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RESEARCH ARTICLE

A COMPARATIVE STUDY OF USG GUIDED TRANSVERSE ABDOMINIS PLANE BLOCK VERSUS CAUDAL BLOCK WITH 0.2% INJ ROPIVACAINE FOR POST OPERATIVE ANALGESIA IN CHILDRENS UNDERGOING INGUINAL HERNIA SURGERY

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Abstract

Objectives: To compare the duration of postoperative analgesia betwee n TAP block and caudal block in children undergoing inguinal hernia surgeries.

Materials & Methods: A prospective study conducted in 40 children of age 2-8 years and ASA grade I and II, undergoing elective inguinal hernia surgery were randomly allocated into two groups: Group A(n =20) received USG-guided TAP block with 0.5mL/kg of 0.2% ropivacaine and Group B (n = 20) received caudal block with 1mL/kg of 0.2% ropivacaine. The primary outcome variable was the duration of postoperative analgesia and the secondary outcome variables included variation in hemodynamic parameters and adverse effects.

Results: There was no significant difference in median of FLACC score till 5 postoperative hours, thereafter till 24 postoperative hours, significantly lower FLACC score were found in Group A. Mean duration of analgesia was 780 ± 273.30 min in Group A, whereas in Group B, it was 456 ± 120.54 min. No significant difference was observed in hemodynamic variations and adverse effects.

Conculsion: TAP block and caudal block both are effective in providing postoperative analgesia in children undergoing inguinal herniotomy. USG-guided TAP block was found to be superior as it provided longer duration of analgesia and reduced rescue analgesic dose without any significant adverse effects as compared with caudal block after inguinal herniotomy.

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Introduction:-

Post operative pain management is one of the most important issues influencing the outcome of surgery, and usually it is an unmet criteria in children. Regional anaesthesia technique significantly relivespain in post-operative period. Regional blocks with the help of ultrasound have been of great importance for post-operative pain relief. Caudal block is the most common block and TAP block is being used recently.

Aims:-

To study and compare the duration of postoperative analgesia in TAPand Caudal block, the amount of rescue analgesia required in the first 24hrspostoperatively and incidence of any side effects to 0.2% inj ropivacaine and/or procedure.

Materials and Method:-

A Prospective interventional study was conducted among 40 paediatric patients of age 2-8years and ASA grade I and II, undergoing Inguinal hernia surgery. 40 children satisfying the inclusion criteria were included in the study, after obtaining informed consentfrom the parents/guardian of the patients. They were randomly allocated intotwo groups of 20 patients in each. Group A (n=20) Received USG-guided TAP Block and Group B (n= 20) Received Caudal Block with 1ml/kg of 0.2% inj ropivacaine.

All patients were visited 1 day prior to surgery and explained about the anesthesia technique and perioperative course. Each patient underwent a thorough pre-anesthetic check.Age and weight of the patient was recorded preoperatively.All children were fasted 8hrs for solid, 6hrs for milk and 2 hrs for clear liquid. On arrival in OT, multipara monitoring of ECG, SpO2, NIBP were established. Base line parameters (SpO2, pulse rate, SBP, DBP) were recorded. Patient was pre-medicated with glycopyrrolate 0.005mg/kg, midazolam 0.05mg/kg, and fentanyl 2µg/kg intravenously (IV) through already secured IV line, and ringer lactate infusion was started. After pre-oxygenation with 100% O2, anesthesia was induced with propofol 2– 3mg/kg and atracurium 0.6mg/kg; endotracheal intubation was done using appropriate size endotracheal tube. Anesthesia was maintained with O2:N2O ratio 2:3 and sevoflurane (1%–2%) and atracurium 0.15mg/kg SOS.

Group A (n=20): USG Transversus abdominis plane block

Patient is in supine position, under Ultrasound guidance sub-coastal TAP block is given with 1ml/kg 0.2% inj ropivacaine. The linear ultrasound probe connected to a portable ultrasound unit was placed in mid axilliary level in the transverse plane to the lateral abdominal wall midway between the lower costal margin and the highest part of iliac crest. A 22G needle attached with syringe fixed with 0.2% ropivacaine (1ml/kg) was inserted in plane with the ultrasound probe and advanced until it reached the plane between transversus abdominis and internal oblique muscle, after careful aspiration to exclude vascular puncture, the local anaesthetic solution was injected, leading to separation between the internal oblique and transversus abdominis muscle, which appeared as a hypo echoic space in ultrasound.

Group B(n=20): With all asceptic measures caudal block was performed using 22G needle in left lateral decubitus position. Sacral hiatus is palpated, 2 sacral cornua are identified , Between the sacral cornua are the sacrococcygeal ligament and dorsal bony surface of sacrum . A 22G needle is then inserted into the sacral hiatus (between the two cornua) until a pop is felt during penetration of the sacrococcygeal ligament, further ensured by doing whoosh test using 0.5ml of air . Inj 0.2% ropivacaine 1ml/kg was administered after negative aspiration of blood and CSF.

Intra operative heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure were recorded every 5 minutes. After completion of the surgical procedure, patient was transferred to PACU (post anaesthesia care unit). PostoperativeFLACC pain score was assessed at 0,2,4,6,8,10,12,16,20 and 24hrs. If two coupled observations separated by a 5min waiting period yielded FLACC pain scale score anytime to be more than 3, rescue analgesia with IV PARACETAMOL was administered to achieve FLACC score of 3 (or) less. The primary outcome measures were the time tofirst rescue analgesia (in minutes from the time of caudal (or) TAP block injection to first registration of FLACC pain score >3. Secondary outcome measures included FLACC Scale score and intra operative hemodynamic variables. Complications like PONV, urinary retention, respiratory depression, apnea etc are recorded. Collected data was analysed by IBM SPSS2.0 version software. Quantitative and qualitative data analysis was done by t-test and chi-square test respectively.

Results:-

Table 1:- Flacc Score-Comparison in two groups of patients studied.

FLACC SCORE	CAUDAL	TAP	Total	Z Value	P Value
0hrs	0.00±0.00	0.00±0.00	0.00±0.00	0.000	1.000
2hrs	0.05±0.22	0.00±0.00	0.03±0.16	-1.000	0.317
4hrs	1.4±1.14	0.7±0.73	1.05±1.01	-2.127	0.033*
6hrs	2.85±1.09	1.4±0.88	2.13±1.22	-3.917	<0.001**
8hrs	2.4±1.19	1.9±0.97	2.15±1.1	-1.345	0.179
10hrs	2.1±1.21	2.45±1	2.28±1.11	-1.195	0.232
12hrs	1.8±1.11	2.7±0.98	2.25±1.13	-2.874	0.004**
16hrs	2.35±0.99	2.75±1.41	2.55±1.22	-.758	0.449
20hrs	2.65±0.99	2.25±1.07	2.45±1.04	-1.209	0.227
24hrs	3.05±1.15	2.4±0.94	2.73±1.09	-1.667	0.096+

FLACC score at 4th hour was statistically moderately siginificant, at 6th hour and 12th hour were strongly significant

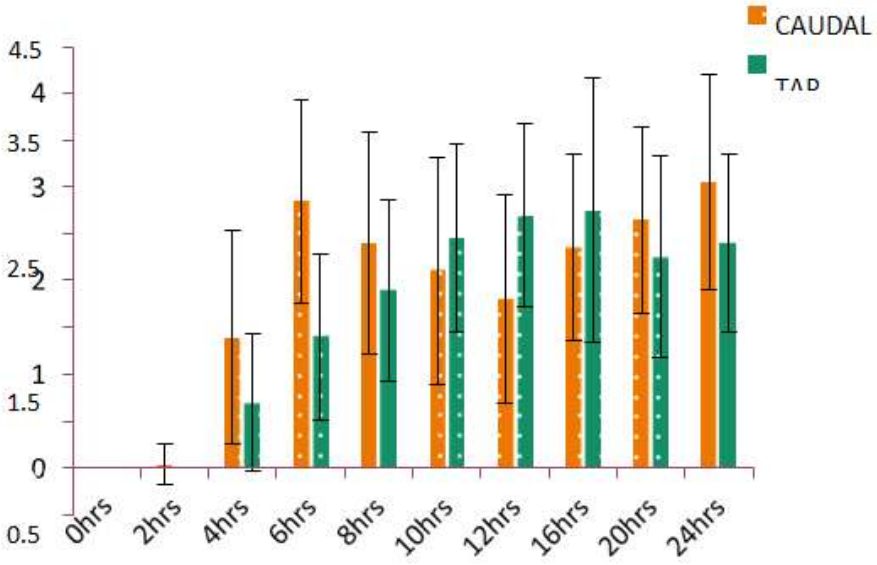
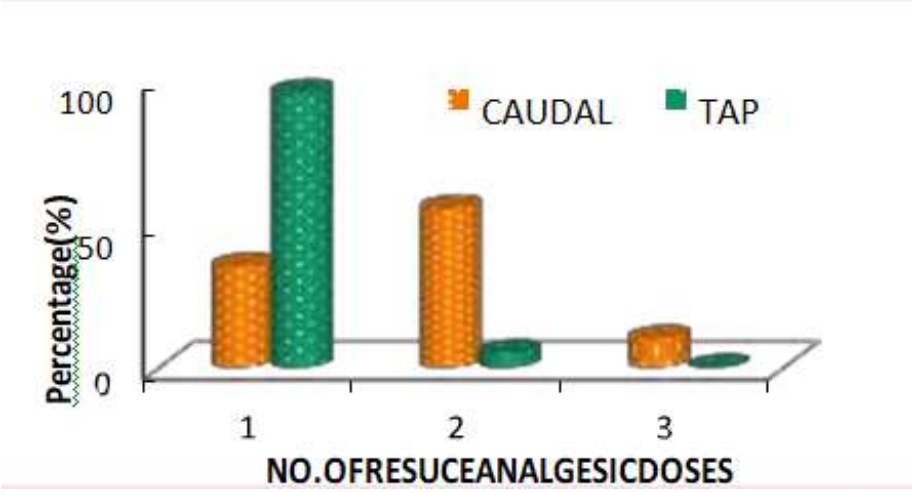


Table 2:- No. of resuce analgesic doses-Comparison in two groups of patients studied.

NO. OF RESUCE ANALGESIC DOSES	CAUDAL	TAP	Total
1	7(35%)	19(95%)	26(65%)
2	11(55%)	1(5%)	12(30%)
3	2(10%)	0(0%)	2(5%)
Total	20(100%)	20(100%)	40(100%)

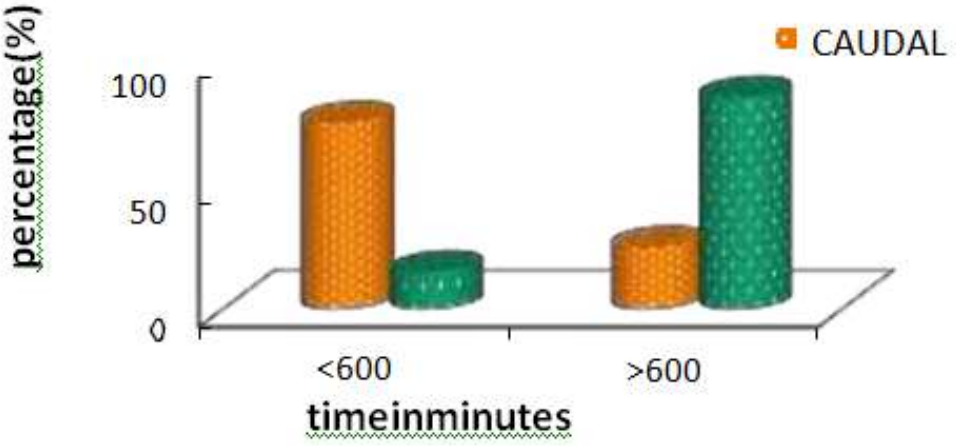


P≤0.001**, Significant, Fisher Exact Test
Number of rescue analgesic dose required showed statistical significance.

Table 3:- Time of First Analagesia in Mins.

TIME OF FIRST ANALAGESIA IN MINS	CAUDAL	TAP	Total
<600	15(75%)	3(15%)	18(45%)
>600	5(25%)	17(85%)	22(55%)
Total	20(100%)	20(100%)	40(100%)
Mean ± SD	456±120.63	780±273.92	618±265.63

P≤0.001**, Significant, Student t Test

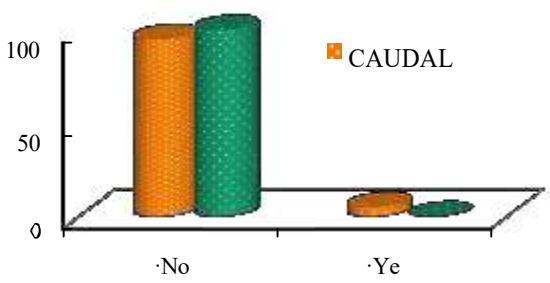


Time of first analgesic dose in caudal block was 456±120.63mins while TAP block was 780±273.92. They showed strong statistical significance

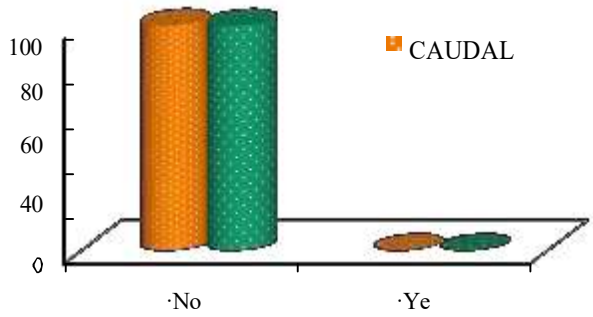
Table 4:- Post OP Complications.

POST OP COMPLICATIONS	CAUDAL (n=20)	TAP (n=20)	Total (n=40)	P Value
RESPIRATORY DEPRESSION				
No	19(95%)	20(100%)	39(97.5%)	1.000
Yes	1(5%)	0(0%)	1(2.5%)	
APNEOA				
No	20(100%)	20(100%)	40(100%)	1.000
Yes	0(0%)	0(0%)	0(0%)	
URINARY RETENTION				
No	15(75%)	20(100%)	35(87.5%)	0.047*
Yes	5(25%)	0(0%)	5(12.5%)	
PONV				
No	17(85%)	19(95%)	36(90%)	0.604
Yes	3(15%)	1(5%)	4(10%)	

Chi-Square Test/Fisher Exact Test



POST OP COMPLICATIONS : RESPIRATORY



POST OP COMPLICATIONS :

Discussion:-

Pain relief in children undergoing surgery in intra-operative and post-operative period is often unmet critical need. Adequate management of acute pain is essential to prevent transition to chronic pain[7]. Studies have shown good evidence that regional anaesthesia provides good quality, post-operative pain relief[8,9,10,11,12]. Regional blocks with the help of ultrasound have been of great importance for post-operative pain Relief in paediatric age group recently with lesser complications during procedure due to precise localisation of nerve. Reduced post- operative pain, pain scores, opioid consumption and post-operative nausea vomiting are few ofthe benefits of regional block[13].

In 2014, Dalia M. Fawy et al[14] conducted a study where in Thirty-nine patients were divided into two groups: group A (caudal; n = 19 patients) received a single caudal dose of isobaric bupivacaine 0.25% (1.25 ml/kg) and group B (TAP block; n = 20 patients) received isobaric bupivacaine 0.25% (0.3 ml/kg). The results showed Group B had a significantly longer time tofirst analgesia dose than group A. Our study showed the duration of analgesic effect in post- operative period was found to be significantly longer in TAP block than caudal block.

Robert B Bryskin et al[15] conducted a double blinded study to compared TAP block and caudal block in paediatric patients and concluded that TAP block provided superior analgesia compared with the caudal block at 6 to 24 hours after block placement, as demonstrated by astatistically significant decrease in cumulative opioid requirement.

In our study, were the duration analgesia for caudal group with 0.2% plane ropivacaine was 456 ± 120.63 min. And for TAP block it was found to be 780 ± 273.92mins. The duration of post operative pain relief was longer in TAP block when compared to caudal block. This can be because of the high vascularity of the caudal space; the absorption of local anaesthetic intosystemic circulation is more in caudal block, resulting in faster clearance of the local anaesthetic. Transversus Abdominis Plane is a relatively avascular fascial plane. The local anaesthetic drug volume deposited in the caudal space has to spread over a larger area to achieve the level of blockade whereas the drug volume injected in TAP spreads in a narrow fascial plane between two muscles Neha Kanojia et al[16] in the year 2015 compared USG guided TAP block with Caudal block forlower abdominal surgeries in children of age group 1-12yrs demonstrated lower mean VAS scores in both the groups for first 3-4 hours postoperatively, similar to our study. After 3-4 hours, there was a rise in the number of patients with mean VAS score >3 in Caudal group compared to group TAP.

In the year 2022, Mukesh singh rautela et al[17] conducted a study to compare TAP block, Caudal block and local infiltration for post operative analgesia. The primary outcome was the efficacy of postoperative analgesia using modified objective pain score (MOPS). Results showed that the MOPS was statistically better in Group TAP compared to group CB and group LI at 8 and 24 h postoperatively. Different observational pain scores were considered in different studies. In our study we considered FLACC scoring for pain. The FLACC scores were comparable in the immediate post op period 2hrs in both groups. This gives an impression thatboth caudal and TAP block provides Immediate post op pain relief. FLACC score was significantly higher at 4 to 6 hour in caudal block group requiring administration of analgesics.
In 2021 Bindu Ganesh et al[18] conducted a study on children of age group 2- 7 years undergoinglower abdominal surgeries. Group T received ultrasound guided TAP block and Group C receivedcaudal block. The study result showed rescue analgesic requirement was significantly less in Group T compared to Group C.

Rajesh Kumar Kodali et al[19] in 2020, conducted a study were in Sixty-two children undergoinginguinal hernia repair received TAP block (Group A) or caudal block (Group B) after randomization.The children were analyzed by comparing the post operative pain scores and duration of analgesia. They concluded that children who received TAP block had prolonged duration of analgesia and lower pain scores compared to those who received caudal analgesia. In our study, there was a significant difference seen in the number of rescue dose of analgesia were in caudal group required more analgesic dose than TAP block in first 24hrs.

Harsha Shanthanna et al[20] in 2014, did A Systematic Review and MetaAnalysis of Caudal Block as Compared to Non-caudal Regional Techniques for Inguinal Surgeries in Children. Their study showed thatcaudal block had significantly higher chances of urinary retention when compared non caudal regional techniques. Our study results showed significantly higher incidence of urinary retention in caudal group when compared to TAP group.

Conclusion:-

From the study conducted, we conclude that administration of ultrasound guided Transversus abdominis plane block for children undergoing inguinal hernia surgery increases the duration of post operative analgesia when compared to caudal block. Andhas no/minimal adverse effects. Hence, ultrasound guided Transversus abdominis planeblock can be used as an alternative for safe and prolonged post operative analgesia in children undergoing inguinal hernia surgery.

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