

Anaesthetic consideration for neonatal surgical emergencies

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ABSTRACT

A newborn requires constant vigilance, rapid recognition of the events and swift intervention during anaesthesia. The anaesthetic considerations in neonatal surgical emergencies are based on the physiological immaturity of various body systems, poor tolerance of the anaesthetic drugs, associated congenital disorders and considerations regarding the use of high concentration of oxygen. The main goal is for titration of anaesthetics to desired effects, while carefully monitoring of the cardiorespiratory status. The use of regional anaesthesia has shown to be safe and effective. Advancements in neonatology have resulted in the improvement of the survival of the premature and critically ill newborn babies. Most of the disorders previously considered as neonatal surgical emergencies in the past no longer require immediate surgery due to new technology and new methods of treating sick neonates. This article describes the common neonatal surgical emergencies and focuses on factors that affect the anaesthetic management of patients with these disorders.

Key words: Anaesthesia, emergency surgeries, neonate

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INTRODUCTION

Newborns undergoing emergency operations present several difficult challenges for the anaesthesiologist. Many surgical emergencies in the neonate are life threatening and are frequently accompanied by multiple organ system failure. Communication and cooperation between the entire health care team, including the surgeons, anaesthesiologists and neonatologists, are of utmost importance to ensure the best possible care of the neonate.^[1] The efficient recognition and prompt management of illness in the neonatal period may be life saving. This review provides a systemic approach to the recognition, emergency stabilization and management of the more common newborn surgical emergencies.

BASIC ANATOMY AND PHYSIOLOGY OF THE NEONATE

The cricoid cartilage is the narrowest portion of the larynx in a neonate. A 3.5 mm size internal diameter

endotracheal tube (ETT) is usually appropriate for full-term neonates and 2.5-3 mm is used for smaller or premature infants. The commonly used blades for laryngoscope in neonates are Miller size 0, 1 and Wis-Hipple blades^[1] and 000 face mask and 0-sized laryngeal mask airways should be available.^[2] Infants operate close to closing volume during tidal breathing resulting in more rapid anaesthetic gas uptake as well as more rapid desaturation during apnoea. Volume replacement and maintenance of heart rate are essential for maintenance of blood pressure in new borns. Immaturity of the blood and blood vessels increase the risk of intra-ventricular haemorrhage (IVH) in the neonatal period. The first 72 h of neonatal life is the risk for IVH. Hypoxia, hypercarbia, fluctuations in blood pressure or venous pressure, high or low haemoglobin and pain increase the risk of IVH.

Pharmacology

Immature tubular function in neonate results in decrease clearance of some drugs, especially morphine and immature liver function also results in decreased

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biotransformation of many drugs (eg, opioid/local anaesthetics). All drug doses [Table 1] are to be calculated before commencing anaesthesia.^[3,4] The immaturity of blood brain–barrier results in higher cerebrospinal fluid opioid level in the newborns.^[5] Remifentanyl, an ultra-short-acting opioid is useful for its volatile sparing effect and for neonates at risk for post-operative apnoea who are to be extubated after completion of surgery. Newborns require higher dose of succinylcholine (2 mg/kg). Mivacurium and cisatracurium possess a more predictable duration of action, provided the infant is normothermic and devoid of significant cardiovascular side effects. The duration of action is shorter in neonates. Rocuronium and vecuronium have prolonged duration of action in neonates.^[6] The use of bupivacaine, for caudal epidural anaesthesia is associated with higher blood level in neonates. The level may continue to rise for more than 48 h from the time of administration. There is a risk of using lidocaine due to its toxicity, but it can be used safely because the blood level of lidocaine can be easily measured.

Chlorprocaine can be used with greater safety in the newborns. Sevoflourane has less effect on infant hemodynamics compared with halothane and may be preferred to halothane. Time of emergence is significantly faster with desflurane and beneficial in neonates in whom extubation is planned. Nitrous oxide is contraindicated in many neonatal surgical emergencies.^[6] Thiopentone (5-6 mg/kg) is being used as induction agent in neonates. Propofol causes moderate-to-severe hypotension and hypoxia when used in a dose 2-3 mg/kg. Ketamine is a very useful induction drug for patients with compromised hemodynamic critically ill patients. Fentanyl has minimal cardiovascular depressant effects so it is used in critically ill patients, 12 µg/kg^[6] for abdominal surgery, and 50 µg/kg^[6] for thoracic surgery. Remifentanyl is a very-short-acting drug and useful where extubation is desirable at the end of surgery.^[6] Dexmedetomidine is useful if one wishes to keep a patient sedated and spontaneously breathing to do awake intubation; however, decrease in heart rate and blood pressure do occur sometimes.

Table 1: Neonatal drug dosing

Drug	Use	Route	Dose
Vitamin K	Prevention of hemorrhagic disease of newborn	i.m.	1 mg/kg
Atropine	Anti-sialogogue	p.o. 60 min preop i.m. 30 min preop i.v. on induction	40 µg/kg 20 µg/kg 10 µg/kg
	Prevention and t/t of bradycardia	i.v.	20 µg/kg
Glycopyrolate	Anti-sialogogue	i.v. on induction	0.005-0.01 mg/kg
Caffeine	Prevention and t/t of apnoea	i.v.	10 mg/kg
Thiopental	Induction	i.v.	6-7 mg/kg
Ketamine	Induction	i.v.	1-2 mg/kg
Propofol	Induction	i.v.	2.5-3 mg/kg
Etomidate	Induction	i.v.	0.3 mg/kg
Succinyl choline	Intubation and muscle relaxant	i.v.	1-2 mg/kg
Rocuronium	Intubation and muscle relaxant	i.v.	0.5-1 mg/kg
Atracurium	Intubation and muscle relaxant	i.v.	0.5 mg/kg
Cisatracurium	Intubation and muscle relaxant	i.v.	0.2 mg/kg
Vecuronium	Intubation and muscle relaxant	i.v.	0.1 mg/kg
Atropine	Reversal	i.v.	20 µg/kg
Neostigmine	Reversal	i.v.	40-50 µg/kg
Paracetamol	Analgesia	p.o., p.r.	20 mg/kg 6 hrly
Codeine phosphate	Analgesia	p.o., i.m.	1 mg/kg 6 hrly
Fentanyl	Analgesia	i.v.	1-2 µg/kg bolus
Morphine	Analgesia	p.o. i.v. bolus	0.4 mg/kg 4 hrly 0.05-0.1 mg/kg
		NCA infusion (1 mg/kg in 50 mL), 5% glucose (20 µg/mL)	0.5-1 mL/h
Remifentanyl	Analgesia (intra-operative)	i.v. infusion	Bolus 1 mL, lock out 15-20 min 0.1-0.2 µg/kg/min
Bupivacaine 0.25%	Regional anaesthesia	Local infiltration Epidural	Bolus 2 mg/kg Bolus up to 2 mg/kg
Ropivacaine	Regional anaesthesia	Epidural infusion	Bolus 0.5-1 mL/kg 0.375% 0.1-0.3 mL/kg/h 0.2%
Dopamine	Vasopressors	i.v.	3-5 µg/kg/min

Pre-operative evaluation

A detailed history and physical examination is very important. The history includes gestational age, significant events at birth (asphyxia, meconium aspiration, Apgar score) and ventilatory support. The physical examination includes hydration status and co-existing diseases. Laboratory examinations include a recent haematocrit, glucose and calcium. Neonates are at risk for hypoglycaemia and dehydration. Six hours for formula milk, 4 h for breast milk and 2 h for clear fluid are appropriate fasting for most neonates.^[3] A discussion with parents includes the planned conduct of anaesthesia, pain relief, post-operative monitoring, blood transfusion, invasive monitoring, admission to HDU and paediatric intensive care unit (ICU).

Intra-operative management

Neonates are extremely susceptible to hypothermia. The consequences of hypothermia include pulmonary hypertension, delayed drug metabolism, hypoxia and apnoea. Care is taken during transport and intra-operative period. They are to be provided a neutral thermal environment (warm operating room) and transport them in a heated module. Warm humidified inspired gases, warm antiseptic solution and for intra-operative irrigation, warm blood and intravenous (IV) fluid, heated mattress, radiant warmer, Bair-Hugger warmers are ideal for them.^[1] Heated hot air circulation under the drapes and microprocessor controlled device (Allon system), which heats/cool the re-circulating water contained in a garment covering the patient^[7] have been found to be effective in maintaining perioperative normothermia. Optimal monitoring includes precordial stethoscope, pulse oxymeter, capnograph, noninvasive blood pressure, electrocardiogram (ECG) and thermal probe (oesophageal/rectal). Monitoring of urine output (5Fr feeding tube) as urinary catheter is advised for major surgery. Intra-arterial catheter (IAC) is useful in

critically ill neonates. Central venous pressure catheter (3Fr) is placed usually in the right internal jugular vein, useful for monitoring and IV access.^[5] Commonly 24G and 22G are the largest IV catheters that can be inserted peripherally.^[1] Additional monitoring may be inspired airway pressure and neuromuscular function.^[8] Fluid considerations for neonates follow similar lines to those of adult patients [Table 2].^[3] For neonates, the maintenance fluid consists of hypotonic glucose solution (dextrose 5 or dextrose 10 with water or 0.2 normal saline) and for replacement of insensible (third space) and small volume blood loss, isotonic fluid may be administered separately. To prevent excessive fluid (and glucose) administration it is wise to run both maintenance fluid (4 mL/kg/h) and operative (insensible and blood loss) fluid replacement (3-10 mL/kg/h) on infusion pumps. During neonatal surgery glucose administration can be continued but blood glucose measurement is essential. Hypoglycaemia is defined as blood glucose level below 45 mg/dL, first 3 days of life and 75 mg/dL thereafter.^[5] Response to fluid therapy is monitored by variations in heart rate, blood pressure and central venous pressure.^[6] In the neonate epidural analgesia may be indicated when the goal is early extubation (after tracheo-oesophageal fistula) or spontaneous ventilation (eg, following congenital diaphragmatic hernia (CDH)) to avoid barotraumas. These goals are relevant in developing countries where facilities are limited or stretched.^[9] Caudal anaesthesia has become the most valuable adjunct to general anaesthesia.^[10] Epidural catheters provide optimal analgesia when the tip of the catheter is placed at centre of dermatomes affected by surgery. Safe blood levels of bupivacaine have been found after bolus injection of 1.5-2.0 mg/kg bupivacaine (0.6-0.8 mL/kg of 0.25% bupivacaine) followed by a continuous infusion of 0.2 mg/kg/h. Lidocaine (1 mg/kg) may prove safer. Chlorprocaine (10-15 mg/kg) may be used with less risk of toxicity.^[5] With ultrasound-guided nerve block,

Table 2: A simple intra-operative fluid regimen that requires a glucose-saline fluid, a colloid and occasionally blood

Period	Requirement	Notes	Glucose/colloid/blood	Saline/colloid
Pre-operative & intra-operative	Maintenance fluids at 4mL/kg/h	If blood glucose low	Glucose 10%	Saline 0.18%
	Maintenance fluid at 4mL/kg/h	If blood glucose normal	Glucose 4%	Saline 0.18%
Intra-operative	Volume replacement at 10 mL/kg/h	For third space losses & evaporative losses from open body cavity	Colloid	Gelofusine or 4.5% albumin
	Volume replacement	For initial blood loss	Colloid	Gelofusine or 4.5% albumin
	Volume replacement	For significant blood loss	Blood product	–
Post-operative	Maintenance fluid ¹		Glucose 4% or 10%	Saline 0.18%
	Gut & drain losses	Replacement mL for mL	Glucose 4% or 10%	0.9% Saline with potassium chloride (usually 20 mmol/L or more, guided by serum potassium

¹Post-operative fluid regimens should be guided by surgical procedure

careful monitoring, regular audit, the safety of regional anaesthesia in neonate will continue to improve [Figures 1 and 2].^[9]

Post-operative considerations

Some procedures require a period of post-operative ventilation, but in many cases return to neonatal unit or high dependency unit is anticipated.^[6] Immediate post-operative extubation in the neonate require that the patient is awake with full strength (hip flexion, arm lifting), have a low likelihood of airway obstruction (normal airway anatomy), normal temperature, blood pressure and volume status and regular respiratory pattern with adequate minute ventilation.^[5] Risk of post-anaesthetic apnoea (PAA) is considered in all patients born prematurely (less than 37 weeks of gestation), regardless of anaesthetic technique. The factors which increase the risk for PAA are hypothermia, hypoglycaemia, hypoxia, sepsis and hypocalcaemia, which occurs with greater frequency in neonates who undergo emergency surgery.^[6] Use of apnoea mattress or trans-thoracic impedance monitoring through the ECG leads is commonly used. Oxygen saturation monitor, heart rate, blood pressure, temperature, blood glucose, central venous pressure, urine output, observation of stoma or wound drainage is inevitable.^[3] Post-operative fluid management varies with surgical procedure and general condition of the neonate. Electrolytes are checked daily. Total parenteral nutrition may be required in some patients.

In abdominal surgery having no feeding since birth, most newborn abdominal surgical emergencies are considered “full stomach” and they require volume

loading (10-20 mL/kg Ringer's lactate solution) and pre-oxygenation (1 min) before induction.

Tracheo-oesophageal fistula/oesophageal atresia

Tracheo-oesophageal fistula/oesophageal atresia (TEF/EA) is a relatively common congenital malformation occurring in 1:3000-4500 live births.^[11] Commonly TEF is of 5 types (A-E), with type C being the most common. It is commonly diagnosed in the delivery room when suction catheter cannot pass from mouth to stomach. Infants with TEF are premature (20-30%) and they have a high incidence of congenital heart disease and other anomalies. In all infants of TEF, echocardiography and chest X-ray are ideally done. The aortic arch side can be identified as the surgical incision will be made on the opposite side. Until the workup is completed surgery may be delayed. Infants have pooling of secretions in the pouch so they have to be kept in a semi-upright position with a drainage catheter on low suction in the pouch. Before induction, atropine 20 µg/kg can be given to neonates. The pouch has to be aspirated and inhalational induction can be performed with avoidance of positive pressure ventilation to prevent gastric distention. The infant is intubated deep without muscle relaxant and gentle positive pressure ventilation (PPV), the location of fistula is identified by listening over the lungs and stomach. In premature infants, an awake intubation is preferred. Induction with sevoflurane or halothane allows spontaneous respiration, and adequate anaesthetic depth may be associated with hypotension, hypoventilation and coughing.^[11] The tube is taped at a location below the fistula but above the carina. If the fistula is at the carina the tube may be advanced

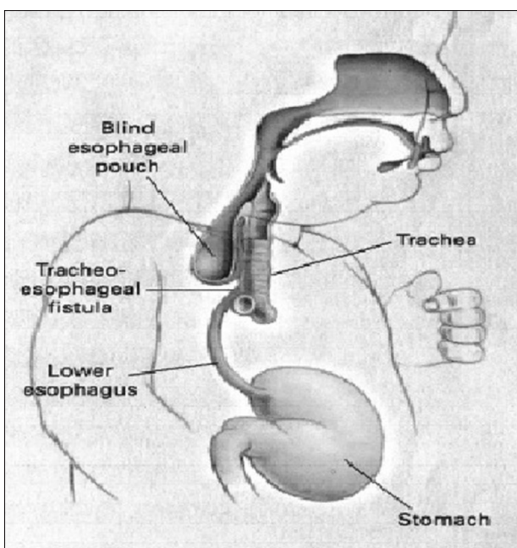


Figure 1: Type C tracheo-oesophageal fistula

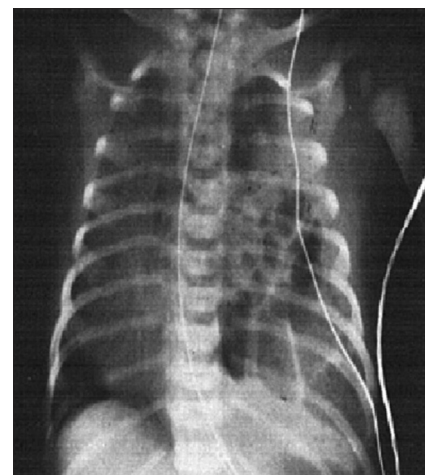


Figure 2: Congenital diaphragmatic hernia. Chest radiograph of infant with diaphragmatic hernia showing hollow viscera in left chest and mediastinal shift. Nasogastric tube is in place. Radiopaque lines are electrocardiogram leads

into the bronchus of the lungs on the non-operative side. There are a number of proposed methods of estimating the correct ETT position: Manipulating the ETT during auscultation; placing the tracheal tube into the bronchus and withdrawing until air entry is heard bilaterally; and rotating the ETT so the bevel faces anteriorly away from the fistula in an attempt to occlude the fistula. A cuffed ETT may also provide assistance in occluding the fistula.^[11] Many surgeons do a rigid bronchoscopy after induction to locate the fistula.^[5] Occlusion of the fistula with a Fogarty catheter, either with the bronchoscopy or less commonly in a retrograde manner via a gastrotomy may be done to isolate the airway from the gastrointestinal tract. Care to be taken to avoid tension pneumothorax during bronchoscopy by limiting insufflations of oxygen via the bronchoscope. When the patient is settled and positioned for right thoracotomy or neck incision, the job of anaesthesiologist is to guide the surgeon to locate the proximal oesophageal pouch and fistula. For that a red rubber catheter or infant feeding tube is placed in proximal pouch. Tube is pushed time to time to make proximal pouch prominent on demand of surgeon. When thoracotomy is done the lung is packed away to mobilise the distal segment of oesophagus for anastomosis, which may lead to oxygen desaturation. Anaesthesia for bronchoscopy, intubation and TEF repair can be induced by IV agents, inhalational agents or combination of both the techniques with additional use of local anaesthetics and opioids. A recent study of Atzori *et al.* concluded that tracheo-bronchoscopy is a useful and safe procedure and to be recommended in tertiary centres for infants with oesophageal atresia before surgical repair.^[12] Knottenbelt *et al.* in their study concluded that the usefulness of routine bronchoscopy and best management of a large TEF need to be defined.^[11] If ventilation can be accomplished without gastric inflation; the patient can receive muscle relaxant. Usually gentle bagging will ventilate the lungs.^[13] Bleeding into trachea during surgical manipulations can cause blockage of ETT. So suction or replacement of the tube is needed if blockage cannot be cleared. Airway pressure is kept to a minimum during the entire procedure. IV fluid is used with caution.^[1] An umbilical arterial line may be a good alternative to radial and femoral line.^[14] IAC is advisable for arterial blood gas and patients with unstable haemodynamics. Fentanyl may be used intra-operatively and as continuous infusion for post-operative analgesia. Paracetamol can also be given rectally or IV for post-operative

analgesia.^[11] A caudal catheter can be advanced to T₆-T₇ to supplement the general anaesthesia (isoflurane/sevoflurane/desflurane/air/oxygen) and provide excellent post-operative analgesia without use of opioid and to facilitate extubation. New catheters (Flex Tip plus™) have incorporated a coiled wire to improve ultrasound visualisation. Local anaesthetic clearance is reduced in neonates.^[15] Maximum dose of local anaesthetic is to be reduced and the duration of infusion should be maximum up to 48 h post-operatively.^[16] Local infiltration, intercostal block, paravertebral blockade or intra-pleural infusion of local anaesthetics can be considered.^[11] Most infants are extubated if they are awake. Infants smaller than 2000 g may require post-operative mechanical ventilation. There is a debate whether risk of reintubation is greater in these infants than the risk of continued intubation with respect to the site of fistula.^[5] Dynamic collapse of the trachea during inspiration can occur presenting with increase in child's respiratory effort. Tracheopexy may be necessary or a tracheotomy may be required.^[4] In a recent study conducted by Al-Mendalawi *et al.*, mortality rate due to TEF is maximum due to respiratory failure and rest are due to sepsis and cardiac arrest during anaesthesia is the least.^[17] Endoscopic surgical procedures for TEF are becoming an attractive alternative to open procedures. Use of Proseal laryngeal mask airway which allows drainage of gastric fluid and air, can decrease the chances of unwanted gastric insufflations.^[18]

Omphalocoele/Gastroschisis

Both omphalocoele and gastroschisis look similar but are different due to defects of abdominal wall. The incidence of omphalocoele is 1:6000 live births, whereas the incidence of gastroschisis is 1:15000 live births.^[4] In omphalocoele there is a mid-line defect and is associated with other anomalies, whereas gastroschisis is not. In both the cases large fluid resuscitation is required before, during and after surgery. In a study conducted by Chirdan *et al.* in African countries, where silos are not available, an infusion bag may be used for temporary cover of eviscerated bowel. So reported mortality and morbidity from ruptured exomphalos and gastroschisis from Africa is quite high.^[19] These patients are considered as full stomach. Anaesthetic maintenance can include fentanyl in addition to inhalational agent as the increased intra-abdominal pressure and diaphragmatic elevation reduces respiratory compliance and makes extubation inadvisable.^[5] Nitrous oxide should be avoided. Maintenance of body temperature is essential.

Continuous epidural injection provides analgesia, motor blockade without respiratory depression and may reduce the post-operative ventilation.^[20] Isotonic fluid (10 mL/kg/h or more), colloid (albumin), sometimes dopamine infusion may be necessary. Warm irrigation fluid is administered.^[5]

Pyloric stenosis

The incidence of pyloric stenosis (PS) is 3:1000 live births.^[20] Symptoms are apparent from 2nd to 6th week of life. Neonates have severe projectile non-bilious vomiting with resultant hypochloreaemic dehydration. Before surgery, measurement of electrolyte and correction of hypovolaemia and alkalosis can be done by administration of 10-20 mL/kg of isotonic fluid. The goal is to lower the serum HCO₃ to less than 30 mEq/L. Maintenance fluid of D5, 0.45 NS at 4 mL/kg/h can be administered. Although alkalosis is usually associated with hypokalaemia, 36% of cases with PS present with hyperkalaemia.^[5] Orogastric tube is placed and suctioned after 0.15 mg/kg atropine administration, with the infant turned side to side to empty the stomach prior to rapid sequence intubation and cricoid pressure with placement of 3.5 mm ETT or the size, which yields a leak of 10-25 cm H₂O. Nitrous oxide is avoided. Maintenance of anaesthesia is by inhalational agent with remifentanyl.^[5] Local infiltration technique can be used for the operation also.^[20] Post-operatively wound infiltration, rectal acetaminophen and ketorolac are very useful.^[5] Awake intubation is safer. Blood glucose monitoring is essential. Oral feed may be started 4-6 h of surgery in some cases.^[20]

Necrotising enterocolitis/intestinal obstruction

Necrotising enterocolitis (NEC) is primarily seen in premature [preterm (less than 32 weeks) and low birth weight (less than 2 kg)] infants, whereas intestinal obstruction manifests in 2nd to 6th week of life with incidence 1:2000.^[20] NEC occurs as a result of bowel ischemia and hypotension due to poor cardiac output state, infection, and others, whereas intestinal obstruction is due to congenital malformations, such as duodenal/jejuna atresia, Ladd band, rotations and others. These emergencies share the same clinical picture with abdominal distention, hypotension, coagulopathy, sepsis, dehydration and electrolyte imbalances.^[5] These neonates are critically ill and usually come to operation room with ETT and inotropes. Judicious fluid management is required for NEC (70 mL/kg) and intestinal obstruction (20 mL/kg isotonic crystalloid) to combat the dehydration. Rapid

sequence induction with cricoid pressure is preferred. In debilitated patients awake intubation can be done. Naso-gastric tube is essential for gastric decompression and remained on suction during induction and intubation to minimize the amount of gastric contents on oropharynx. Ketamine 4 mg/kg/h combined with fentanyl 10-30 µg/kg and a muscle relaxant can be administered.^[20] Inhalational agent can be used with caution nitrous oxide is contraindicated. Blood, Fresh Frozen Plasma, platelet, dopamine, adrenaline in low dose may be necessary. Light general anaesthesia and epidural analgesia are contraindicated due to sepsis and coagulopathy in NEC. However, this may be considered in intestinal obstruction to avoid need for post-operative ventilation. IAC is advisable as hypotension and frequent laboratory assessment may be necessary. Post-operative management may require meticulous fluid management, inotropic and ventilator support and antibiotics. Sometimes neonates are managed with placement of an abdominal drain percutaneously in the neonatal ICU with IV analgesia/sedation.^[5]

Congenital diaphragmatic hernia

The incidence of congenital diaphragmatic hernia (CDH) is 1:2500 live births.^[4] Herniation of abdominal viscera into thoracic cavity leads to pulmonary hypoplasia due to compression by the viscera on developing lungs. To improve ventilation high-frequency ventilation, Extra Corporeal Membrane Oxygenerator, nitric oxide and pulmonary vasodilators are used but nitric oxide use is controversial.^[21] Chirdan *et al.* concluded in their study that in African countries most of the severe cases of CDH are missed and the infants die in the immediate post-natal period.^[19] Other factors predicting poor prognosis are PaO₂ less than 80 mmHg or PaCO₂ more than 40 mmHg after therapy. Before coming to operation room (OR), the patient has to be stabilised. This may take 10 days in severe pulmonary hypertension. In the OR high volumes or ventilation pressure has to be used carefully as there will be trauma to healthy lung. Listening to breath sounds beforehand and knowing the hernia is on left or right side are important. An oro-/nasogastric tube is inserted. Neonates who are not intubated before arrival in the OR are generally intubated awake or after rapid sequence induction. Analgesia may be administered. High inflation pressures for mask ventilation are avoided. Pentothal and fentanyl can be used. IAC is recommended. Hypoxia, acidosis and hypothermia are avoided. Blood loss is to be taken care. Sometimes hernia is repaired while a child is on extra corporeal

membrane oxygenator (ECMO) despite hemodynamic and pulmonary instability. Isoflourane can be used by administering it through ECMO circuit. Drug also can be given directly to patient or ECMO circuit. Patient on ECMO are heparinised. Intra-operative bleeding can be problematic because haemostasis is abnormal.^[22]

CONCLUSION

The responsibility of treating neonates with severity of illness is challenging. However, smallest and sickest neonates can be successfully anaesthetised with proper planning, attention to minute detail and adequate knowledge of newborn physiology.

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Announcement

Bar coded ID card

All the members of ISA are requested to obtain their Bar coded ID card to participate in election process, to be held during ISA AGBM 2012 at Indore during ISACON 2012 on 28th December 2012.

Please send this "Update yourself form" available in Indian Journal of Anaesthesia along with One copy of Passport size Photo. No fees charged.

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