

ORIGINAL ARTICLE

A RANDOMIZED CONTROLLED TRIAL EXPERIENCE OF TRANSVERSE ABDOMINAL PLANE (TAP) BLOCK VERSUS LOCAL ANESTHESIA INFILTRATION AT SURGICAL SITE IN OPEN APPENDICECTOMIES

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ABSTRACT

OBJECTIVE: To know the duration of analgesia of right-sided transversus abdominis plane block versus local anaesthetic infiltration around incision site after open appendicectomy.

METHODS: A double blind, randomized controlled study conducted in the operation theatre of a private hospital, during 8 months period from January 2017 till August 2017. Patients aged 60 years, presented with American Society of Anaesthesiologist (ASA) I or II, who had to be planned open appendectomy were enrolled. Two groups were classified, Group T (transversus abdominis plane block) group, infiltrating anaesthetic drug in the skin 2" cephalad towards the iliac crest using a "double-pop" technique and Group I (surgical incision) group in which patients received infiltration into the surgical incision. Both groups were infiltrated with the 0.6ml/kg of 0.25% bupivacaine anesthesia, at their respected defined site.

RESULTS:

Mean age of the patients in group T was 27.32 ±10.16 years while mean age in group I was 26.06 ±8.38 years (p-value 0.683). There were 181 (61.1%) males and 115 (38.9%) females. Mean analgesia in group T was 106.66 ±2.91 minutes duration and that in group I was 38.88 ±2.85 minutes (p-value 0.001).

CONCLUSION: Transverse abdominis plane block to be a patient friendly technique, rendering patients pain free for a longer period of time after open appendicectomy, as compared to the surgical incision infiltration block.

KEYWORDS.

Transverse abdominis plane block, surgical incision infiltration block, postoperative analgesia, open appendicectomy.

INTRODUCTION.

Acute postoperative pain has always been a dilemma in surgery settings, affecting patients' morbidity.¹ It has psychological and emotional aspects.² The abdominal wall incision is the culprit of producing acute pain.³ The term transversus abdominis plane (TAP) block was initially coined by Rafi,⁴ who blocked thoraco-lumbar (T6–L1) neuronal bundle with the help of anaesthetic drugs. The advantages TAP block provides are seen in surgeries like appendicectomies^{5,6}, hysterectomies and caesarean sections^{7,8}, colonic resections⁹, prostatectomies, and minimal invasive cholecystectomies^{10,11}. In

2004, a literature demonstrated pioneered theme on TAP blocks in live as well as cadaveric subjects at the scientific programme of the American Society of Anesthesiologists¹².

A study stated that except for herniotomy, TAP was not a significant and effective procedure for pain relief excluding appendicectomies, gynaecological surgeries, and open cholecystectomies etc¹³. The effectiveness of TAP block are proved in different studies but there is not enough literature search comparing local wound infiltration in patients undergoing open appendectomy. The aim is to evaluate the usefulness of TAP block in terms of

analgesia duration after surgery. Hence the purpose of this research is to know the significance of this cost effective technique which reduces the morbidity by decreasing the length of stay and use of adjunct analgesic drugs.

METHODS

An eight months period from January till August 2017 was considered during which randomized controlled trial was conducted, in operation theatre of a private hospital.

Patients with age under 60 years, American Society of Anaesthesiologist (ASA) I and II, and of either gender were included. Excluded patients were those who denied consent, above 60 years of age, any history of hypertension or allergy to anaesthetic drug, history of opioid abuse, perforated appendix, or surgery involving extended incision apart from the gridiron or lanz incisions.

After approval from the institution's ethical committee, patients with the mentioned criteria standards were included. Verbal and written consent was registered from the patients. Patients were allocated by software generated random number within the groups.

GROUP I: local anesthetic infiltration at surgical incision

GROUP T: transversus abdominis plane block

In operation theatre pulse oximeter was applied and blood pressure and ECG monitoring done. Preoxygenation using a tight-fitting facemask was done with 100% oxygen, anesthesia was started using propofol 2mg per kg, nalbuphine 0.1 mg per kg and succinylcholine 1 mg per kg all as intravenous (IV) drugs while oxygen was used as maintainance anesthesia along with isoflurane and atracurium 0.25mg per kg initially then 0.1mg per kg bolus. At the end of surgery before extubation, an experienced anaesthetist administered the transversus abdominis plane block as well as local anesthetic infiltration at surgical incision.

In Group T, right sided transversus abdominis plane block was achieved by using 21G blunt-tipped needle at the level of mid-axillary line, entering the skin 2 inches cephalad to the iliac crest using "double-pop" method. Negative aspiration to rule out venous puncture was done, and 1ml of anaesthesia was injected as a test dose. In order to overcome any resistance come in the path of the needle tract, the needle is repositioned, and finally 0.6ml per kg of 0.25% bupivacaine was given.

Surgical incision infiltration of with 0.6ml per kg of 0.25% bupivacaine was administered in group I patients. At the end of surgical procedure, neostigmine 0.04-0.08mg per kg and glycopyrrolate 0.2mg per mg was given as reversal drugs, when adequate recovery from neuromuscular blockade was established. Duration of analgesia was noted by patient's first request for analgesia by the investigator who was blind to the group allocation.

Data and statistical analysis were completed using statistical package for social sciences 20 (SPSS 20). Relevant descriptive statistics like frequency and percentages were calculated for qualitative variables like ASA status and gender. Mean and standard deviation was computed for quantitative variables like age and duration of postoperative analgesia. T-test was applied for the comparison of duration of post-operative analgesia. P-value < 0.05 was considered significant. Stratification was done to control effect modifiers like age, ASA status and gender to observe an outcome. Post-stratification t-test was applied.

RESULTS

Overall mean age of the patients was 26.69 +9.32 years. Mean age of the patients in group T was 27.32 +10.16 years while mean age in group I was 26.06 ±8.38 years (p-value 0.683). Majority of the patients 269 (90.9%) had <40 years of age. There were 181 (61.1%) males and 115 (38.9%) females. ASA status I was found in majority 265 (89.5%) patients and ASA status II was found in 31 (10.5%) patients. Overall mean duration of analgesia was 72.77 ±34.06 minutes. Mean analgesia duration in group T was

106.66 $\pm$ 2.90 minutes and that in group I was 38.38 $\pm$ 2.85 minutes (p-value 0.001). (Table 1) Comparison was done to see the effects of age and gender on the outcome. Results are shown in tables (2 and 3).

TABLE 1 COMPARISON OF DURATION OF ANALGESIA BETWEEN GROUPS

n=296

Duration of analgesia (in minutes)	Group	n	Mean $\pm$ SD	p-value	95% CI
	T	148	106.66 $\pm$ 2.90	0.001	67.11 to 68.43
	I	148	38.88 $\pm$ 2.85		

TABLE 2: AGE =40 AND >40 YEARS COMPARISON OF DURATION OF ANALGESIA BETWEEN GROUPS

n=296

Duration of analgesia (in minutes)	Group $\leq$ 40		N	Mean $\pm$ SD	p-value
	Transversus Abdominis Plain (TAP)		134	106.98 $\pm$ 2.74	0.001
	Infiltration of surgical incision		136	39.18 $\pm$ 2.75	

Duration of analgesia (in minutes)	Group >40		N	Mean $\pm$ SD	p-value
	Transversus Abdominis Plain (TAP)		14	103.57 $\pm$ 2.59	0.001
	Infiltration of surgical incision		12	35.42 $\pm$ 1.24	

TABLE 3: MALE AND FEMALE GENDER COMPARISON OF DURATION OF ANALGESIA BETWEEN GROUPS

n=296

	Group	N(males)	Mean $\pm$ SD	p-value
Duration of analgesia (in minutes)	Transversus Abdominis Plain (TAP)	94	106.94 $\pm$ 2.76	0.001
	Infiltration of surgical incision	87	39.14 $\pm$ 2.9	

	Group	N(females)	Mean $\pm$ SD	p-value
Duration of analgesia (in minutes)	Transversus Abdominis Plain (TAP)	54	106.17 $\pm$ 3.09	0.001
	Infiltration of surgical incision	61	38.51 $\pm$ 2.76	

DISCUSSION

The block is technically feasible, however the hindrance prevails among anesthetist for its routine use, Transverse abdominal plane (TAP) block functions by anesthetizing parietal peritoneum, surrounding skin and related musculature of the applied region¹⁴. Even after the first description of the procedure a decade ago, several modifications have been conducted which highlighted its potential benefits in different surgeries¹⁵.

The low risk of complications and successful results after newer techniques of TAP block even was not a centre of attention in clinical society and remained underutilized ¹⁶.

TAP block for postoperative analgesia when performed in spinal caesarean patients, showed reduction of the intravenous morphine use by 24mg

(39.65 to 7.78) in 24 hours, when compare with placebo. These statistics showed significant figures (P=0.004) favoring the use of TAP block ¹⁷. In another study, the comparison of wound vs TAP block administration of anesthesia showed (6.11+6.2 vs. 2.63+1.83) ¹⁸. Duration of analgesic effect in caesarean section cases performed under spinal anesthesia (p=0.003)

In 2007, TAP block also showed its efficacy in open prostatectomy cases ^{19,20}. In a literature, comparison of postoperative analgesic effect of transverses abdominal plane block performed ultrasound guided for open appendectomy, the time duration noted for first analgesia showed 100.2 $\pm$ 254.3 minutes and 40.9 $\pm$ 34.7 minutes in TAP bloc group and control group, respectively²¹.

In our research, the mean analgesia duration in group T (TAP block) was 106.66 $\pm$ 2.9 minutes and in group

I (local infiltration) was 38.88 ± 2.89 minutes (p-value 0.001), which favors and complies with above mentioned literature work.

CONCLUSION

Transverse abdominal plane block provides a significantly prolonged duration of postoperative analgesic effect when compared to local anesthetic application at surgical incision site; hence it provides a means of fast recovery and reduced morbidity of postoperative pain, especially in patients undergoing open appendectomy.

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