

Original Article

COMPARISON OF CAUDAL BLOCK AND LOCAL BUPIVACAINE IN CHILDREN FOR POST-OPERATIVE PAIN

Asif Iqbal, Naeem Liaqat, Imran Hashim, SH. Dar, Fozia Bashir and Ejaz Ahmed

Objective: To compare efficacy of caudal block with Bupivacaine and local infiltration of wound with Bupivacaine in children after inguinal herniotomy so as to replace narcotic analgesics with other alternatives particularly in daycare surgeries.

Methods: Present randomized controlled trial conducted in Paediatric Surgery Unit, Services Hospital, Lahore for a period one year. Patients were randomly divided in two groups by lottery method. Group A: Caudal group, Group B: Local Bupivacaine. Postoperatively patients were assessed for pain using Wong Bakers Faces pain scale. The intensity of the pain was recorded at 0, 1, 2, 4, 6 and 8 hours. Statistical analysis was done using SPSS version 20.

Results: A total of 150 patients were included in the study, fulfilling the inclusion and exclusion criteria. In group A 12 while 9 patients while in group B 9 were postponed due to low hemoglobin or other causes like respiratory tract infection. Remaining patients who completed the study were 63 in group A and 66 in group B. P value was significant (<0.005) in both groups at 0 hour but at 1, 2, 4 and 8 hour it was not significant. Mean pain scores in group A were less than group B at all readings. In group A, 21 patients (33.33 %) needed rescue analgesic while in group B, 24 patients (36.33%) needed rescue analgesic ($P=0.698$). Mean time for requirement of rescue analgesic was 4.66 ± 2.105 hours in group A while 5.000 ± 2.043 hours in group B ($P=0.169$).

Conclusions: Present study showed caudal with bupivacaine is slightly superior, however both techniques are effective for post operative pain control in children after inguinal herniotomy.

Keywords: caudal block; local bupivacaine; children; post-operative pain.

Introduction

Post-operative pain control has been a major concern for the surgeons in general and particularly in children. Most commonly paediatric surgeons had been using opioid analgesics which are associated with certain side effects including nausea, pruritis and respiratory depression. In order to avoid such effects in children particularly for daycare procedures like inguinal herniotomy, a search for alternative technique had been under discussion for a long period.¹ Caudal block for inguinal surgeries in children was first introduced by Cambell in 1933 and is being practiced widely with different combinations of drugs, Bupivacaine being most commonly used. It was found an alternative to opioid analgesics as it was found reducing requirement of inhalational anesthetics and post-operative analgesics in children. However it is also not without side effects and most commonly encountered are urinary hesitancy, motor weakness of limbs and postural hypotension.² Also because of well-developed blood vessels in sacral area, there had been reports that the possibility of systemic toxicity is always there if no blood draw on aspiration even needle is within the vessel.³ Local infiltration of Bupivacaine is also being used for post-operative pain

management in children effectively and many trials have ascertained its efficacy in small procedure.⁴ The aim of the study was to compare efficacy of caudal block with Bupivacaine and local infiltration of wound with Bupivacaine in children after inguinal herniotomy so as to replace narcotic analgesics with other alternatives particularly in daycare surgeries.

Methods

This was a randomized controlled trial conducted in Paediatric Surgery Unit, Services Hospital, Lahore for a period one year from Jan, 2014 to Dec, 2014. After getting approval from ethical committee, all male and female patients between ages of 1 to 12 years undergoing elective inguinal herniotomy were included in the study. Patients of American society of Anesthesiologists (ASA) class \geq III, those on analgesics, obstructed inguinal hernia and those with other associated problems were excluded from the study. A total of 150 patients fulfilling the inclusion and exclusion criteria were included in the study. Patients were randomly divided in two groups by lottery method. Group A: Caudal group, Group B: Local Bupivacaine. For inclusion in the study consent was taken from by guardian of each child. All the patients were operated electively by Paediatric surgical team of the same hospital. All the patients were

provided with the anesthesia in a standard manner which included midazolam (0.05 mg/kg), Ketorolac (0.5mg/kg) Propofol at 1.5 to 2 mg/kg used for induction. While 1.0 mg/kg Suxamethonium chloride used before intubation. Isoflurane 0.7 to 1.5% & low flow oxygen used for anesthesia maintenance. Additionally, Atracurium 0.5mg/kg as bolus dose was given and if needed was repeated as 0.1mg/kg to facilitate artificial ventilation. Three lead electrocardiograph & pulse oximetry was used to monitor the vital during surgery. Isoflurane was replaced with 100 percent O₂ about 5 min before completion of procedure. While Neostigmine & Atropine used as reversal drugs. Patients were extubated according to the standard train-of-four criteria. At the end of the procedure, patients in group A were given caudal block with 0.7 ml.kg⁻¹ of 0.25% Bupivacaine while patients in group B patients, injection Bupivacaine was locally infiltrated in the wound. Postoperatively patients were assessed for pain using Wong Bakers Faces pain scale. The intensity of the pain was recorded for all patients using Faces Pain Scale (Fig-1) at 0, 1, 2, 4, 6 and 8 hours after surgery by on duty doctor, who was not aware of the drug given to the patient. If the patient develops pain score ≥4, patient was given intravenous Nalbuphine 0.2 mg/kg and it was recorded. After 8 hours of surgery, patients were given oral Ibuprophen (10mg/kg) and were discharged after assessment by senior team member on duty. All the data including demographic details were recorded in the proforma. Statistical analysis was done using SPSS version 20, arithmetic mean and standard deviation values for different variables were calculated and statistical analyses were performed for each group. Independent sample t-test was used to compare continuous variables exhibiting normal distribution, and Chi-squared or Fisher exact test for non-continuous variables. P<0.05 is considered significant.

Results

A total of 150 patients were included in the study, fulfilling the inclusion and exclusion criteria. They were randomly divided into group, 75 patients being in each group. However 12 patients in group A while 9 patients in group B were postponed due to low hemoglobin or other causes like respiratory tract infection. Remaining patients who completed the study were 63 in group A and 66 in group B [Table 2]. Demographic details including age, gender distribution and site of inguinal hernia were comparable in both groups as tabulated in **Table-1**. Pain scores of the patients noted at 0 hour, 1 hour, 2 hour, 4 hour and 8 hours are given in table 2 along with P value. P value was significant (<0.005) in both groups at 0 hour but at 1, 2, 4 and 8 hour it was not significant. Also mean pain scores in group A were less than group B at all readings. In group A, 21 patients (33.33 %) needed rescue analgesic while in group B, 24 patients (36.33%) needed rescue analgesic (P=0.698). Mean time for requirement of rescue analgesic was 4.666±2.105hours in group A while 5.000±2.043 hours in group B (P=0.169).

Table-1: Demographic details of patients in both groups.

	Group A (Caudal Block)	Group B (Local Bupivacaine)
Age (in years) (Mean±SD)	4.166±3.36	3.56±2.74
Gender	Male	54
	Female	12
Site Involved	Right	32
	Left	12
	Bilateral	13

Table-2: Comparison of Pain score in both groups.

	Group A (Caudal Block)	Group B (Local Bupivacaine)	P-value
0 Hour	1.8±1.972	2.666±2.168	0.026
1 Hour	2.666±2.094	3.142±1.891	0.164
2 Hour	3.238±3.415	3.111±1.893	0.797
4 Hour	3.269±2.671	3.619±3.695	0.552
8 Hour	2.222±2.275	2.031±2.77	0.670

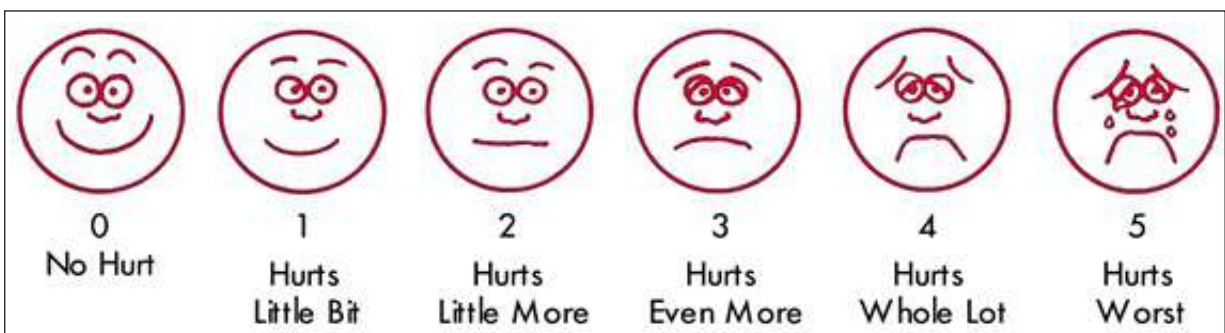


Fig-1: FACES Pain scale

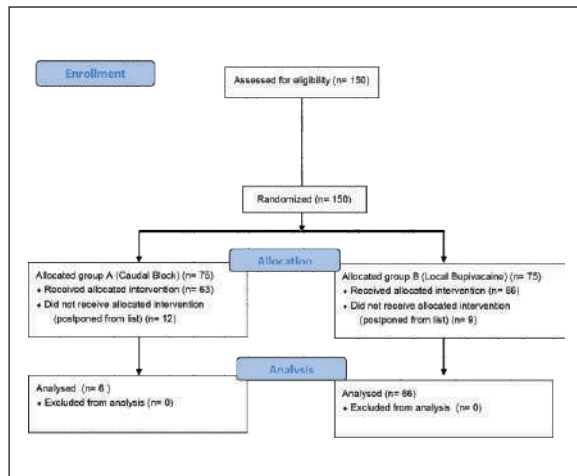


Fig-2: Consort flow diagram.

Discussion

Greek Philosopher; Aristotle proposed that pain was a passion of the soul.⁵ There is much debate about what therapeutic modality is appropriate for pain control after different types of procedures. Which is the best technique of regional anesthesia is still unknown.⁶ We compare caudal block efficacy with bupivacaine and local infiltration of bupivacaine. Bupivacaine is the most commonly used agent for caudal block.⁷ Toxicity of local bupivacaine can be avoided if only recommended dose is given.⁸ We used volume & concentration range same as Gavrilovska et al, mention for their study i.e. 0.7ml /kg of 0.25% for caudal block & local infiltration.⁹

In our study pain score was noted at 5 points and P value was found significant (<0.005) in both groups at 0 hour but it was not significant during rest of the readings. Seyed Abbas HJ et al compared three agents (I) acetaminophen suppository (II) wound infiltration of bupivacaine (III) caudal block with bupivacaine and they noted that there is no significant differences at any of recorded reading in the bupivacaine wound infiltration and caudal block groups ($P=0.848$), how're they reported significant statistical differences between these two groups and the acetaminophen group ($P<0.05$).¹⁰ In another study, the postoperative analgesic effect of suppository paracetamol was compared with the combination of paracetamol suppository and bupivacaine wound infiltration for inguinal herniorrhaphy in pediatric patients & author found that combination of these two methods produced better analgesia than suppository paracetamol

alone.¹² Razavi and colleagues found that the caudal anesthesia in relieving pain after pediatric inguinal surgery was more effective than acetaminophen suppository.¹² We observed that mean pain scores in group A were less than group B at all readings. Conroy et al also reported higher mean pain score for bupivacaine infiltration group as compared to caudal block group.¹³ Machotta A compared caudal block and wound infiltration and found no significant difference of pain score between two groups.¹⁴ But Petersen et al., reported that during inguinal hernia repair in children, wound infiltration is as good as ilioinguinal-iliohypogastric nerve block or caudal block up to a couple of hours following surgery. Many other studies have examined postoperative analgesia following infiltration of bupivacaine into the wound after herniorrhaphy and found a beneficial effect.¹

Need for rescue analgesia in our study was seen in 33.33% & 36.33 in caudal block and local infiltration group respectively. Conroy et al. reported that in caudal block group patient required supplemental analgesia was 37.14% while 55% patients in infiltration group.¹³

We found that Mean time for requirement of rescue analgesic was 4.666 ± 2.105 hours in group A while 5.000 ± 2.043 hours in group B. Laiq N et, al. compared caudal bupivacaine & bupivacaine plus tramadol and found that caudal block group needed rescues analgesia in 50% and 66% patients at 4 & 6 postoperative hour respectively.¹⁶

Seyed Abbas HJ et al compared three agents and found that duration of analgesia for caudal group was 5.37 ± 1.79 and bupivacaine local infiltration was 5.40 ± 1.73 while 4.407 in acetaminophen suppositories group and p value was not significant for caudal block and infiltration group comparison.¹⁰

Conclusion

Present study showed caudal with bupivacaine is slightly superior at 0 hour & in rescue analgesia requirement; however both techniques are effective for post operative pain control in children after inguinal herniotomy.

Department of Peads Surgery
SIMS/ Services Hospital, Lahore
www.esculapio.pk

References

1. Numanoğlu KV, Ayoğlu H, Er DT. Efficacy of tramadol as a preincisional infiltration anesthetic in children undergoing inguinal hernia repair: a prospective randomized study. *Ther Clin Risk Manag*. 2014;10:753-8
2. Goodarzi M. The effect of perioperative and postoperative caudal block on pain control in children. *Paediatr Anaesth*. 1996;6:475-477.
3. Cheon JK, Park CH, Hwang KT, Choi BY. A comparison between caudal block versus splash block for postoperative analgesia following inguinal herniorrhaphy in children. *Korean J Anesthesiol*. 2011 Apr;60(4):255-9.
4. Gurnaney HG, Maxwell LG, Kraemer FW, Goebel T, Nance ML, Ganesh A. Prospective randomized observer-blinded study comparing the analgesic efficacy of ultrasound-guided rectus sheath block and local anaesthetic infiltration for umbilical hernia repair. *Br J Anaesth*. 2011;107:790-5.
5. Bonica JJ. History of pain concepts and pain therapy. *The Mount Sinai journal of medicine, New York*. 1991 May;58(3):191-202.
6. Mossetti V, Ivani G. Controversial issues in pediatric regional anesthesia. *Pediatric Anesthesia*. 2012 Jan 1;22(1):109-14.
7. Beyaz SG, Tokgöz O, Tüfek A. Regional anaesthesia in paediatric surgery: results of 2200 children. *JPMA-Journal of the Pakistan Medical Association*. 2011 Aug 1;61(8):782.
8. Rosenberg PH, Veering BT, Urme y WF. Maximum recommended doses of local anesthetics: a multifactorial concept. *Regional anesthesia and pain medicine*. 2004 Dec 31;29(6):564-75.
9. Gavrilovska-Brzanov A, Kuzmanovska B, Kartalov A, Donev L, Lleshi A, Jovanovski-Srceva M, Spirovska T, Brzanov N, Simeonov R. Evaluation of Anesthesia Profile in Pediatric Patients after Inguinal Hernia Repair with Caudal Block or Local Wound Infiltration. *Open Access Maced J Med Sci*. 2016 Mar 15;4(1):89-93.
10. SeyedAbbas HJ, poor Sadegh S, SeyedehMasoumeh HV, Amir J. Effects of suppository acetaminophen, bupivacaine wound infiltration, and caudal block with bupivacaine on postoperative pain in pediatric inguinal herniorrhaphy. *Anesthesiology and pain medicine*. 2012 Apr;2012(4, Spring):243-7.
11. Abdellatif AA. Ultrasound-guided ilioinguinal /iliohypogastric nerve blocks versus caudal block for postoperative analgesia in children undergoing unilateral groin surgery. *Saudi journal of anaesthesia*. 2012 Oct 1;6(4):367.
12. Razavi SS, Shaeghi S, Shiva H, Momenzadeh S. A comparison between Acetaminophen suppository and caudal anesthesia in relieving pain after pediatric surgery. *Urology journal*. 2009 Jun 18;1(1):40-4.
13. Conroy JM, Othersen HB, Dorman BH, Gottesman JD, Wallace CT, Brahen NH. A comparison of wound instillation and caudal block for analgesia following pediatric inguinal herniorrhaphy. *Journal of pediatric surgery*. 1993 Apr 1;28(4):565-7.
14. Machotta A, Risse A, Bercker S, Streich R, Pappert D. Comparison between instillation of bupivacaine versus caudal analgesia for postoperative analgesia following inguinal herniotomy in children. *Pediatric Anesthesia*. 2003 Jun 1;13(5):397-402.
15. Petersen PL, Mathiesen O, Stjernholm P, Kristiansen VB, Torup H, Hansen EG, Mitchell AU, Moeller A, Rosenberg J, Dahl JB. The effect of transversus abdominis plane block or local anaesthetic infiltration in inguinal hernia repair: a randomised clinical trial. *European Journal of Anaesthesiology (EJA)*. 2013 Jul 1;30(7):415-21.
16. Laiq N, Khan MN, Tahmeedullah GY, Khan S. Comparison of caudal bupivacaine and bupivacaine-tramadol for postoperative analgesia in children undergoing hypospadias surgery. *J Coll Physicians Surg Pak*. 2009 Nov;19(11):678-81.