**Transversus abdominis plane block versus local anesthetic wound infiltration in patients undergoing open inguinal hernia repair surgery**

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**Abstract:**

**Objectives:**This study aimed to compare the analgesic effect of ultrasound-guided TAP block versus wound infiltration in patients undergoing open inguinal hernia repair.

**Patients and methods:** 60 male patients scheduled for open unilateral inguinal hernia repair under general anaesthesiarandomly allocated into two equal groups: Group W received wound infiltration with 0.2 ml/ kg 0.25% levobupivacaine at the site of incision and Group T received ultrasound guidance TAP block with 0.25% levobupivacaine 0.5 ml/ kg. Time to first analgesic request, total morphine requirement over 24 hours, visual analogue pain scoreat rest and during cough were assessed over the course of 24 hours.

**Results:**Total morphine requirement in the first twenty-four hours was highly significant less in group T. 21 patients in group W required supplemental morphine compered with 13 patients in group T. Time to 1st analgesic request was highly significant longer in group T.Patients receiving TAP block had significantly lower pain scores at rest for 12 h and on cough for 6 h after operation when compared with patients who received wound infiltration.

**Conclusion:**TAP block provided reliable and effective analgesia and reducing total 24-hour postoperative morphine consumption.

**Keywords:**Transversus abdominis-plane block versus local, wound infiltration, open inguinal hernia repair.

**Introduction:**

Postoperative pain management is of great importance in perioperative anesthetic care. (1)The transversus abdominis plane (TAP) block is a regionalanesthesia technique that provides analgesia to the parietalperitoneum as well as the skin and muscles of the anteriorabdominal wall (2).It has been shown to be a safe and effective postoperative adjunct analgesia method in a variety of surgical procedures and it is suggested as part of the multimodal anesthetic approach to enhance recovery after lower abdominal surgeries (3). Randomized controlled trials have demonstrated the efficacyof TAP block in providing postoperative analgesia forup to 24 h after lower abdominal surgery (4).

Local anesthetic wound infiltration is also a commonly used method for reducing postoperative pain. Post-operative pain relief can be obtained by single injection of local anesthesia into skin and subcutaneous tissue layer at surgical incision sites, which could decrease the pain scores postoperatively (5).

The aim of this study was to compare the analgesic effect of ultrasound-guidedTAP block versus wound infiltrationin patients undergoingopen inguinal hernia repair.

**Patients and methods:**

After local ethical committee approval and patient's informed written consent, this prospective randomized comparative clinical trial was conducted on 60 male patients, ASA I and II, scheduled foropen unilateral inguinal hernia repairunder generalanaesthesia.Patients were allocated randomly by sealed envelopes,according to a computer-generated sequence of randomnumbers, into two equal groups:

**Group W:**Wound infiltration with 0.2 ml/ kg 0.25% levobupivacaine at the site of incision after induction of general anaesthesia and before start of surgical procedure.

**Group T:**Ultrasound guidance TAP blockwith 0.25% levobupivacaine 0.5 ml/ kg was performed on the same side as the hernia after induction of general anaesthesia and before start of surgical procedure.

Exclusion criteria were inability to consent tothe study, skin infection atthe puncture site, chest diseases,hepatic, renal or coagulation disorders, contra-indication to any of the drugs used during the study.

One hour before surgery after insertion of venous access, all patientsreceived premedication in the form of midazolam 0.05- 0.1 mg/kg. Perioperative monitoring included ECG, pulse oximetry, non-invasive arterial blood pressure, Capnography and temperature monitoring. General anesthesia was induced using propofol 1.5–2.5 mg/ kg, atracurium 0.5 mg/kg to facilitateendotracheal intubation and fentanyl 2 micg/kg. Anesthesia wasmaintained using isoflurane (1 MAC) and atracurium supplementswere given every 20 minutes to maintain muscle relaxation.

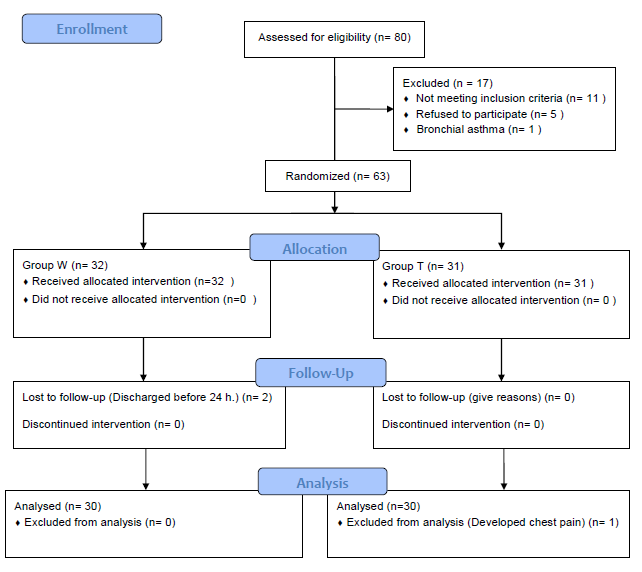
TAP block procedure was done under ultrasound guidance using SonoSite M Turbo (USA) with linear multi-frequency 6 -13 MHz transducer (L25x13–6 MHz linear array) scanning probe. Under complete aseptic condition with the patient in the supine position, The TAP block was performed laterally behind the mid-axillary line between the iliac crest and the subcostal margin. The plane between the internal oblique and transversus abdominis muscle was located around the midaxillary line with the probe transverse to the abdomen. Anteriorly, the needle (Stimuplex D needles, B Braun, Germany) was passed to come perpendicular to the ultrasound beam and placed between transversus and internal oblique posterior to the midaxillary line. Then, the local anesthetic was injected.

At the end of surgical procedure anesthesia was discontinued, musclerelaxant reversed using 0.05 mg/kg of neostigmine and atropine 0.02 mg/kg.Then,patient extubated and transferred to PACU.An independent anesthesiologist conductedpostoperative assessments and was not aware of groupallocation.Rescue analgesia was given with morphine 3 mg IV boluses on demand or whenever visual analogue scale (VAS) pain score was ≥ 4.

The duration of surgery (time from skin incision till removal of surgical drapes),Time to first analgesic request (time from patient's arrival to PACU till VAS > 4), total morphine requirement over 24 hours, number of patients requiring analgesia and visual analogue pain score (at rest and during cough)at 2,4,8,12,24 hours were assessed over the course of 24 hours.

**Results:**

In total 80 patients were screened during the study period. 11 patients did not match the inclusion criteria. 5 patients refused to participate. One patient was excluded as he had bronchial asthma.63 patients were included in the study but 3 morepatients excluded shortly thereafter because 2 patients were discharged before 24 hours and one patient developed postoperative chest pains. So in total 60 patients completed the studyprotocol**(Figure 1)**.

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**Figure 1: Consort flow diagram**

All patients were similar with respect topatient demographic characteristics, ASA physical status and durationof surgery.**(Table 1)**

Total morphine requirement in the first twenty-four hours was highly significant less in group T when compared with group W. 21 patients in group W required supplemental morphine; while only 13 patients in group T required supplemental morphine.Time to 1st analgesic request was highly significant longer in group T than group W. **(Table 1)**

**Table 1: Demographic characteristics and clinical features**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | | **Group W** | **Group T** | **p-value** |
| **Age (yrs.)** | | 56.32±13.2 | 52.6±14.8 | 0.3 |
| **Weight (kg)** | | 80.4±19.3 | 83.1±18.8 | 0.58 |
| **Height (cm)** | | 171.2±30.7 | 168.3±29.42 | 0.7 |
| **ASA** | **I** | 21 | 19 | 0.58 |
| **II** | 9 | 11 |
| **Duration of surg. (min.)** | | 55.3±10.41 | 52.9±9.34 | 0.35 |
| **Total morphine requirement (mg)** | | 8.4±1.2 | 6.2±1.04 | <0.001\*\* |
| **No. of patients requiring analgesia** | | 21 | 13 | 0.03\* |
| **Time to 1st analgesic request (min.)** | | 263.1±43.32 | 489.4±93.2 | <0.001\*\* |

Patients receiving TAP block had significantlylower pain scores at rest for 12 h and on cough for 6h after operation when compared with patients who received wound infiltration.**(Table 2 &3)**

**Table 2: VAS at rest**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Group W** | | **Group T** | | **p-value** |
| median | IQR | median | IQR |
| **2h** | 3 | 2 | 2 | 1 | <0.05 |
| **4h** | 3 | 2 | 2 | 1 | <0.05 |
| **6h** | 3 | 2 | 2 | 1 | <0.05 |
| **12h** | 4 | 2 | 3 | 1 | <0.05 |
| **24h** | 4 | 2 | 4 | 2 | >0.05 |

**Table 3: VAS during cough**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Group W** | | **Group T** | | **p-value** |
| median | IQR | median | IQR |
| **2h** | 4 | 2 | 3 | 1 | <0.05 |
| **4h** | 4 | 2 | 3 | 1 | <0.05 |
| **6h** | 4 | 2 | 3 | 1 | <0.05 |
| **12h** | 5 | 2.25 | 4 | 2 | >0.05 |
| **24h** | 5 | 2 | 5 | 2 | >0.05 |

**Discussion:**

Postoperative analgesia is one of the main concerns of both the surgeons and theirs patients. Multiple methods have been put into use to achieve this goal such as local anaesthetic infiltration, epidural analgesia, peripheral nerve block, and patient-controlled analgesia(2).

Several studies have documented that the TAP block providedeffective postoperative analgesia during the first 24 hours lower abdominal surgical procedures (6, 7, 8, and 9).

VAS pain score, considered the gold standard of pain quantification, was used to evaluate the severity of postoperative pain at rest and during cough.

The present study found that there was a significantly lower pain score in the TAP group at 12 hours postoperatively compared with wound infiltration group.Total morphine consumptionwas less in TAP group. The number of patients required supplemental morphine was less in TAP block. Time to 1st analgesic request was longer in TAB group.This isconsistentwith the results ofSivapurapu et al (10),who compared the analgesic efficacy of TAP block with that of direct infiltration of local anesthetic into surgical incision inlower abdominal gynecological procedures under general anesthesia.Time to rescue analgesic was significantly more and the VAS scores were lower in the TAP group. The 24 hours morphine requirement and the incidence of side effects were less in the TAP group. In meta-analysis done byMishrikyet al, (11) they reported that TAP block significantly reduced opioid consumption and reduced pain scores for up to 12 hourspostoperative.

In a prospective, randomized, double-blind study of 64 patients undergoinginguinal hernia repair,Salman and his colleagues (12) found thatTAP block provided effective analgesia, reducing total 24-hour postoperative analgesic consumption and morphine requirement.

**Conclusion:**We conclude that ultrasound guided TAP block provided reliable and effective analgesia and reducing total 24-hour postoperative morphine consumptionin patients undergoing open inguinal hernia repair surgery.

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