

## Case Report

# Anaesthesia in Extremely Low Birth Weight and Preterm Neonate – A Case Report

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### Abstract

Preterm neonates has always been a challenge to the anaesthesiologist due to their immature development, physiology and anatomy. In present times we seem to witness a higher incidence of very low birth weight infants (birth weight < 1.5 kg) and extremely low birth weight infants (birth weight < 1 kg) undergoing surgery. The mean survival rates of these neonates born at 24 weeks and 27 weeks are presently 50% and 90% respectively. The common cause of lower urinary tract obstruction in male neonates, is posterior urethral valve (PUV) incidence ranging from 1 in 8000 to 1 in 25,000 live births. Lower than normal doses of anaesthetic drugs are used in preterm infants than term infants considering the altered pharmacokinetics of a preterm, that poses a dilemma. Caudal analgesia, a unique regional technique, provides considerable postoperative analgesia. Ropivacaine, a novel long acting amide local anaesthetic agent, with fewer cardiac and central nervous system toxic effects, provides satisfactory sensory and motor effects.

**Keywords:** extremely low birth weight, preterm neonates, caudal analgesia.

### Introduction

Neonates born less than 37 weeks of gestation are defined as preterm. Neonates with a birth weight of less than 1.5 kg are termed very low birth weight and less than 1 kg are extremely low birth weight.<sup>1</sup> The incidence of preterm deliveries is estimated as 9.6% of all deliveries worldwide. Premature neonates are at an increased risk of the following problems: respiratory distress syndrome, intraventricular haemorrhage, periventricular leukomalacia, retinopathy of prematurity, necrotizing enterocolitis and patent ductus arteriosus.<sup>2</sup> The major anaesthetic concerns faced by the anaesthesiologists with these preterm neonates are: 1) hyperoxia which can be avoided by altering the inspired oxygen 2) hypothermia, which should be combated by using adequate measures to keep the neonates warm 3) hemodynamic instabilities which should be closely monitored.<sup>3</sup> Caudal analgesia is the most common regional anaesthesia technique used in paediatric surgery such as lower abdominal, urological and lower limb surgeries.<sup>4</sup> This technique offers analgesia beyond the length of the surgery, with a gentle healing time and strong post operative pain manage-

ment, there by reducing analgesic requirements perioperatively and facilitating early discharge.

### Case Report

We report the case of a neonate of 850 grams, born at 28 weeks 5 days of gestation by caesarean section for premature membrane rupture of which Apgar was 6/10 at 1 minute and 7/10 at five minutes. Since the neonate had respiratory problems, he was intubated and was on mechanical ventilation for 6 days. Respiratory parameters improved after a dose of surfactant, the neonate was extubated and adjusted to intermittent CPAP for about a week.

### Pre anaesthetic check showed

HR – 160 / min, Saturation – 96% (NIV), RR – 45 / min, Auscultation – B / L AE+.

### Analysis showed

Hb – 14.8 gm / dl, TLC – 12100, BUN – 83, Sr. Creatinine – 2.54.

Antenatal USG (Fig 1) displayed bilateral renal pelviectasis with a posterior urethral valve.

After birth, the neonate did not pass urine therefore suprapubic cannula was inserted and strict

monitoring of urine production was done. Later, vesicostomy was scheduled on the 17th day after birth (31 weeks 1 day of gestation) and was successfully completed under general anaesthesia and caudal anaesthesia.

The neonate was transferred from the NICU with peripheral venous access to the operation theatre in a paediatric incubator with an ambient temperature of 36.5 – degree celsius. The same ambient temperature was maintained in the operating room throughout the surgery. Intraoperative monitoring such as ECG, pulse oximetry, temperature, and end tidal CO<sub>2</sub> were instituted. Anaesthesia was induced with 4 percent sevoflurane and neonate was laterally positioned for administering caudal analgesia (Fig 3) and 0.7 ml of 0.2 percent Ropivacaine was administered under aseptic precautions using 26G needle (13 mm). Neonate was placed back in



Figure 1 : Ultrasound showing posterior urethral valve



Figure 2 : Facemask with intermittent assisted ventilation

supine position and anaesthesia was effectively maintained with 2 percent Sevoflurane with oxygen mixture via facemask with intermittent assisted ventilation (Fig 2). Preventive measures were taken to avoid complications such as hypothermia, hypoxia and bradycardia. Intraoperative vitals were stable. Surgery lasted approximately 1 hour. Neonate was transferred back to NICU on a paediatric incubator maintaining the ambient temperature throughout the transfer.

## Discussion

In children, posterior urethral valve (PUV) possess significant cause of morbidity, mortality and continuous renal damage. It is also known as congenital obstructing posterior urethral membranes (COPUM). The projected occurrence is – 1 in 10,000 – 25,000 live births with a higher rate of occurrence in utero.

Preoperative assessment in extremely low birth weight neonates involves parental consultation about the chances of potential decline in pulmonary function in the perioperative period and need for postoperative ventilator support. Haemoglobin, haematocrit, platelets and coagulation profile will be checked routinely. Preoperative Echocardiogram is done in these premature neonates to rule out congenital anomalies. Respiratory factors like FiO<sub>2</sub>, the need for breathing assistance, ventilator parameters and arterial blood gas baseline values are assessed for those preterm babies on ventilator help. In preterm neonates, the chemoreceptors reflexes are blunted and apnoea is more common. The prevalence of apnoea in severely low birth weight category ranges from 25 percent in the premature low birth weight to 84 percent. Apnoea is more common in first 12 hours post-surgery and can continue until 48 – 72 hours. Strict monitoring of oxygen saturation and respiratory rate were performed to avoid apnoea episodes with intermittent NIV ventilation in this case. The marked trans epidermal permeability and a relatively large body surface are a speeds up water loss in preterm neonates. In the first few days of life, evaporative water loss is increased by 15 fold. The high ratio of surface area to body weight, decreased brown fat stores and then non-keratinized skin make the preterm neonate extremely susceptible to heat loss. In premature neonates, heat loss is a major possible stress. The operation theatre's ambient temperature should be maintained (36.5 degree celsius) 1. Preventive measures are to be taken to combat intraoperative hypothermia. All equipment including the anaesthetic machine, ventilator, breathing circuits, infusion pumps and laryngoscopes are pre checked. Intraoperative fluid management is important in these neonates and adequate hydration should be maintained. Positioning the neonate for caudal analgesia is most necessary to prevent

episodes of desaturation which were carefully taken care of in our neonate.<sup>4</sup>

## Conclusion

An understanding of premature neonatal physiology in extremely low birth weight and premature infants is essential for the successful management of anaesthetics.

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