



ORIGINAL RESEARCH PAPER

Anesthesiology

ANALGESIC EFFICACY AND OPIOID SPARING EFFECT OF TRANSVERSUS ABDOMINIS PLANE BLOCK AFTER CAESAREAN SECTION

KEY WORDS: Injection butorphanol, post-operative analgesia, Haemodynamics;; Opioids

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ABSTRACT

A multimodal approach to postoperative analgesia after caesarean section is required. This study evaluates the efficacy of transversus abdominis plane (TAP) block in providing postoperative analgesia and opioid sparing effect in caesarean section .

Aims and Objectives: The aim of the study was to evaluate the postoperative analgesic efficacy and opioid sparing effect of transversus abdominis plane block after caesarean section.

Materials and methods: After obtaining approval from the Hospital Ethics Committee and written informed patient consent, a prospective, randomized, double blinded, case control study involving 50 ASA physical status I-II patients scheduled for caesarean section by pfannenstiell incision were included. Baselines data like pulse rate, blood pressure, respiratory rate, and basic investigations were collected. The patients were divided into two groups of 25 each, Group[®]: Ropivacaine group and Group (N): Normal saline group. Patients were randomly allocated to undergo TAP block (n=25) with 20 ml of 0.375% ropivacaine (to a maximum dose of 150 mg) per side or TAP block with saline 0.9% (control n=25) Group (R) received 20 ml of 0.375% Ropivacaine on each side and Group (N) received 20 ml of normal saline on each side. The two groups were compared to evaluate efficacy and safety of TAP Block, evaluate pain scores at 1, 2, 3, 4, 5, 6, 12, 18, and 24 hrs after surgery, time of request of rescue analgesic and total postoperative opioid consumption. Groups were comparable in terms of age, weight and duration of surgery.

Results: The total tramadol consumption was less in R group (104±4.38mg) than in N group (324±26.15 mg) and difference was statistically significant, with **p<0.05** likewise the mean time for first request of rescue analgesic was 290±20.94 minutes in R group, when compared with 81±1.79 minutes in the N group which is nearly 3rd times lesser than Ropivacaine group. The difference of 209 minutes with **p<0.05** was statistically very significant and no complications due to the TAP block were detected.

Conclusion: Transversus abdominis plane (TAP) block as a component of multimodal analgesia provides highly effective postoperative analgesia in the first 24 hours after caesarean sections. As a component of multimodal analgesic regimen TAP block significantly reduced opioid consumption.

INTRODUCTION

Caesarean section is a major surgical procedure after which substantial postoperative discomfort and pain can be anticipated. The provision of effective postoperative analgesia in pregnant patients is important to facilitate early ambulation, infant care (including breast feeding, mother infant bonding) and prevention of postoperative morbidity.

Use of opioids and their subsequent side effects can be reduced or eliminated by regional anaesthesia with local anaesthetics. Direct blockade of the neural afferent supply of the abdominal wall, such as abdominal field blocks, ilioinguinal, and hypogastric nerve blocks provide significant postoperative analgesia in patients undergoing caesarean section. However, the lack of clearly defined anatomical landmarks make the abdominal wall blockade difficult in patients undergoing caesarean section.

By injecting local anaesthesia into the transverses abdominis plane via petit triangle, it is possible to block the sensory nerves of the anterior abdominal wall. TAP Block as a part of multimodal analgesic regimen would result in decreased opioid consumption and improved analgesia.⁴⁻⁷ Thus the efficacy of Transversus abdominis plane (TAP) block in providing postoperative analgesia in caesarean section and its opioid sparing effect is evaluated in this study.

AIM OF THE STUDY

The aim of the study was to evaluate the postoperative analgesic efficacy and opioid sparing effect of Transversus abdominis plane block after caesarean section.

MATERIALS AND METHODS

Study design:

Prospective, randomized, double blinded, case control study.

Study population:

50 female patients who underwent caesarean section by pfannenstiell incision in a tertiary care hospital.

Outcome Measures for this Clinical Trial

To evaluate efficacy and safety of TAP Block, to evaluate pain scores at 1, 2, 3, 4, 5, 6, 12, 18, and 24 hrs after surgery, time taken for the first analgesic dose (Injection Tramadol) & postoperative total opioid dose consumption.

Inclusion Criteria:

- ASA physical status class I and II
- Age between 18 and 35 years pregnant patients

Exclusion Criteria:

- Patient refusal
- Patient with known reaction to local anaesthetics
- History of bleeding diathesis
- Known psychiatric illness,
- Patients on chronic analgesics.

Probability sampling:

50 lots were randomized (25 in each group) from the people who were willing to take part in the study. All the patients stand an equal chance of getting into any group. All the patients were aware of the study and informed consent was obtained.

Sample size:

Ropivacaine (R) group - 25 patients
Normal saline (N) group - 25 patients

Data collection:

Age, weight, duration of surgery, VISUAL ANALOGUE SCALE in 1, 2, 3, 4, 5, 6, 12, 18 and 24 hrs, HR, Systolic BP, Diastolic BP, time for first demand of analgesic, total dose of rescue analgesia.

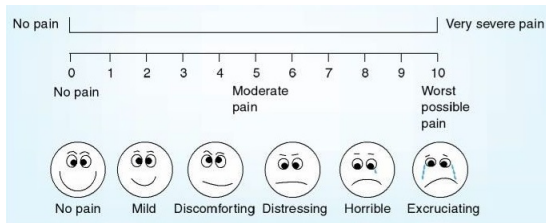
Methods:

After obtaining approval by the Hospital Ethics Committee and written informed patient consent, we studied 50 ASA physical status I-II patients scheduled for caesarean section by pfannenstiell incision. Baselines data like pulse rate, blood pressure, respiratory rate, and basic investigations were collected.

Patients were randomly allocated to undergo TAP block (n=25) with 20 ml of 0.375% ropivacaine (to a maximum dose of 150 mg) per side or TAP block with saline 0.9% (control n=25). Common to both groups an 18G IV Cannula was secured, preloading done with 1000ml of crystalloid. Under asepsis, SAB performed with 5% Lignocaine using 23G Quincke's spinal needle to all the patients in both groups. Under asepsis TAP Block was performed bilaterally by an anaesthesiologist who was blinded to the drug, a double 'pop off' technique was used to locate the Transversus abdominis plane. Group (R) received 20 ml of 0.375% Ropivacaine on each side and Group (N) received 20 ml of normal saline on each side.

Standard postoperative analgesic regimen: Inj. Diclofenac sodium 75mg i.m. was given to all patients after shifting to the ward, second dose repeated 12 hours later. Rescue analgesia: Inj. Tramadol 100mg i.m. was used as first rescue analgesia either on demand or when the VAS score was ≥ 3 . If the patient asks for second/subsequent rescue dose between 3 and 6 hours Inj. Tramadol 50mg i.m. was given. After 6 hours Inj. Tramadol 100mg i.m. was repeated for pain.

The presence and severity of pain was assessed using visual analogue scale (VAS 0=no pain and 10 =worst pain imaginable) at 1, 2, 3, 4, 5, 6, 12, 18, and 24 hours by an investigator blinded to group allocation. Vitals were recorded upto 6 hours in the immediate post operative period.



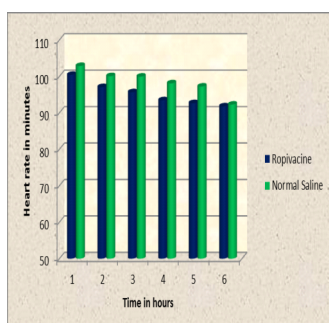
OBSERVATIONS AND RESULTS

In our study we have evaluated the analgesic efficacy and opioid sparing effect of Transversus abdominis plane block in caesarean section for postoperative pain relief, the observation and results were analyzed, using two sample student's t-test and chi square test, the results were considered statistically significant when "p" value was ≤ 0.05 . The two groups are comparable with respect to age, weight and duration of surgery & the difference was statistically insignificant ($p > 0.05$).

Table 1: VAS pain score:

VAS Score	Drug groups		P value
	R	N	
1 hr	0	1.28±1.10	>0.05
2 hr	0	5.20±0.52	<0.05
3 hr	0	3.64±0.38	<0.05
4 hr	0	4.92±0.20	<0.05
5 hr	1.52±0.93	5.04±0.47	<0.05
6 hr	1.92±0.91	4.8±0.35	<0.05
12 hr	2.24±0.62	4.68±0.54	<0.05
18 hr	2.20±0.62	4.48±0.51	<0.05
24 hr	2.00	4.00±0.64	<0.05

GRAPH :1 VAS pain score

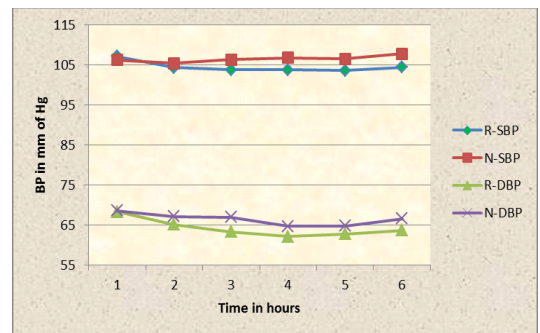


Ropivacaine group has decreased HR in all the intervals compared to Normal saline group with statistical significance ($p < 0.05$)

Table 3: Blood pressure (in mmHg)

Time Hours	Systolic BP			Diastolic BP		
	Group (R)	Group(N)	p value	Group(R)	Group(N)	p value
1	107.12±4.59	106.2±4.3.28	>0.05	68.32±4.19	68.60±4.19	>0.05
2	104.24±5.15	108.32±2.62	<0.05	65.12±4.12	67.12±2.89	<0.05
3	103.74±5.07	106.24±3.48	<0.05	63.36±5.62	66.96±4.00	<0.05
4	103.76±3.75	106.72±2.91	<0.05	62.16±4.24	64.72±3.24	<0.05
5	103.56±3.32	106.48±3.93	<0.05	62.80±3.74	64.80±2.71	<0.05
6	104.32±3.14	107.68±3.68	<0.05	63.68±3.35	66.64±3.09	<0.05

GRAPH 3 :Line diagram for postoperative blood pressure (in mmHg)



Both R and N groups had a very normal mean systolic BP and diastolic BP in all analyzed intervals which shows a statistically significant 'p' value ($p < 0.05$) except in the 1st hour which showed statistically insignificant value ($p > 0.05$).

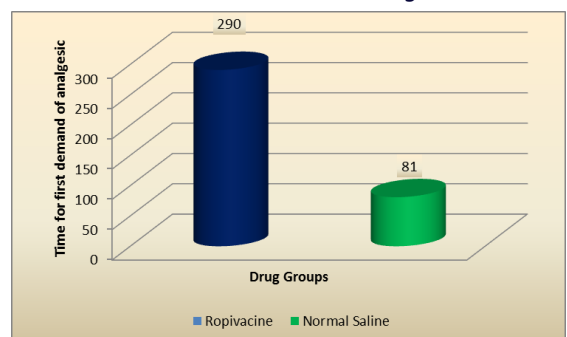
Table 4: Total dose of postoperative analgesic requirement (Injection Tramadol)

Groups	N	Mean	Std.deviation	Std.Error	p value
R	25	104	4.38	0.89	<0.05
N	25	324	26.15	5.34	

Table 5: Time to need for first demand of rescue analgesic (Injection Tramadol) in minutes

Group	N	Mean	Std.deviation	Std.Error	p value
R	25	290.00	20.9414	4.1883	<0.05
N	25	81.00	8.9629	1.7925	

BAR CHART : Time for first demand of analgesic in minutes



Total Tramadol consumption was less in Ropivacaine group (104±4.38mg) than in Normal saline group (324±26.15 mg), the mean difference of 220mg with $p < 0.05$ was statistically significant

as shown in (table 9), likewise the mean time for first request of rescue analgesic was 290 ± 20.94 minutes in Ropivacaine group, when compared with 81 ± 1.79 minutes in the Normal saline group which is nearly 3rd times lesser than Ropivacaine group. The difference of 209 minutes with $p < 0.05$ was statistically very significant.

DISCUSSION

Caesarean section under regional anesthesia provides an excellent opportunity to perform TAP block postoperatively.

In our study we used 20 ml of 0.375% Ropivacaine or Normal saline on each side for TAP block which is comparable to McDonnell et al,⁴ bilateral TAP block for caesarean section with 1.5 mg/kg of 0.75% ropivacaine (to a maximal dose of 150 mg) or saline on each side.

Bilateral TAP block has been demonstrated to provide excellent analgesia to the skin and musculature of the anterior abdominal wall in patients undergoing caesarean section.

Our study results had demonstrated that postoperative TAP block reduced VAS score significantly in the study group at all the intervals when compared to control group. Interestingly the VAS score was zero in study group for the first 4 hours which itself explains the effectiveness of TAP block. VAS score even at the end of 24 hours was 50% less than the control group. It is well correlated with the findings of McDonnell JG et al.

Ropivacaine group showed decreased HR and BP which occurred in early hours of postoperative period in Normal saline group. In our study the mean time for first request of rescue analgesic was 290 ± 20.94 minutes in Ropivacaine group, when compared with 81 ± 1.79 minutes in the Normal saline group, the difference of 209 minutes with $p < 0.05$ was statistically very significant as shown in (fig. 12). Total tramadol consumption was less in Ropivacaine group (104 ± 4.38 mg) than in normal saline group (324 ± 26.15 mg), the mean difference of 220mg was statistically significant as shown in (table 9). Thus TAP block as a component of multimodal analgesia has decreased the total tramadol consumption and delayed the time for first demand of rescue analgesic by nearly 3rd times. McDonnell et al,⁴ demonstrated that the TAP block reduced overall postoperative morphine requirements by more than 70% in the first 48 postoperative hours and a longer time to first PCA morphine request.

McDonnell et al,⁴ demonstrated in the TAP block group, morphine was sufficient to induce PONV. In our study the incidence of PONV was very much reduced in both the study groups because we had chosen injection tramadol.

Complications like peritoneal and visceral punctures related to TAP block were not encountered in our study. Farooq M, Carey M. in 2008 reported a case of Liver Trauma with a blunt regional anesthesia needle while performing Transversus Abdominis Plane Block. Thorough familiarity with anatomy, safe monitoring and injection technique, knowledge of local anaesthetic pharmacology and toxicity would prevent the possibility of complications and simplify the TAP block technique. These precautions will prevent major complications with TAP block. The use of ultrasound to confirm needle position is a promising approach that should further reduce the risk of this complication

CONCLUSION

Transversus abdominis plane (TAP) block as a component of multimodal analgesia provides reliable and highly effective postoperative analgesia in the first 24 hours after caesarean sections, with reduced opioid consumption & nil complications.

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