Original Research Article

Sole caudal epidural anaesthesia in former preterm and neonatal lower abdominal surgeries

Nalagandla Srinivas Reddy[1], Cherukuri Sunil Kumar[2*], Aavula Muralidhar[3]

[1,2,3]Associate Professor, Department of Anaesthesiology, Osmania Medical College and Hospital, Hyderabad, Telangana, INDIA.
Email: sunilkumar176@gmail.com

Abstract

Background: The newborn requires meticulous anaesthesia to maintain physiologic homeostasis, prevent pain, stress responses, and their sequelae. Anaesthesia-related morbidity and mortality are higher in neonates especially preterms and low birthweight babies. **Aim:** To evaluate the efficacy of caudal epidural anaesthesia as a sole anesthetic in preterm babies and neonates undergoing lower abdominal, emergency and elective surgeries and its effect on post operative outcome. **Materials and Methods:** This study was conducted at Niloufer Hospital for Women and Children during the period of six months. 30 infants which included premature infants (post-conceptual age< 60 weeks), term newborns and neonates posted for elective and emergency lower abdominal surgeries were given single dose caudal epidural anaesthesia under sedation. **Results:** Our study included neonates who are term, former preterms and low birth weight babies. Male babies are more in the study. Duration of surgery less than 80 min in former preterm and neonates without any complications. No aspiration was reported. No change in cardiovascular parameters was observed. One neonate had a transient apnea with bradycardia responded to tactile stimulus. No post-operative complications like apnea, bradycardia, desaturation were observed. **Conclusions:** Caudal epidural anaesthesia can be safely performed in former preterm infants and neonates as a sole anaesthetic for lower abdominal surgeries.

Key Words: Caudal epidural anaesthesia, lower abdominal surgeries, Complications, preterm and neonates.

***Address for Correspondence:**
Dr. Cherukuri Sunil Kumar, Associate Professor, Department of Anaesthesiology, Osmania Medical College and Hospital, Hyderabad, INDIA.
Email: sunilkumar176@gmail.com
Received Date: 20/07/2018 Revised Date: 17/08/2018 Accepted Date: 12/09/2018
DOI: https://doi.org/10.26611/10157312

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 16 September 2018

INTRODUCTION

With the development of high risk obstetric care and improved neonatal intensive care there has been increased number of preterm babies and neonates coming for various elective and emergency surgeries. Anesthesiologists are encountering with more number of high risk neonatal cases for the management. Ideal anaesthetic techniques recommended for these high risk and small babies still remains controversial. General anesthesia in neonates poses a variety of complications like difficult airway, narcotic respiratory depression, delayed recovery, hypothermia, post-operative apnea requiring post-operative respiratory support. Caudal epidural in neonates is very useful and simple technique. It provides good intraoperative and postoperative analgesia for lower abdominal and perineal surgeries. It provides preemptive analgesia and reduces the dose requirements of general anaesthetic agents. It allows a more rapid awakening[1]. In this study, we have used caudal epidural anesthesia as a sole anesthetic in a series of twenty-five former preterm babies and neonates undergoing ano-rectal, inguinal, lower abdominal surgeries posted for emergency and elective surgeries and subsequently evaluated its effect on patient outcome.

MATERIALS AND METHODS

This study was conducted at Niloufer Hospital for Women and Children during the period of six months from January 2018 to July 2018. Thirty infants which included premature infants (post-conceptual age < 60 weeks), term newborns and neonates posted for elective and emergency lower abdominal surgeries were given

How to site this article: Nalagandla Srinivas Reddy, Cherukuri Sunil Kumar, Aavula Muralidhar. Sole caudal epidural anaesthesia in former preterm and neonatal lower abdominal surgeries. *MedPulse International Journal of Anesthesiology.* September 2018; 7(3): 154-156. http://medpulse.in/Anesthsiology/index.php

single dose caudal epidural anesthesia under sedation. Infants with following conditions were excluded from the study:

1. Neonates with upper/midgut obstruction.
2. Coagulation abnormalities.
3. Sacral Anomalies.
4. Long duration surgeries with major fluid shifts.
5. Neuromuscular or metabolic disorders.
6. Systemic Infection.
7. Meningitis.
8. Local infection at the site of puncture.

After appropriate fasting, confirmation of investigations, high risk consent all babies were premediated with Inj. Atropine 0.1mg iv. Babies are induced with O2 and Sevoflurane maintaining the spontaneous respirations to facilitate the anesthesiologist to perform the caudal. After all the monitors including ECG, Pulse oximeter, NIBP are connected, babies are placed in the lateral decubitus positon with the hips well flexed. Under aseptic precautions single dose caudal block is performed with 23G IV needle 1-1.25ml/kg of 0.2% Ropivacaine was injected based on Armitage's formula [2] after confirming negative aspiration for blood and/or CSF. After confirmation of onset of anesthesia by absence of withdrawal to toe pinch, all the babies are sedated with1% Sevoflurane with supplemental Oxygen using Jackson Rees circuit preserving spontaneous respirations. Infants were surgically prepared and draped as the attainment of adequate caudal block took 10-15 min. Intra-operatively HR, NIBP, ECG, SP02, temperature, respiratory rate were closely monitored. Intra-operatively IV fluids (RL with dextrose component) were given depending on the nature of surgery as per the existing protocol. All the neonates are observed in operation theatre after surgery till they regained eye opening and cry to stimulation. Postoperatively all the neonates were monitored in Neonatal Intensive Care Unit (NICU) with pulse oximeter, in a radiant warmer for a period of 24hrs after the surgery.

RESULTS

Table 1: Patient characteristics

Patient details	Number of patients	Percentages
Preterm babies	6	20
Term babies	10	33.34
Former Pre-term babies	5	16.66
Neonates	9	30

Most of the babies are term babies and neonates

Table 2: The demographic characteristics of infants are

Gender	Number of patients	Percentages
Males	22	73
Females	8	27

Males infants are more in our study

Table 3: Surgical details in study

No of Patients = 30	Mean ± SD	Range
PC age at surgery	38.48 + 4.56	34 – 50weeks
Weight at surgery	2.3 ± 0.85	2 – 4 kg
Duration of surgery	51 +11.5	30 – 80 min

Duration of surgery in present study is 51 +11.5min

Table 4: The surgical procedures performed

Surgical Procedure	No of patients	Percentages
Non-obstructed inguinal hernia	11	40
Anoplasty	2	10
Colostomy	6	23.4
Cystoscopy PUV fulguration	3	13.3
Vesicostomy	2	10
Torsion testis	1	3.3

Caudal block was successful in all the neonates within two attempts. All the patients maintained heart rate, blood pressure, oxygen saturation (95-98%) within normal range. One former preterm baby had a transient apnea without bradycardia. Three neonates had tachypnea immediately after placing the caudal injection normalized in three to four minutes but maintained normal oxygen saturation. None of our patients had any post-operative apnea or bradycardia.

DISCUSSION

General Anaesthesia in preterm infants and neonates requires a skilled pediatric anesthesiologist and the risk factors related to general anesthesia are like inadequate mask ventilation, endotracheal intubation, bradycardia, delayed recovery due to residual effects of muscle relaxants, inhalational agents and opioids, requirement of post-operative respiratory support will increase the morbidity in these babies. The apnea in the former preterm infant was first reported by Gregory in 1981 and by Steward in 1982[3]. Preterm and former preterm infants up to 60 weeks post conceptional age, particularly those with anemia are at risk of post-operative apnoea[1]. It is highest at 46 weeks and is rarely seen after post conceptional age of 60 weeks[3]. Incidence of post-operative apnea after general anaesthesia ranges from 11-37% in first 2-12 hours in former preterm and preterm infants. To prevent these the methylxanthines aminophylline and caffeine 5-10mg/kg has been used as respiratory stimulants[4]. Regional anesthesia like spinal, caudal epidural have got distinct advantages over general anesthesia in these age group with very low incidence of post-operative apnoea[5,6]. Regional anesthesia avoids the risks associated with general anaesthesia and provide stable hemodynamics without any change in heart rate and blood pressure secondary to relative immaturity of the sympathetic nervous system and less blood volume in the lower extremities [7].Spinal anesthesia in neonates has high failure rate of 10-30% and requires good expertise

and the disadvantage being that surgery may outlast the anesthesia because of lesser duration of block. In our study, we have used caudal epidural as single shot injection as it has also been used as a sole anesthetic in expremature infants to decrease the incidence of post-operative apnea, and to avoid the use of general anaesthesia and narcotics[6]. We have performed the caudal epidural under sedation as any performance of a block in an agitated and moving child is not only unethical but could be dangerous when the needle approaches the delicate nervous structures[8]. Sevoflurane was used to make the neonate co-operate for procedure and majority of the neonates slept during the surgery with a lower MAC probably due to sensory de-afferentation from lower extremities. In our study, we have used preservative free 0.2% Ropivacaine which has onset time similar to Bupivacaine with longer duration of action secondary to intrinsic vasoconstrictor activity, apart from that ropivacaine has a lower risk of cardiac and CNS toxicity than bupivacaine[9]. In neonates and infants, a single dose of 0.2% Ropivacaine at 1ml/kg resulted in plasma levels that were well below toxic dosages[10]. In our study, we have avoided high risk babies with major upper gastrointestinal and midgut surgeries with a possibility of risk of aspiration in an unprotected airway. All the babies were admitted prior to surgery, evaluated and observed for at least 24 hours post-operatively. We have used caudal epidural as a sole anesthetic performed under sedation using Sevoflurane for minor surgeries below the umbilicus with duration of surgery less than 80 min in former preterm and neonates without any complications. No aspiration was reported, no change in cardiovascular parameters was observed. One neonate had a transient apnea with bradycardia responded to tactile stimulus. No post-operative complications like apnea, bradycardia, desaturation was reported.

CONCLUSION

In summary, caudal epidural anesthesia can be safely performed in former preterm infants and neonates as a sole anesthetic for lower abdominal surgeries below the umbilicus as it obviates the need for general anesthesia and endotracheal intubation, but requires an experienced anesthesiologist and surgeon.

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Source of Support: None Declared
Conflict of Interest: None Declared