

Anaesthetic management of a one day old neonate with multiple congenital anomalies posted for emergency colostomy

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Key points

A newborn requires constant monitoring and immediate intervention during anaesthesia. Multiple congenital anomalies pose further problems. Anaesthetic management of a newborn depends upon the type of surgical emergency and condition of the newborn. After ensuring that the patient has been adequately prepared, the anaesthesiologist needs to develop a detailed plan that encompasses the issue of anaesthetic equipment and monitoring.

Abstract

Newborn babies undergoing emergency operations present several challenges for the anaesthesiologist, especially in a setup where surgeries on newborns are not done routinely. Problems are more compounded when operation theatre is not fully equipped to handle newborn babies. A newborn requires constant monitoring and immediate intervention during anaesthesia. Multiple congenital anomalies pose further problems. Anaesthetic management of a newborn depends upon the type of surgical emergency and condition of the newborn. Consideration to use anaesthetic drugs depends on the maturity of various vital organs. The aim is to use titrated dose of anaesthetic drugs to get desired effect. Post operative survival of newborn babies has improved in the last few decades due to advancement in neonatology.

Keywords: neonate; multiple congenital anomalies; imperforate anus; colostomy.

Introduction

A baby was delivered with multiple congenital anomalies to a multipara mother at a primary health center (PHC) in rural area and was transferred to this hospital on the same day. Neonate had high anal anomaly, genital transposition, left undescended testis and congenital talipes equino varus (CTEV). Paediatrician clinically diagnosed it as a case of Jacobsen syndrome. Neonate required emergency surgical intervention for high anal anomaly. High anal anomaly is caused by imperfect fusion of entoderm cloaca with the proctoderm (Figure 1, 2). Definitive diagnosis of congenital anomalies requires genetic karyotyping which is not available in rural and peripheral centers. Our hospital is not well equipped to manage a neonatal surgical case, hence we had to improvise our technique to manage this case.



Figure 1



Figure 2

Case report

A one day old baby was delivered at PHC with multiple congenital anomalies to a multipara mother, his other siblings were normal. Baby was referred to our hospital for further management mainly for high anal anomaly. Baby was born at full term, a normal delivery, cried immediately after birth. Vital parameters were normal and his urine output was also normal.

Pre-anaesthetic evaluation:

The newborn baby was ill looking, poorly nourished, dehydrated and lethargic. His body temperature was 36.7°C. Pallor, icterus, cyanosis were absent. Heart rate (HR) was 138/min, regular. Respiratory rate (RR) was 38/min and oxygen saturation (SpO₂) 90% without oxygen. Skull; head circumference 33 cm, crown heel length 46 cm, anterior and posterior fontanelle were normal. Systemic examination; Abdomen was distended, bowel sounds were exaggerated. Respiratory

system examination showed equal air entry on both sides, vesicular breathing. Cardiovascular system examination; S1, S2 normal, no murmur heard. Preoperative laboratory investigation; Hb%18mg/dl, total leukocyte count (TLC) 2090/cumm, differential leukocyte count (DLC); polymorphs 90%, lymphocytes 10%, platelets 3.5 lakhs/cumm. Prothrombin time (PT) 10.3s, activated partial thromboplastin time (APPT) 27.5s, C reactive protein (CRP) positive. His serum electrolytes: sodium 143 mmol/l, potassium 4.5 mmol/l. Bilirubin 2.5 mg%, SGOT 83 IU/l, SGPT 29 IU/l, alkaline phosphatase 237 IU/l. Blood urea 28 mg%, creatinine 0.8 mg/dl. Ultrasonography (USG) showed dilatation of rectum and sigmoid colon with inversion of recto sigmoid ratio and absent left kidney. 2D ECHO was normal. Neonate was accepted for emergency surgery in ASA III E.

Perioperative management:

Intravenous access was secured with 24 G intracath over dorsum of the hand. Intravenous fluid RL with 1% dextrose was started at 20ml/hr, calculated by Holliday and Segar formula. Nasogastric tube (feeding tube no 8) was inserted and stomach aspirated periodically. In order to prevent hypothermia, neonate was wrapped with cotton wraps and supplemented with 100% O₂ by mask. Operating room (OR) temperature was maintained at 28°C and humidity 75% respectively. Intraoperative body temperature of neonate was maintained at 38±1°C. [1] Esophageal stethoscope, pulse oximeter, temperature probe (peripheral and core), electrocardiogram (ECG) and non invasive blood pressure (NIBP) monitors were attached. [2] Baby was premedicated with inj fentanyl 5µg. Before induction, he was preoxygenated with 100% O₂ for 5 mins, induction was done with sevoflurane with stepwise 1% increments made every 5-10 breaths till there was loss of eye lash reflex, with N₂O 50% in O₂, via Jackson and Ree's circuit. [3] Intubated with a miller no 1 blade and endotracheal tube (ETT) no 2.5. Anaesthesia was maintained on O₂/N₂O 50/50, sevoflurane and

ventilation was assisted with tidal volume 20 ml and RR 20/min. Colostomy was completed in 20 minutes. Intraoperative vitals were stable throughout the surgery and post-operative analgesia was administered with 3 ml 0.125% bupivacaine and fentanyl 6 µg single shot caudal. [1] Baby was shifted to post operative room with ETT in situ and monitored. After confirming adequate spontaneous tidal volume and rate, neonate was extubated and shifted to neonatal intensive care unit (NICU) for postoperative care.

Post-operative Management:

Neonate was kept in NICU for two days, supplemented with O₂ hood. RR, HR, SpO₂, and temperature were monitored continuously for two days. Intravenous fluid, 10% dextrose at the rate of 210 ml/24hrs with calcium gluconate. EBM feeding was started through nasogastric tube on second postoperative day. The remaining hospital stay was uneventful and the neonate was discharged from hospital on 7th post-operative day and referred to higher center for further management of congenital anomalies.

Discussion

This newborn with multiple congenital anomalies was referred to our institute for further management. The incidence of multiple congenital anomalies is 1.91% and high anal anomaly is 1 in 5000 live births. [4, 5] This medical college hospital is located in a rural area having facilities for all basic specialties, but we do not have neonatal surgical unit. The purpose of this case report is to highlight successful management of a one day old baby with improvised methods to manage hypoxia, hypothermia, and hypoglycemia.

The preoperative optimization of a neonate with congenital anomalies is the key for successful management of anaesthesia which depends on several issues. O₂ supplementation is necessary in a neonate with respiratory embarrassment as in our case which was due to abdominal distension. Some of neonates require elective ventilation to prevent respiratory embarrassment and to prevent aspiration pneumonitis. [6]

Correction of dehydration by appropriate selection of fluid, estimation of required amount of fluid to be replenished makes it one of the important issues in stabilizing the neonate. Most of the neonates with imperforate anus are diagnosed shortly after birth. Some of them may have vomiting secondary to obstruction, which poses a problem for fluid and electrolyte management. An enormous amount of fluid can be sequestered within the intestinal tract. This fluid is essentially extracellular fluid and has high sodium content. Hence these neonates should be prepared expeditiously for surgery and should have a serum sodium levels within normal limits. IV fluid should be of balanced salt solutions such as ringer lactate. [2, 6] To avoid hypoglycemia, appropriate glucose administration is of paramount importance. In most cases maintenance fluid containing 10% glucose and 0.2% Normal Saline with 20 mmol/l of potassium in first 48 hrs of life is replaced. Maintenance fluid requirement increases during the first few days of life. The IV fluid is estimated to be 60, 80, 100 and 120 ml/kg/24hrs for first 4 days of life respectively, for rest of the neonatal period, a maintenance rate of 150 ml/kg/24 hrs is appropriate.

The newborn is at a risk for significant metabolic derangements caused by hypothermia. The newborn does not shiver. There is no increase in activity or vasoconstriction in response to cold as in older children. In addition the newborn has large body surface area to weight ratio and low levels of subcutaneous fat for insulation which promotes heat loss. The primary mechanism that the newborn has to respond to heat loss is non-shivering thermogenesis. Because the diuresis, diversion of cardiac output away from the core circulation and metabolic acidosis are maladaptive, every effort should be made to prevent heat loss in newborn. Transport should be done with newborn in an incubator, not on an open bed. In the OR the room temperature is raised to its maximal level to minimize loss of conduction of heat, placing the newborn on a

forced air warming blankets can reduce conductive heat loss dramatically, ^[1, 7] as well as using plastic wrap or commercially available covers and hats to minimize heat loss from the head and all other areas not in surgical field. A complicating factor is that anaesthetic agents can reduce or eliminate thermogenesis, removing any ability to compensate for cold stress. ^[8, 9] So every necessary step to prevent hypothermia was instituted in our case.

Neonates are at a disadvantage when it comes to perioperative monitoring because of their small size, many of the monitoring modalities that are used in older children are not suitable for neonates. Some of which are used occasionally but do not provide reliable information for technical reasons. The goal of monitoring should be to establish American Society of Anaesthesiologist standard monitoring pulse oximetry, BP and ECG at the beginning of the case and add invasive monitoring as appropriate. Although physical observation of the patient is important but is difficult to use during surgical procedure, therefore there is a large dependence on electronic monitors. However it should be remembered that the heart and breath sounds heard through a precordial/esophageal stethoscope, the compliance determined during hand ventilation and trends noted in anaesthetic record are the best observations that the anaesthesiologist can use as part of the overall assessment of the patient. ^[1, 10]

Conclusions

Effective evaluation, preparation, and appropriate management of the neonate depend on appropriate knowledge, clinical skills, and vigilance by the anaesthesiologist. For safe and effective care, the anaesthesiologist must take extraordinary care to understand the current status of the patient, nature of planned surgery and potential need for stabilization and preparation before surgery. After ensuring that the patient has been adequately prepared, the anaesthesiologist needs to develop a detailed plan that encompasses the issue of anaesthetic equipment and

monitoring. Airway management, drug choice, fluid management, temperature control, anticipated surgical needs, pain management and post-operative care are all essential in monitoring of the neonate.

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