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Assessment of complications of epidural infusion analgesia in pediatric patients: A clinical study

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Abstract

Background: Epidural analgesia is now firmly established in pediatric anaesthetic practice and its popularity continues to grow. The present study was conducted to determine complications due to epidural infusion analgesia in children.

Materials & Methods: The present study was conducted on 52 patients of both genders. All children undergoing elective or emergency surgeries under general anaesthesia and given concomitant epidural analgesia for post-operative pain management. In all patients, complications such as at the time of insertion, during maintenance -nerve injuries, and during removal -catheter breakage was recorded.

Results: Out of 52 cases, males were 32 and females were 20. Complications in patients were at the time of insertion such as blood trap in 2, failure to identify space in 1, wet tap in 4, epidural hematoma in 1 and nerve injuries in 1. The difference was significant ($P < 0.05$). During maintenance of epidural such as peri-catheter leaks in 2, catheter migration in 3, during removal such as infections in 5 and other causes were seen in 1 cases. The difference was significant ($P < 0.05$).

Conclusion: Authors stated that epidural infusion analgesia is an effective and safe method of providing analgesia.

Keywords: Children, epidural infusion analgesia, Peri-catheter leaks

Introduction

Epidural analgesia is now firmly established in paediatric anaesthetic practice and its popularity continues to grow. Despite the lack of controlled studies in children, the combination of excellent pain relief associated with minimal side-effects provides high patient satisfaction when compared with other methods of analgesia^[1]. Provision of safe and effective post-operative analgesia is a challenging task, especially in children. Despite being an effective method of providing post-operative pain relief, epidural analgesia remains a frequently underutilized modality in children. The big question faced by pediatric anesthesiologists is, 'how safe are epidurals in children?'^[2]

Consideration should be given to the use of epidural analgesia as part of the multimodal approach to acute and chronic pain management in children. Risk versus benefit information derived from adult epidural literature is often extrapolated to pediatric patients while obtaining consent from parents. Limited studies are available regarding the safety of epidural infusion analgesia (EIA) in children with no studies from the Indian subcontinent^[3].

Epidural analgesia offers numerous benefits in the pediatric surgical patient. It is commonly used to augment general anesthesia and to manage postoperative pain (for 48–72 h) with minimal hemodynamic alteration. Effective postoperative pain relief from epidural analgesia facilitates early recovery, rapid weaning from ventilators with reduced PICU costs, reduced time spent in a catabolic state, and lowered circulating stress hormone levels^[4]. The present study was conducted to determine complications due to Epidural infusion analgesia in children.

Materials & Methods

The present study was conducted in the department of Anesthesiology. It comprised of 52 patients of both genders. The study protocol was approved from institutional ethical committee and written consent was obtained from parents of all pediatric children.

All children undergoing elective or emergency surgeries under general anaesthesia and given concomitant epidural analgesia for post-operative pain management.

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In all patients, complications such as at the time of insertion, during maintenance -nerve injuries, and during removal -catheter breakage was recorded. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table I: Distribution of patients

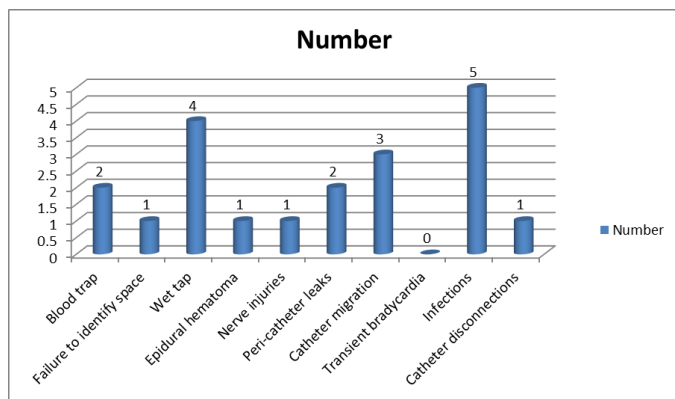
Total- 52		
Gender	Males	Females
Number	32	20

Table I shows that out of 52 cases, males were 32 and females were 20.

Table II: Complications in patients

Complications	Number	P value
At time of insertion		
Blood trap	2	0.05
Failure to identify space	1	
Wet tap	4	
Epidural hematoma	1	
Nerve injuries	1	
During maintenance of epidural		
Peri-catheter leaks	2	0.02
Catheter migration	3	
Transient bradycardia	0	
During removal		
Infections	5	0.01
Others		
Catheter disconnections	1	

Table II, graph I shows that complications in patients were at the time of insertion such as blood trap in 2, failure to identify space in 1, wet tap in 4, epidural hematoma in 1 and nerve injuries in 1. The difference was significant ($P < 0.05$). During maintenance of epidural such as peri-catheter leaks in 2, catheter migration in 3, During removal such as infections in 5 and other causes were seen in 1 cases. The difference was significant ($P < 0.05$).



Graph I: Complications in patients

Discussion

Precise placement of epidural needles and catheters for single-shot and continuous epidural anesthesia ensures that the dermatomes involved in the surgical procedure are selectively blocked with resultant lower doses of local anesthetics [5]. Complications during administration, maintenance and removal of epidural were audited as

follows: At the time of insertion - failure to identify the epidural space, blood tap, wet tap, epidural haematoma, during maintenance -nerve injuries, drug errors in the form of excess of local anaesthetics leading to central nervous or cardiac toxicity or in case of opioids causing respiratory depression, peri-catheter leak (identified by mild soakage of dressing applied at the site of insertion), catheter migration, infections and during removal -catheter breakage [6]. The present study was conducted to determine complications due to Epidural infusion analgesia in children.

In present study, out of 52 cases, males were 32 and females were 20. We found that complications in patients were at the time of insertion such as blood trap in 2, failure to identify space in 1, wet tap in 4, epidural hematoma in 1 and nerve injuries in 1. The difference was significant ($P < 0.05$). During maintenance of epidural such as peri catheter leaks in 2, catheter migration in 3, during removal such as infections in 5 and other causes were seen in 1 cases.

Kasanavesi *et al.* [7] conducted a study to analyze all the complications that occurred during administration and maintenance of EIA in pediatric patients. All children undergoing elective or emergency surgeries under general anaesthesia and given concomitant epidural analgesia for post-operative pain management were included. Seventy children received epidural analgesia during the span of study, of them five were neonates and fifteen were infants. No major complications that were life-threatening or leading to permanent disability were documented. Two children (2.85%) had blood tap during procedure. Eleven children (15%) had peri-catheter leaks and 14 children (20%) had catheter dislodgements.

Epidural catheter placement in neonates and infants is decidedly different though not necessarily difficult. The lateral decubitus position with midline approach is commonly chosen though some advocate the paramedian approach. In neonates, the intercrystal line bisects L5 (unlike L3/4 interspace in adults) and the spinal cord ends at L3 (unlike L1 in adults). The epidural space is more superficial with a more subtle "give" as the ligamentum flavum is pierced [8].

Dolin *et al.* [9] conducted a study in which peri-catheter leak was a unique complication seen in 11 (15.71%) children, which has not been documented in other reviews. Minimal soakage of the epidural site dressing with infused solution was noted in these patients, but it did not result in need for rescue analgesia nor result in local site infections. The most plausible explanation for the peri-catheter leak may be the discrepancy between the size of needle (19-gauge) and size of catheter (22-gauge), which was a manufacturing limitation.

Conclusion

Authors stated that epidural infusion analgesia is an effective and safe method of providing analgesia.

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