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Original Research Article

An Analgesic Efficacy Between TAP Block and Infiltration Around Incision Site Post Operatively in Caesarean Section: A Comparative Study

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Abstract

Women's pain satisfaction post-cesarean section remains a challenge. Accurate assessment of pain severity of post-cesarean section helps to choose the most appropriate anesthetic approach, drug, and dose, as well as improvement of treatment of postoperative pain. Our objective was to compare the efficacy of transversus abdominis plane (TAP) block by double pop Technic and infiltration around incision site in the first 24 h postoperative in women who underwent cesarean section. The primary outcome was postoperative pain at 2, 4, 6, 12, and 24 h. The secondary outcomes were intestinal mobility, early mobilization, nausea, vomiting, heart rate, and respiratory rate.

Materials and Methods: The study population consisted of 60 patients posted for elective and emergency caesarean section. They were blindly divided into two groups of 30 patients each. Group T received 40ml 0.25% Ropivacaine in Transverses abdominis plane (TAP) block for postoperative analgesia and group I received 40ml 0.25% ropivacaine as infiltration at incision site for postoperative analgesia. Patients were observed for numeric pain score NPS, analgesic requirements, total analgesic consumption and adverse effects if any.

Results: There was highly significant difference in numeric pain scores at 2^{nd}, 6^{th}, 12^{th} and 24^{th} hours ($p<0.0001$). Both the time for first rescue analgesic and total amount of analgesic consumed are statistically significant ($p<0.0001$).

Conclusions: TAP block is an effective postoperative analgesic procedure for post caesarean section patients.

Keywords: Postoperative pain relief, Ropivacaine, TAP block

Introduction

Lower segment caesarean section (LSCS) is a major surgical procedure with substantial post-operative pain [1]. Good control of pain following LSCS is essential to facilitate early mobilisation and to enable adequate care of the new born. Achieving good pain relief is challenging because of the altered physiology and of the possibility of transmission of drugs through breast milk. Although a variety of choices of drugs and routes of administration are available,

we are yet to achieve a safe and effective method of pain control after LSCS. Conventional analgesic regimens use opioids administered through systemic and/or neuraxial routes. Neuraxial methods are effective and safe, but need to be performed by an experienced person and require very close monitoring [2]. Opioids can also be delivered using intravenous or epidural patient controlled analgesia (PCA). PCA allows patients to have control over their pain management and hence improves their satisfaction with the therapy [3]. However, unwanted effects like sedation, nausea and vomiting, pruritus and occasionally respiratory depression remain the major drawbacks of opioids [4]. Secretion into breast milk is the additional concern in this population [2]. Non-steroidal anti-inflammatory drugs (NSAIDs) and paracetamol can only supplement other modes of analgesia and are not sufficient on their own [2]. Given these issues, peripheral nerve block techniques like transversus abdominis plane (TAP) block were introduced as an effective component of multimodal analgesia after caesarean delivery [5]. These techniques not only reduced pain quite successfully but also eliminated some of the problems associated with the use of systemic opioids or central neuraxial blocks [6, 7].Double pop technique transversus abdominis plane (TAP) block is one such effective method of providing post-operative analgesia for lower abdominal surgeries [8]. The purpose of this randomised study was to evaluate the efficacy of TAP block for post LSCS pain specifically targeting the Indian population. We assessed the role of this block as a component of a multimodal analgesic regimen that excludes intrathecal morphine.Transversus abdominis plane (TAP) block has recently been described as an addition or alternative to the other analgesic regimes. TAP block technique has been shown to be safe and effective postoperative adjunct analgesia method in a variety of general, gynaecological, urological, plastic and paediatric surgeries and is suggested as part of the multimodal anaesthetic approach to enhance recovery. Although ultrasound guided approach makes it easier to identify the transverse abdominal plane but double pop Technic (conventional) is also easier for the transversus abdominis plane and administration of local anaesthetic in this plane. Local anaesthetic infiltration is a widely performed convenient postoperative analgesia technique [9].

Materials and Methods:

The study population consisted of 60 patients posted for elective and emergency caesarean section. They were blindly divided into two groups of 30 patients each. Group T received 40ml 0.25% Ropivacaine in Transverses abdominis plane (TAP) block for postoperative analgesia and group I received 40ml 0.25% ropivacaine as infiltration at incision site for postoperative analgesia. Patients were observed for numeric pain score NPS, analgesic requirements, total analgesic consumption and adverse effects if any.

Results

The study population consisted of 60 patients posted for elective and emergency caesarean section. They were blindly divided into two groups of 30 patients each. Group T received 40ml 0.25% ropivacaine in transverses abdominis plane (TAP) block for postoperative analgesia, group I received 40ml 0.25% ropivacaine as infiltration at incision site for postoperative analgesia. Demographic characteristics were comparable in both the study groups (Table 1).

Table 1: Demographic characteristics.

Characteristics	Group I (n=30) mean ±SD	Group T (n=30) mean ±SD	P value
Age (years)	25±3.9	26.367±3.498	0.158
Height (cm)	151.7±6.1327	154.4±7.6411	0.1366
BMI (kg/m^2)	23.166±2.288	23.04±1.561	0.8041
Duration of surgery (min)	42.433±2.7877	42.7±2.667	0.7060
ASA (I:II)	11:19	15:15	0.297

Pre-operative and intra-operative hemodynamic parameters e.g. heart rate and mean arterial blood pressure were comparable in both the study groups during entire surgical procedure (Table 2).

Table 2: Hemodynamic parameters in study groups.

Time	Heart rate (min)				Mean arterial pressure (mm Hg)			
	Group I (n=30) mean ±SD	Group T (n=30) mean ±SD	t-value (df-58)	P value	Group I (n=30) mean ±SD	Group T (n=30) mean ±SD	t-value (df-58)	P value
Pre-operative	85.367 ±13.57	86.8 ±13.19	1.35	0.237	87.97 ±10.11	92.8 ±10.614	1.5	0.11
O min	87.37 ±14.363	83.93 ±12.28	1.008	0.25	88.73 ±11.017	89.533 ±11.088	0.43	0.1703
5min	86.7 ±14.008	84.47 ±13.12	0.92	0.186	90.033 ±8.899	90.2 ±11.46	0.391	0.12
10min	89.47 ±15.158	85.8 ±10.44	0.893	0.97	90.167 ±8.574	93.03 ±12.43	0.391	0.543
15min	87.433 ±14.09	86.8 ±10.327	1.963	0.59	90.2 ±8.6279	94.03 ±11.49	1.37	0.567
20min	84.93 ±12.747	87.23 ±10.03	1.258	0.61	90.767 ±10.05	90.57 ±8.834	0.87	0.42
25min	85.43 ±10.672	86.87 ±10.64	0.8999	0.22	91.367 ±9.492	90.4 ±8.962	1.05	0.512
30min	83.77 ±11.245	86.167 ±11.099	0.918	0.278	91.57 ±10.874	90.067 ±9.017	0.887	0.111
35min	83.9 ±11.046	85.73 ±10.942	0.999	0.342	90.9 ±9.5569	90.4 ±8.8575	0.292	0.275
40min	84.4 ±11.545	85.533 ±10.28	1.925	0.175	91.03 ±8.9961	87.07 ±11.17	1.37	0.89

Block height achieved as highest dermatomal level and level of sensory block at the end of surgery was statistically insignificant in both groups (Table 3).

Table 3: Block characteristics in study group.

	Group I (n=30)	Group T (n=30)	P- value
Highest dermatome level achieved			
T3	3	5	X2 =degree of

T4	20	18	freedom=3
T5	4	4	Two tailed value (Exact
T6	3	3	value) Non-significant
Level of sensory block at the end of surgery mean (range)	T6 (T6-T8)	T6 (T6-T8)	

Numeric pain scores at different time intervals were compared using unpaired t test. NPS at the time of giving TAP block or surgical site infiltration was 0. Analysis showed that there was highly significant difference in numeric pain scores at 2nd, 6th, 12th and 24th hours (p<0.0001) (Table 4).

Table 4: Numeric pain score (NPS), analgesic requirement and satisfaction scores in study groups.

Time (in hrs)/ parameter	Group I (n=30) mean ±SD	Group T (n=30) mean ±SD	t-value (df-58)	P- value
NPS0	0.00±0.00	0.00±0.00	-	-
NPS2	5.967±0.994	3.83±1.167	10.616	<0.0001*HS
NPS6	4.9±0.662	3.9±0.6074	8.4767	<0.0001* HS
NPSfm	4.0±0.4549	3.966±0.6149	0.331	0.7408
NPS12	5.0±0.5872	2±0.3714	32.8835	<0.0001*HS
NPS24	4.133±0.5074	1.967±0.4901	23.3867	<0.0001*HS
First demand of analgesic	2.537±1.149	5.99±1.514	13.8361	<0.0001*HS
Total diclofenac (in mg) consumed in first 24hrs	162.5±34.585	107.5±37.800	8.1755	<0.001
Patient satisfaction score	7.667±0.661	7.9±1.029	1.45	0.689

*=p value<0.0001 Highly significant(HS), NPS= Numeric pain score

Discussion

Effective post-operative pain control is an essential component of the care of the surgical patient. Inadequate pain control may result in increased morbidity and mortality. [10,11] Regarding a special postoperative condition like in postoperative caesarean section, during the planning of postoperative analgesic regimen, along with the mother, we need to consider the breast feed dependent new born also. It may result in respiratory, dietary intake and ambulation impairment which consequently leads to complications. [12] Another concern in these patients is that as they breast feed the new born, opioids must be avoided in these patients due to secretion in breast milk. Keeping these in mind, we chose to study the TAP block and LIA using 0.25% ropivacaine in post caesarean pain relief. Authors found that NPS in both the groups at the time of intervention was 0 and level of sensory block was at the level of T6 at the end of surgery and before application of TAP block or LIA. It was due to the fact that at that time patient were under the effect of spinal anaesthesia. MT Ayodogmus et al studied the analgesic efficacy between TAP block and LIA using levobupivacaine 0.25% and NPS at the time of intervention was 0 [13]. In present study 27 (n=30) patients in group I in the 2nd hour (NPS2) needed

supplemental analgesia in the form of intramuscular diclofenac injection, whereas in the TAP group only 3 patients required rescue analgesia. This difference was statistically significant, thus proving the analgesic efficacy of TAP block in comparison to LIA (mean ±SD: 5.967±0.994: LIA Vs 3.83±1.167: TAP). MT Ayodogmus et al also found TAP block to be significantly superior over LIA in NPS at 2nd postoperative hour (p=0.005).[13] In a study, Charles F Bellows and David H Berger found local site infiltration in laparoscopic ventral hernia repair, using 0.25% Bupivacaine with epinephrine efficacious than control group. [14] But at 2nd hour, VAS score was only 3.1±0.9 in contrast to our study, where Authors found NPS score 3.83±1.167 at 2nd hour. This difference can be explained by demographic profile of patients and type of the surgery. As we know that the intensity of pain sensation depends on the sex of the patient, females being more sensitive, and our study exclusively consisted of female subjects, while in their study major bulk was of male patients. Also, in their study, surgical procedure was minimally invasive while in this study, surgery was more invasive. They used local vasoconstrictor in the form of epinephrine, which was not used.In this study Authors found that pain scores in this study in group T at 6th, 12th, 24th hour were lower as compared to group I (NPS6:LIA 4.9±0.662 vs TAP 3.9±0.6074) (p<0.0001) (NPS12: LIA5.0±0.5872 Vs TAP: 3.9667±0.6149) (p<0.001) (NPS 24: LIA 4.133±0.5074 vs TAP 1.9667±0.4901) (p<0.001). this was quite similar to the study done by MT Ayodogmus et al who demonstrated a significant lower NPS at 6th, 12th, 24th hour (NPS6: p= 0.003, NPS12 P=0.0001, NPS 24: p=0.0001). [13]A single shot TAP block can produce effective analgesia for up to 2 days. This prolonged duration of analgesia is due to relatively poor vascularisation of transverses abdominis plane.There was no significant difference in first mobilisation NPS (NPSfm). In present study, only 3 patients out of 30 in group T, experienced NPS >5 after first mobilisation. In group I, 3 patients out of 30 experienced NPS >5 (NPSfm: LIA4.0±0; 4549 vs TAP 3.9667±0.6149) (p=0.7408). This finding is similar to the study done by MT Ayodogmus et al, who did not find any statistically significant difference in terms of NPS between the two group after first mobilisation (NPSfm, p=0.123) which was further supported by the observations of the study done by Michel Chandon et al where they compared the US guided TAP block with the continuous wound infusion in post caesarean section patients. [13,15]They found that though the pain during mobilisation was higher in intensity but similar in both the groups (p>0.9). Post-operative pain arises mainly from somatic and visceral component. Both TAP block and LIA act on somatic component, not on visceral component. During mobilisation, pain mainly arises from visceral component which is not under the effect of TAP or LIA. Hence during the mobilisation, both the groups demonstrate similar NPS score. In the present study, in group I, 28 patients (n=30) showed NPS >5 within 2-3 hours of the LIA whereas in group T 22 patients (n=30) sustained their analgesic effects up to 6 hours after that they showed NPS >5 and were treated by parental analgesic (LIA 2.5±1.149 vs TAP 5.99±1.514) (p<0.0001). MT Ayodogmus et al also demonstrated a statistically significant difference in first analgesic application time (LIA 2.63±1.83 vs TAP 6.11±6.2) (p=0.003). [13] Vijaylaxmi Sivapurapu et al compared bilateral TAP block with LIA using 0.25% bupivacaine and noted the time for first request of analgesia as well as visual analogue scale at that time (VAS T- rescue). [16] They used morphine 0.1mg/kg IV as rescue analgesic. TAP proved its superiority in their study (p=0.001) as well. [17]

Conclusion

From these observations and analysis, it can be inferred that. TAP block provides better analgesia in comparison to local anaesthetic infiltration. TAP block also prolongs the time interval for first rescue analgesic. TAP block decreases the total analgesic consumption. It can be concluded that the TAP block is an effective postoperative analgesic procedure for post caesarean section patients.

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