Section: Anaesthesia

Original Research Article

COMPARISON OF USG GUIDED TAP BLOCK VS SURGEON ADMINISTERED TAP BLOCK FOR PAIN CONTROL, ACCURACY AND OPERATIVE TIMES AFTER ABDOMINAL SURGERIES IN CHILDREN

Tanveer Pal Singh[1], Amit Rai[2], Karunesh Chand[3]

[1]Classified specialist, Department of Anaesthesia and Critical care,166 Military hospital Jammu, India.
[2]Professor, Department of Anaesthesia and Critical Care, Command Hospital Chandimandir, India.
[3]Professor, Department of Peadiatric Surgery and General Surgery, Command Hospital Kolkata, India.

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Corresponding Author:
Dr. Tanveer Pal Singh,
Classified specialist, Department of Anaesthesia and critical care,166 Military hospital Jammu.
Email: tpsingh457@gmail.com

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ABSTRACT

Background: The transversus abdominis plane (TAP) block has gained popularity for providing analgesia after abdominal wall surgeries since Rafi introduced it as a landmark technique in 2001. TAP blocks can be performed using ultrasound guidance or placed directly by the surgeon at the end of surgery. With the increasing use of ultrasound in operating rooms, TAP blocks are more frequently utilized in abdominal surgeries. Surgeons can visualize the plane between the internal oblique and transversus abdominis muscles, allowing them to place catheters through the open surgical site into this plane.

Materials and Methods: This study was conducted in Department of Anaesthesia at tertiary care facility in Maharashtra University of Health Sciences Pune. This study was done from the period of Nov 2016 to Dec 2018.All ASA grade I to III children between 0 to 10 years of age undergoing upper abdominal surgery after written informed consent. This study was included 19 patients for both group ie ultrasound guided TAP block or surgeon administered TAP block.

Results: The results showed a significant difference, with a p-value of less than 0.05, indicating that catheter placement by the surgeon took less time than the ultrasound-guided approach, which consequently affected total operating room time. Parent satisfaction regarding pain relief for their children was consistent across both techniques.

Conclusion: This study concludes that, by evaluating operative time, complications, and parent satisfaction, we found that the surgeon performed TAP block is a relatively new tech which has immense potential as it can save time; result in more accuracy and success of the block.

Keywords: Ultrasound-Guided TAP Block, Surgeon-Administered TAP Block, Pain score, Abdominal Surgery.

INTRODUCTION

Currently, there are no standardized guidelines for pain management following abdominal surgeries in children.[1]Various methods used include IV paracetamol (PCM), opioids, and epidurals placed in the caudal, lumbar, or thoracic epidural spaces.[2] Children often need regional blocks for adequate pain relief immediately after surgery, either through a neuraxial or peripheral nerve block. Postoperative pain management has become a key aspect of anesthetic care. Among neuraxial blocks, the caudal epidural is commonly used for analgesia but may not be effective for upper abdominal surgeries.[2]

The transversus abdominis plane (TAP) block has gained popularity for providing analgesia after abdominal wall surgeries since Rafi introduced it as a landmark technique in 2001.[3] This block involves injecting a local anesthetic into the plane between the transversus abdominis and internal oblique muscles, where the thoracolumbar nerves (originating from the T6 to L1 spinal roots) provide

sensation to the anterolateral abdominal wall.[4] TAP blocks can be performed using ultrasound guidance or placed directly by the surgeon at the end of surgery. With the increasing use of ultrasound in operating rooms, TAP blocks are more frequently utilized in abdominal surgeries. Surgeons can visualize the plane between the internal oblique and transversus abdominis muscles, allowing them to place catheters through the open surgical site into this plane.

The aim of this study is to evaluate the effectiveness of this technique and compare it with an ultrasound-guided catheter placed postoperatively. The analgesic benefits of the TAP block have been demonstrated in numerous prospective randomized controlled trials (RCTs), showing superiority over placebo in terms of reduced visual analog scale (VAS) scores and decreased opioid use post-surgery. While extensive literature exists for adults, studies comparing continuous subcostal TAP blocks to other pain management techniques in children are limited. Therefore, this study aimed Operation Theater Time for Ultrasound-Guided TAP Block versus Surgeon-Administered TAP Block: A Study of Efficiency in Abdominal Surgery".

MATERIALS AND METHODS

Study Area: This study was conducted in Department of Anaesthesia at tertiary care facility in Maharashtra University of Health Sciences Pune.

Study Duration: This study was done from the period of Nov 2016 to Dec 2018.

Study population: All ASA grade I to III children between 0 to 10 years of age undergoing upper abdominal surgery after written informed consent. This study was included 19 patients for both group ie ultrasound guided TAP block or surgeon administered TAP block.

Data collection

Children aged 0 to 10 years undergoing upper abdominal surgery and willing to participate were included, while those over 10, unable to be extubated post-operatively, with psychiatric illness, on prolonged opioid use, allergic to study medications, or who refused were excluded. Patients were randomly assigned to one of two groups: ultrasound-guided or surgeon-administered TAP block. Pre-operative Anaesthesia assessments, including tests and physical exams, were performed, and informed consent was obtained from parents.

Both groups received standard general Anaesthesia with fentanyl, Atracurium, and acetaminophen, followed by sevoflurane maintenance. Group U received an ultrasound-guided TAP block by an experienced anesthesiologist, while Group S received a surgeon-administered TAP block intraoperatively. Identical dressings were used to maintain blinding and OT time were recorded for both techniques.

A bolus of 0.5 ml/kg of 0.25% bupivacaine was administered, followed by a continuous infusion of 0.1% bupivacaine for 48 hours. Pain scores were assessed at regular intervals postoperatively using the FLACC scale. Rescue fentanyl was given if scores were ≥4. The time to first analgesia, total analgesic dose in 48 hours, complications, and parental satisfaction were recorded.

Data Analysis: Data analysis was done by using Microsoft Excel & SPSS.

RESULTS

This study included two groups: the ultrasound-guided TAP block (Group U) and the surgeon-administered TAP block (Group S), each consisting of 19 cases. In Group S, 9 cases and in Group U, 15 cases involved patients under 1-year-old. There were 2 cases in both groups for the 1-2 age range, while Group S had 8 cases and Group U had 2 cases for those over 2 years. ASA grades were also documented, as shown in Table 3. The study compared ultrasound-guided TAP blocks and surgeon-administered TAP blocks in abdominal surgery. Due to the variety of surgeries and patient differences in age, sex, and airway, only the procedural times of the two techniques were analyzed to assess their impact on operating room efficiency. The results showed a significant difference, with a p-value of less than 0.05, indicating that catheter placement by the surgeon took less time than the ultrasound-guided approach, which consequently affected total operating room time. Parent satisfaction regarding pain relief for their children was consistent across both techniques. Initially, at 0 hours post-surgery, 21.1% of patients in Group S and 26.3% in Group U had FLACC scores above 6. By 30 minutes post-surgery, these numbers dropped to 10.5% in Group S and 0% in Group U, and by 24 hours, both groups showed 0% in that category. Thus, continuous TAP catheters provided better and longer-lasting pain control compared to a single bolus of local anesthetic. Only 1 of the 19 patients in Group S had a FLACC score above 4 at the 24-hour mark, while none in Group U did. A FLACC score of 4 or less was considered to indicate adequate pain relief.

Table 1: Distribution of cases according to Gender

Sex	Groups		Total
	GroupS	GroupU	
F	4	3	5
%	21.1	15.8	13.2
M	15	16	33
%	78.9	84.2	86.8

Total	19	19	38

Table 2: Distribution of cases according to Age

Age	Groups		Total
	GroupS	GroupU	
Below1Yr	9	15	24
%	47.4	78.9	63.2
1to2Yrs	2	2	4
%	10.5	10.5	10.5
Above2yrs	8	2	10
%	42.1	10.5	26.3
Total	19	19	38

Table 3: Distribution of cases according to ASA grade

ASA grade	Groups		Total
	Group S	Group U	
II	13	17	30
%	68.4	89.5	78.9
III	6	2	8
%	31.6	10.5	21.1
Total	19	19	38

Table 4: Distribution of cases according to ASA Weight

WT(KG)	Groups		Total
	Group S	Group U	
Below10	8	14	22
%	42.1	73.7	57.9
10to20	8	5	13
%	42.1	26.3	34.2
Above20	3	0	3
%	15.8	0.0	7.9
Total	19	19	38

Table 5: Type of surgery

ultrasound guidedTAPblock	19
surgeonadministeredTAPblock	19

Table 6: Distribution of cases according to OT Time

Time for Procedure(inmin)	Groups		Total
	Group S	Group U	
0to10	14	0	14
%	73.7	0.0	36.8
10to20	5	6	11
%	26.3	31.6	28.9
20to30	0	9	9
%	0.0	47.4	23.7
30to40	0	4	4
%	0.0	21.1	10.5
Total	19	19	38

Group Statistics					
	TAPblocktech	N	Mean	Std.Deviation	Std.ErrorMean
Timetakenforprocedure*(inminutes)	s	19	8.4211	2.87355	.65924
	u	19	22.4737	5.87243	1.34723

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Table 7: Distribution of cases according to Parent Satisfaction

Parent Satisfaction	Groups		Total
	Group S	Group U	
Grade 3	2	3	5
%	10.5	15.8	13.2
Grade 4	3	3	6
%	15.8	15.8	15.8
Grade 5	14	13	27
%	73.7	68.4	71.1
Total	19	19	38

Table 8: Distribution of cases according to FLACC score

FLACCSCORE	0 HR		30MIN		24 HR		48 HR	
	GroupS	GroupU	GroupS	GroupU	GroupS	GroupU	GroupS	GroupU
0to2	0	2	2	16	14	17	18	5
%	0.0	10.5	10.5	84.2	73.7	89.5	94.7	26.3
2to4	8	10	12	2	4	2	1	14
%	42.1	52.6	63.2	10.5	21.1	10.5	5.3	73.7
4to6	7	2	3	1	1	0	0	0
%	36.8	10.5	15.8	5.3	5.3	0.0	0.0	0.0
6to8	4	5	2	0	0	0	0	0
%	21.1	26.3	10.5	0.0	0.0	0.0	0.0	0.0
Total	19	19	19	19	19	19	19	19

DISCUSSION

TAP block is already an established technique for providing superior pain relief after abdominal surgery. It is now a part of multimodal analgesia recommended for pain treatment following surgery. Many studies have confirmed the superiority of TAP block over conventional methods like wound infiltration or IV analgesics like opioids. But most of these studies have been on adult patients and very fewer studies have concentrated on pediatric population. By using two different TAP block techniques and then comparing the two techniques in terms of efficacy and complication and effect on operation theater time. We found both the techniques are equally good in providing pain relief to the patients with comparable pain scores at the time of arrival in PACU, and at the end of study time that is after 48 hours. No major complications occurred due to TAP block technique during the study period so it can be said that the use of ultrasound minimizes the complication rates and makes the TAP block relatively safe to use in pediatric patients. By putting a catheter in the TAP plane we ensured the prolonged and continuous delivery of local anesthetic for the pain relief and it resulted in very less use of rescue fentanyl only 4 out of 19 patients in surgeon group and 6 out 19 patients in USG group needed the rescue fentanyl. The cumulative mean dose in mcg/kg in the two groups was 1.55 in surgeon group and 1.78 in the USG group which is very less to produce any opioid related side effects like nausea, vomiting, respiratory depression or abuse potential. However it was noted that the surgeon placed technique takes significant less time with mean of 8.421(in minutes) as compared to use of USG for the block with mean time of 22.47(in minutes) which is statistically significant finding as it effects the overall operative time by prolonging the Anaesthesia time for the patient.

Ehab Farag et al in their study on post-operative pain relief post renal transplant found that the use of continuous TAP catheter for drug delivery to control pain after renal transplant was effective in reducing the morphine-equivalent requirements and its associated complications.[5]

In our study we also found surgical TAP block technique to be equally effective in controlling the pain as USG guided TAP block with no complications but our study was done in pediatric population we have different pain perception and pathways than adults and is at times more difficult to control.

Levent Sahin in their study done in children undergoing hernia repair compared the USG guided TAP block with local wound infiltration for post-surgery pain control and found TAP block to be superior in reducing pain scores at 24 hours and gives longer duration of analgesia as evident by the longer time for requirement of rescue analgesic.[6]

Our study also found TAP block to be effective in producing lower pain scores at 24 hours though we did not included a control group as we were studying the two different techniques of TAP block only.

Elonka Bergman et al carried out a prospective observational study on 87 children undergoing abdominal repair who received a preoperative TAP block for pain control and found that 47 percent did not required IV opioids and 27 percent did not received any opioids at all.[7] In our study we found 73.7 percent did not needed IV opioids post operatively.

CONCLUSION

In conclusion, effective post-surgical pain control is crucial for pediatric patients, and our study comparing ultrasound-guided versus surgeon-administered TAP blocks highlights significant insights. By evaluating operative time, complications, and parent satisfaction, we found that the surgeon performed TAP block is a relatively new tech which has immense potential as it can save time; result in more accuracy and success of the block. Effective control of post-surgical pain achieves a higher parent satisfaction to the treatment imparted and enhances the confidence they invest in the health care provider. It lowers the morbidity associated with the surgery, helps in preventing psychosomatic effects of incomplete pain control which can be detrimental to a child's growth.

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