

Comparison of Transversus Abdominis Plane Block versus Local Wound Infiltration in Reducing Postoperative Pain in Patients Undergoing Infraumbilical Hernia Repair

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ABSTRACT

Objective: To compare the outcomes of TAP block versus local wound infiltration in reducing postoperative pain in patients undergoing infra-umbilical hernia repair.

Study design: Randomized controlled trial

Place and Duration of Study: Department of Anaesthesiology, Surgical Intensive Care Unit & Pain Management, Dow Medical College & Civil Hospital Karachi from 1st August 2020 to 31st January 2021.

Methodology: One hundred patients with undergoing infra-umbilical hernia mesh repair were randomly allocated into two groups. Fifty patients in group A were treated with transversus abdominis plane block and 50 were in group B for local infiltration. Anaesthetic technique was standardized. The drug was administered according to the weight of the patient. Visual analogue score (VAS), graduated from 0-10 was recorded.

Results: The mean age was 41.08±10.36 years. There were 61% males and 39% females. Mean time of analgesia was significantly high in group A than groups B [413.2±63.83 vs 274.16±41.28; p=0.0005]. Mean VAS pain score at rest and movement was also significantly low in group A than group B.

Conclusion: Transversus abdominis plane block seemed preferable to local anesthetic wound infiltration in postoperative analgesia. Current evidence is insufficient to suggest that the transversus abdominis plane block will minimize post-operative morphine requirements and associated side effects in comparison with local anesthetic infiltration.

Key Words: Hernia repair, Transversus abdominis plane (TAP) block, Local wound infiltration, Postoperative morphine

INTRODUCTION

Hernia repair is one of the most common elective procedures performed in general surgery. Good post-operative pain control not only evades post-op complication but also an essential component for early ambulation and return to daily routine. NSAIDs and opioids are the most common modalities used parenteral to control post-operative pain. Besides pain relieve it is important to keep side effects minimum. Therefore pre-emptive wound analgesia has been popularized.¹ Use of local anesthetic agents for infiltration of wound is an easy and virtually cost free method to minimize pain, and requires no special expertise.

Another technique includes the use of anesthetic agents in the plane between the oblique inner and transversal muscles to directly block the peripheral nerves that supply anterior abdominal walls, called the transversus abdominis plane.² This technique was first developed by Kuppuelumani et al³ and formally documented in 2001 by Rafi.⁴ While the theoretically more demanding use of the ultrasound loco-regional blocks takes some experience, the efficacy of the TAP block is acknowledged as part of a multimodal analgesic scheme for operations including an open appendectomy, laparoscopic cholecystectomy, hysterectomy, caesarean section and a large-line intestinal resection.^{5,6}

Mishra and Mishra⁷ in their study established that local analgesia infiltration and regional block (TAP block)

reduced post-operative opioid consumption after caesarian sections and other lower abdominal surgeries.

In an another study Abd El-Hamid and Afifi⁸ found that time to first analgesia request in minutes in those with tap block group was significantly higher than in those with wound infiltration (group T 489.4±93.2 vs group W 263.1±43.32 and p value of <0.001) and VAS Score between the tap block group were low as compare to the wound infiltration group 2 hours after surgery at rest (Group T median=3 and IQR=1 vs Group W median =3 and IQR=2 and P-value0.027) and VAS Score between the tap block group were low as compare to the wound infiltration group 2 hours after surgery at movement or cough (Group T median=3 and IQR=1 vs Group W median =4 and IQR=2 and P-value0.027). Similar findings were noted by Ranjit⁹ and Mc Donnell et al.¹⁰ Ranjit⁹ stated that bilateral TAP block not only reduced VAS score compare to local wound infiltration (p<0.05) but also reduced post-operative opioid use. Ramzy¹¹ found promising results in favor of TAP block even among children who underwent open appendectomy, he found TAP block reduced analgesia usage in controlling post-operative pain.

The study aims to compare the outcomes of ultrasound (USG)-guided TAP block with wound site infiltration anesthesia with the rationale being that good pain control post-operatively is essential to reduce hospital stay and early return to normal physical activity and due to USG TAP block now widely available and being safe,

results of this study can be used to formulate guidelines for their more extensive use.

MATERIALS AND METHODS:

This randomized controlled trial study was conducted at Department of Anaesthesiology, SICU and Pain Management, Civil Hospital Karachi from 1st August 2020 to 31st January 2021 and comprised 100 patients. Patients age 18 to 60 years, of either gender, undergoing infra-umbilical hernia mesh repair, elective procedure and American Society of Anaesthesiologists (ASA) physical status I & II were included. Patients history of allergy or hypersensitivity to bupivacaine either local skin allergy or systemic, as determined by previous history or medical records, require emergency hernial surgeries like obstructed and strangulated hernia and ASA ≥ III were excluded. Patients were divided into two groups, group A for TAP block and group B for local infiltration. Patients were seen by pre-op anaesthesia clinic by anaesthetist with 5 year post-fellowship experience. On the day of surgery, selected patients were identified and their nothing per oral (NPO) status was confirmed; monitors was applied and their baseline heart rate, respiratory rate, oxygen saturation and blood pressure was recorded. Intravenous line was maintained with ringer’s lactate. Just before induction of anaesthesia dexamethasone was administered by the principal investigator.

The method of anesthesia has been standardized. The medicine was given according to the patient’s weight. Profolol caused 2.5 mg/kg body weight and nalbuphine 0.1 mg/kg body weight in the patients. Tracheal intubation with atracurium 0.5 mg/kg body weight was encouraged. Isoflourane, nitrous oxide in 40% oxygen, was retained in anaesthesia. If necessary to ensure sufficient muscle relaxation during the operation, additional doses of atracurium were administered and the patient was ventilated mechanically.

When the operation ends, the patient remains in the abdomen and in an aseptic state. TAP group(n=50) will receive an ultrasound-guided, portable ultrasound system with 7.5MHz linear probe, bilateral TAP block with 20 ml of 0.25 percent bupivacaine on either hand. The probe was positioned around the iliac crest and the shoreline. A 8cm long, 22G peripheral nerve needle stimulating the progress of the aircraft between internal oblique aponeurosis and transverses abdominis muscles. After the tip of the needle touching the plane has been visualized, the hydro-dissection is injected with a 2ml anesthetic solution verifying the right placement. After this, the overall volume of the medication is induced by moving the two layers apart to create a meniscus between the planes. Procedure similarly replicated on the contralateral side.

Local infiltration with 0.25 percent bupivacaine 20 ml can occur in the LWI population (n=50). The patients were then positioned laterally, isoflourane and nitrous oxide were removed and the patient had 100% oxygen ventilation. Neostigmine 0.05 mg/kg and atropine 0.02 mg/kg of body weight were administered intravenously of antagonist residual effects to a neuromuscular blocking drug after sufficient spontaneous respiration was observed. Patients were extubated wake in the left side after diligent suction.

Visual analogue score (VAS), graduated from 0-10 was recorded by a blinded investigator, who was year 1 or 2 post graduate trainee in anesthesia but not involved in the research, at 2 hours post operatively. Patients with VAS score of 4 or more at any point of time, will received either or both of diclofenac 75 mg intramuscularly and tramadol 50 mg intravenously. And time of first supplemental analgesia was noted. Final outcome was the VAS score at 2hours post operatively in both the groups and time of first supplemental analgesia in the form of Inj. tramadol 100mg IV stat. The data was entered and analyzed through SPSS-22. Unpaired student ‘t’ test was applied to compare the outcomes between two groups at 3 hours. Statistical significance was taken at p<0.05.

RESULTS

The average age of the patients was 41.08±10.36 years. Mean demographic characteristics of the patients with respect to groups (Table 1). There were 61% males & 39% females and ASA status was also observed in Table 2. Comparison the mean time of analgesia between groups in reducing postoperative pain in patients undergoing infra-umbilical hernia repair is shown Fig. 1. Mean time of analgesia was significantly high in group A than groups B [413.2±63.83 vs. 274.16±41.28; p=0.0005]. Mean VAS pain score at rest and movement was also significantly low in group A than groups B (Table 3).

Table 1: Demographic characteristics of patients (n=100)

Variable	Group A	Group B
Age (years)	39.32±10.26	42.84±10.26
Weight(kg)	66.80±9.24	68.62±11.43
Height(cm)	158.70±4.33	160.28±4.54
BMI(kg/m ²)	26.51±3.49	26.63±3.84

Table 2: Frequency of genders, ASS in among groups (n=100)

Variable	Group A		Group B	
	No.	%	No.	%
Gender				
Male	31	62.0	19	38.0
Female	30	60	20	40.0
ASA status				
I	24	48.0	26	52.0
II	23	46.	27	54.0

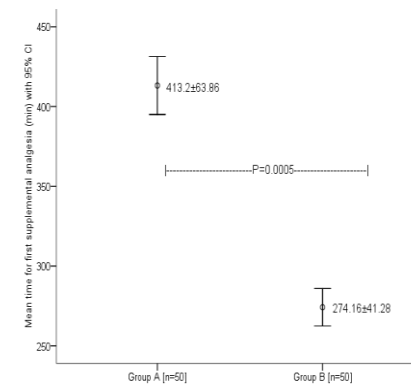


Fig. 1: Compare the mean time of analgesia between groups in reducing postoperative pain in patients undergoing infra-umbilical hernia repair (n=100)

Table 2: Comparison of mean vas pain score between score at rest and movement

Pain	Group A	Group B	P value
VAS rest	0.92±0.72	2.38±0.75	0.0005
VAS movement	1.92±0.63	3.14±0.70	0.0005

DISCUSSION

Among the most common surgical complications are abdominal wall hernias. An umbilical hernia causes damage to the abdominal wall behind the navel. It may cause the navel to bulge outside the bulb consisting of abdominal fat from the larger impulses or often from the small intestine. In other species, abdominal wall hernias are among the most frequent issues with surgery. Many hernias never cause complications and need no medication whatsoever. However, as the risk of age complications is higher, and without treatment the hernia is probably unresolved, surgery is typically advised.¹² An ultimate objective of surgical procedure is to achieve better recovery without complications and sequences in a high quality of life. Over 80 percent of surgical patients suffer from post-operative pain¹³, with various negative effects under care and a significant global issue.¹⁴

Persistent post-surgical pain (PPP), the incidence of which is up to 30%-5%, caused by surgery and acute postoperative pain without sufficient management, has significant negative effects in the quality of life of the person and poses a severe burden on society that disturbs millions of people globally and challenges perioperatives.^{15,16} Most postoperative pain is caused by the surgery and visceral sites.^{17,18}

Transversus abdominis plane (TAP) block, first identified by Rafi et al¹⁷ in 2001, can block the provision of sensory nerve to the anterior abdominal wall by injecting local anesthetics into the transversal-abdominal plane between the internal oblique and transversal-abdominal muscle layers. After abducting^{18,19}, hysterectomy²⁰ and caesarean delivery^{6,21}, the TAP block showed effective pain relief as compared to no interventions or placebo in previous meta-analyses. Local anesthetics have long been used in postoperative analgesia (either as a single shot or using intraoperative catheters).²²

The TAP block²³ as well as the wound infiltration²⁴ are superior to placebo, but one of which offers stronger analgesics after surgery is unknown. In this study, the results of a tap block versus local wound infiltration in patients who undergo infra-umbilic hernia repair are compared to reduce post-operative pain. A total of 100 patients, aged between 18 and 60 years of age, were recruited with undergoing sub-umbilical hernia mesh repair. These patients have been assigned randomly in two groups. Fifty TAP block patients in Group A and 50 in Group B were treated for local infiltration. Some 27% of males and 3% of females also experience hernia throughout their lives.²⁵ About 25 million people had hernia in 2013.²⁶ Inguinal, femoral and abdominal hernias caused 32,500 deaths in 2013 worldwide and 50,500 deaths in 1990.²⁷ The prevalence of umbilical hernia in women is 5 times higher^{28,29} as a major etiological factor. In complete contrast to this, our findings show that men have actually undergone more than twice as much umbilical/para-umbilic hernia repair.

In two randomized trials, two meta-analysis^{30,31} compared TAP block and wound infiltration were performed. Yu et al³⁰ conducted four adult pain trials performed with many lower abdominal operations and a substantial TAP block decrease in pain scores at 24 hours. However, no major pain variations were observed at 2 and 4 hours, morphine intake at 24 hours or nausea and vomiting. Guo et al³¹ comprised nine studies on variable abdominal surgery (laparoscopic and open including cesarean administration) of heterogeneous patient populations (kids and adults including parturients) and showed a substantial reduction in 8 and 24-hour TAP block pain scores and in total morphine intake within 24 hours. Conversely, at 12, 24, 36, and 48 hrs, the period of the first morphine, or nausea and vomiting, Telnes et al³² showed no substantial difference in cumulative morphine usage and pain scores at rest and activity. The TAP block was compared to continuous wound infusion with the other research³³ that was prematurely terminated due to generalized seizures of one patient in the TAP group and indicated no substantial differences in pains between the 2 groups.

CONCLUSION

Transversus abdominis plane block appeared to be superior to local anaesthetic wound infiltration with respect to postoperative analgesia. Adults may have benefits additional to the analgesic effect than children. Current evidence is insufficient to conclude that transversus abdominis plane block could reduce the requirements for postoperative morphine and associated side effects as compared to local anesthetic infiltration.

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