Original Research Article

Indian Journal of Anesthesia and Analgesia
2019; 6(2) (Part - II): 678-683
DOI: http://dx.doi.org/10.21088/ijaa.2349.8471.6219.47

Comparison of Caudal Bupivacaine and Rectal Diclofenac for Postoperative Pain Relief in Pediatric Genitourinary and Lower Limb Surgery

Vishal Shrimali[1], Anup Chandnani[2], JC Vasava[3]

[1]Assistant Professor, [2]Associate Professor, [3]Professor and Head, Department of Anesthesiology, GMERS Medical College, Gotri, Vadodara, Gujarat 390021, India.

Abstract

Back ground and Aim: "Pain" is the most feared symptom of disease or post-surgery especially in children because of its difficult to differentiate restlessness or crying due to pain, from that of hunger or fear in the children. There are different techniques available for pain relief in postoperative period like Non pharmacological approach, Parenteral narcotics, NSAIDS, Caudal blocks. We carried out the present study to compare the effect of rectal diclofenac and caudal bupivacaine for postoperative analgesia in pediatric patients for genitourinary and lower limb surgeries. *Methodology:* Fifty pediatric patients posted for elective genitourinary and lower limb surgeries of ASA grade I & II, aged 4 to 11 years of either sex were selected for this study. They were randomly divided in two groups of 25. Group A Received Caudal bupivacaine [0.25%] 1 ml/kg and Group B received Rectal Diclofenac suppository 2 mg/kg. postoperative pain was assessed by Hannallah score and analgesia given only when the score was > 7. *Results:* It was Observed that mean duration of time interval for first dose of analgesic was significantly longer in group B [8.56 hrs] than group A [4.2 hrs]. There were no significant hemodynamic changes, respiratory depression in both groups. *Conclusion:* This study concluded that Rectal diclofenac is a useful alternative to caudal bupivacaine and may offer advantages compared to caudal bupivacaine with regard to convenience of use for postoperative pain relief in children, as it is non- invasive method of pain relief.

Keywords: Bupivacaine, Caudal Block, Rectal Diclofenac

How to cite this article:

Vishal Shrimali, Anup Chandnani, JC Vasava. Comparison of Caudal Bupivacaine and Rectal Diclofenac for Postoperative Pain Relief in Pediatric Genitourinary and Lower Limb Surgery. Indian J Anesth Analg. 2019;6(2):678-683

Introduction

The society of pediatric anesthesia, on its annual meeting at New Orleans, Louisiana [2001] clearly defined the alleviation of pain as a' basic human right', irrespective of age, medical condition,treatment,primary service response for the patient care or medical institution. An effective pain therapy to block or modify the myriad physiologic responses to stress has become an essential component of modern pediatric anesthesia and surgical practice.

Historically, children have been under treated for pain and for painful procedures because of the wrong notion that they neither, suffer or feel pain nor respond to or remember the painful experience to the same degree that adult did. An unproved safety and efficacy of the analgesics and worries about the risk of opioid induced respiratory depression, added more reasons for the under treatment of pain in children. Finely et al. have recently reported that many types of the so called "minor" surgery can cause significant pain in children and, parents have number of misconceptions concerning pain treatment.

Corresponding Author: Anup Chandnani, Associate Professor, Department of Anesthesiology, GMERS Medical College, Gotri, Vadodara, Gujarat 390021, India.
E-mail: anupchandnani29@gmail.com
Received on 06.02.2019, **Accepted on** 06.03.2019

Langlade et al. suggested that the postoperative pain treatment must be included in the anesthetic planning even before induction of anesthesia, adopting the idea of "managing pain before it occurs." Now a days postoperative pain management is an integral part of practice of pediatric anesthesia in all major hospitals.

The different techniques available for pain relief in postoperative period such as Non pharmacological approach, Parenteral narcotics, NSAIDS, Caudal blocks NSAIDS like diclofenac has been used for postoperative pain relief through rectal route. The rectum has rich blood & lymph supply & drugs can cross the rectal mucosa like other lipid membranes. Administration of a rectal suppository or a capsule is simple procedure which can be undertaken by unskilled persons and by the patient himself. It is a noninvasive technique to provide post-operative analgesia. Supplementing general anesthesia with Caudal block, allows a smooth intra – operative course, decrease requirements for general anesthetic drugs, decrease stress response, pain free awakening and avoidance of potentially dangerous side effects that may occur with Parenteral administration of narcotics during surgery and above all, an excellent post-operative pain relief. Keeping in mind the above points, we carried out the present study to compare the effect of rectal diclofenac (2 mg / Kg) and caudal bupivacaine (0.25%) 1 ml/kg for postoperative analgesia in pediatric patients for genitourinary and lower limb surgeries.

Methods

This prospective randomized double blind study was conducted after approval from institution and written informed consent from the parents. For the study 50 pediatric patients posted for elective genitourinary and lower limb surgeries of ASA grade I & II, aged 4 to 11 years of either sex were selected.

All the children were kept nil by mouth for 6 hours and premedicated with inj.glycopyrrolate 10 mcg/kg IM 45 minutes before induction. An intravenous access was obtained with 22G cannula and 5% dextrose was started. After pre-oxygenation with 100% oxygen for 3 min. patients were induced with Inj. Thiopentone sodium (4-7 mg/kg) intravenously and Inj. Succinylcoline (2 mg / kg) intravenously, patients were intubated orally with appropriate size of endotracheal tube, IPPV was undertaken using JR circuit / Bain's circuit connected to Boyle apparatus. Anesthesia was maintained using nitrous oxide and oxygen in the proportion of 50%:50% and Isoflurane and Muscle Relaxant in form of vecuronium bromide (0.08-0.1 mg / kg). Immediately after general anesthesia patients were randomly divided in two equal group of 25.

Group A: Caudal bupivacaine (0.25%) 1 ml/kg.

Group B: Rectal Diclofenac suppository (2 mg/kg)

In group – A patients caudal block was given in lateral decubitus position under aseptic & antiseptic precaution with 24G 1.5" hypodermic needle. Loss of resistance and negative aspiration were considered as confirmatory signs for caudal space location. After checking for negative aspiration for blood or CSF, bupivacaine (0.25%) 1 ml/kg was administered. In group B patients Diclofenac suppository (2 mg/kg) was inserted rectally in lateral decubitus position. After that patients were made supine and observed for pulse, blood pressure, SpO_2. No sedation was given to patients. After completion of surgery, patients were reversed with Inj. Neostigmine (50 mcg/kg) and Inj. Glycopyrrolate (10 mcg/kg) intravenously. After extubation patients were observed for 12 hours every hourly postoperatively for Pulse, Blood Pressure, SpO_2, Respiratory rate, Duration of postoperative analgesia according to pain score, Rescue analgesia, Postoperative complications like nausea, vomiting respiratory depression, urinary retention, pruritus and neurological squeal were also noted. Pain score was evaluated by using Hannallah Score. The score consists of 6 parameters. Each parameter has score 0, 1 and 2 according to observations as shown in table 1. Each parameter has maximum score of 2 thus it has total score of 12. Total score up to 7 was considered as pain free period. Therefore when score was more than 7, patients were given rescue analgesic in the form of Inj. paracetamol intravenously 5 mg/kg.

Duration of post operative analgesia was assessed by noting the time elapsed after completion of surgery till the child required rescue analgesia at Hannallah score ≥ 7.

The result of both group were tabulated and mean and standard deviation value were taken out. Statistical analysis was done using chi-square test and t – test. $p<0.05$ was regarded as statistically significant.

Results

The two groups were comparable in age, weight,

sex, duration of surgery and hemodynamic changes [14] as showed in table 2.

On comparing both the groups, the mean objective pain score was always lower in group B than in group A at any time interval. After 1 hour mean objective pain score was low in group B compare to group A that was statistically significant. Mean objective pain score reached to 7 at 5 hrs in group A, while in group B the mean objective pain score reached at 7 after 10 hours. Thus the difference was highly significant ($p < 0.001$). This suggest that pain free period was up to 5 hours in group A while it was up to 10 hours in group B as showed in table 3.

Table - 4 show that requirement of rescue analgesia was started at 3 hours in group A while it was started at 7 hrs in Group B. In group A 8% patients required rescue analgesic after 3 hours and 64% patients required rescue analgesia after 4 hours and remaining 28% patients required rescue analgesia at 5 hours, while none of the patients in group B required rescue analgesic at this time. In group B only 8% patients required rescue analgesic

Table 1: Hannallah Score

	Parameter	Observation	Score
1	Blood Pressure	+ 10% Pre-operative	0
		> 20% Pre-operative	1
		> 30 % Pre-operative	2
2	Cry	No crying	0
		Crying but responding to TLC	1
		Crying not responding to TLC	2
3	Movement	None	0
		Restless	1
		Thrashing	2
4	Agitation	Patient asleep / calm	0
		Mild	1
		Hysterical	2
5	Posture	No specific posture	0
		Flexion of legs & thighs	1
		Holding scrotum or groin	2
6	Complaints of pain	A sleep / no pain	0
		Can not localize	1
		Can localize	2

TLC=Tender Love Care

Table 2: Patient data and duration of Anesthesia

	Group A	Group B	p Value
AGE (4-11 yrs.)	5.92 + 1.38 (mean)	6.2 + 1.53 (mean)	> 0.05
Sex : Male	23 (92%)	23 (92%)	
Female	02 (8%)	2 (8%)	
Weight (12-25 Kg.)	17.4 + 3.72 (mean)	17.68 + 3.49 (mean)	> 0.05
ASA – I	23 (92%)	24 (96%)	
II	02 (8%)	01 (4%)	
Duration of surgery [hours]	1.18 + 0.56	1.14 + 0.57	>0.05

Table 3: Mean objective pain score

Time (hrs)	Group A	Group B	p Value
1	1.48 + 0.71	1.48 + 0.51	> 0.05
2	3.36 + 0.95	1.56 + 0.50	< 0.05
3	5.2 + 1.08	2.65 + 0.56	< 0.05
4	6.49 + 0.91	3.48 + 0.71	< 0.001
5	7.0	4.24 + 0.72	< 0.001
6		4.96 + 0.67	
7		5.6 + 0.64	
8		6.28 + 0.737	
9		6.92 + 0.28	
10		7.0	
11			
12			

at the end of 7 hours and 36% patients required at the end of 8 hours and 48% patients at end of 9 hours, total 92% patients required rescue analgesia at the end of 9 hours in group B. Thus rescue analgesic was required significantly earlier in group A than in group B ($p < 0.001$).

Mean duration of postoperative analgesia was 4.2 ± 0.57 hours in group A and 8.56 ± 0.76 hours in group B. Thus mean duration of postoperative analgesia was significantly longer in groups B than group A. The difference was statistically highly significant as showed in Table 5.

Only two patients in group A had nausea and vomiting while one patient of group B had urinary retention. No other complications were noted in any of the group as showed in Table 6.

Table 4: Requirement of rescue analgesia

Time Hrs.	1	2	3	4	5	6	7	8	9	10	11	12
Group A	-	-	2 (8%)	16 (64%)	7 (28%)	-	-	-	-	-	-	-
Group B	-	-	-	-	-	-	2 (8%)	9 (36%)	12 (48%)	2 (8%)	-	-

Table 5: Mean duration of postoperative analgesia

Group	Duration	p Value
A	4.2 + 0.57	< 0.001
B	8.56 + 0.76	

Table 6: Complication

Complications	Group A	Group B
Nausea & Vomiting	2 (8%)	0
Respiratory depression	0	0
Urinary retention	0	1 (4%)
Pruritus	0	0
Neurological sequel	0	0

Discussion

Pediatric surgical patients pose some unique problems as compared to adults. They definitely perceive pain, it's only their inability to express this perception that lead to the belief that they do not do so. As Laurence M. & Josephineum have said in 1983, there appeared to be no relationship between age of patient & severity of pain. Postoperative pain may have adverse psychological effects in the children. Pain can result in restless and uncooperative patients, and it therefore seems preferable to prevent the onset of pain rather than to relieve its existence. Children were found to be more comfortable in recovery if they received analgesia during intra operative period.

NSAIDS have been used successfully to provide postoperative analgesia in children because it avoids the side effects of narcotics [12,15]. Rectal administration of diclofenac in children is found to be effective analgesic for postoperative pain relief in children. Rectal administration in children is easy, safe and convenient route of drug absorption [1]. Caudal anesthesia with bupivacaine is another technique of providing anesthesia and postoperative analgesia in pediatric surgical patients [4,13].

In our study, on comparing both group, in group A objective pain score at the end of one hour was 0 in 12% patients while none of the patient had 0 pain score at end of initial one hour in group B. On further comparison at different time interval none of the patient had 0 pain score in group B compare to group A. This suggests that caudal Bupivacaine has provided better pain relief in initial one hours of postoperative period compare to rectal diclofenac. At the end of 2 hours 8% patients had pain score 2 in group A while at this time 56% patients had pain score 2 in group B. At the end of 3 hours 8% patients had pain score 3 in group A while at this time 68% patients had pain score 3 in group B. This suggest in later part of postoperative period (during end of 2^{nd} & 3^{rd} hour) rectal diclofenac had provided better pain relief as compare to caudal bupivacaine. This might be due to the difference in peak effect of both drug as caudal bupivacaine is having earlier onset of action compare to rectal diclofenac. Mean objective pain score reached 7 at 5 hours in Group A and at 10 hours in group B. The difference was highly significant ($p<0.001$). P value

for mean objective pain score started becoming significant after 2 hours and the pain score were always less in group B than group A at any point of observation. This all suggested that there was more pain free period in group B than group A. Mean duration of postoperative analgesia was 4.2 ± 0.57 in group A and 8.56 ± 0.76 in group B. The difference was highly significant as shown in table-6. Thus there was almost double pain free period in rectal diclofenac group compare to caudal bupivacaine group.

Rescue analgesic requirement was significantly earlier in group A than in group B. Requirement of first dose of analgesic started at 3 hours in group A, while it was started at 7 hours in group B. Also maximum number (16) of patients required rescue analgesia at 4 hours in caudal group compare to 12 patients at 9 hours in rectal group. Thus rectal diclofenac provided longer duration of postoperative analgesia than caudal Bupivacaine. The result of our study in terms of post operative analgesia indicate that except in the immediate postoperative period, rectal administration of diclofenac provided better analgesia than caudal block. Dipasari Bhattcharya et al. [8] in their study had shown that except in the immediate post operative period, rectal administration of diclofenac provided analgesia superior to that produced by caudal block. Significantly less postoperative analgesic was required by patients who received rectal diclofenac compared to caudal bupivacaine group. Moores Ma, Wandless to et al. [17] in their study showed that caudal bupivacaine provided more pain free patients at first but later the incidence of pain was equal in the two treatment groups.

Our study concluded that analgesic effect of caudal bupivacaine is superior to rectal diclofenac in the immediate postoperative period whereas rectal diclofenac in late postoperative period is superior to caudal bupivacaine. Rectal diclofenac is a useful alternative to caudal bupivacaine and may offer advantages compared to caudal bupivacaine with regard to convenience of use for postoperative pain relief in children, as it is non- invasive method of pain relief.

Conclusion

Analgesic effect of caudal bupivacaine is superior to rectal diclofenac in the immediate postoperative period whereas rectal diclofenac in late postoperative period is superior to caudal bupivacaine. Rectal diclofenac is a useful alternative to caudal bupivacaine and may offer advantages compared to caudal bupivacaine with regard to convenience of use for postoperative pain relief in children, as it is non- invasive method of pain relief.

References

1. Abduihamid H et al. Combined use of caudal bupivacaine and rectal diclofenac is not superior to the use of each analgesic regimen alone. England journal of anesthesia. 2005;21;63-66.
2. Bare GA et al. The effects of paracetamol or diclofenac before operation on post operative pain and behavior after adenoidectomy in small children. Anesthesia. 1992;47:1078-80.
3. Bone ME. et al. A comparison of rectal diclofenac and intramuscular papaverentum or placebo for pain relief following tonsillectomy. Anesthesia. 1988;43:277-280.
4. Bramwell RG. et al. Caudal block for postoperative analgesia in children. Anesthesia 1982;Oct37 (10):1024-28.
5. Chan A et al. Analgesia for day case surgery. Evaluation of the effect of diclofenac given before or after surgery with or without bupivacaine infiltration. Anesthesia. 1996;Jan (51):592-595.
6. Colbert S A. et al. A prospective study. Comparing intravenous tenoxicam with rectal diclofenac for pain relief in day case surgery. Euro journal of anesthesia. 1998 Sept;15(5)544-548.
7. Cross G D. et al. Comparison of two regional techniques for postoperative analgesia in children following hernia and orchidopexy. Anesthesia. 1987;42:845-849.
8. Dipasre Bhattacharya et al. Comparison between rectal diclofenac and caudal bupivacaine for postoperative pain relief in children. Journal of anesthesia, Clinical pharmacology. 2003;199-202.
9. D.J. Hutch. et al. caudal analgesia in children. Anesthesia. 1984;39:873-878.
10. Dommerby H. et al Diclofenac pain relieving effect after tonsillectomy. Acta otolaryng. 1984 Jul-Aug;98(12)185-192.
11. Ejnell h. et al. Treatment of postoperative pain with diclofenac in Uvulopharyngoplast. British journal of anesthesia. 1992;68:76-80.
12. Eva Kokinsky et al. postoperative pain control in children. A guide to drug choice. Paediatric drugs 2003;5(11):751-762.
13. Gadiyar V et al. the effect of a combination of rectal diclofenac and caudal bupivacaine on post operative analgesia in children. Anesthesia. 1995;50:820-822.
14. J Nakamura. et al. metabolic and endocrinal responses to surgery during caudal analgesia in children. Canadian journal of anaesthesia. 1991;38(8):969-973.

15. Kokki H. et al. nonsteroidal anti-inflammatory drugs for post operative pain; a focus on children. pediatric drug. 2003;5(2):103-123.
16. Leont D V et al. post operative analgesia with nonsteroidal anti-inflammatory drugs in children. Anesteziol Reanimotol. 2004 Jan-Feb;(1):54-57.
17. Moores M A et al. pediatric post operative analgesia. A comparison of rectal diclofenac with caudal bupivacaine after inguinal herniotomy. Anesthesia 1990;45:156-158.
18. Nordbladh I et al. post operative pain relief in patients undergoing tonsillectomy using pre and post operative diclofenac suppository. clinical otolaryngol. 1991;Dec 16(6):554-58.
19. Payne K et al. caudal block for analgesia after pediatric surgery. Afr. Med Journal. 1987 Nov 7;72(9):629-30.