragmatic respiration can expose the neonate at risk of inadequate ventilation during anaesthesia, favouring the development of respiratory failure. The presence of fetal hemoglobin (HbF) may reduce peripheral oxygenation due to the ability of fetal HbF to capture oxygen and its difficulty in releasing it at peripheral level.

Newborns may have associated important respiratory diseases e.g., respiratory distress syndrome (RDS) and meconium aspiration syndrome (MAS) during the first days of life, cardiac malformations, pneumonia, chronic lung disease *i.e.*, bronchopulmonary dysplasia (BPD) and single or multiorgan failure (MOF). The neonate's anesthetist must be prepared to perform all types of treatment including administration of surfactant, inhaled nitric oxide (iNO) and/or high frequency oscillatory ventilation (HFOV) if required.

Generally, pressure controlled ventilation (PCV) and synchronized intermittent mandatory ventilation (SIMV) are preferred for ventilating neonates to treat respiratory failure in NICU but both methods may not be appropriate during anaesthesia. PCV can protect from barotrauma but can result in variability of tidal volume and hypoventilation. SIMV can cause the risk of hypoventilation if the neonate does not add any spontaneous breath to the preset ventilator back-up due to respiratory depression during anaesthesia.

Typically, newborns with two types of characteristic may come to the attention of the anaesthetist. The first includes infants ventilated invasively or non-invasively before anaesthesia to treat pre-existing lung pathology. Non-invasive nasal CPAP (nCPAP) is frequently applied in the treatment of pre-term infants but is not suggested to continue during anaesthesia because this does not control the ventilation if apnea develops. The same mode of invasive ventilation can be used if gas exchange is guaranteed. Some ventilator supports mode *e.g.*, HFOV, may require total intravenous anaesthesia, because the HFOV ventilators are not suitable for anesthetic gases. In preterm infants when surfactant supplementation is indicated, its administration is advisable before starting anaesthesia, to improve lung pathology and favours "gentle" ventilation with reduced risk of ventilation induced lung injury (VILI). A recent experience has been reported using surfactant administration intra-operatively during neonatal sacrococcygeal teratoma resection.

The second includes neonates not receiving any respiratory support before anaesthesia. In this case, the intraoperative ventilation mode must be chosen according to the infant's characteristics, presence of co-existing lung pathology, minor or major surgery to be performed or for special investigations *sg.*, CT scan or biopsies. The skill of the anesthetist plays a great role in the safety and efficacy of the treatment. When choosing one method to another it is discriminant to consider if the newborn can remain under continuous control and if is easily accessible by the anesthetist.

The most common modes of ventilation during anaesthesia are:

1. Manual ventilation using bag and mask

This simple (but not easy) ventilation method allows assisted and controlled ventilation but exposes the risk of irregularity in ventilation and development of hypoxia, hypercapnia or hypocapnia. Hypercapnia exposes to brain hemorrhage while hypocapnia exposes to cerebral ischemia that can lead to leukomalacia. Furthermore, irregular ventilation favors atelectasis and lung barotrauma. If inhalation gases are used, concern for safety of the anesthetist have also to be considered because this method exposes to environmental pollution. Bag and mask ventilation is more effective using flow-inflating bag instead of an auto-inflating bag. A flow-inflating bag can deliver appropriate inspiratory peak pressure, ensure effective ventilation (the bag does not remain inflated if there is no return of ventilated gas), allows the application of PEEP and distending maneuvers and to administer free O₂ by face mask (figure 1). All these benefits cannot be obtained using an auto-inflating bag. *airway*

A laryngeal mask (LMA) is infrequently used in neonates during anaesthesia essentially due to the lack of appropriate suitable masks. Also the LMA does not protect against aspiration and does not ensure the possibility of applying high inspiratory pressures. The LMA could be helpful to ensure ventilation in case of an extremely difficult airway and impossible intubation. The limited currently available evidence and literature and the lack of experience, the general advise is to use the LMA great deal of caution in neonates.



Figure 1
Flow inflating bag

2. Invasive mechanical ventilation

Applying invasive ventilation usually requires the use of an endotracheal tube, cuffed or uncuffed.

The use of cuffed and uncuffed tubes remains still open to debate, although the safe use of cuffed tubes is confirmed by the recent literature especially with the availability of Micro-cuff tubes. For children under one year of age, the use of cuffed tubes should be carefully assessed from time to time. Both methods have advantages and disadvantages. The safest and most appropriate mode for their use is in accordance with the needs of patient during anaesthesia and intensive care.

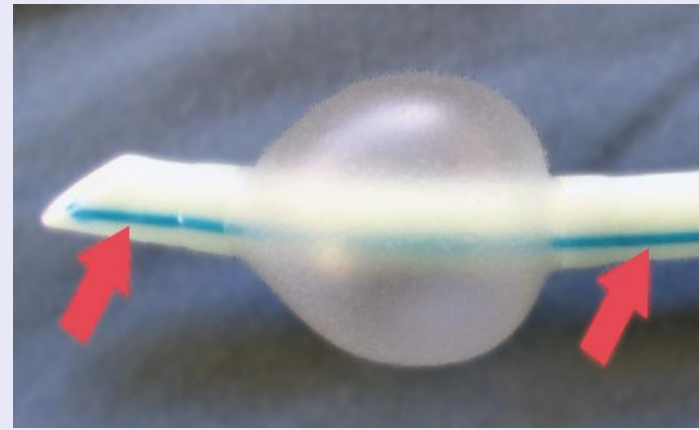


Figure 2-Cuffed tube. Some material can be accumulate between the cuff and vocal cords and below the cuff.

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The main problems with cuffed tubes are related to the need to reduce the size of the tube (internal diameter ,ID) to avoid larynx injury during its positioning.Reducing tube ID increases airway resistance leading to inappropriate ventilation. The cuffed tube does not allow complete protection of lower airway because some material can be accumulated in the folds of the cuff (“cuff channels”), between the cuff and vocal cords and below the cuff (figure 2). This material can be inspired in the lower airway when the cuff is deflated and spontaneous breathing starts. Effective protection from aspiration can be obtained keeping continuously positive pressure into the lung (PEEP) and avoiding the increase of negative intra-thoracic pressure*i.e.*, patient fighting ventilatorthat may move the foreign matterfrom pharynx into the lower airways. The presence of materials around the cuff and the material accumulates on the folds of the cuff have an important role in the development of ventilation associated pneumonia (VAP) in ICU.

2.1 Ayre’s T- tube

It is the simplest method to guarantee the lung ventilation in intubated patients but the efficacy of ventilation is operator’s dependent. Ventilated gases are generally cold and not humidified favoring the mucosal damage, the consolidation of secretions, the obstruction of small airways and atelectasis. Also, this method exposes to the risk of irregularity of ventilation and to environmental pollution. T-tube can be useful in short-term ventilation and essentially in emergency conditions to assess ventilation, to control the patency of the endotracheal tube and to evaluate the acquired spontaneous breathing at the end of the anaesthesia.

2.2. Pressure control ventilation

Pressure control ventilation (PCV) allows to control peak inspiratory pressure, for long time considered at the origin of lung barotrauma, but does not deliver stable tidal volume during anaesthesia if lung compliance and resistance change. In case of major abdominal surgery and cardiothoracic surgery, the direct or indirect lung manipulation and the limitation of diaphragm excursion expose the neonate to the risk of hypoventilation, hypoxia and atelectasis.

2.3. Volume control ventilation and Pressure regulated volume control

Volume control ventilation (VCV) is commonly preferred during anaesthesia because allows stable tidal and minute volume even though lung compliance and resistance change. It is more frequently used during surgery in which the lung is manipulated and normal movement of diaphragm is limited.

Pressure Regulated Volume Control (PRVC) (adaptive ventilation) can be used in minor surgery and essentially when lung compliance can vary rapidly, *i.e.* after surfactant supplementation or use of bronchodilators.

The risk of high peak pressure (barotrauma) that can be achieved during the VCV can be controlled applying moderate low tidal volume (7-8 ml/kg) strategy. Moderate low tidal volume is preferred to low tidal volume (5-6 ml/kg) strategy because the low tidal can exposes to the risk of ventilate only the dead space and consequently creating hypoventilation. In this case, consequent hypercapnia that develops can increase the risk of bleeding, atelectasis, cardiac arrhythmia and hyperkalemia. Moderate permissive hypercapnia could be cautiously accepted ($\text{PaCO}_2 < 50$ mmHg) just in case to difficult ventilation to protect the lung from VILI.

2.4. High-Frequency Oscillatory Ventilation

High-Frequency Oscillatory Ventilation (HFOV) is used in NICU for ventilating pre-term neonates to normalize gas exchange. HFOV could be continued during anaesthesia if appropriate oxygenation cannot be assured using conventional ventilation. HFOV has been proposed in anaesthesia for paediatric surgery of esophageal atresia and diaphragmatic hernia without significant evidence-based.

Use of Positive End-Expiratory Pressure

Terminal bronchioles of neonates are not completely developed and alveoli are unstable. Higher closing volume of small airway negatively influences the gas exchange and favors gas trapping. The difficulty of open the lung and keep the lung open exposes the newborn to hypoventilation, atelectasis and need for high FiO_2 . The application of 5 cm H_2O of positive end-expiratory pressure (PEEP) in normovolemic neonates does not create hemodynamic variation additional from intermittent positive pressure ventilation (IPPV). PEEP should be safely and routinely applied in infants to counteract the tendency of lung collapse and atelectasis, to reduce the work of breathing and oxygen consumption. In any case the application of 5 cm H_2O PEEP is recommended after recruiting maneuvers to improve oxygenation and reopen the collapsed lung during anaesthesia. Applying 5 cm H_2O of PEEP at the end of anaesthesia is useful to evaluate appropriate fluid replacement during surgery if a central venous catheter is not available. Inappropriate fluid replacement causes immediate tachycardia and reduction of arterial blood pressure.

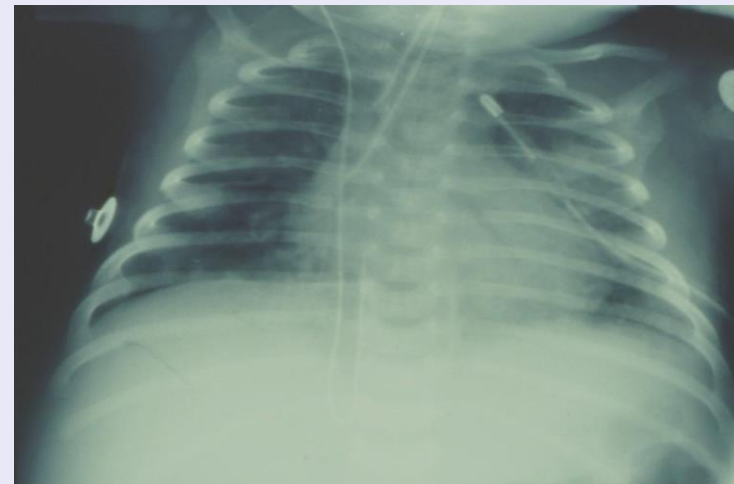


Figure 3 : Chest x-ray of neonate intubated selectively using two single lumen tubes. One tube is in trachea and the other selectively intubates the right bronchus.

Nasal CPAP in the post-operative care and immediately after extubation

Nasal CPAP (nCPAP) appears to be useful for improving oxygenation and ventilation and to reduce the invasiveness of ventilation on support, duration of intubation and oxygen toxicity. The use of nCPAP in the NICU is recommended to prevent apnea of pre-terms and for the treatment of all neonates with laboured breathing or persistent cyanosis. nCPAP improves functional residual capacity (FRC) and oxygenation, reduces work of breathing and FiO_2 . Early application of nCPAP can prevent failure of extubation and the risk of re-intubation. Future studies may demonstrate the possibility of anticipating extubation at the end of anaesthesia supporting the newborn with nCPAP.

Use of caffeine to control post-operative apnea

Prevention and control of postoperative apnea of pre-term and ex-premie infants can be obtained using caffeine. This drug is a powerful central nervous system stimulator with lower toxicity and slower elimination when compared to aminophylline. Caffeine increases the muscular strength of the diaphragm and the accessory respiratory muscles, reduces the risk of apnea through multiple mechanisms mainly by increasing minute ventilation, increased sensitivity to CO_2 and central respiratory control.

Use of oxygen

A cautious use of oxygen must be considered during anaesthesia to avoid atelectasis and the development of oxygen free radical (biotrauma). In pre-term infants high FiO_2 exposes at risk of retinopathy of prematurity (ROP), respiratory distress syndrome (RDS) and bronchopulmonary dysplasia (BPD). FiO_2 must be regulated in order to keep SpO_2 94-95%. High FiO_2 must be used only for short a time as possible. The need for supplementing continuously high FiO_2 can be avoided by the use of appropriate levels of PEEP.

Selective bronchial intubation, one-lung ventilation and independent lung ventilation

Selective bronchial intubation (SBI) to ventilate a single lung or to apply separate lung ventilation can be frequently required during anaesthesia also in neonate. But SBI is a method limitedly applied in the neonate because of lack of suitable devices.

One lung ventilation (OLV) can be obtained using a conventional endotracheal tube (ETT), the average length of the ETT is generally sufficient to achieve selective bronchial intubation. The ETT positioning and airway manipulation during the surgery can expose to the risk of lobar atelectasis, tube obstruction and dislocation creating difficulty in ventilation. The correct re-positioning of dislodged/obstructed ETT during surgery can be difficult.

SBI and OLV can also be obtained by the use of embolectomy and arterioseptomy catheters as bronchial blockers (BBs), but this use is 'off-label indication' because BBs are designed and intended for other purposes. BBs have an inflatable balloon-cuff at the distal end, the cuff has pre-fixed low-volume and high-pressure properties that can increase the risk of ischemia of the bronchial mucosa also in short time use. The blocker, positioned through or alongside the ETT, increases the resistance of gas flow leading to difficult ventilation. The correct positioning of these BBs is confirmed preferentially under fiberoptic bronchoscopy even though blind technique can be used.

Selective bronchial intubation can be performed using "Marraro Paediatric Bilumen Tube". This double lumen tube offers the opportunity to apply both one-lung ventilation and independent-lung ventilation at the end of surgery. The possibility of collapsing and re-expanding separately the two lungs during surgery makes this tube ideal to be used to perform one-lung ventilation during surgery. This tube, currently available as special product only, can be used in different calibers suitable for treating also small patients. Furthermore, two conventional tubes can be used for selective bronchial intubation in neonates. SBI can be obtained positioning one tube into one bronchus while another tube is kept into the trachea. The use of this complex technique requires high skilled and properly trained professional, and caution should be considered to perform this method that allow to ventilate the two lungs independently (figure 3).

All described methods to achieve effective ventilatory strategy for neonate in operating theater may be complex and require adequate knowledge and skills from all healthcare providers involved. Specific advantages, disadvantages, limitations of procedures and devices must be carefully evaluated before, during and after the treatment, taking into account the specific characteristics of the neonate, the experience of physicians and nurses' team, and the available equipment. Of paramount importance is to be the focus to effectively treat the patient by reducing side effects and to enhance patient safety.

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IAPA Fellow's experience

Every child is different...

I had never seen doctors being so vigilant in measuring time like this before! The count starts in the delivery suite when the neonatologist switches on the timer during resuscitation of the baby and that continues later with the anesthesiologist noting down milestone development whenever the parents bring the child to the operation theatre for any surgery. Yes! that's the scenario in Rainbow Hospitals, Hyderabad. I had joined as a paediatric anaesthesiology fellow, the first armed forces anesthesiologist to do so in a corporate hospital.

Earlier I used to write for all paediatric cases during the pre-operative visit "To be posted as first case in OT". Soon I understood that it is not required anymore and that a child is not just a "miniature adult". To handle them, every piece of equipment was miniature; needles, IV cannulas, circuits, Ambu bag and even fixation plasters.

The teaching started with assessment of my technique of caudal anaesthesia. Over a period of time, I improved my skills in holding the USG probe over a collapsible central vein, cannulating a narrow artery lumen and finding a vein in a chubby child and most importantly, to be obsessive about sterile precautions. I realized that putting the thin transparent film for preventing hypothermia is the toughest. I may need another fellowship to learn it from my technicians.

Learning is a never-ending story and I must thank Dr M.Subhramaniam, Dr Gita Nath, Dr Sunidhara Reddy and the entire Axon Paediatric anaesthesia team for continuously teaching me and improving my skills. I learnt many soft skills from my fellow colleagues (Dr Asha, Dr Nimisha and Dr Shilpa); the way they would hug and take the child from the mother, to build up the confidence of the parents.

Rainbow Hospital, being a tertiary care hospital for mother and child, gave me a chance to interact and be involve with many Paediatric super speciality like Paediatric Dentistry, Orthopedics, Gastroenterology, Oncology and Fetal Medicine. I will always admire Dr N.Srinivas, Paediatric Dentistry Consultant, who easily managed to keep the mouth of a child open, examine and do the procedure in a jiffy!

Friday was the day for the techno-savvy academic sessions in Rainbow Hospital. It was tough when I was not prepared for the topic for discussion, which was most often the case. Sessions would start with a few Whats App chats for zoom ID, followed by a churning of the concerned topic from past ideas to future trends. I have witnessed many decisions and change in practices as a result of these discussions; like reconsidering 6-4-2 fasting guidelines, adopting neuraxial anaesthesia for routine surgeries of premature babies, proving balanced anaesthesia for critical neonatal surgery in the NICU and many others. I was also able to participate in the WFSA SAFE Paediatric programme, a WFSA simulation workshop, Paediatric airway workshop and IAPA conferences which helped me refine my hard and soft skills.

After completing my MD anaesthesia from AFMC, Pune I worked in Air Force Hospital, Gorakhpur for four years before joining the IAPA Paediatric fellowship programme. There were many firsts during my course in Rainbow Hospital, Hyderabad; first subarachnoid block in a 600g baby, nerve blocks in <1 kg baby, intubation with a 2.0mm ID ETT, resuscitating a newborn after fetal distress, fetal transfusion in a hydrops fetalis and many more. With or without supervision, I have anaesthetised over 1000 Paediatric patients of different age group and different systemic problems. The thrill of successfully handling an autistic child preoperatively and managing a difficult Paediatric airway was special. I realised that if one can handle premature babies, it's a certification that one has matured. Finally, when you handover a baby to the mother and she accepts her child with tears in her eyes and a smile in on her face, then you feel it's a job well done for the day. In the days to come, when I return to working in Armed Forces hospitals, I may not conduct so many Paediatric cases but will definitely be able to deliver quality Paediatric anaesthesia care as I have been trained. It may be a challenge for me to ensure availability of specific equipment and trained assistants and to set up protocols but sooner or later I hope I'll achieve it.



Answers Quiz IAPA Across

1. C
2. E
3. B
4. A
5. C
6. D
7. D
8. E
9. C
10. D
11. E

Answers Cross word puzzle

Across	Down
5. Osmolarity	1. JACKSON
7. Dantrolene	2. APGAR
8. Subglottis	3. Hyoid
10. Gastroschisis	4. Hypotension
12. Guedel	6. Hurlers
14. ASA	9. Trismus
	11. Apnoea
	13. EMLA

QUIZ – IAPA

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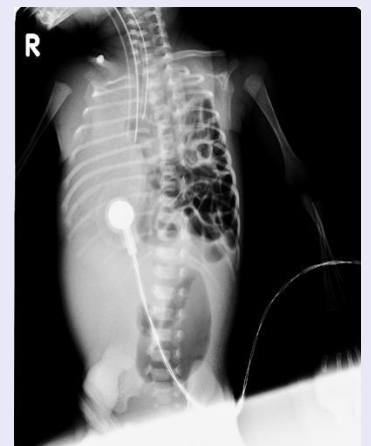
1. Preoperative evaluation of a 9-month-old boy for myringotomy and placement of tympanostomy tubes is concerning for possible difficulty with airway management. Physical exam reveals micrognathia, glossoptosis, and cleft palate. What is the most likely diagnosis?

- (A) Beckwith Syndrome
- (B) Goldenhar Syndrome
- (C) Pierre-Robin Syndrome
- (D) Treacher Collins Syndrome
- (E) Trisomy 21



2. A neonate presents with respiratory distress, a scaphoid abdomen and absent breath sounds on the left side of the chest. The incidence of this congenital lesion is 1 in 2000-5000 live births. Xray was done, shown below. Which one of the following statements is true?

- (A) Mortality in infants with this lesion is 50-70%.
- (B) 70% of all lesions involve the foramen of Bochdalek.
- (C) 30% of infants with this lesion have an accompanying congenital urologic abnormality.
- (D) 30% of infants with this lesion have an accompanying congenital cardiac lesion.
- (E) Approximately 5% of infants with this lesion present with symptoms of bowel obstruction.



3. A healthy 5-month-old presents for repair of an umbilical hernia. Induction of anaesthesia is uneventful and surgical preparation and draping are completed. At incision it is noted that the patient's temperature is 34.9°C. The patient had a normal temperature in the preoperative area. The most important factor in the operating room contributing to the patient's current temperature is which one of the following?

- (A) Body temperature on arrival to the operating room
- (B) Room temperature
- (C) Lack of a warming blanket
- (D) Use of cold fluids
- (E) Temperature of prep solutions

4. A full term neonate is brought to the OPD. He is being planned for surgery. All of the following are true regarding anaesthetic technique and surgery for this patient EXCEPT

- (A) supine position should be avoided and therefore the patient should be intubated in the lateral position
- (B) succinylcholine may be used safely in this patient
- (C) extubation at the conclusion of the surgery is desirable
- (D) spinal anaesthesia is a possible technique for this patient
- (E) this patient will likely need a ventriculo peritoneal shunt



5. A 7-year-old patient with Down syndrome is admitted for dental extractions. Additional medical history includes well-controlled asthma. Xray neck was done during preop evaluation. In providing anaesthesia for this patient, which one of the following is true?

- (A) Atropine should be avoided.
- (B) Opioids should be avoided.
- (C) Neck stability must be ensured.
- (D) Neuromuscular blockers should be avoided.



6. A full term neonate is scheduled for inguinal hernia repair. The anaesthetic plan is for spinal anaesthesia. Which one of the following statements is true of spinal anaesthesia in the neonate?

- (A) It is suitable as the sole technique of anaesthesia for procedures lasting 2 h or more.
- (B) The apex of the conus medullaris is usually at L2-L3.
- (C) Epinephrine should never be added to local anaesthetics.
- (D) Tetracaine 0.4 mg/ kg is a suitable dose for subarachnoid block.

7. A 4-year-old child is brought to the emergency department at 1 a.m. She was put to bed in apparently good health, but awoke four hours later crying and having difficulty breathing. Physical examination reveals that the child is flushed, drooling, sitting upright, and has severe inspiratory stridor. Xray shown below. Which one of the following statements is true?



- (A) The most likely diagnosis is acute laryngotracheobronchitis.
- (B) A possible diagnosis is croup.
- (C) Rectal temperature should be checked.
- (D) The child should be taken straight to the operating room for intubation/emergency tracheostomy.
- (E) It is important to place an IV prior to induction in this patient.

8. A newborn presents for repair of myelomeningocele. During maintenance of anaesthesia, end-tidal isoflurane is 0.9%. A colleague offering you a break and comments on the end tidal isoflurane and expresses concern that the patient is not receiving adequate anaesthesia. You explain that the concentration is adequate for the patient for all of the following reasons EXCEPT

- (A) neonates have an immature nervous system
- (B) neonates have an immature blood–brain barrier
- (C) neonates have elevated progesterone levels
- (D) neonates have elevated blood levels of β -endorphin
- (E) neonates have immature liver function

9. At the conclusion of a gastroschisis repair, the surgeon requests that the patient remains paralyzed and that you continue with controlled ventilation. Arrangements are made to transport the intubated patient to the ICU. Which one of the following is the best circuit to use for transport of this patient to the ICU?



10. A 4-year-old child with Down syndrome presents for tonsillectomy and adenoidectomy for upper airway obstruction. The child had a ventricular septal defect repaired in the past that was well tolerated. The patient does not have any other congenital abnormalities and neck radiographs are negative for atlantoaxial subluxation. On arrival to the operating room, the child is very agitated and crying. You induce general anaesthesia with sevoflurane dialled to 8% and then establish IV access. You note that the patient's heart rate has decreased from 140 bpm prior to induction to 102 bpm now. You administer propofol 4 mg/kg, fentanyl 1 μ g/kg and rocuronium 0.5 mg/kg. Just after the patient has been intubated, you note that the heart rate is now 55 bpm with sinus rhythm. What is the most likely cause of this bradycardia?

- (A) Propofol
- (B) Fentanyl
- (C) Vagal response from direct laryngoscopy
- (D) Sevoflurane
- (E) Rocuronium

11. Choose the correct option for the instrument given below:



- (A) Is an indirect laryngoscope
- (B) Is not suited to children with limited mouth opening
- (C) Is useful where neck movement is limited
- (D) Is a single use device
- (E) All of the above



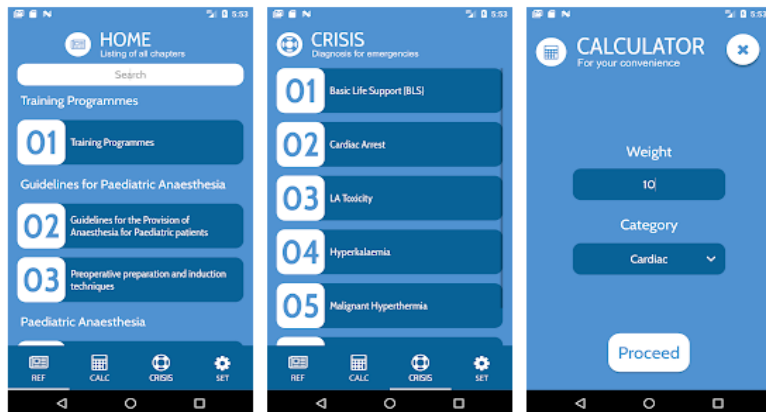
KKH PAN

School of Science and Technology, Singapore Medical



⚠ You don't have any devices.

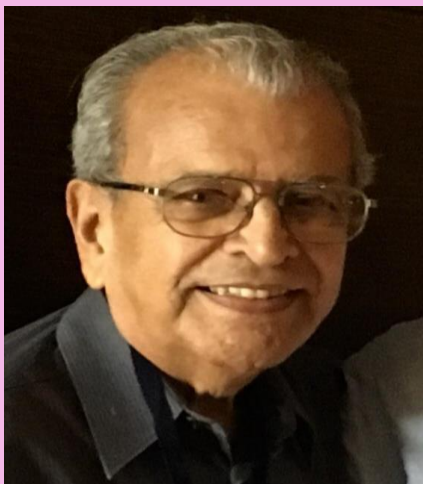
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App available for free online

KKH PAN is an app developed by the School of Science and Technology, Singapore. This app is free of cost and is available on both ios and android. It covers guidelines, equipments related information, complications and their management, drug dosages and infusion dilution, fluid management guidelines and many more aspects of paediatric anaesthesia

OBITUARY



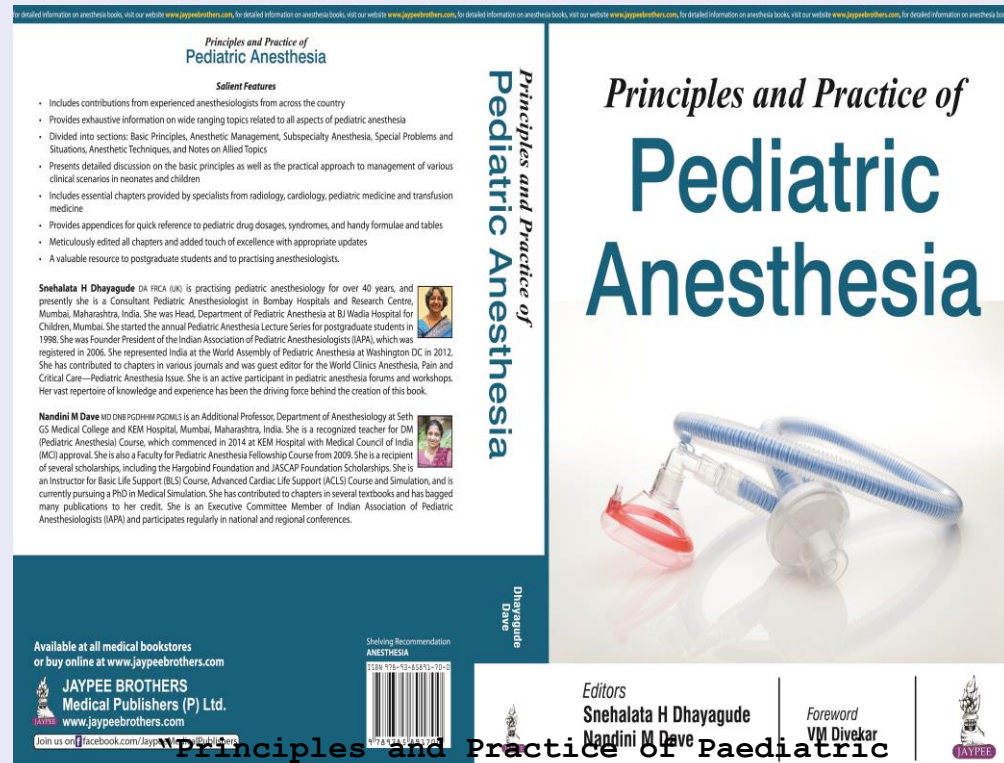
Our beloved "Teacher of Teachers", Dr. Subhash Dalal, left for his heavenly abode on 06/10/ 2019. He was the Head of the Department of the Paediatric Surgery and later Dean of Bai Jerbai Wadia Hospital for Children Mumbai.

Dr Dalal was very popular amongst all paediatric medical, surgical and paediatric anaesthesia doctors. He was the recipient of several awards including the Life Time Achievement Award for the Paediatric Surgeon by the Asian Association of Paediatric Surgeons in 2010 in Kuala Lumpur

He became an IAPA life member and always encouraged and supported his paediatric anaesthesiologists.

Let us thank God for the blessed life of Dr Subhash Dalal and uphold the bereaved members of the family in our prayers. May his soul rest in peace.

IAPA Family



Anaesthesia"

Editors- Dr Snehalata Dahigude and Dr Nandini Dave.

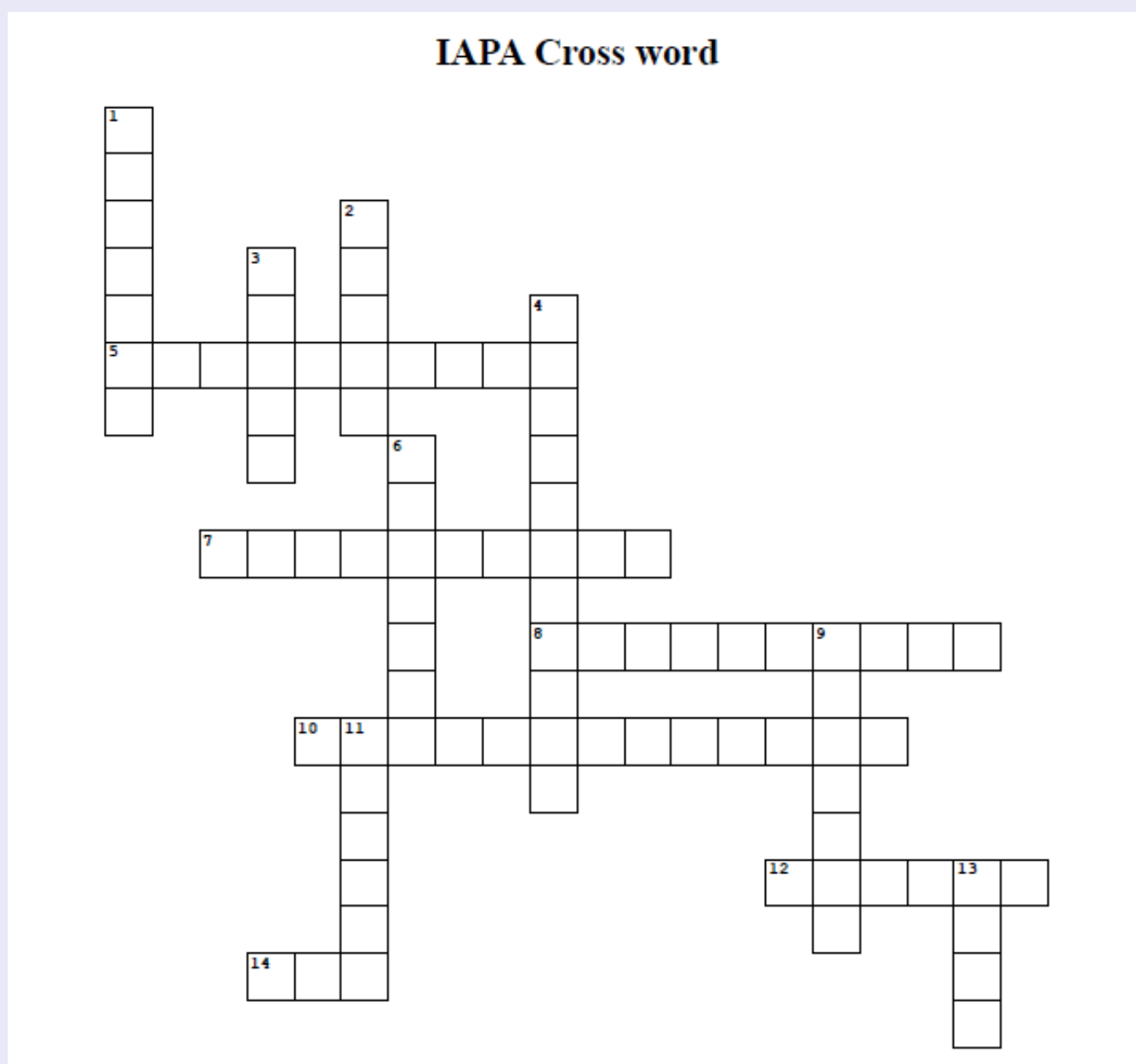
This book is fact-filled compendium of current Paediatric anesthetic knowledge and practice in India. it is very simple and direct in presentation, relying heavily on information boxes, well-chosen graphics, learning points, and bullet points to convey its information.

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Crossword

Dr. Anisha Dey



Across

5. Concentration of a solution expressed as the total number of solute particles / litre (10)
 7. Drug of choice for Malignant Hyperthermia (10)
 8. Narrowest part of Paediatric airway (10)
 10. An abdominal birth defect (13)
 12. Used to properly open upper airway (6)
 14. A six - category physical status classification system (3)

Down

1. A British Anaesthetist, a pioneer in Paediatric anaesthesia- having a medical equipment named after him (7)
 2. A neonatal assessment tool (5)
 3. U- shaped bone with two horns (5)
 4. A common presentation of anaphylactic reaction (11)
 6. Mucopolysaccharidosis 1(7)
 9. Masseter hypertonia
 11. A common postoperative complication in an infant < 37 weeks of gestational age (6)
 13. A Topical Anaesthetic cream (4)