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GYNECOLOGICAL SURGERIES;
EFFECTIVE POSTOPERATIVE ANALGESIA ULTRASOUND GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK

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ABSTRACT… Objectives: To evaluate the use of ultra-sound guided transversus abdominis plane block for effective postoperative analgesia in patients undergoing gynaecological surgery via transverse lower abdominal skin incision. **Study Design:** Randomized Control Trial. **Period:** Six months from April 2013 to October 2013. **Setting:** Department of Anesthesiology, Holy Family hospital, Rawalpindi .**Sampling technique:** Consecutive non-probability sampling. **Material and Methods:** 200 female patients undergoing gynecological surgery via transverse lower abdominal skin incision were enrolled in the study. They were divided into two groups; both received ultra-sound guided transversus abdominus plane block with either bupivacaine (Group A) or saline (Group B). SPSS version17.0 was used to analyze the data. **Results:** Two hundred female patients undergoing gynecological surgeries were included. Mean age of patients was 41 yrs (17-71yrs). There were 100 patients in each group. Both groups were comparable with respect to baseline features. The US-TAP block significantly reduced pain intensity as compared to standard care in the PACU at 4hrs(5.2±3.1vs.8.4±1.3,p=0.003).There was insignificant difference between the visual assessment score of pain at 8hrs between the two study groups(3.6±2.3vs.2.3±2.4,p=0.4). **Conclusions:** Ultrasound guided transversus abdominis plane block (TAP) is an effective modality for reducing postoperative pain after gynaecological surgery via transverse lower abdominal skin incision.

Key words: Ultra-sound guided transversus abdominis plane block (TAP), postoperative analgesia, Gynecologic surgery, transverse lower abdominal skin incision, visual Assessment Score(VAS).

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INTRODUCTION

The transversus abdominis plane block is a newly described peripheral block involving the nerves of the anterior abdominal wall. Block has been developed for post-operative pain control in case of elective gynaecologic and abdominal surgeries. Rafi[1] first described TAP block, who injected local anaesthesia through the ilio-lumbar Triangle of Petit within the gap between the internal oblique and transverses abdominis muscle utilizing the double loss of resistance technique. Virtually, the ultrasound guided TAP block is highly effective and easy technique for rendering analgesia post-operative for anterior abdominal incision as supported by the literature.[2]

Pain experienced following laprotomy is largely due to abdominal wall incision. Effective mitigation of this plane is vital to improve patient satisfaction and for early ambulation. Mrunalini evaluated the efficacy of transverses abdominis plane block for postoperative analgesia, as a component of multimodal analgesia. Tramadol consumption was decreased by 36% in TAPblock group. Tramadol consumption was measured every 2hrly and found to be less up to 18hrs, after which, there was an increase in pain scores and tramadol consumption in TAP block group.[3]

The provision of high quality pain relief after C-section is something that women desire and obstetric anaesthetists aspire to provide. The reality is that this can be a somewhat lofty ambition, for a variety of reasons such as difficulty in predicting an individual's pain, interpatient variability in the analgesic response

and contraindications to certain techniques, obstetric complications like medical disorders, APH, PPH. Consequently, there is no universally accepted, gold standard method with most units having preferred approaches that work well for the majority of women. Mc Donnell et al found that TAP block, as a component of a multimodal analgesia regimen, provided superior analgesia when compared with placebo block up to 48hrs after elective c-section.[4] Women who received TAP block with ropivacaine compared with placebo had reduced postop visual analog pain scores .Mean total morphine postop requirement in the first 48hrs were also reduced as was the 12hr interval morphine consumption up to 36 hrs. Less sedation was given in TAP block group. There were no complications attributed to TAP block.

As is often the case with relatively new techniques , the first clinical trial findings can be somewhat different to what is subsequently found when further studies are performed or when the technique is applied in actual clinical practice. Practical issues and complications of TAP technique not apparent in a closely controlled research environment, involving comparatively small numbers of patients, may manifest once applied to daily clinical practice. Complications such as liver injury have been documented and concern has been raised about the potential for high plasma concentrations of local anaesthesia after bilateral TAP blocks. This is of particular relevance in obstetric patients, given their frequent exposure to local anaesthesia.[5] In one study patient went in to anaphylactic shock after receiving bupivacaine so allergy to local anaesthesia should be kept in mind when recruiting the patients.

Rivard et al in 2014 studied the difference between the gynae oncology patients undergoing laprotomy. Patients were divided as using patient controlled epidural analgesia and TAP block. He found that epidural group is associated with decreased narcotic use and pain scores as compared to TAP group who were associated with decrease narcotic use only on day of surgery, but not on the postoperative 2nd and 3rd day. Although there was no difference in the intra operative factors but complications during surgery were increased in TAP block group.[6]

Safety remains an important issue. Plasma concentration of local anaesthesia is a potential cause for concern, especially in patients who are not local anaesthetic naïve because of recent exposure to epidural local anaesthetic techniques. Although consensus has supported the use of ultrasound guided rather than a landmark-based technique, new research shows both a high failure rate and potential risk associated with reliance on a double pop for correct needle placement. Ultrasound technique is not doubt better than blind single or double pop technique.
There is a need for training in the performance of the block; even with ultrasound guidance. It is challenging in morbidly obese pregnant women, who represent an increasing proportion of our practice. Trande et al[7], found that despite providing sparing effect on local anaesthesia and opiod consumption, stimulating catheters are associated with side effects and analgesia related expenditures. Published reports of RCTs provide evidence to formulate limited recommendations regarding the use of adjunctive U/S and stimulating perineural catheters. Further meticulously executed RCTs are warranted.

Barrington, Tran and Mc Donnell assessed the spread of local anaesthetics in cadavers.[8,9] Only one study has investigated the distribution of dermatomal sensory blockade after different TAP block approaches. TAP block reduce the parietal pain from the skin and muscles, which are innervated by ilioinguinal and iliohypogastric nerves, but does not influence the visceral pain produced by stretch receptors of the fallopian tubes, uterus and vagina that are innervated by the sympathetic and parasympathetic nerves.[10]

MATERIAL AND METHODS

This randomized control trial was conducted on 200 patients at Department of anaesthesia and Department of Obstetrics &Gynecology HFH Rawalpindi over a period of six months from April 2013 to October2013.Women included in the study had ASA-1(normal healthy patient),

II(mild systemic disease with no functional limitation) between 20-50yrs of age undergoing elective gynaecological surgery under general anaesthesia. Patient were excluded if they had BMI>35kg/m^2, any concomitant co-morbidity like Diabetes, hypertension, malignancy, pulmonary, hepatic or renal pathology. If she require ventilator support in postop period, coagulopathy and had any contraindication to general anaesthesia. After approval from hospital ethical committee, 190 patients were recruited according to selection criteria. All patients were assessed for elective surgery. Written informed consent taken. Patients were randomly divided in group A and group B by lottery method. "Group A" received ultra-sound guided Tansversus Abdominis Plane block with bupivacaine 0.25% after induction of gen anesthesia before skin incision. "Group B" received same block with normal saline after GA before skin incision. Intravascular access was established in pre-operative room. In operation theatre, monitoring included electrocardiography, pulse oximeter, noninvasive blood pressure was attached. Heart rate and blood pressure were noted. General anaesthesia given with 0.1mg/kg Nalbuphine, 0.2 glycopyrrolate, followed by 2mg/kg propofol, 01-1.5mg/kg suxamethonium for induction and intubation respectively. Before skin incision, patients in Group "A" received ultra-sound guided Transversus Abdominis Plane block 20ml, 0.25% bupivacaine on each side. Vitals were taken after the regular interval of 5 minutes. At the end of surgery, patients were extubated and shifted to post anesthesia care unit (PACU) for 24 hrs.

Post operatively all patients received injection Tramadol and Dimenhydramine I/V 8hourly.All patients were evaluated at 4 and 8 hrs by post graduate trainee after surgery using ten points numerical pain rating scale and those having a score of 4 or more were given rescue analgesic. Final outcome will be measured in 8 hrs. Rescue analgesia will be injection Nalbuphine 5mg slow I/V.

Data was analyzed on SPSS-15.Continuous variables like age, pulse, blood pressure, pain scores were expressed as mean± SD. Independent sample T-test was used to compare mean pain scores in two groups. P value<0.05was considered statistically significant.

RESULTS

Two hundred female patients undergoing gynecological surgeries were 0included in the study. There were 100 patients in each group. The baseline comparison of the two groups is shown in table-I. The mean age (43.15±7.85 vs. 44.06±9.3, p=0.45), BMI (26.76±1.14 vs. 27.01±1.29 p=0.15), Baseline Pulse: 91.29±9.65 vs. 90.10±9.01 p=0.37, Baseline systolic blood Pressure: 127.35±10.77 vs. 129.08±9.97 p=0.24, and Baseline diastolic blood Pressure: 79.64±9.30 vs. 80.25±9.57 p=0.65 were not significantly different between two groups.

	Group A	Group B	P value
Age (yrs)	43.15±7.85	44.06±9.3	0.45
BMI (kg/m^2)	26.76±1.14	27.01±1.29	0.15
Baseline Pulse	91.29±9.65	90.10±9.01	0.37
Baseline systolic blood Pressure	127.35±10.77	129.08±9.97	0.24
Baseline diastolic blood Pressure	79.64±9.30	80.25±9.57	0.65

Table-I. Comparison of patients with and without ultra-sound guided transversus abdominis plane block with bupivacaine.

The US-TAP block significantly reduced pain intensity as compared to standard care in the PACU at 8hrs Mean Visual Analogue Scale (2.36 ± 0.83 vs. 5.28 ± 0.60, p = 0.0001) at 8hrs between the two study groups.

	Group A (US-TAP with Bupivacaine	Group B (US-TAP with saline (Placebo)	
Mean Visual Analogue Scale	2.36 ± 0.83	5.28 ± 0.60	p = 0.0001

Table-II. Comparison of visual analogue scale (vas) between the two groups

DISCUSSION

Rafi was the first to document TAP blocks in 2001[1]. In the original technique, after confirming the flank bulge sign, Triangle of Petit and transverses abdominis muscle were entered through a consecutive single pop technique.[11]

In our study, pain scores were reduced at 4hrs and 8hrs in ICU in post-operative period. Pain was compared between TAP block and saline group, when it is more than 4 then extra pain killer was given. The results are clearly in favour of TAP block with bupivacaine(2.36± 0.83 versus. 5.28±0.60 p=0.0001).

Many studies FAVOUR my study. Pain scores were also reduced in a study by Mei W[12] who found that 4 women who had C-section with US guided TAP block combined with ilioinguinal-iliohypogastric nerve block using 0.5% ropivacaine. Pain during the delivery of baby was treated with small dose of i/v ketamine and propofol. They suggest that tap is a good alternative to local anesthesia for C-section.

TAP reduce the requirement of opioid analgesia, assessed in a double blind controlled trial by Tan TT [13] .40 women had C-section. All were given G.A. Half were given TAP and other half were given no local analgesia. In TAP group there is less morphine consumption and more patient satisfaction. But no difference was found in visual pain scores, sedation level, nausea vomiting or antiemetic medication. Both studies were conducted in obstetric patients .Lee at al [14] found that TAP blocks in conjunction with intrathecal morphine provided superior early post op analgesia in C-section, to intrathecal morphine alone. However, after 24 hrs there was no difference in pain scores or analgesia consumption. Still more trials are required as Obstetric complications need to be addressed like in case of PIH,PRE ECLAMPSIA, OBESE mothers, patients with emergencies like APH as all studies are in elective patients without obstetric complications.

There are many studies in which TAP block is evaluated in other abdominal surgeries like in laparoscopic colorectomies. The results clearly indicate that TAP block along with early feeding and ambulation allow for early return of bowel function and short hospital stay.[15]

Many studies have been conducted to see the best possible post-operative analgesia for abdominal hysterectomies, unlike my study other drug has been added to bupivacaine to prolong analgesia effect. Dexmedetomidine is a agonist, added to bupivacaine and found to prolong analgesia when used in neuraxial and peripheral nerve blocks. This trial was conducted in Saudia 2014.[16]

But the numbers of patients were small in this group and more trials are required to see the beneficial effect of this alpha- agonist.

Bhattacharijee[17] conducted a randomized controlled trial and conducted that tap block before giving lower abdominal incision, decreased fentanyl requirement during surgery, prevent hemodynamic responses to surgical stimuli and provide effective post op analgesia. Pulse rate, systolic and diastolic blood pressure were significantly higher in Group N. Intraoperative fentanyl requirement was significantly higher in Group N. VAS scores on emergence at rest (3 mm vs 27 mm), with activity (8 mm vs. 35 mm) were significantly lower in Group B, which is TAP block. Median duration of analgesia was significantly higher in TAP block (290 min versus 16 min, P = 0.000). No opioid related side effect attributed to TAP block were noted in any patient.

In a study evaluating TAP in all abdominal surgeries, pain scores, both at rest and during mobilization, were significantly reduced with the TAP block in the early postoperative period till 6 hrs in four studies (bowel resection, abdominal hysterectomy, caesarean section and appendectomy). After appendectomy, bowel surgery and abdominal hysterectomy, pain scores were also reduced after 24hr. Furthermore, in the abdominal hysterectomy, reduced pain scores, both at rest and during mobilization were reported for till 48 hr post operatively[18] which is very significant as I have studied pain scores till

8hrs postoperative only. Trials are required on the type of technique being used as one technique should be announced as gold standard in future and radiologist should be involved in these studies because ultra-sound guidance no doubt increase the accuracy as compared with blind technique.

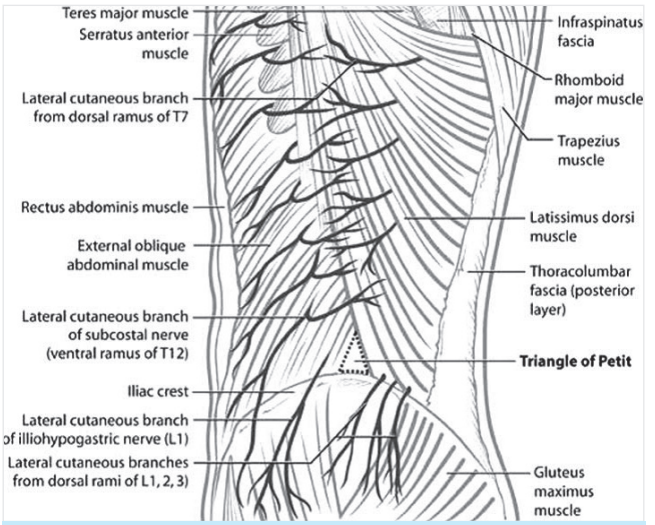

Figure-1. Line drawing of the anatomy of the abdominal wall, including the lumbar triangle of Petit (TOP); The triangle is bounded posteriorly by the latissimus dorsi muscle, anteriorly by the external oblique, with the iliac crest forming the base of the triangle.

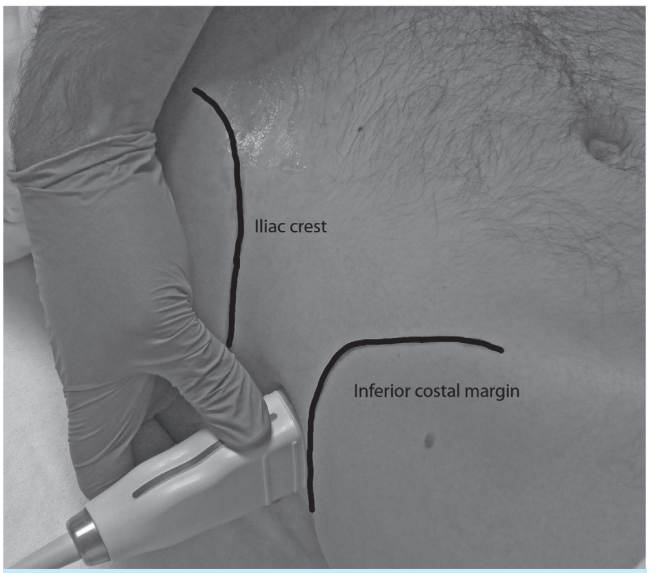

Fig-3. For the transversus abdominis plane block, the ultrasound tranducer is placed in transverse orientation, just superior to the iliac crest at the midaxillary line.

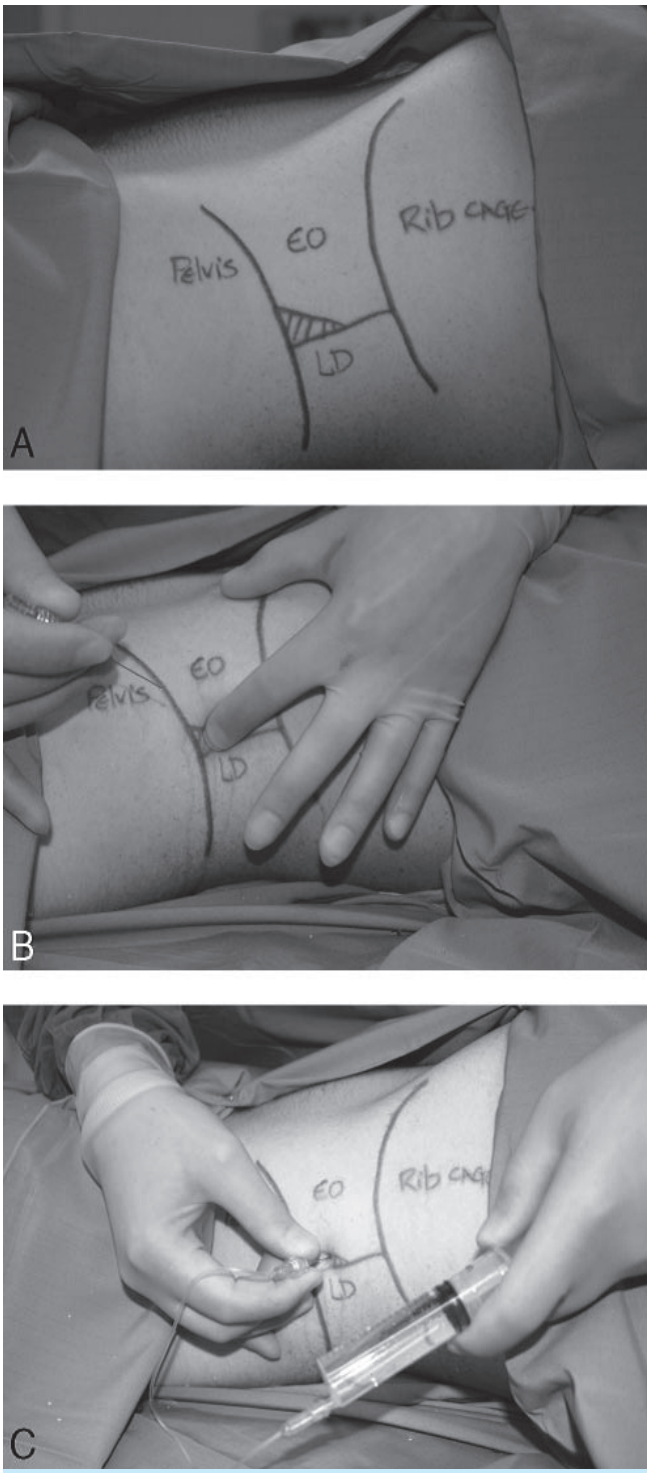

Figure-2. Panel A: Surface anatomy of the TOP. Panel B: Site of needle insertion into of the TOP. Panel C: Injection of local anesthetic through the needle inserted into the transverses abdominis neurofascial plane via the TOP. TOP _ lumbar triangle of Petit; LD _ latissimus dorsi muscle; EO _ external oblique muscle.

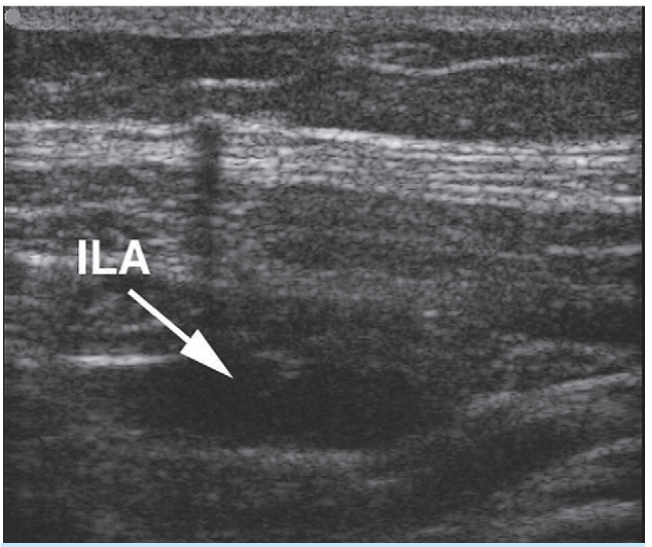

Fig. 4 Ultrasound image of spread of local anesthetic solution between the internal oblique and transverse abdominus muscles during the transabdominus plane block. ILA = injected local anesthetic.

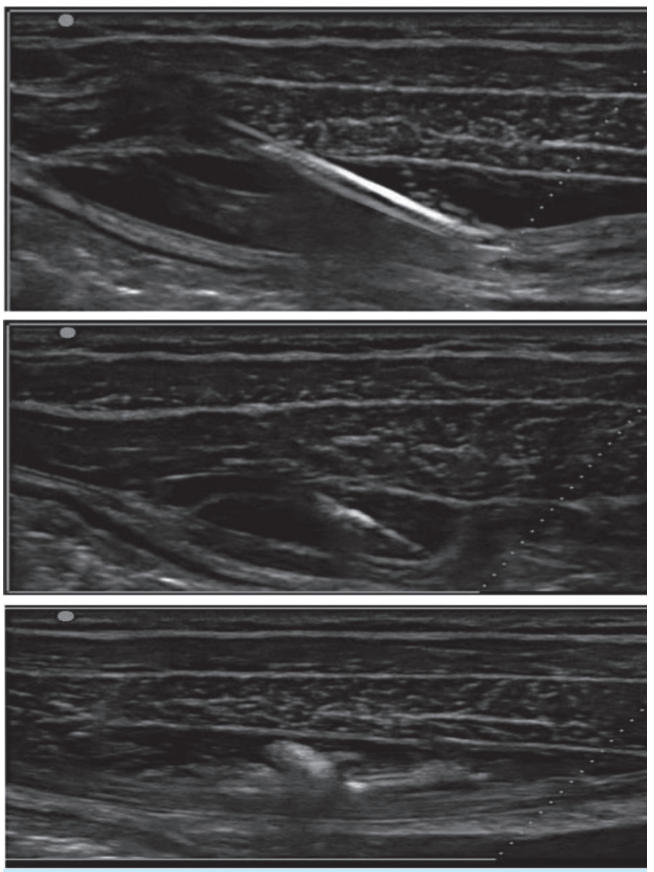

Fig-5. Sequence of the transversus abdominis plane (TAP) catheter placement; 1.1: visualization of the plane; 1.2: dissection of the plane with local anesthetic solution using an 18-gauge Tuohy needle; 1.3: advancement of the catheter 3–4 cm in the plane and final placement control by aero-dissection.

CONCLUSIONS

TAP block seems to hold considerable promise for patients undergoing gynaecological procedures involving lower abdominal wall incisions. The maximum benefit is seen in first 4hrs with comparable pain reduction later on. Training courses should be conducted for all anaesthesiologists to learn TAP technique.

LIMITATIONS: Two potential limitations should be considered. First, the study limited assessment of analgesia to the first 24 postoperative hours. However, the TAP block produce clinically useful levels of analgesia for at least 48 h postoperatively. Second, there are difficulties in adequately blinding studies such as these, given that the TAP block produces loss of sensation of the abdominal wall. However, neither the patient nor the anesthesiologist conducting postoperative assessments were aware of the group allocation.

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PREVIOUS RELATED STUDY

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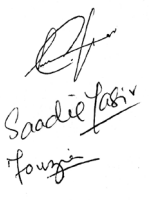
1	Dr. Mubashir Iqbal	All major co-authors	
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