



A COMPARATIVE STUDY OF 0.25% BUPIVACAINE AND 0.25% ROPIVACAINE IN TRANSVERSUS ABDOMINIS PLANE BLOCK FOR POST OPERATIVE ANALGESIA FOLLOWING EMERGENCY LAPAROTOMY.

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Abstract

Aim : To compare the analgesic efficacy of 0.25% Bupivacaine and 0.25% Ropivacaine in TAP block as a part of a multimodal analgesia regimen for post Laparotomy pain management.

Materials and Methodology: Patients more than 18 years old posted for emergency laparotomy in a tertiary care centre of eastern India. After approval from the institutional ethical committee and written informed patients consent, 60 Patients were included in the study.

Mode Of Selection Of Cases: Randomised computer sampling technique. Group A: TAP Block with 0.25% Bupivacaine 20 ml each side Group B: TAP Block with 0.25% Ropivacaine 20 ml each side

Conclusion : We conclude that the Inj. Bupivacaine and Inj. Ropivacaine provide comparable analgesia in TAP block for post operative Analgesia following Emergency laparotomy.

INTRODUCTION

The transversus abdominis plane (TAP) block is a regional anesthesia technique that provides analgesia to the parietal wall and the skin and muscles of the anterior abdominal wall^[1].

Despite a relatively low risk of complications and a high success rate using modern techniques, TAP blocks remain overwhelmingly underutilized^[2].

First described just a decade ago, it has undergone several modifications, which have highlighted its potential utility for an increasing array of surgical procedures. Although the block is technically straightforward, there is inertia regarding its adoption into clinical practice.

There is an increasing interest in abdominal wall block in emergency surgery where neuraxial blocks are not possible. The ultrasound-guided technique has improved the performance and success rate.

INCLUSION CRITERIA

- Patients undergoing emergency laparotomy above 18 years of age.
- ASA grade I and II.

EXCLUSION CRITERIA

- Patient's refusal
- Allergy to opioids, amide group of local anaesthetics & NSAIDS
- Coagulation derangement/bleeding disorder.
- Infection at the site of block.
- Patients with cardiovascular, pulmonary or neurological diseases.
- Patients converted to general anaesthesia after giving subarachnoid block.

MATERIALS AND METHODOLOGY

We studied TAP block in patients posted for emergency laparotomy under general anesthesia.

Group A: TAP Block with 0.25% Bupivacaine 20 ml each side Group B: TAP Block with 0.25% Ropivacaine 20 ml each side.

OBJECTIVE

Primary objective is to measure Pain scores during the first 24 hrs. Analgesic requirements during the first 24 hrs.

Secondary objective is to measure

The time of first onset of pain & the time of first request for analgesia. Side effects during first 24 hrs.

This is a comparative study of sample size 60. This study was carried out in the tertiary care centre of eastern India. Patients were assessed at 30 minutes, 2nd, 4th, 6th, 12th & 24th hr with the help of visual pain Analogue scale and scored Rescue analgesia was given with Tramadol 2mg/kg when the patient complained of pain or When VAS score >4.

TECHNIQUE

USG APPROACH.

An ultrasound-guided approach was first described in 2007 by Hebbard et al .The authors applied a transversely orientated ultrasound probe to the anterolateral abdominal wall where the three muscle layers are most distinct .

After identification of the TAP between the internal oblique and transversus abdominis muscles, the probe was moved posterolaterally to lie across the midaxillary line just superior to the iliac crest (i.e. ,over the triangle of Petit). The block needle was then introduced anteriorly and advanced in an in - plane approach Real -time ultrasonography facilitates easy needle visualization as it approaches and reaches the target fascial plane. A hypoechoic layer , created by injection of local anesthetic, is also easily visualized Hebbard etal. Also noted that the—pop sensation in the classic approach could be imprecise due to anatomic variability, especially in patients with large BMI and, as such, concluded that real -time visualization of local anesthetic spread was likely to be a more definitive endpoint , as is often the case with other regional block techniques. This ultrasound guided technique is commonly referred to as the posterior approach.



Intraoperative

All patients received General Anesthesia .A standardized general anesthetic regime was employed, consisting of propofol (2.5 mg/kg), fentanyl (3 mcg/kg), and atracurium (0.6 mg/kg), with intraoperative non-opioid analgesia of paracetamol (15–20 mg/kg) and diclofenac (0.5 mg/kg).

Monitoring was done for all patients using the following:

- ECG.
- Pulse oximetry
- Non Invasive blood pressure monitoring.

IV crystalloids and ephedrine were administered as needed to treat hypotension.

At end of surgery, Petit's triangle was identified on both sides above iliac crest between the fibres of external oblique and latissimus dorsi muscles.

Under all aseptic precautions the block was given through Petit's triangle with 22 G hypodermic needle attached to a 20 ml syringe containing the drug as per the group allocation. Needle was introduced perpendicular to skin and advanced until two "POPS" or give way felt . Then the drug was deposited in the fascial plane after aspiration, check aspiration was done every 3 ml to rule out intravascular injection. The patient was observed for 15 minutes and then shifted to post - anaesthesia care unit .

Group A 20ml of 0.25% of Bupivacaine injected on either side.

Group B 20ml of 0.25% of Ropivacaine injected on either side.

Maximum allowable concentration of local anesthetic solution was not crossed in this study.

Postoperative

The presence and severity of pain, nausea, vomiting and any other side effects were assessed for all patients in both groups.

These assessments were performed in the PACU for 30 mins and at 2, 4, 6, 12, 24 hrs postoperatively in the labour ICU.

All patients were asked to give scores for their pain and for the degree of nausea at each time.

Pain severity was measured using visual analog scale (VAS, 0 = no pain and 10= worst pain imaginable). Rescue analgesia was given for visual analogue scale (VAS) \geq 4 with IV tramadol 2mg /kg.

The time of first onset & the time of first request for analgesia requirements during the first 24 hrs were noted.

Antiemetics were given to any patient who complained of nausea or vomiting.

Any signs of adverse effects of the technique like local site infection, hematoma formation, local anesthetic toxicity due to intravascular injection of anesthetic (like dizziness, tinnitus, perioral numbness and tingling, lethargy, seizures, signs of cardiac toxicity like atrioventricular conduction block, arrhythmias, myocardial depression and cardiac arrest).

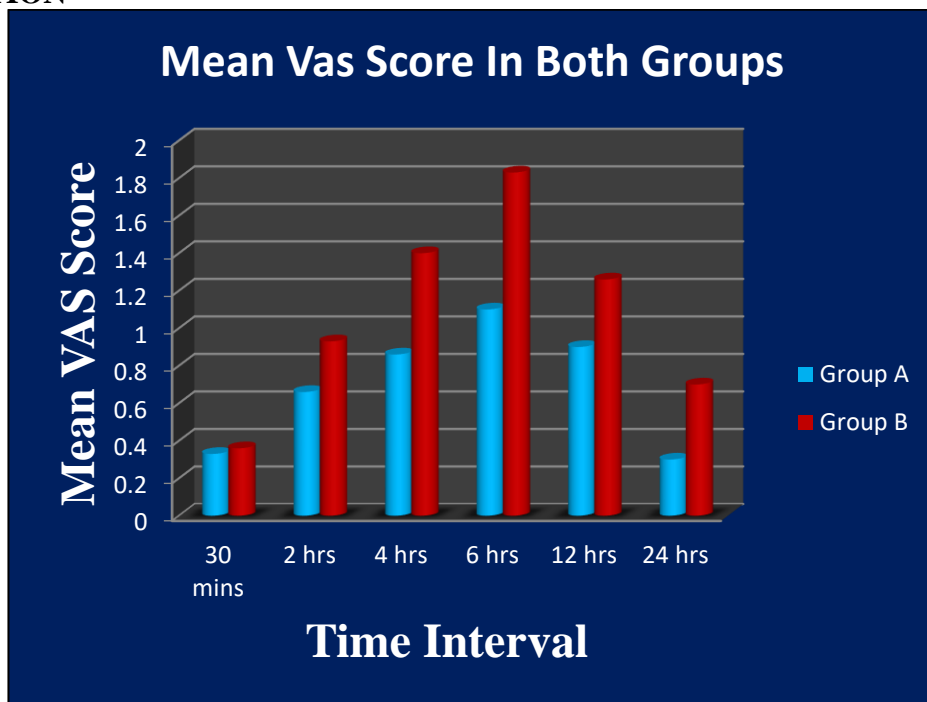
Visual Analogue Scale

The Scale consist of 10cm or 100 millimeter line anchored at one end by a label —no pain and the other end by a label —the worst pain imaginable or pain as bad as it can be. VAS is a most common method for measuring pain and pain relief in clinical practice.

- 1-2=no pain
- 3-4=mild pain,
- 5-6= moderate pain,
- 7-8=severe pain
- 9-10= intolerable pain

Ultrasound image showing the structures in TAP block, EOM:external oblique Muscle, IOM: internal oblique Muscle, TAM: transversus abdominis Muscle, TAP- Transversus Abdominis plane

OBSERVATION



The comparison of VAS scores at different time interval in both groups showed that TAP block has equal analgesic effects with Bupivacaine and Ropivacaine. 3patients in Bupivacaine group and 4 patients in Ropivacaine group required rescue analgesia during first 12 hours.

REVIEW OF LITERATURE

REFERENCE	OUTCOME
Sforza et al . , 2011 ^[3]	Superior analgesia compared to IV/PO medications
Hivelin et al . , 2011 ^[4]	Superior analgesia compared to IV/PO medications
Mei et al . ,2011 ^[5]	Superior analgesia compared to local infiltration
Bharti et al.,2011 ^[6]	Superior analgesia compared to IV/PO medications
Borglum et al . 2011 ^[7]	Significant reduction in pain and anticipated need for IV/PO analgesics
Aveline et al . 2011 ^[8]	Superior analgesia compared to landmark – based ilioinguinal / iliohypogastric nerve block
Owen et al . , 2011 ^[9]	Superior analgesia compared to IV/PO medications
Gravante et al 2011 ^[10]	Superior analgesia compared to IV/PO medications
Baaj et al . 2010 ^[11]	Superior analgesia compared to IV/PO medications
Heil et al . 2010	Superior outcome compared to anticipated results with IV/PO medications
Araco et al 2010	Superior analgesia compared to IV/PO medications
Kadam and Moran 2011	Non inferior outcome compared to epidural analgesia
Niraj et al.,2011	Non inferior outcome compared to epidural analgesia

Petersen et al. reviewed 7 randomized, double blinded, clinical trials of both landmark based & USG guided TAP blocks for managing post operative pain after abdominal surgery with incisions below the level of the umbilicus^[12].

All 7 studies compared pain-related outcomes with TAP blocks as part of a multi-modal postoperative analgesic regimen.

Morphine ± acetaminophen ± NSAIDS drugs was most commonly used to complement TAP blocks. A meta-analysis of these 7 studies demonstrated an average reduction in 24-hour morphine consumption in favour of TAP block patients compared with standard management. Postoperative sedation, as well as postoperative nausea and vomiting (PONV), was marginally reduced in patients with TAP block.

A. Kocum, A.Turkoz et al. Compared efficacy of Ropivacaine 0.25% and Bupivacaine 0.25% in providing surgical anaesthesia for lumbar plexus and sciatic nerve block and the result were comparable.

They found that Ropivacaine 0.25% and Bupivacaine 0.25% are equally efficacious in providing analgesia as well as blockade achieved by either drug was of similar quality and provided similar duration of postoperative analgesia^[14].

Hickey R, Hoffman J, Ramamurthy S et al in 1991 studied the effectiveness of 0.5% ropivacaine and 0.5% bupivacaine for brachial plexus block in 48 patients and found that the mean time for anesthesia and analgesia did not differ significantly and concluded that Ropivacaine 0.5% and Bupivacaine 0.5% appeared equally effective in providing brachial plexus block^[15].

ANATOMY

- The musculature of the lateral abdomen has three layers. From superficial to deep, they are the external oblique, the internal oblique, and the transversus abdominis muscles.
- On its course from medial to lateral, the internal oblique muscle slopes upward and creates a small gap above the iliac crest.
- It is this sloping edge, above the iliac crest, that defines the medial aspect of the lumbar triangle of Petit.
- The posterior edge of the triangle is the latissimus dorsi muscle.
- The external oblique may overlap the medial edge of the latissimus dorsi muscle.
- The inferior aspect of the triangle is the iliac crest, and the peritoneum rests directly deep to the innermost muscle.
- The TAP is the fascial layer between the internal oblique and the transversus abdominis muscles.

DISCUSSION

The benefit of adequate postoperative analgesia are clear and include a reduction in the postoperative stress response, reduction in postoperative morbidity, and in certain types of surgery, improved surgical outcome.

Effective pain control also facilitates rehabilitation and accelerates recovery from surgery.

TAP blocks have been described as an effective component of multimodal postoperative analgesia for a wide variety of abdominal procedures including

- Large bowel resection
- Cesarean section
- Lap. appendectomy/cholecystectomy
- Total abdominal hysterectomy
- Open prostatectomy^[13]
- Abdominoplasty with/without flank liposuction

Using local anaesthetic agents in TAP Block is a simple and effective analgesic technique, appropriate for surgical procedures where parietal pain is significant component of postoperative pain.

RESULTS

Result was analyzed Statistically.

- Mean comparison between the groups were done using UNPAIRED 'T' TEST.

- Both the groups were comparable in demographic data
- The diagnosis and surgeries performed were similar in both groups.
- The reduction of VAS score was comparable in both the groups. ($P>0.05$)

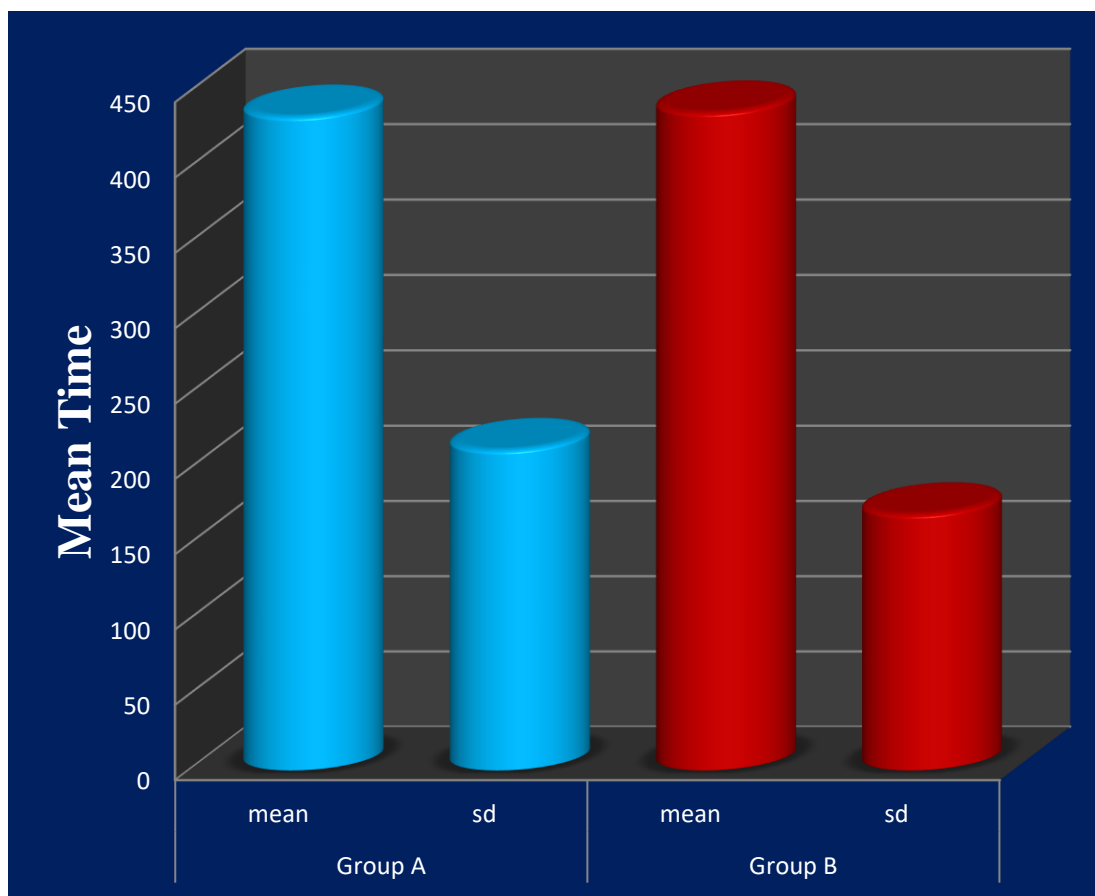
VISUAL ANALOGUE SCORE

- The mean VAS score in group A at 30 minutes , 2,4,6,12 and 24 hours were 0.33 ± 0.88 , 0.66 ± 1.09 , 0.86 ± 1.27 , 1.1 ± 1.47 , 0.9 ± 1.29 and 0.3 ± 0.74 respectively .
- The mean VAS score in group B at 30 minutes , 2, 4, 6, 12 and 24 hours were 0.36 ± 0.88 , 0.93 ± 1.08 , 1.40 ± 1.35 , 1.83 ± 1.44 , 1.26 ± 1.22 and 0.7 ± 0.91 respectively .
- The difference in mean VAS score was less at all time interval in group A but was not significant . ($p>0.05$) Mean VAS Scores

RESCUE ANALGESIA

The mean time to first rescue analgesia in Group A was 434.166 ± 213.035 min
The mean time to first rescue analgesia in Group B was 436.875 ± 170.229 min, which was not significant statistically ($p>0.05$)

The requirement of rescue analgesia in the postoperative period was similar in both the groups.

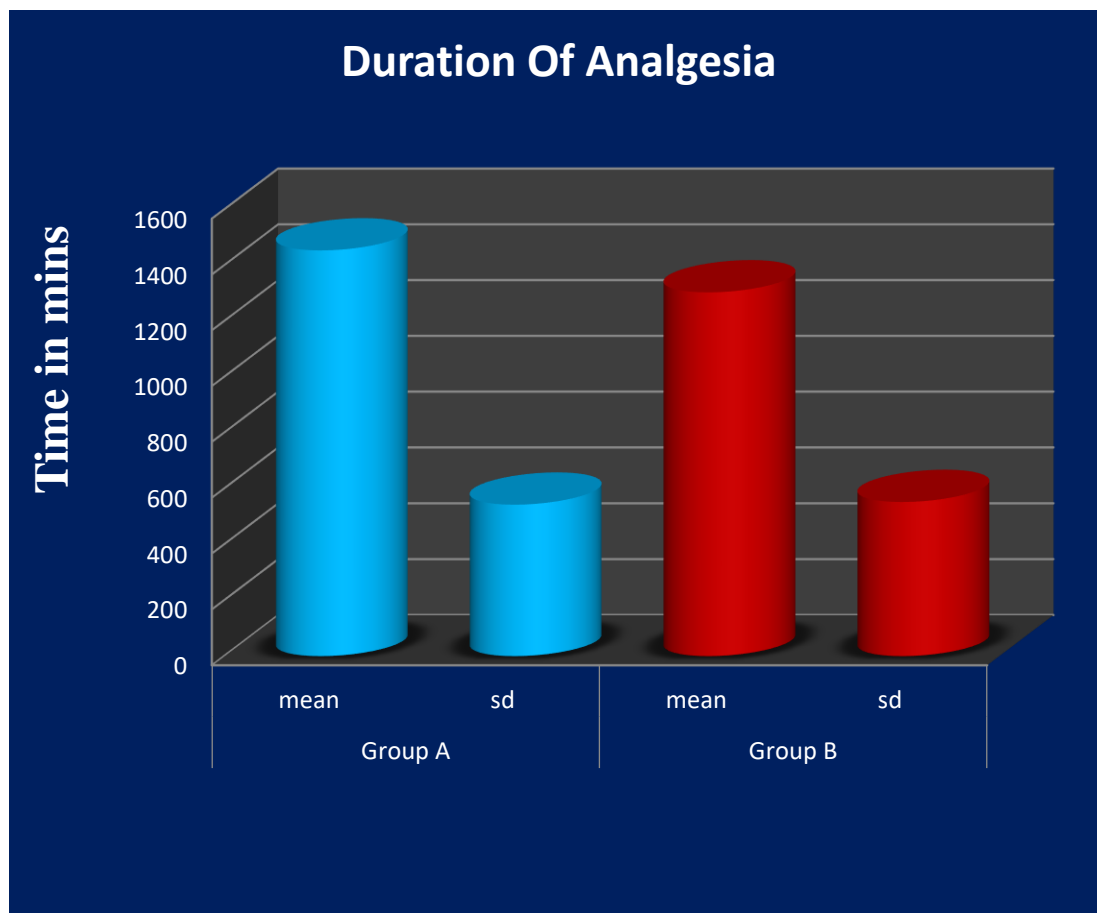


The mean time to first rescue analgesia in Group A was 434.166 ± 213.035 min and in Group B it was 436.875 ± 170.229 min which was not significant statistically. The requirement of rescue analgesia in the postoperative period was similar in both the groups

DURATION OF ANALGESIA

In Group A the mean duration of analgesia was 1454.266 (24 hrs) minutes with Standard deviation of 542.798 (9 hrs)

In Group B the mean duration of analgesia was 1303.833 (22 hrs) minutes with a standard deviation of ± 552.447 (9 hrs 20 minutes) which was insignificant. P value was >0.05 .



DURATION OF ANALGESIA

CONCLUSION

The most important clinical implication of our findings is the significant opioid sparing effects of TAP block in the post operative period. Opioids, though very effective in perioperative pain management, may be associated with nausea, vomiting, pruritis and respiratory depression.

Patients who are morbidly obese or having obstructive sleep apnea will be maximally benefitted from TAP block as it provides opioid sparing effects.

It may be a relatively safer alternative to neuraxial block for intra and postoperative analgesia in patients having coagulopathy.

We conclude that Bupivacaine and Ropivacaine are equally effective in Transversus Abdominis Plane Block for Post Operative Analgesia Following emergency laparotomy.

REFERENCES

1. S.Charlton, A.M.Cyna, P.Middleton, and J. D. Griffiths,“Perioperative transversus abdominis plane(TAP)blocks for analgesia after abdominal surgery ,”Cochrane Database of Systematic Reviews ,vol .8,Article ID CD007705, 2010.
2. R.J.Kearns and S.J.Young,— “Transversus abdominis plane blocks a national survey of techniques used by UK obstetric anaesthetists ,” International Journal of Obstetric Anesthesia , vol .20,no.1, pp. 103–104, 2011.

3. M.Sforza, K.Andjelkov,R.Zaccheddu,H. Nagi , and M.Colic , “Transversus abdominis plane block in abdominoplasties,” *Plastic and Reconstructive Surgery*,vol.128, no. 2, pp. 529–535, 2011.
4. M. Hivelin, A.Wyniecki, B.Plaud, J.Marty, andL.Lantieri , “Ultrasound -guided bilateral transversus abdominis plane block for postoperative analgesia after breast reconstruction by DIEP flap,” *Plastic and Reconstructive Surgery*, vol . 128,no. 1, pp. 44–55, 2011
5. W.Mei,C.Jin ,L.Feng et al . , “Case report : bilateral ultrasound-guided transversus abdominis plane block combined with ilioinguinal -iliohypogastric nerve block for cesarean delivery anesthesia,”*Anesthesia and Analgesia*,vol.113, no. 1, pp. 134–137, 2011.
6. N.Bharti, P.Kumar ,I.Bala, and V.Gupta, “The efficacy of a novel approach to transversus abdominis plane block for Post Operative Analgesia after Colorectal Surgery,” *Anesthesia and Analgesia*, vol . 112, no. 6, pp. 1504 –1508, 2011.
7. J.Borglum, C.Maschmann, B.Belhage, and K.Jensen ,“Ultrasound-guided bilateral dual transversus abdominis plane block: a new four-point approach ,” *Acta Anaesthesiologica Scandinavica*,vol.55,no.6,pp.658–663,2011.
8. C.Aveline,H.Le Hetet ,A.Le Roux et al . ,“Comparison between ultrasound-guided transversus abdominis plane and conventional ilioinguinal/iliohypogastric nerve blocks for day case open inguinal hernia repair,” *British Journal of Anaesthesia*, vol.106, no.3, pp.380–386, 2011.
9. D.J.Owen,I.Harrood, J.Ford,M.Luckas, and V.Gudimetla , “The Surgical Transversus abdominis plane block-a novel approach for performing an established technique ,” *British Journal of Obstetrics and Gynaecology*, vol.118,no.1, pp.24–27,2011.
10. G.Gravante, F.Castri ,F.Araco and A.Araco, “A comparative study of the transversus abdominis plane (TAP) block efficacy on post -bariatric vs aesthetic abdominoplasty with flank liposuction,”*Obesity Surgery*,vol.21,no.3,pp.278–282,2010.
11. J.M.Baaj ,R.A.Alsatli ,H.A.Majaj , Z.A.Babay, and A.K.Thallaj, “Efficacy of ultrasound-guided transversus abdominis plane (TAP) block for post -cesarean section delivery analgesia—a double blind, placebo controlled,randomized study,” *Middle East Journal of Anesthesiology*,vol.20,no.6,pp.821–826, 2010
12. P.L.Petersen,O. Mathiesen ,H.Torup,and J.B.Dahl, “The Transversus abdominis plane block: a valuable option for post operative analgesia? A topical review,”*Acta Anaesthesiologica Scandinavica*, vol .54, no.5, pp. 529 –535,2010.
13. B.D.O’Donnell , J.G.McDonnell, an d A.J.McShane , “The Transversus Abdominis Plane (TAP) block in open retropubic Prostatectomy,” *Regional Anesthesia and PainMedicine* , vol.31, no. 1, article 91, 2006.
14. Kocum A,Turkoz A,Bozdogan N, et al .Femoral and sciatic nerve block with 0.25% bupivacaine for surgical management of diabetic foot syndrome: an anaesthetic technique for high-risk patients with diabetic nephropathy. *J Clin Anesth* 2010; 22:363- 6. doi :10.1016/ j.jclinane. 2009.04.009.
15. Hickey R1, Hoffman J, Ramamurthy S. A comparison of ropivacaine 0.5% and bupivacaine 0.5% for brachial plexus block. *Anesthesiology*. 1991 Apr;74(4):639-42.