

# Assessment of Postoperative Analgesic Efficacy of Ilioinguinal-Iliohypogastric Block as Compared to Caudal Block in Children undergoing Inguinal Herniotomy: A Randomised Clinical Study

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## ABSTRACT

**Introduction:** An inguinal herniotomy is most frequently performed surgery in children under general anaesthesia along with various regional anaesthesia techniques such as ilioinguinal-iliohypogastric block (hernia block) or caudal block.

**Aim:** To compare postoperative analgesic efficacy of hernia block (anatomical landmark guided ilioinguinal-iliohypogastric block) versus caudal block using bupivacaine as a local anaesthetic in children undergoing inguinal herniotomy.

**Materials and Methods:** This single-centre, randomised clinical study was conducted at Tertiary Medical College and Hospital (Lokmanya Tilak Municipal Medical College and General Hospital), Mumbai, Maharashtra, India, from December 2016 to December 2018. The study included 100 children from age 6 months to 6 years with American Society of Anaesthesiologists (ASA) grade I and II, posted for elective inguinal herniotomy (unilateral). All children were given either hernia block or caudal block, based on computerised randomisation method. Total 55 patients received hernia block (Group H) with 0.3 mL/kg of 0.25% concentration

of bupivacaine and another 45 patients received caudal block (Group C) with 0.75 mL/kg of 0.25% bupivacaine. In the postoperative period, mean pain free period and total duration of rescue analgesia were recorded in both the groups. Chi-square test and Fisher's-Exact test. The p-value <0.05 was indicated as statistically significant.

**Results:** Demographic data was comparable in two groups. The mean drug volume (bupivacaine 0.25%) used in group C was 8.44±3.46 mL and in group H was 4.24±1.6 mL. The mean pain free period, with in the first 24 hours, in group C was 8.80±6.43 hours and in group H, it was 11.77±8 hours. Rescue analgesia and FLACC score (the Face, Legs, Activity, Cry, Consolability scale) at 0 min, 15 min, 30 min and every hour upto 4 hours was comparable in both the groups. Mean time of discharge of patients receiving either of blocks, FLACC score at the time of discharge were comparable in both the groups.

**Conclusion:** Hernia block was more effective than caudal block based on duration of postoperative analgesia. There was higher margin of safety with lower volume of local anaesthetic used.

**Keywords:** Anatomical landmark, Bupivacaine, Haematoma, Hernia blocks, Pain free period

## INTRODUCTION

Inguinal hernia is a common paediatric pathology, occurring in approximately 2% of infant males, slightly reduced incidence in females, and as high as 9-11% in premature infants [1].

Young children lack the ability to communicate their analgesic needs and are unable to use a patient controlled analgesic devices, therefore, regional anaesthesia techniques are preferred in children for relief of postoperative pain [2]. The most preferred regional anaesthesia techniques in paediatric patients are caudal blocks or anatomical landmark guided/ultrasound guided ilioinguinal-iliohypogastric nerve blocks (hernia blocks) for the above groin procedures [3]. The quality and level of the caudal blockade is dependent on the volume, and concentration of the injected drug [4,5]. Caudal analgesia is effective but can be short-lived and related with undesired motor blockade and other complications like urine retention, haematoma and rarely epidural abscess [2].

Hernia block have been shown to provide excellent postoperative pain control for inguinal herniotomy and orchidopexy and allow early ambulation and urination with no lower extremity weakness [6]. Although both the blocks are easy to perform, it has been observed that preparation time for hernia block was much shorter and the total dose of local anaesthetic used and the morbidity was less than for a caudal block [7]. Ultrasound guided hernia blocks are always more accurate as well safe [8,9]. However, in India due to lack of

resources and unavailability of Ultrasonography (USG) machine landmark technique is still ongoing and feasible. Anatomical landmark techniques are not only easy to learn but can be effectively utilised to provide perioperative analgesia with minimal resources and is highly cost effective [10].

The present study aimed to compare the postoperative analgesic efficacy of hernia block versus caudal block in inguinal herniotomy. The primary outcome measures were the postoperative pain free period as per the FLACC score (the Face, Legs, Activity, Cry, Consolability scale) (time interval between the end of surgery and first dose of rescue analgesia given), and the requirement of postoperative rescue. The secondary outcome measures were adverse effects like motor blockade, nausea, vomiting, urinary retention and haematoma at the site of injection.

## MATERIALS AND METHODS

This single-centre, randomised clinical study was conducted at Tertiary Medical College and Hospital (Lokmanya Tilak Municipal Medical College and General Hospital), Mumbai, Maharashtra, India, from December 2016 to December 2018. After Institutional Review Board and approval from the Human Research Ethics Committee (SRS/550/16 dated 15/12/16), 100 children undergoing inguinal herniotomy were enrolled in the present study. Written informed consent were obtained from their respective parents.

This trial has been registered in Clinical Trial Registry-India (CTRI/2021/10/037565).

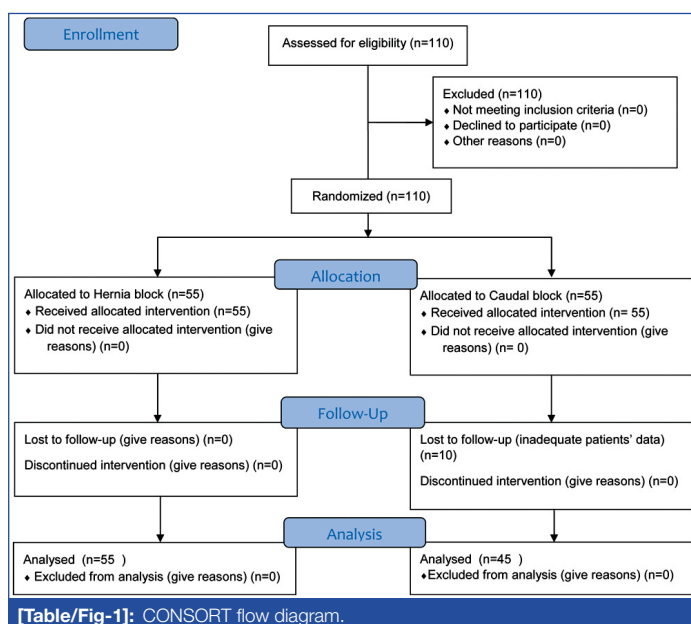
**Inclusion criteria:** Children aged 6 months to 6 years of age, of both gender, belonging to American Society of Anaesthesiology (ASA)- Physical Status grade I and II, posted for elective unilateral inguinal herniotomy were included in the study.

**Exclusion criteria:** Patients with lack of parental consent, coagulopathy, infection at the site of puncture, congenital anomaly of spine, known allergy to drug used in the study were excluded from the study.

**Sample size calculation:** A power analysis estimated a sample size of 70 patients, with alpha error of 0.05 and beta error of 0.2 (80% power), to detect a 30% reduction in number of patients requiring rescue analgesia between hernia block and caudal block groups. However, 100 consenting patients were included in the study.

All respective parents/guardians fulfilling the above-mentioned criteria have explained about the study. Informed, written and valid consent from respective parents/guardians for participation in the study was obtained prior to surgery. After complete history and thorough clinical examination, patient's demographic characteristics were noted. All patients fulfilling the above mentioned inclusion criteria were selected by convenient, consecutive sampling method as per the discretion of consultant anaesthetist and divided into respected groups [Table/Fig-1].

- Group C: Caudal Epidural block (Caudal block)
- Group H: Ilioinguinal/Iliohypogastric block (Hernia block)



## Study Procedure

All children were given general anaesthesia as per the routine standard institutional protocol. In presence of peripheral intravenous (i.v.) access, all the patients were premedicated with injection glycopyrrolate 0.004 mg/kg, injection midazolam 0.02 mg/kg, fentanyl 2 µg/kg. Patients were induced with propofol 3-4 mg/kg in presence of pre-existing i.v. access. In case of no intravenous access, sevoflurane was used for the induction of anaesthesia. Subsequently, after securing i.v. access, glycopyrrolate 0.004 mg/kg, midazolam 0.02 mg/kg, fentanyl 2 µg/kg were administered intravenously. Airway was secured using an appropriately sized supraglottic airway device like I-gel™ after the child was in an adequate plane of anaesthesia or appropriately sized endotracheal tube (portexuncuffed) was inserted after giving muscle relaxant. Anaesthesia was maintained with spontaneous or assisted controlled ventilation with oxygen (O<sub>2</sub>), nitrous oxide (N<sub>2</sub>O) along with sevoflurane or i.v. propofol as per the discretion of consultant anaesthetist. Perioperative judicious fluid management was done

according to Holiday-Segar formula using dextrose containing lactated ringer's solution. Intraoperative monitoring included 3 lead Electrocardiogram (ECG), End-Tidal Carbon Dioxide (EtCO<sub>2</sub>), peripheral oxygen saturation (SpO<sub>2</sub>), Non Invasive Blood Pressure (NIBP). Caudal block or hernia block was given prior to surgery following induction of anaesthesia.

Intraoperatively increase in Heart Rate (HR) or systolic blood pressure of greater than 20% was managed with fentanyl 0.5 µg/kg or 1 µg/kg as required.

**Caudal Epidural block (Group C):** After giving general anaesthesia patient was put in the left lateral position. Once sacral hiatus was appreciated, the area above was scrubbed, painted and draped. Ascalp vein cannula (23 Gauge) was inserted in midline to sacral canal with an angle of about 45° to the skin till 'a click' was appreciated, as the sacrococcygeal ligament was pierced by the advancing needle. The needle was then oriented in a cranial direction at an angle approaching the long axis of sacral canal. After confirming correct needle position i.e. with negative aspiration of cerebrospinal fluid or blood, test dose was administered. Drug used was 0.75 mL/kg of 0.25% concentration of bupivacaine.

**Anatomical landmark guided ilioinguinal- iliohypogastric nerve block (Group H):** The iliohypogastric and ilioinguinal nerves arise from the first Lumbar spinal nerve root (L1). Hernia block (ilioinguinal-iliohypogastric nerve block) was given according to the landmarks explained by Van Bahr [11] and Sethna and Berde [12], using a double-pop technique which consisted drawing a line from the Anterior Superior Iliac Spine (ASIS) to the umbilicus which subsequently divided into four equal parts. The site of puncture was at the junction of the lateral one-fourth and the medial three-fourths. With the patient in supine position, after part scrubbed, painted and draped, 23 G short beveled needle (preferably blunt needles to appreciate the loss of resistance as the needle traversed the layers of the abdominal wall) was then inserted perpendicularly to the skin at the above described point and slowly advanced deep to the external oblique muscle (first pop) and internal oblique muscle (second pop). Drug was then injected above the transverse abdominis muscle where the nerves and their branches run, after negative aspiration of blood. Local anaesthetic used was 0.3 mL/kg of 0.25% concentration of bupivacaine.

After surgery children were shifted to the post anaesthesia care unit for continuous monitoring of vital signs and assessment of pain when they were satisfactorily awake and capable of maintaining an open airway. Patients were observed for 2 hours in post anaesthesia care unit and later in the Paediatric Ward till discharge.

- Postoperative pain assessment was monitored and recorded at 0 minute (immediate postoperative), 15 minutes, 30 minutes, 1 hour and every hour up to 4 hours and at the time of discharge or up to 24 hours. Assessment of analgesia was done by using FLACC score [13]. Vital parameters like HR and SpO<sub>2</sub> were monitored for first 4 hours, postoperatively.
- Duration of postoperative analgesia (pain free period) was measured. The pain free period was the time interval between the completion of surgery and first dose of rescue analgesia given. Patients with FLACC score more than or equal to 4 were given rescue analgesia with 15 mg/kg paracetamol intravenously.
- Assessment of adverse events such as urinary retention, haematoma at puncture site was done till discharge.
- Children were discharged from the hospital after 6 hours or next day morning when they were pain free, as per discretion of surgeons.

## STATISTICAL ANALYSIS

After data collection, data entry was done in Microsoft Excel. Data analysis was done with the help of Statistical Package for Social Sciences (SPSS) software for windows, version 15.0. Quantitative

data is presented as arithmetic mean, median, standard deviation. Comparison among various groups were done with the help of Unpaired t-test. Qualitative data is presented as frequency and percentage. Association among various study parameters was assessed by Chi-square test and Fisher's-Exact test. The p-value <0.05 was indicated as statistically significant.

## RESULTS

A total of 100 patients were recruited for the study. Mean age, gender, mean weight and time required for surgery were comparable in both groups [Table/Fig-2].

Variables	Group C (Mean±SD)	Group H (Mean±SD)	p-value
Mean age (years)	3.28±2.06	3.88±1.77	0.119
Gender			
Female (n)	2	5	-
Male (n)	43	50	
Weight (kg)	11.93±4.01	13.39±4.07	0.075
Duration of surgery (minutes)	44.00±11.56	46.18±30.18	0.648

**[Table/Fig-2]:** Demographic characteristics in group C (n=45) and group H (n=55). p-value <0.05 was considered as statistically significant

The mean drug volume (bupivacaine 0.25%) used in group C was 8.44±3.46 mL and in group H was 4.24±1.6 mL. The mean pain free period in 24 hours in group C was 8.80 ±6.43 hours and in group H, it was 11.7±8 hours, significant difference noted between the two groups [Table/Fig-3].

Characteristics	Group C (Mean±SD)	Group H (Mean±SD)	Unpaired t-test	p-value
Drug volume (0.25% bupivacaine) (in mL)	8.44±3.46	4.24±1.60	8.035	<0.0001
Mean pain free period (first rescue analgesia given) (in hours)	8.80±6.43	11.77±8.00	-2.015	0.047

**[Table/Fig-3]:** Bupivacaine and mean pain free period in both groups. p-value <0.05 was considered as statistically significant

Rescue analgesia at 0 min, 15 min, 30 min, 1<sup>st</sup> hour, 2<sup>nd</sup> hour, 3<sup>rd</sup> hour and 4<sup>th</sup> hour was comparable in both groups. Fourteen patients required rescue analgesia within 30 minutes postoperatively in both the groups. This could mean failed blocks [Table/Fig-4].

Rescue analgesia	Group C (n, %)	Group H (n, %)	Total (n=100)	p-value
At 0 min	0	0	0	-
At 15 min	2 (4.4%)	1 (1.8%)	3 (3%)	0.444
At 30 min	5 (11.1%)	6 (7.3%)	11 (9%)	0.445
At 1 hour	1 (2.2%)	3 (5.5%)	4 (4%)	0.412
At 2 hours	1 (2.2%)	1 (1.8%)	2 (2%)	0.886
At 3 hours	0	2 (3.6%)	2 (2%)	0.196
At 4 hours	0	1 (1.8%)	1 (1%)	0.363

**[Table/Fig-4]:** Requirement of rescue analgesia at various time intervals. p-value <0.05 was considered as statistically significant

The mean pain score during hospital stay for a group C was 0.89±1.68 compared to 0.88±1.66 in group H. Mean time of micturition after surgery, FLACC score at the time of discharge, mean time of discharge of patients and average duration of stay in hospital of patients receiving either of blocks were comparable in both the groups [Table/Fig-5].

[Table/Fig-6] shows the variation of heart rate in postoperative period. The values were compared using unpaired t test. Maximum mean heart rate was noted in group C was 102.31 and in group H was 98.20 at immediate postoperative period i.e, at 0 minute. [Table/Fig-7] shows comparison of peripheral oxygen saturation

in postoperative monitoring which was determined between 97% and 100% in both group at all measurement point. There was no significant difference.

Characteristics	Group C (Mean±SD)	Group H (Mean±SD)	p-value
Time of micturition after surgery (hours)	3.36±1.61	3.20±1.60	0.614
FLACC score at discharge	0.36±0.80	0.29±0.74	0.676
Time of discharge (in hours)	6.09±3.99	5.95±2.51	0.834
Duration of stay in hospital after surgery (hours)	5.94±4.02	5.94±2.51	1

**[Table/Fig-5]:** Postoperative assessment of discharge time, micturition time, FLACC score and hospital stay. p-value <0.05 was considered as statistically significant

Heart rate (beats/min)	Group C (Mean±SD)	Group H (Mean±SD)	Unpaired t-test	p-value
At 0 min	102.31±20.17	98.20±14.84	1.173	0.244
At 15 min	100.56±21.37	95.04±14.84	1.520	0.132
At 30 min	97.31±20.55	96.44±18.31	0.225	0.823
At 1 hour	96.60±19.54	90.98±13.70	1.686	0.095
At 2 hours	92.16±15.16	88.25±10.50	1.516	0.133
At 3 hours	91.67±13.33	86.20±9.67	2.374	0.020
At 4 hours	91.73±12.83	86.47±9.31	2.373	0.020

**[Table/Fig-6]:** Comparison of Heart Rate (HR) in postoperative monitoring. p-value <0.05 was considered as statistically significant

SpO <sub>2</sub> (%)	Group C (Mean±SD)	Group H (Mean±SD)	Unpaired t-test	p-value
At 0 min	99.44±0.62	99.64±0.59	-1.579	0.118
At 15 min	99.58±0.58	97.87±12.09	0.944	0.347
At 30 min	99.58±0.58	97.91±12.09	0.924	0.358
At 1 hr	99.64±0.53	99.62±0.59	0.231	0.818
At 2 hr	99.64±0.48	99.71±0.57	-0.605	0.546
At 3 hr	99.71±0.51	99.71±0.63	0.017	0.986
At 4 hr	99.71±0.46	99.80±0.49	-0.932	0.353

**[Table/Fig-7]:** Comparison of SpO<sub>2</sub> in postoperative monitoring. p-value <0.05 was considered as statistically significant

[Table/Fig-8] shows comparison of FLACC score at different point of measurement. The average pain score during hospital stay for group C was 0.89±1.68 compared to 0.88±1.66 in group H, with no statistically significant difference between groups according to unpaired t-test.

FLACC score	Group C (Mean±SD)	Group H (Mean±SD)	Unpaired t-test	p-value
At 0 min	1.13±2.05	1.25±1.85	-0.310	0.757
At 15 min	1.18±1.92	1.49±2.10	-0.771	0.443
At 30 min	1.18±1.95	1.40±2.51	-0.487	0.628
At 1 hour	0.98±1.92	0.91±1.88	0.180	0.858
At 2 hours	0.91±1.93	0.45±1.15	1.466	0.146
At 3 hours	0.42±0.97	0.38±1.16	0.186	0.853
At 4 hours	0.44±1.01	0.31±0.96	0.684	0.495

**[Table/Fig-8]:** Comparison of FLACC Score in postoperative monitoring. p-value <0.05 was considered as statistically significant

The present study showed that, in caudal group, out of 45 patients, nine patients were infant of which 3 (33.33%) patients required rescue analgesia. In hernia group, out of 55 patients seven patients were infant out of which only 1 (14.28%) patient required rescue analgesia. This showed that caudal block was technically more difficult to give in infants as compared to hernia block [Table/Fig-9]. In the present study, more patients in group H (25.45%) required additional i.v. fentanyl intraoperatively than group C (20%). This showed that, not only landmark based hernia blocks but caudal

Group	Age	Rescue analgesia		Total	p-value
		Yes	No		
Group C	6 to 12 months	3 (33.3%)	6 (66.6%)	9	0.742
	Above 1 year	6 (16.66%)	30 (83.33%)	36	0.799
	Total	9 (20%)	36 (80%)	45	0.063
Group H	6 to 12 months	1 (12.5%)	7 (87.5%)	8	0.742
	Above 1 year	13 (27.65%)	34 (72.34%)	47	0.799
	Total	14 (25.45%)	41 (74.54%)	55	0.063

**[Table/Fig-9]:** Association among study groups between age, rescue analgesia group. p-value <0.05 was considered as statistically significant; Pearson Chi-square test

blocks had almost similar failure rates or inadequately acting blocks [Table/Fig-10]. There were no opioid related treatment requiring side-effects or block related complications in cases during the postoperative follow-up.

Intraoperative fentanyl 2 µg/kg	Group C (n, %)	Group H (n, %)	Total	p-value (Pearson Chi-square test)
Additional received fentanyl	9 (20%)	14 (25.45%)	23 (23%)	0.625
Not received fentanyl	36 (80%)	41 (74.54%)	77 (77%)	0.809
Total	45	55	100	

**[Table/Fig-10]:** Shows subsequent analgesic requirements intraoperatively. p-value <0.05 was considered as statistically significant

## DISCUSSION

Caudal anaesthesia is one of the popular and most commonly used regional blocks in children. Technique of caudal block has limitations like anatomical variations, sacral or spinal deformities and coagulation disorder. Caudal blocks can also cause complications such as mechanical damage to the nerves, bone marrow puncture, retroperitoneal haematoma, bowel perforation and the dangers of systemic toxicity.

In hernia block, limitations are less but it has its own set of complications such as pelvic haematoma, colonic or small bowel puncture, femoral nerve palsy, quadriceps muscle paraesis, infection and abscess formation.

As anatomical landmark guided techniques were used, rescue analgesia used was more in the hernia block (25.45%) as compared to caudal block (20%). However, the chances of failure of block could be due to inaccurate placement of Local Anaesthetic (LA) in adjacent anatomical structure with unpredictable block results [9], or lack of specific spatial knowledge of the anatomy of these nerves in infants and neonates [14]. Yet in the present study, 80% patients required no rescue analgesia for 24 hours in the group C and 74.54% in H group, though the difference was statistically insignificant.

The present study showed that, in group C, out of 45 patients, nine patients were infant of which 3 (33.33%) patients required rescue analgesia. In hernia group, out of 55 patients, seven patients were infant out of which only 1 (14.28%) patient required rescue analgesia. This showed that caudal block was technically more difficult to give in infants as compared to hernia block.

In another study, the success rate hernia block has been reported to be approximately 70% [6]. Weintraud M et al., performed a study to explain the reasons behind failed block and to determine the actual location of LA when hernia blocks were performed using landmark-based techniques (single pop-up) and dispersion of the LA performed with Ultrasonography (USG). According to their study, the local anaesthetic solution was administered successfully around the nerves in 14% of the blocks while in remaining 86%, the local anaesthetic was administered in adjacent anatomical structures and 45% of these blocks were failed [9]. Their study concluded that clinical successful blocks were closer to the targeted nerves than failed blocks however, in majority of patients, the local anaesthetic was inaccurately placed in adjacent anatomical structures with

unpredictable block results. This was not seen in the index study, probably because an accurate technique of double pop-up method [external oblique (first pop) and internal oblique muscle (second pop)] was used, and thus majority of the patients were pain-free in both the groups. The failures of hernia blocks may be due to the difficulty in identification of external oblique aponeurosis and unable to appreciate pop-up techniques well. This was avoided by using short, beveled or slightly blunted needle to emphasise the resistance of the needle as it passes through the aponeurosis. These two pop-ups were confirmed before depositing the drug between the transverse abdominis and internal oblique muscle plane [9].

Hernia block provided more duration of pain free period than a caudal block, with a lesser amount of local anaesthetic solution administered. This could be anticipated as uptake of drug was faster from the epidural space. There was no means of reliable control of the spread of anaesthetic solution inside the caudal space, which may lead to a reduced cephalad spread or unilateral block, also, because of its vascularity, uptake, metabolism and excretion of drug would be faster in caudal block as compared to peripheral nerve blocks. However, with the local anaesthetic deposited closure to the nerves, hernia block may provide higher drug concentration around the targeted nerves, and as the quantity of the local anaesthetic decreases over time, the advantages of hernia block gradually become prominent. Yet, the variable duration of pain free period in hernia blocks can be due to the fact that it may not be always possible to locate the exact site of the nerve fibres in blind techniques [4,5].

The study done by Abdellatif AA, mean pain free period was more variable in Ultrasound (US) guided hernia block (253±102.6 minutes) as compared to (219.6±48.4 minutes) caudal block in children aged 1-6 years undergoing unilateral groin surgeries. As the study was US-guided, precise administration of LA resulted in effective hernia blocks in children, with a reduced failure rate of 4%, suggestive of decreased incidence of failure rate in ultrasound guided blocks [15].

According to Bhattarai BK et al., the mean duration of analgesia was 253±102.6 minutes in hernia group as compared to 219.6±48.4 minutes in caudal block group which suggested that, the simplified hernia blocks in combination with LA wound infiltration offers longer mean duration of analgesia and better safety margin to start oral analgesics than caudal block in children undergoing inguinal herniotomy [16].

Bupivacaine, levo-bupivacaine, ropivacaine can be used in peripheral nerve blocks and caudal blocks [17,18]. The present study used bupivacaine as local anaesthetic drug in our study as it was easily available and there was no significant difference between ropivacaine and bupivacaine as stated by other authors. Astuto M et al., compared 0.25% levobupivacaine with 0.25% of ropivacaine by the caudal route in children undergoing elective minor inguinal surgeries including herniotomy with volume of 1 ml/kg, and found no significant difference for mean time to requirement of additional analgesia (230±38 min for the ropivacaine group and 302±29 min for the levobupivacaine group) [17]. Lignocaine has a very short duration of action among the other drugs. Authors have used 0.25% concentration of bupivacaine in both the groups. The total dose (volume and concentration) of local anaesthetic used for the hernia block technique was much lesser than that of required for caudal anaesthesia.

The present study used bupivacaine of 0.25% concentration of 0.3 mL/kg in hernia block and 0.75 mL/kg in caudal block, as it has long duration of action. With the local anaesthetics being deposited closure to the nerves in the plane between internal oblique and transverse abdominis muscle in hernia block, may have required lower volume of local anaesthetic to attain the similar effects as compared to caudal block. By using lower volume of local anaesthetic, there will be lesser systemic toxic effects, authors were ensuring safety of the children by using smaller drug volumes, one

can further decrease the drug volume while actually observing the nerves like in US-guided blocks.

A study by Willschke H et al., showed that effective hernia block can be achieved using a volume of LA as low as 0.075 mL/kg when using ultrasound guidance [19].

General anaesthesia might have some complications like postoperative nausea, vomiting, cardiac instability, urinary retention and prolonged hospitalisation due to delay of recovery from anaesthesia. In the present study, there were no complications in children, related to general anaesthesia. It has been observed that hernia block was easier and faster to perform as given in supine position itself hence, preparation time for hernia block is much shorter than caudal block, as it is given in lateral position.

In the current study, in group C (20%) patients and group H (25.45%) were received additional i.v. fentanyl intraoperatively. Time to onset of analgesia, as indicated by changes in intraoperative heart rate in response to surgical stimulation was not comparable in this study as preparation time required for both the blocks was different and the surgeon immediately prepared for the incision and subsequent surgery. So, the present study primarily aimed to compare analgesic efficacy of both the groups, postoperatively. Hernia block may be sparing the visceral pain of hernia sac traction, as it mainly covers somatic pain. There were no opioid-related treatment requiring side effects or block related complications in cases during the postoperative follow-up in the present study.

Markham SJ et al., compared ilioinguinal-iliohypogastric block versus caudal block in children aged 1-12 years undergoing herniotomy or orchidopexy and proposed that earlier micturition in ilioinguinal-iliohypogastric group was an important advantage over the caudal block [20]. Authors have noted similar finding in the present study.

The longer duration of analgesia, less invasiveness of the procedure and lower incidence of complications after peripheral nerve block (hernia block) should encourage paediatric anesthesiologist to use them more often when they are appropriate, in the place of a central neuroaxial block which is more invasive.

### Limitation(s)

The study did not assess the time of onset of analgesia as preparation time and positioning required for both the blocks was different and the surgeons prepared for the surgery, immediately following performance of the block.

### CONCLUSION(S)

Ilioinguinal- iliohypogastric nerve block, if given by proper anatomical landmark technique, can be an ideal postoperative analgesic for

unilateral inguinal herniotomy in children where ultrasonography is not available. The present study concluded that hernia block was more effective than caudal block based on longer pain free period and lower drug volume, making it more safe.

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