

# Postoperative pain management with combined local infiltration and oral analgesia in herniotomy wound in children

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## Abstract

**Introduction:** Post operative pain management in children is one of the most challenging job to anaesthetic as well as to surgeon. Adequate analgesia in children is necessary to reduce parent's distress after any surgery. This study was carried out to assess the subjective adequacy of combined approach local anaesthesia and oral analgesia after inguinal herniotomy surgery in children.

**Methods:** It was a prospective study done in a very remote district of Rukum in Nepal. Adequacy of postoperative pain management was observed after wound infiltration at the local site in inguinal herniotomy cases. Subsequently after surgery in 80 children. Wound infiltration at the local site was made with 0.5% bupivacaine. Subsequently a combination of syrup of oral analgesic ibuprofen and paracetamol was given 4 hours after surgery when child became fully awake. Children's Hospital Eastern Ontario Pain Scale (CHEOPS) was used to assess the adequacy of pain management.

**Results:** Out of 80 children, pain score  $< 6$  was observed in 95.5% children. Among behavioral score the commonest neutral behavior in torso was found in 75 children. Likewise, no cry in 73, smiling in 70%, positive in 70%, not touching in 74%, neutral behavior in 74% were observed in cry, facial, child verbal, torso, touch and legs respectively.

**Conclusion:** Local wound infiltration with 0.5% Bupivacaine is a simple and effective method in pain management in herniotomy cases which gives satisfaction to the children as well as their parents.

**Key Words:** local infiltration, postoperative pain management

## Introduction

Local infiltration with 0.5% Bupivacaine in herniotomy cases in children provides effective postoperative analgesia. This can be provided by caudal block also. But the motor block produced by caudal anaesthesia is avoided with the use of local infiltration<sup>1</sup>.

A solution of bupivacaine 0.5%, which has a prolonged duration of action of four to eight hours has been used in many studies.<sup>2</sup> The use of local bupivacaine along with oral analgesics, a combination of Paracetamol and Ibuprofen is particularly suitable for day care surgery in camp set up. With the use of these agents the nausea, vomiting and sedation which are frequently associated with the administration of parenteral opioids are also avoided<sup>1, 2, 3</sup>.

Moreover 2mg/kg of Bupivacaine is less likely to cause

systemic toxicity unless accidental to intravenous route. However episodes of systemic toxicity has been reported due to very excessive dosing of bupivacaine 3.75 mg/kg along with lidocaine 7.5 mg/kg.<sup>5</sup> On the other hand local infiltration in herniotomy cases for pain management has been seen more effective and cost effective. It has provided satisfactory pain control in children and lessened the psychological as well as physical

## Methods

This prospective study was carried out in very periphery of Nepal in Rukum district in 2006 during the camp set up. A total of 80 children had herniotomy done under IV ketamine and midazolam. Venous access was made prior to Anaesthesia. Midazolam 0.1mg/kg body weight with Ketamine 2mg per kilogram body weight IV was given to all the cases as anaesthetic agents. Atropine 0.02mg/kg IV was

given as a antisialogue premedication. Anaesthesia was maintained with increment dose of IV Ketamine. All the children had local infiltration with 2mg/kg of 0.5 % Bupivacaine subsequently after herniotomy. The minimum surgical time was 10 minutes and maximum was 30 minutes. The children were given syrup of Paracetamol 15mg/kg with Ibuprofen 10mg/kg every 8 hourly 4 hours postoperatively. Extra dose of analgesics was given as per need. We used the Children's Hospital of Eastern Ontario behavioural Pain Scale (CHEOPS) to assign a quantitative pain measurement at each observation point. This scale assigns a numerical value of six behaviour patterns viz. cry, facial expression, verbalization, body posture, leg movements and attempts to touch the wound. The children who had CHEOPS of >6 had extra dose of oral analgesics as per patient demand.

A score of six and less than six on the CHEOPS scale depicts a child, who is not crying, has a facial expression at least neutral, is not indicating pain verbally, has an inactive torso, is not touching or grabbing at the wound and is lying with legs relaxed. This suggests a lack of severe pain and was taken to be a reflection of satisfactory pain control. For similar reasons by a score of nine was taken as an indication of severe pain and treatment failure.

Pain intensity was assessed at 2 hour, 4 hour, 8 hour, and 12 hour using Children's Hospital Eastern Ontario Pain Scale (CHEOPS) as follows:

**Table 1:** Children's Hospital Eastern Ontario Pain Scale (CHEOPS)

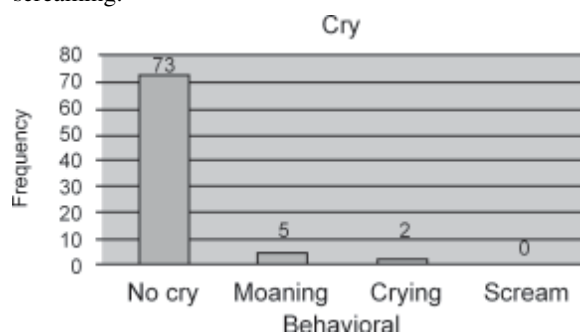
	Behavioral	Definition	Score
<b>Cry</b>	No cry	1 Child is not crying.	
	Moaning	2 Child is moaning or quietly vocalizing silent cry.	
	Crying	2 Child is crying, but the cry is gentle or whimpering.	
	Scream	3 Child is in a full-lunged cry; sobbing; may be scored with complaint or without complaint.	
<b>Facial</b>	Composed	1 Neutral facial expression.	
	Grimace	2 Score only if definite negative facial expression.	
	Smiling	0 Score only if definite positive facial expression.	
<b>Child Verbal</b>	None	1 Child not talking.	
	Other complaints	1 Child complains, but not about pain, e.g., "I want to see mommy" or "I am thirsty".	
	Pain complaints	2 Child complains about pain.	
	Both complaints	2 Child complains about pain and about other things, e.g., "It hurts; I want my mommy".	
	Positive	0 Child makes any positive statement or talks about others things without complaint.	
<b>Torso</b>	Neutral	1 Body (not limbs) is at rest; torso is inactive.	
	Shifting	2 Body is in motion in a shifting or serpentine fashion.	
	Tense	2 Body is arched or rigid.	
	Shivering	2 Body is shuddering or shaking involuntarily.	
	Upright	2 Child is in a vertical or upright position.	
	Restrained	2 Body is restrained.	

<b>Touch</b>	Not touching	1 Child is not touching or grabbing at wound.
	Reach	2 Child is reaching for but not touching wound.
	Touch	2 Child is gently touching wound or wound area.
	Grab	2 Child is grabbing vigorously at wound.
	Restrained	2 Child's arms are restrained.
<b>Legs</b>	Neutral	1 Legs may be in any position but are relaxed; includes gentle swimming or separate-like movements.
	Squirm/kicking	2 Definitive uneasy or restless movements in the legs and/or striking out with foot or feet.
	Drawn up/tensed	2 Legs tensed and/or pulled up tightly to body and kept there.
	Standing	2 Standing, crouching or kneeling.
	Restrained	2 Child's legs are being held down.

## Results

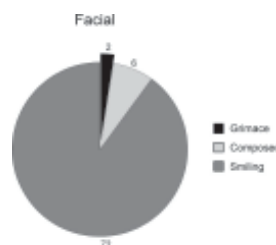
In 12 hours observation period of 80 children; 73 children(91.25%) had no cry,72 children(90%) had smiling,68 children(85%) had positive,75 children(93.75%) had neutral,73 children(91.25%) had not touching and 74 children(92.5%) had neutral in CHEOPS of No cry, Facial, Verbal, Torso, Touch, and Legs respectively. The mean CHEOPS of different behavioural items shows that 92.5% had CHEOPS <6 and 7.5% had CHEOPS > 6. None of the children had CHEOPS score 9 or 10. The result of our study reveals that 92.25 % of children who had CHEOPS of <6 score responded well to simple analgesics. Other Studies also have proven satisfactory and excellent post operative pain management where up to 95% of cases were free of pain with this method (p value 0.35 )<sup>10</sup>.

The result of CHEOPS **score cry** shows 73 children(91.25%) had no cry, 5 children(6.25%) had moaning,2cases (2.5% ) had crying and no cases found screaming.



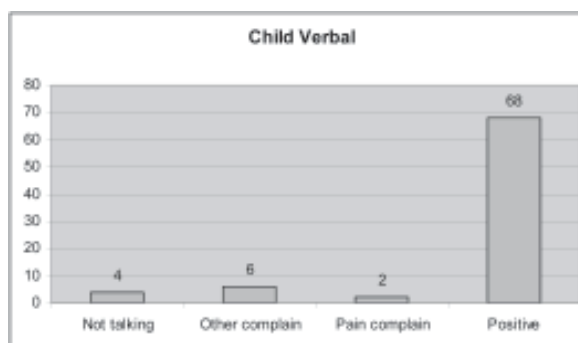
**Fig. 1:** The CHEOPS score cry.

The result of CHEOPS score Facial shows; 72 children ( 90% ) had smiling,6 children( 7.5%) had composed and 2 children(2.5%) had grimace.



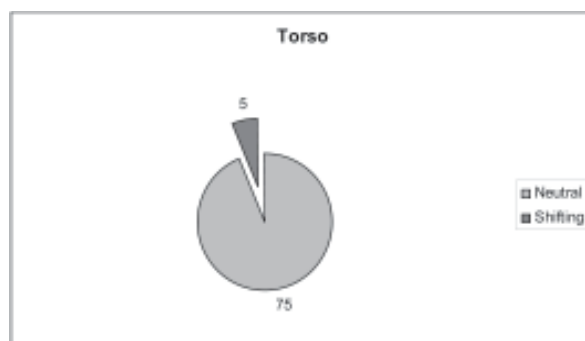
**Fig. 2:** The CHEOPS score Facial.

The result of CHEOPS score child verbal shows: 68 children ( 85% ) had positive,6 children(7.5%) had other complain,4 children (5%) had not talking and 2 children( 2.5%) had pain complain.



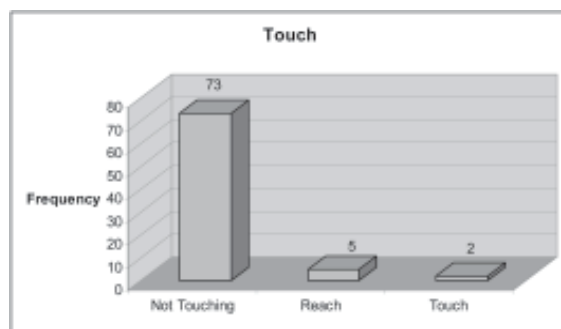
**Fig. 3:** The CHEOPS score verbal

The result of CHEOPS score Torso shows: 75 children (93.75%) had neutral and 5 children (6.25% ) shifting.



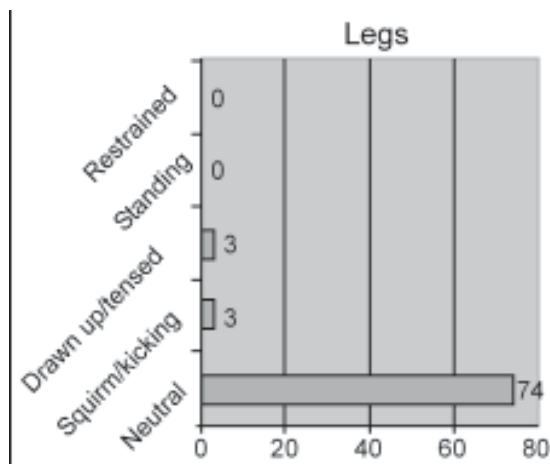
**Fig. 4:** The CHEOPS score Torso.

In CHEOPS score touch 73 patients(91.25%) had not touching, 5 patients (6.25%) had reach and 2 patients(2.5%) had touch.



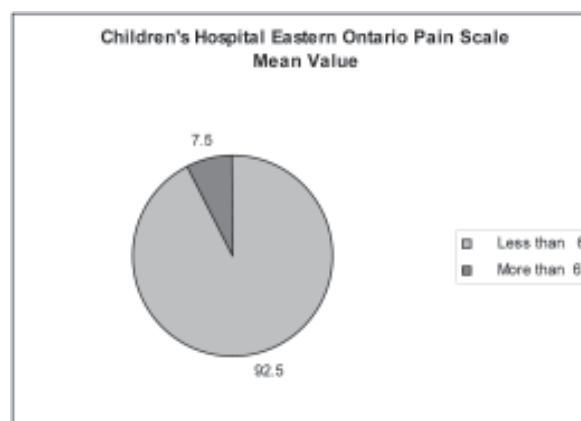
**Fig. 5:** The CHEOPS score Touch.

In CHEOPS score legs 74 (92.5%) patients had Neutral, 3 patients (3.75%) had Squirm/kicking and 3 patients((3.75%) had Drawn up/tensed.



**Fig. 6:** The CHEOPS score Legs

The mean CHEOPS scoring:- The mean value of different child behavioural scale shows that 74 children(92.5%) had CHEOPS<6 and 6 children(7.5%) had CHEOPS > 6.



**Fig. 7:** The mean CHEOPS scoring.

## Discussion

Adequate analgesia after inguinal herniotomy in children is essential and may be obtained through various techniques. These methods include the administration of opioids, such as codeine, the administration of nonsteroidal anti-inflammatory drugs, such as ketorolac, and the use of regional anesthetic techniques, such as local anesthetics and caudal anesthesia. Each of these techniques has their advantages and disadvantages, and they have proved efficacy when compared with placebo. Some of these methods have been compared to determine if one is superior with respect to pain control or adverse effects. When an inguinal field block was compared with caudal anesthesia, the investigators concluded that they had similar effects on postoperative analgesia.<sup>8</sup> In practice field block appears to be the technique of choice in many pediatric institutions because it is usually effective and has low cost and minimal risks. Local anesthesia is typically effective but studies have shown that supplementation with either a nonsteroidal anti-inflammatory drug or caudal block further improves analgesia. When lidocaine is used subfascially and subcutaneously the effect is better seen with the subfascial route. The reason for the better effect with SF administration could be that the pain stimuli after inguinal herniotomy are primarily generated in the SF layers, whereas the SC layers generate fewer pain stimuli.<sup>5</sup> Similarly combination of wound infiltration with 0.5% bupivacaine and Ilio inguinal and Ilio hypogastric nerve blocks reduces total morphine requirements in the first 24 hour<sup>8</sup>. The study done on local infiltration of 0.5% Bupivacaine alone, 0.5% Bupivacaine with 50 microgram/kg midazolam and 50 microgram of midazolam in 0.9% Saline has shown better pain relief with

Bupivacaine and midazolam group than other two groups<sup>9</sup>. Studies have revealed that there is no significant difference in post operative pain management in the patient with local infiltration and caudal block. However complications like urinary retention and delay in ambulation is seen more with caudal than local wound infiltration<sup>4</sup>.

Many other agents have been used like Caudal administration of 50 microgram per kg of midazolam with 0.25% bupivacaine has shown good analgesics result to that of Bupivacaine 0.25% alone or midazolam 50 microgram/kg in normal saline.<sup>6</sup> Similarly Comparison of Intramuscular and local infiltration of ketorolac with and without local anaesthetic have been studied. Where wound infiltration with ketorolac 30 mg alone in saline, 0.25% bupivacaine alone or ketorolac 30 mg with 0.25% bupivacaine provided equivalent analgesia. However Wound infiltration with ketorolac 30 mg in saline provided analgesia superior to that of ketorolac 60 mg i.m.<sup>7</sup>

The result of our study reveals that 92.25 % of children who had CHEOPS of <6 score responded well to simple analgesics. Study done on Ilioinguinal nerve block and local infiltration in 49 cases have revealed 95% responding to simple analgesics in cases with local infiltration and 100% with the ilioinguinal nerve block. Which is statistically nonsignificant with the result obtained in our study (p value 0.35)<sup>10</sup>

Another study done on trial of three methods of intraoperative Bupivacaine analgesia for pain after paediatric groin surgery in 168 cases with 61 cases had wound infiltration alone. In this study, the children who had wound infiltration alone had 78.1% CHEOPS score of <4. Which is statistically significant with our study (p value 0.004)<sup>3</sup> On evaluation of the relative effectiveness of three techniques of regional anaesthesia in the provision of postoperative analgesia in children was carried out in another study. Where the random assignment of 183 children scheduled for groin surgery to one of three groups. Bupivacaine 0.5% plain 2 mg/kg was injected after surgery. Group A received wound infiltration alone Group B had regional nerve blockade. Group C had a combination of both methods. Postoperatively pain was assessed using the CHEOPS behavioural scales until discharge home. Satisfactory pain control was arbitrarily defined as a CHEOPS score of six or less than six. Here all three methods achieved analgesia with 80% of the pain scores. Statistically it is not significant with our study (p value 0.9). Similarly the study done on Subcutaneously versus subfascial administered Lidocaine in pain treatment after inguinal herniotomy on 44 cases, the VAS score was significantly reduced to subfascial group than in subcutaneous group.<sup>5</sup> The

Study done on comparison of caudal local anaesthetic 0.25% Bupivacaine (1ml/kg) with adrenaline 5 microgram/ml in group A and Bupivacaine 0.25%/ml with clonidine 2 microgram/kg in group B and Bupivacaine 0.25% with 0.5mg/kg preservative free ketamine in group K; in 60 patients. Analgesia was better seen in group B and K than group A.<sup>11</sup> In the study on pre-emptive analgesia on Comparison of preoperative with postoperative caudal block for post operative pain in children, the analgesia was comparatively good in post surgery caudal group than preoperative one.<sup>12</sup> There are various techniques of post operative pain management which are described above among the all local infiltration has been seen simple and superior.

## Conclusion

Local infiltration with 0.5 % Bupivacaine in herniotomy cases resulted good post operative pain management in children when given in combination with oral analgesics. This technique is very simple, cost effective with minimal time taking. For day care surgery this seems to be the best method of pain management in children. When child are playful parents are also satisfied physically as well as psychologically.

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