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Effect of transversus abdominis plane block on chronic postoperative pain after inguinal hernia repair

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Abstract

Aim: The aim of the study is to evaluate the effect of transversus abdominis plane block on chronic postoperative pain after inguinal hernia repair.

Methods: Prospective randomized double blinded study is conducted on 40 male patients posted for inguinal hernia repair under spinal anaesthesia. Divided into 2 equal groups. Group I received USG TAP block with 20 ml of 0.25% bupivacaine whereas Group II received 20 ml of normal saline (Placebo) at the end of surgery. Postoperative VAS scores, analgesic consumption, DN4 scoring at 3 and 6 months to evaluate chronic pain were studied.

Results: Forty male patients were enrolled. Postoperative VAS scores of Group I had improved scores than Group II. Analgesic consumption is also reduced in Group I compared to Group II (156.6 ± 48.3 vs 282.1 ± 43.2) which was statistically significant. Incidence of neuropathic pain in Group II was 5% at 3 months and 10% at 6 months; whereas in Group I one patient scored '3' at 3 months which reduced to '2' at 6 months. No restriction of daily activities present in Group I patient.

Conclusion: USG TAP block provided better postoperative VAS scores and analgesic consumption, along with the reduction in incidence of chronic pain than placebo.

Keywords: Transversus abdominis plane block, chronic postoperative pain, inguinal hernia repair

Introduction

Acute postoperative pain, which starts after surgical trauma is reduced with tissue healing, but in some patients it may become chronic. Werner and Kongsgaard^[1] define the "chronic pain as a pain persisting at least 3 months after surgery that was not present before surgery or that had characteristics or increased intensity from postoperative pain, localized to surgical site or a referred area and other possible causes were excluded". Chronic pain can occur following various operations ranging from simple and common herniorrhaphy, caesarean section or dental extraction to complicated surgeries such as thoracotomy, mastectomy, or hysterectomy. Poobalan^[2] has reported the higher rate of chronic postoperative pain (CPOP) nearly upto 53% after conducting review of studies from 1987 to 2000. The rate of CPOP varies with the type of operation. CPOP develops in 1 in 2 after amputations, 1 in 5 after total knee arthroplasty, 1 in 6 after hernia repair and 1 in 10 after caesarean section^[3] Potential risk factors for CPOP include young age, female sex, preoperative pain, nerve injury and last but the least is the severe acute postoperative pain. So we hypothesized that the efficient management of acute postoperative pain (APOP) with multimodal analgesic techniques could reduce the incidence of chronic pain. Transversus abdominis (TAP) block is widely used for procedure like caesarean section, herniorrhaphy, abdominal hysterectomy, appendectomy after the advent of ultrasound guided (USG) techniques^[4]. It significantly reduces the postoperative pain intensity and further analgesic requirements. This prompted us to conduct a prospective, randomized study on the effect of ultrasound guided transversus abdominis plane block on chronic postoperative pain after inguinal hernia repair.

Materials and Methods

After getting approval from Institutional Hospital Ethics Committee and obtaining written informed consent from 40 male patients of age 18-60 years of ASA I & II grade posted for elective inguinal hernia repair under spinal anaesthesia were selected and divided into 2

equal groups. Group I received 20 ml of 0.25% bupivacaine and Group II received 20 ml of normal saline (placebo). Patients with BMI < 30 kg/m² and unilateral hernia were excluded. Bilateral hernia, complicated hernia, BMI > 30 kg/m², patients with history of any surgery and chronic pain were excluded.

During anaesthetic checkup, proposed procedure was explained in detail (VAS-0 represent no pain; 10 represent worst imaginable pain) and DN4 questionnaire were informed clearly. On arrival in theater, all patients were secured with intravenous access, and all essential monitors were connected and monitoring was done continuously. Under standard sterile protocol, all patients received spinal anaesthesia with 3 ml of 0.5% bupivacaine at L₃₋₄ interspace in lateral position using 25G g spindle needle. At the end of surgery, USG transversus abdominis plane block was given under sterile precautions using (6-14 MHz) linear transducer of sonosite SII. Transducer was placed in midaxillary line on transverse plane between and subcostal margin and iliac crest to visualize abdominal layers. 22G 50 mm insulated nerve block needle was introduced 1 cm medial to the probe and needle was advanced in plane technique between aponeurosis of internal oblique and transversus abdominis and appropriate drug was given after hydrodissection. The patient, anaesthetist performing TAP block and anaesthetist involved in data collection were blinded.

Postoperative pain scores were assessed at 6, 12, 24 hours using VAS.

Inj Tramadol 1.5mg/kg was given intramuscularly when VAS >4 or a patient demand. It was not repeated in <6 hours. If the VAS was still >4, an additional analgesic dose of Inj. diclofenac 50 mg was given intravenously. Monitoring of postoperative scores, rescue analgesic consumption and side effects were done up to 24 hours. Patients were followed up at 3 and 6 months to check for chronic pain development using DN4 questionnaire. Statistical analysis were performed using SPSS software.

Results

Total of 40 patients were selected for this study. Groups were comparable in terms of age, weight, and height and body mass index as shown in Table 1. Duration of surgery, anaesthesia and hemodynamic parameters were comparable.

Table 1: Demographic characteristics of 2 groups

| Variable | Group I | Group II | p value |
|--------------------------|-----------|------------|----------|
| Age (Year) | 40.7±8.2 | 38.7±10.9 | .14 (NS) |
| Height (cm) | 162.5±6.5 | 160.15±3.9 | .11 (NS) |
| Weight (kg) | 66.6±7.8 | 70.7±8.3 | .59 (NS) |
| BMI (kg/m ²) | 25.2±2.5 | 26.8±2.7 | .12 (NS) |

Values are expressed as mean ±SD; NS-Not significant

Patients of bupivacaine group had improved pain scores both at rest and sitting compare to placebo group. Analgesic consumption is reduced in bupivacaine group compare to placebo (156.6 ±48.3mg vs 282.1 ±43.2mg), which was statistically significant. Two patients in Group II and one patient in Group I had vomiting, which was treated with injection metoclopramide.

Chronic pain is evaluated using DN4 score. DN4 score greater or equal to 4 was significantly correlated with a clinical diagnosis of neuropathic pain. Three patients from Group II had chronic pain at 3 months and 6 months; Incidence of neuropathic pain is 5% at 3 months and

increased to 10% at 6 months, whereas in Group I, one patient had chronic pain at 3 months and he scored '3' and the score reduced to '2' at 6 months. No restriction of daily activities was present in Group I. But in Group II, restriction of activities and sleep disturbances were seen in the patients who scored 4 as shown in Table 2. Critical value of chi square distribution with df 2 = 5.991 at (p value of 0.05) is more than the calculated value 1.449 which is significant.

Table 2: DN4-Scoring

| DN4 score | Group I | | Group II | |
|-----------|-----------|-----------|------------|------------|
| | 3 months | 6 months | 3 months | 6 months |
| 2 | 0 | 1/20 (5%) | 0 | 0 |
| 3 | 1/20 (5%) | 0 | 2/20 (10%) | 1/20 (5%) |
| 4 | 0 | 0 | 1/20 (5%) | 2/20 (10%) |

DN4 ≥ 4 signifies neuropathic pain.

Discussion

According to our results, ultrasound guided TAP block has improved the postoperative pain scores along with reduction in incidence of chronic pain after inguinal hernia surgeries.

This is in accordance with Ahmed Topal^[5] who evaluated the efficacy of intravenous analgesia after general anaesthesia and TAP block after general anaesthesia and spinal analgesia on development of chronic pain following inguinal hernia repair. He stated that the incidence of chronic pain is found to be lower in TAP group but there is no difference in terms of pain scores. But Theodorakki^[6] found that the TAP block with ropivacaine has reduced pain scores and opioid analgesic consumption compare to placebo after inguinal hernia repair.

In 2001, the landmark guided TAP block was described by Rafi^[7] which was further evaluated by McDonnell^[8]. Finally USG approach was described by Hebbard^[9] The introduction of USG nerve block allow precise administration of local anaesthetics around the target structure with high success rate and with low complication. Many studies have shown that TAP block as an effective component of multimodal postoperative analgesia for variety of procedures. A meta-analysis on the efficacy of TAP block on postoperative pain reduction, demonstrated that it reduces the need for postoperative opioid administration, prolongs the time of first request of analgesia and produce more effective pain relief^[10].

Prolongation of duration of analgesia is beneficial as the failure of postoperative pain management seem to be an important risk factor for CPOP. The duration of severe pain in the initial 24 hours postoperatively as opposed to the intensity of pain, predicted the chance of developing CPOP. For every 10% increase in time spent in severe pain, the risk of developing CPOP went up by 30%^[11]. Among the other risk factors, nerve injury causes neuropathic pain. Laparoscopic repair has low incidence of nerve injury. But it requires long learning curve (200-250 cases)^[12]. The choice of surgery depends on available resources, expertise of surgeon, hernia and patient related factors. This is supported by Theodorakki^[6] who found that no significant effect of TAP block on chronic pain as the incidence of chronic pain was found to be low with Lichtenstein repair. But a recent review showed that prevalence of neuropathic pain was 31% among patients with CPOP^[13].

The reason for wide variability in the incidence of chronic pain (0-53%) could be due to non-standardization of follow up period, the diversity of pain assessment methods and

pain descriptors and multiplicity of procedures.

Primary problem due to chronic pain after hernia repair is impairment of daily activities and loss of professional workdays. 7-15% of daily activity restriction has been reported after hernia repair^[14]. The patients who scored 4 in Group II, had restriction of daily activities and sleep disturbances.

Treatment of CPOP is still a challenge because of heterogeneity of mechanism and multiplicity of risk factors. Minimal dissection during surgery and effective postoperative analgesia could reduce the incidence of CPOP.

We conclude that TAP block may be used as an effective method in reducing the incidence of chronic pain after inguinal hernia repair. Addition of antihyperalgesic drug to pain management techniques could be tried in future to reduce further incidence of chronic pain.

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