



ORIGINAL RESEARCH PAPER

Anaesthesiology

**A PROSPECTIVE, RANDOMIZED CONTROL STUDY
COMPARING ULTRASOUND GUIDED TRANSVERSUS
ABDOMINIS PLANE BLOCK VS CAUDAL EPIDURAL BLOCK
FOR POSTOPERATIVE ANALGESIA IN CHILDREN
UNDERGOING ELECTIVE LOWER ABDOMINAL SURGERIES**

KEY WORDS: Transversus
Abdominis Plane block, Caudal
epidural block, pain relief

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ABSTRACT This study was conducted to compare the efficacy of ultrasound guided Transversus Abdominis Plane block and caudal epidural block for post-operative pain relief in children undergoing elective lower abdominal surgeries.

INTRODUCTION

The term 'pain' is derived from the term 'poena' Pain is defined as "unpleasant emotional or sensory experience with associated potential or actual tissue damage or described in terms of such damage". It is a proven fact all can receive pain regardless of age, neonates, infants, children, even a preterm child. They show a severe stress response to painful stimuli.

AIM OF STUDY

This study compares the efficacy of ultrasound guided Transversus Abdominis Plane block and caudal epidural block for post-operative pain relief in children undergoing elective lower abdominal surgeries.

MATERIALS AND METHODS

In this prospective, randomized, double blind clinical trial, 46 healthy children between the age group of 1 to 8 years weighing between 5-20kg of ASA grade I (or) II scheduled for elective lower abdominal and genitourinary surgeries were selected. Children undergoing bilateral lower abdominal surgeries, Children with altered sacral, caudal anatomy, local infection at the site of block, renal (or) hepatic insufficiency, ASA III and IV, known allergy to study drugs, history of developmental delay, neurological disease, Skeletal deformities were excluded from the study. This was conducted after getting approval of institutional ethical committee and written informed consent of parents (or) guardians.

Children were randomly divided in to two groups for study using computerized program.

Group-C received caudal epidural block with 1ml per Kg of 0.25% Bupivacaine.

Group-T received ultrasound guided Transversus Abdominis Plane block with 0.3ml/kg of 0.25% Bupivacaine.

The age and weight of child was recorded, preoperative fasting protocols were strictly adhered to. After obtaining patients weight and age, appropriate size laryngeal mask airway was kept ready and the drug to be injected in caudal block and Transversus abdominis plane block was prepared in syringes under strict aseptic precautions.

All patients were premedicated with Inj. midazolam 0.4mg/Kg orally 15-20 min before anaesthetic induction. Patients were monitored using standard monitoring (heart rate, non-invasive blood pressure, and pulse oximetry). All patients were induced with 8% sevoflurane in 50% O₂ and 50% N₂O through Jackson-Rees modification of Ayre's T piece with appropriate size face mask.

A 22G intravenous cannula was inserted. After securing intravenous cannula, Inj.Propofol 2mg/Kg, Inj.Atropine 0.01mg/Kg and Inj.ketamine 1mg/Kg was given. Appropriate size LMA (2 and 2.5) was inserted. Anaesthesia maintained with 2 %sevoflurane, delivered in 50% O₂ and 50% N₂O.

Group-C patients were placed in lateral decubitus position and a single dose caudal block by 0.25% Bupivacaine, 1ml/Kg was performed under sterile conditions using a 23G needle using a standard loss of resistance technique.

Patients in Group T were placed in supine position and TAP block was performed under ultrasound guidance. The linear ultrasound probe connected to a portable ultrasound unit was placed in mid axillary level in the transverse plane to the lateral abdominal wall midway between the lower costal margin and the highest part of iliac crest. A 18G needle attached with syringe fixed with 0.25% Bupivacaine (0.3ml/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.

Intra operative systolic blood pressure, diastolic blood pressure mean arterial pressure and heart rate were recorded every 5 minutes. Balanced salt solution was administered at the rate of 15-20ml/Kg.

After completion of the surgical procedure, laryngeal mask airway removed in deep plane and transferred to PACU

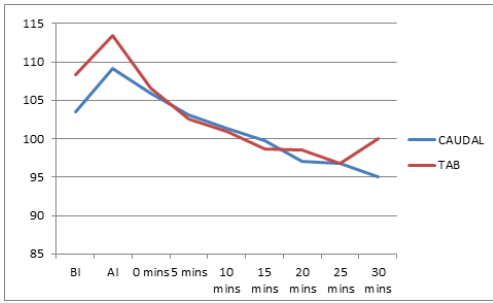
Using the Paediatric observational FLACC pain scale score with its 0-10 score range, postoperative FLACC pain score was assessed upon arrival and every 2 Hr for first 24Hrs.

The primary outcome measures were the time to first analgesia (in minutes from the time of caudal (or) TAP block injection to first registration of FLACC pain score >3.

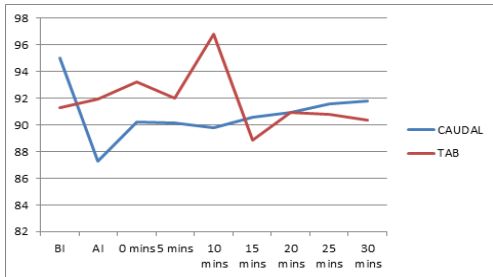
Secondary outcome measures included FLACC Scale score and intra operative hemodynamic variables.

STATISTICAL ANALYSIS

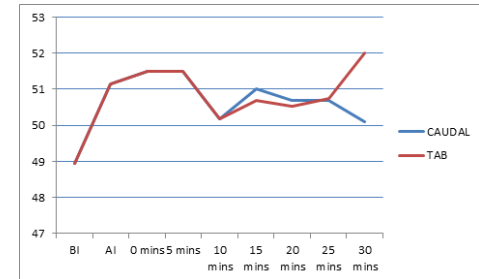
Descriptive statistics was done for all data and suitable statistical tests of comparison were done. Continuous variables were analyzed with the unpaired t test and categorical variables were analyzed with the Chi-Square Test and Fisher Exact Test. Statistical significance was taken as P < 0.05. The data was analyzed using SPSS software (7.1.0.6 version; Center for disease control, USA) and Microsoft Excel 2010.



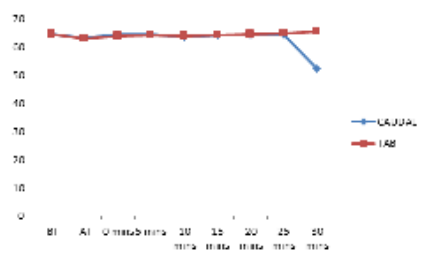
Graph 1 shows that intraoperative heart rate was comparable in both the groups.



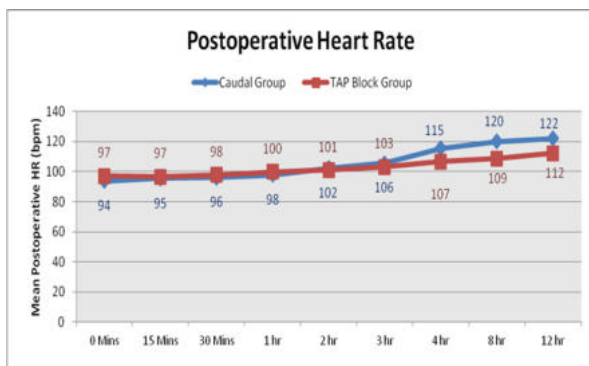
Graph 2 shows that intraoperative systolic blood pressure was comparable in both the groups.



Graph 3 shows that intraoperative diastolic blood pressure was comparable in both the groups



Graph 4 shows that intraoperative mean arterial pressure was comparable in both the groups



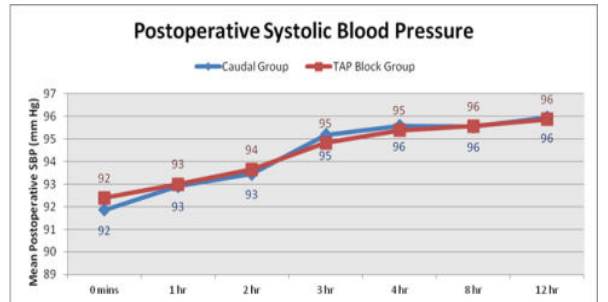
Graph 5 shows the postoperative heart rate in both groups

Postoperative Heart Rate		0 Mins	15 Mins	30 Mins	1 hr	2 hr
Caudal Group	N	22	22	22	22	22
	Mean	93.82	95.45	96.05	97.82	102.27
	SD	6.51	7.58	7.98	7.87	9.50
TAP Block Group	N	23	23	23	23	23
	Mean	97.09	96.61	97.70	99.74	101.09
	SD	4.38	4.00	4.26	5.23	4.94

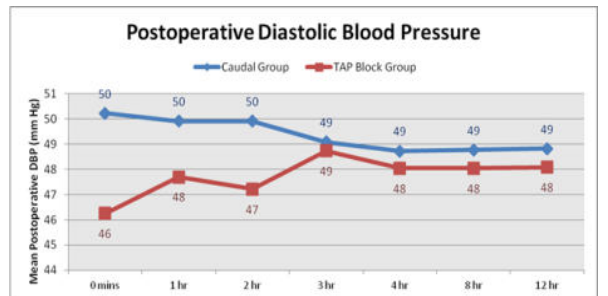
Postoperative Heart Rate		3 hr	4 hr	8 hr	12 hr
Caudal Group	N	22	22	22	22
	Mean	105.68	115.36	120.09	122.09
	SD	11.16	7.66	6.95	5.80
TAP Block Group	N	23	23	23	23
	Mean	103.13	106.52	108.57	112.26
	SD	4.69	5.22	4.77	5.21
P value Unpaired t test		0.3300	0.0001	0.0000	0.0000

Statistical Significance

The increased mean post-operative heart rate in caudal group compared to the TAP block group is statistically significant as the p value is < 0.05 test indicating a true difference among intervention groups



Graph 6 shows that postoperative systolic blood pressure was comparable in both the groups

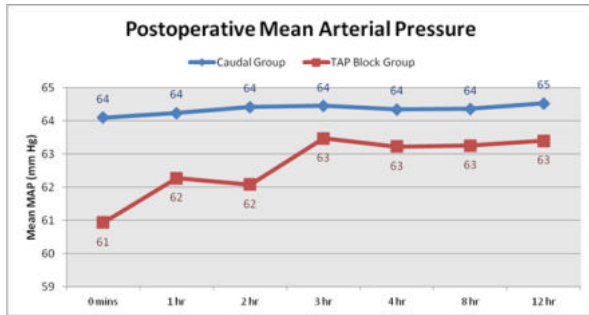


Graph 7 shows the postoperative diastolic blood pressure in both the groups

Postoperative Diastolic Blood Pressure		0 mins	1 hr	2 hr	3 hr	4 hr	8 hr	12 hr
Caudal Group	N	22	22	22	22	22	22	22
	Mean	50.23	49.91	49.91	49.09	48.73	48.77	48.82
	SD	1.07	1.77	0.87	2.04	1.45	1.51	1.56
TAP Block Group	N	23	23	23	23	23	23	23
	Mean	46.26	47.70	47.22	48.74	48.04	48.04	48.09
	SD	1.66	2.53	1.86	1.60	2.14	2.14	1.35
P value Unpaired t test		0.2160	0.1929	0.1007	0.5255	0.0000	0.0005	0.0000

Statistical Significance

The increased mean post-operative diastolic blood pressure in caudal group compared to the TAP block group is statistically significant as the p value is < 0.05 test indicating a true difference among intervention groups.

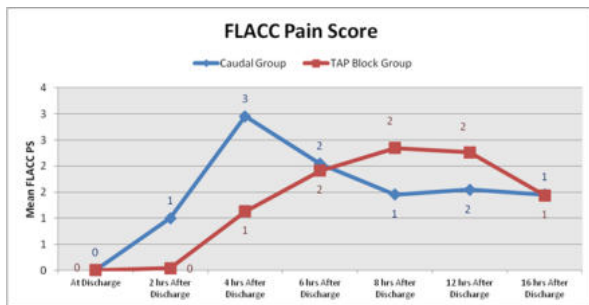


Graph 8 shows the postoperative mean arterial pressure in both the groups

Postoperative Mean Arterial Pressure		0 mins	1 hr	2 hr	3 hr	4 hr	8 hr	12 hr
Caudal Group	N	22	22	22	22	22	22	22
	Mean	64.11	64.24	64.42	64.45	64.35	64.36	64.53
	SD	1.18	1.38	0.80	0.99	1.08	1.27	0.77
TAP Block Group	N	23	23	23	23	23	23	23
	Mean	60.94	62.28	62.09	63.48	63.23	63.26	63.41
	SD	3.39	3.02	2.97	3.63	3.87	3.14	3.04
P value Unpaired t test		0.0002	0.008	0.001	0.225	0.194	0.130	0.097
			0	2	1	7	7	9

Statistical Significance

The increased mean post-operative mean arterial pressure in caudal group compared to the TAP block group is statistically significant as the p value is < 0.05 test indicating a true difference among intervention groups.

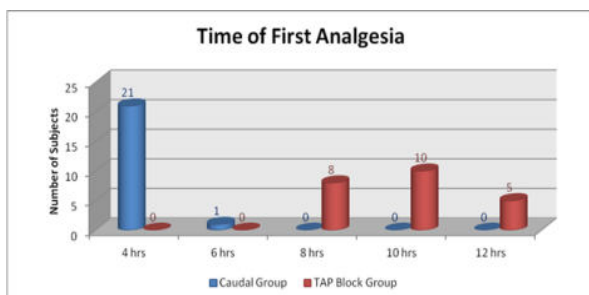


Graph 9 shows the FLACC pain score in both the groups

FLACC Pain Score		0 hrs	2 hrs	4 hrs	6 hrs	8 hrs	12 hrs	16 hrs
Caudal Group	N	22	22	22	22	22	22	22
	Mean	0.00	1.00	2.95	2.05	1.45	1.55	1.45
	SD	0.00	0.00	0.21	0.21	0.51	0.51	0.51
TAP Block Group	N	23	23	23	23	23	23	23
	Mean	0.00	0.04	1.13	1.91	2.35	2.26	1.43
	SD	0.00	0.21	0.69	0.85	0.71	0.45	0.51
P value Unpaired t test		>0.999	0.00	0.00	0.00	0.00	0.00	0.89
			00	00	00	00	00	69

Statistical Significance

The increased mean FLACC pain score in caudal group compared to the TAP block group is statistically significant as the p value is < 0.05 test indicating a true difference among intervention group.



Time of First Analgesia	Caudal Group	TAP Block Group
N	22	23
Mean	245.45	584.35
SD	25.58	90.85
P value Unpaired t test		0.0000

Statistical Significance

The increased mean time for first analgesia in TAP group compared to the caudal block group is statistically significant as the p value is < 0.05 test indicating a true difference among intervention group

DISCUSSION

TAP block in children is an effective means of providing pain relief in children. TAP block is used as a part of a multimodal approach after surgery involving the anterior abdominal wall.

In the above study, duration of analgesia was higher in TAP block group (9hrs 44minutes) compared to caudal group (4 hours 5 minutes), FLACC pain score for analgesic assessment were better in the TAP block group, Post-operative Heart rate, Post-operative Diastolic and Mean arterial pressure were better in the TAP block group which were all statistically significant.

In both the groups, hemodynamic changes in intra operative period were comparable and insignificant.

CONCLUSION

It can be concluded that administration of Ultrasound guided TAP Block for children undergoing Lower Abdominal Surgeries increases the duration of post-operative analgesia without producing any adverse effects compared to Caudal epidural block.

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