



“A COMPARITIVE STUDY OF ROPIVACAINE AND ROPIVACAINE WITH DEXAMETHASONE IN TRANSVERSUS ABDOMINIS PLANE BLOCK FOR POST OPERATIVE ANALGESIA IN PATIENTS UNDERGOING LOWER ABDOMINAL SURGERIES”

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ABSTRACT

Objectives: To compare the following factors in three groups – group I–control group without TAP block, in group II– 1.5 mg/kg of 0.375% ropivacaine with 2ml normal saline in TAP block, in group III- 1.5mg/kg 0.375% ropivacaine with 2ml dexamethasone(8mg) with TAP block in lower abdominal surgeries(inguinal hernia,appendicitis) with respect to:

- Time for first rescue analgesia(fentanyl)at VAS30 after surgery
- VAS score after surgery at 1h,2h,4h,12h,24h,48h
- Total rescue analgesia (fentanyl) requirement after surgery for 48 hrs
- Postoperative nausea and vomiting

Methods: In the present study 90 ASA grade I-II patients divided into three groups – group I – control group without TAP block, in group II – TAP block with 1.5 mg/kg of 0.375% ropivacaine with 2ml normal saline, in group III- TAP block with 1.5mg/kg of 0.375% ropivacaine with 2ml dexamethasone in lower abdominal surgeries(inguinal hernia,appendicitis).

Results : The time for first rescue analgesia was prolonged and statistically significant in group III(540.83) when compared with group I (125.1) and group II(416.9).

VAS scores after surgery at 1h,2h,4h,12h,24h, and 48h were lesser when dexamethasone added to ropivacaine in TAP block when compared with TAP block with ropivacaine and control group (no TAP block) and VAS scores were lesser in TAP block with ropivacaine (group II) when compared with control (group I)

Total rescue analgesia(fentanyl) requirement after surgery for 48hrs was lesser when dexamethasone added to ropivacaine than with ropivacaine in TAP block and it lower in TAP block group when compared with control group.

Postoperative nausea and vomiting was lesser when dexamethasone added to ropivacaine in TAP block when compared with group II and group I. It was no significant difference in TAP block group and with control group.

KEYWORDS:

ROPIVACAINE,DEXAMETHASONE,TRANSVERSUS ABDOMINIS PLANE

INTRODUCTION:

The great majority of patients scheduled to undergo surgery suffer from emotional stress due to anxiety about the pain which is expected in the postoperative period¹. Opioids remain the mainstay of postoperative pain relief but can result in significant adverse effects including sedation, nausea, vomiting, urinary retention, respiratory depression, delayed recovery of intestinal motility, and prolonged postoperative ileus^{2,3}. Moreover, pain which is not treated promptly after surgery can impair the patient's ability to ambulate which may lead to adverse effects such as thrombo embolism, myocardial ischemia, arrhythmias^{4,5}.

Multimodal techniques consist of a combination of opioids (either systemic or neuraxial), non-steroidal anti-inflammatory drugs and acetaminophen as well as patient-controlled analgesia (PCA) are currently used for pain control after surgery. But there are concerns with regard to the potential of systemically administered opioids to cause nausea, vomiting, drowsiness and respiratory depression⁶. Further, epidural patient-controlled analgesia which delivers the analgesics through a catheter placed into the epidural space can lead to serious complications such as epidural abscess, meningitis, vertebral canal hematoma, spinal cord ischemia and paraplegia^{7,8}.

Recently, peripheral nerve blocks have been advocated to alleviate the above problems in addition to controlling the postoperative pain effectively at the same time^{9,10}.

The transversus abdominis plane (TAP) block is a regional anesthesia technique that provides analgesia to the parietal peritoneum as well as the skin and muscles of the anterior abdominal wall¹⁸. First described just fifteen years ago it has undergone several modifications, which have highlighted its potential utility for an increasing array of surgical procedures¹⁷. Despite a relatively low risk of complications and a high success rate using modern techniques, TAP blocks remain overwhelmingly underutilized¹⁹.

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

procedures including large bowel resection, open/laparoscopic appendectomy, inguinal hernia repair, cesarean section, total abdominal hysterectomy, laparoscopic cholecystectomy, open prostatectomy, renal transplant surgery, abdominoplasty with/ without flank liposuction and iliac crest bone graft²³.

Steroids are very potent anti inflammatory and immunosuppressive agents. Peri neural injection of steroid influences the postoperative analgesia. Dexamethasone a 9 alpha derivative of synthetic glucocorticoid was preferred because of potent anti inflammatory property about 25 to 30 times more potent than hydrocortisone and without any mineralocorticoid activity thus was found to be safer and devoid of potential side effects.

Most reports demonstrate the efficacy of TAP blocks by highlighting some combination of reduced postoperative opioid requirement, lower pain scores, and/or reduction in opioid-related side effects such as nausea and vomiting by adding adjuvants (dexamethasone) steroids

MATERIAL AND METHODS

After approval from hospital ethics committee and obtaining written informed consent from patients, 90 adult patients of ASA-physical status 1 & 2 scheduled for lower abdominal surgery(inguinal hernia, appendicitis) under general anesthesia were included in the study.

Type of study: Prospective randomized single blind controlled trial.

Inclusion criteria: All adult patients of ASA physical status 1 & 2 posted for lower abdominal surgery under general anesthesia

Exclusion criteria:

1. Refusal of the patient to give informed consent
2. Age less than 18 years
3. Sensitivity to local anesthetics
4. BMI >40
5. Preexisting coagulation disorders
6. Patients with renal and hepatic impairment
7. Local infection

8. Allergy to opioid
9. Psychiatric disorders

GROUPS: Patients were randomly allocated into three groups using computer generated randomization chart.

GROUP I (N=30): Control group (without TAP block)

GROUP II (N=30): TAP block Ropivacaine (1.5mg/kg of 0.375%) with 2ml normal saline

GROUP III (N=30): TAP block Ropivacaine (1.5mg/kg of 0.375%) with 2ml (8mg) dexamethasone

METHODS

All the patients received general anaesthesia with standard monitoring which included pulse oximetry, NIBP, ECG and End tidal carbon dioxide. All patients were pre oxygenated and were given IV glycopyrrrolate 5µg/kg, midazolam 0.03mg/kg and fentanyl 1 µg/kg. Anaesthesia was induced with thiopentone sodium 3-6 mg/kg and intubation facilitated with succinylcholine 1.5mg-2mg/kg IV. After intubating anaesthesia was maintained with 66% nitrous oxide in oxygen sevoflurane. Muscle relaxation achieved with IV Vecuronium bromide.

The TAP block was performed after intubating the patient, before skin incision using double-pop technique¹⁴. After aspiration to exclude intravascular injection, 1.5mg/kg of 0.375% ropivacaine ± dexamethasone 8mg was injected observing closely for signs of toxicity. All patients were extubated after giving neostigmine 0.05mg/kg with glycopyrrrolate 10µg/kg IV. After completion of the surgical procedure, patients were transferred to the post anaesthesia care unit (PACU) rescue analgesia fentanyl 1mcg/kg given when VAS score ≥30.

Pain severity was measured using a visual analog scale (VAS, 100 mm unmarked line in which 0 mm = no pain and 100 mm = worst pain imaginable). Rescue antiemetics were offered to any patient who complained of nausea or vomiting. The study ended 48hrs after surgery.

Comparing the following parameters

- Time for first rescue (fentanyl) analgesia after surgery at VAS30
- VAS score after surgery at 1h, 2h, 4h, 12h, 24h, 48h
- Total rescue analgesia (fentanyl) requirement after surgery for 48 hrs
- Postoperative nausea and vomiting

DISCUSSION

The transversus abdominis plane (TAP) block is a regional anaesthesia technique that provides analgesia to the parietal peritoneum as well as the skin and muscles of the anterior abdominal wall. Poorly controlled acute pain after abdominal surgery is associated with a variety of unwanted postoperative consequences including patient suffering, distress, respiratory complications, delirium, myocardial ischemia, prolonged hospital stay and an increased likelihood of chronic pain. A major contributor to the pain experienced after abdominal surgery is pain from the incision made in the abdominal wall, with the remainder resulting from internal visceral trauma. Traditionally analgesia for abdominal surgery is provided either by systemic drugs such as opioids, ketamine, nonsteroidal anti-inflammatory drugs (NSAIDs), alpha-2 agonists and paracetamol, by epidural analgesia. Peripheral nerve blockade is an alternative means of providing analgesia by anaesthetizing the sensory nerves conveying pain impulses from the incision site to the spinal cord and brain. TAP blocks provide analgesia mainly to the lower abdominal wall approximately between the dermatomes of T10 and L1 Hebbard et al.

Selection of drug & dosage

In the present study ropivacaine (0.375%) 1.5mg/kg, dexamethasone 8mg (2ml) was used for TAP block. While local anesthetic agent, volume, concentration, and delivery method differ between studies. The exact dose of dexamethasone for peripheral nerve block has not been described. In all the previous studies dexamethasone was used in dose of 4-8 mg for TAP block and was found to be safe without any adverse effects.

The various studies conducted by Andrijan kartalov et al Saradha sinha et al, Carney et al¹³, Griffith et al, Mei et al, Heil et al used different doses

and concentration of ropivacaine for TAP block. The exact dose and volume of ropivacaine for TAP block has not been described in previous studies. In the present study ropivacaine (0.375%) of 1.5mg/kg (20ml-36ml) was used.

Timing of the TAP block

In the present study TAP block was performed after induction of anaesthesia and before skin incision. Most of the studies Carney et al¹³, MC'Donnell et al²⁰, EL Daulatly et al, Niraj et al, andrijan kartalov et al, Ammar AS et al performed TAP block immediately after induction similar to present study. Some of the studies Griffith et al and Saradha sinha et al performed TAP block after the completion of surgery.

Time for first rescue analgesia after surgery

In the present study first rescue analgesia fentanyl 1mcg/kg was given when VAS score was ≥30. The time for first rescue analgesia in group I was 125 minutes, in group II was 416 minutes and in group III was 540 minutes. The mean time for first rescue analgesia was prolonged and statistically significant in group III when compared with group I and group II.

In study by MC'Donnell et al²², time for first rescue analgesia in TAP block group was prolonged compared to control group and these results are similar to present study. Another study of TAP block for TAH was conducted by Carney et al¹³ time for first rescue analgesia was prolonged in TAP block with ropivacaine group when compared to TAP block with normal saline group. These above results were similar to the present study in comparison with group I and group II. Total rescue analgesia (fentanyl) requirement after surgery for 48 hrs

In the present study rescue analgesia (fentanyl 1mcg/kg) was given when VAS score ≥30. The total rescue analgesia for 48hrs in group I was 299 mcg, in group II was 180 mcg and in group III was 59.66 mcg. The mean requirement of total rescue analgesia significantly lower in group III when compared with group II and group I. On intergroup comparison total rescue analgesia requirement in group II was lower when compared with group I.

In study by Carney et al¹³ total rescue analgesia (morphine) requirement after surgery for 48 hrs was significantly less in TAP block group compared to control group (26.8±19.8mg and 55.3±17.6mg respectively, $p < 0.0001$). These results are similar to the present study results. In study by EL Daulatly et al⁵² on TAP block with bupivacaine for lap cholecystectomy total rescue analgesia (morphine) requirement for 24hrs in TAP block group was significantly less in TAP block group compared to control group (10.5±7.7mg and 22.8±4.3mg respectively, $p < 0.0001$) and these results are similar to the present study.

In study done by MC'Donnell et al²⁰ on TAP block with L-bupivacaine for bowel resection, the rescue analgesia (morphine) requirement for 24 hrs was significantly less in TAP block group compared to control group (21.94±8.8mg and 80.44±19.2mg respectively, $p < 0.0001$) and these observations are similar to the observations of the present study.

Charlton et al¹⁸ reviewed 5 studies of TAP block (236 participants) and demonstrated a significant reduction in total rescue analgesia (morphine) requirement in TAP block group compared to control group. 24hrs morphine requirement 22mg (TAP group) vs 38mg (control group). The study results are in line with present study.

VAS SCORES

In the present study VAS scores were compared between group I, group II and group III the mean VAS score at 1hr was 31.83, 20.60 and 10.70 respectively, at 2hrs was 41.36 and 20.20 and 10.40 respectively, at 4hrs was 52.00 and 20.26 and 10.56 respectively, at 12hrs was 55.96 and 19.90 and 9.73 respectively, at 24hrs was 39.86 and 18.13 and 8.30 respectively and at 48 hrs was 30.60 and 24.13 and 7.70 respectively. The mean VAS score was significantly less in group III when compared with group II and group I. On intergroup comparison VAS scores in group II was lower when compared with group I.

Charlton et al¹⁸ done metaanalysis of 5 studies of TAP block with control group and they observed postoperative VAS pain scores at 0hr, 1hr, 12hr, 24hr and 48hr. They found significantly low VAS scores in TAP block group. These results are similar to the present study.

Sforza et al observed lower VAS pain scores for 12 hrs in TAP block group. MC'Donnell et al²³ compared VAS scores between TAP block

with bupivacaine and control group(no TAP block) at 0,2,4,6,24hrs.They observed lower VAS pain scores in TAP block group. Results of all the above studies are similar to the present study in comparison with group I and group II.

PONV (postoperative nausea and vomiting)

In the present study 16 out of 30 members in group I, 14 out of 30 patients in group II and 6 out of 30 members in group III had PONV. The mean PONV was less and statistically significant in group III when compared with group I and group II. On intergroup comparison there is no statistically significant difference between group I and group II.

Carney et al¹³ compared nausea scores. They observed for 48hrs in which 16/24 members in TAP block group and 16/26 in control group had nausea. no significant difference in nausea between two groups. This study results are similar to present study. The study conducted by MC Donnell et al²² compared nausea between TAP block with ropivacaine group and TAP block with normal saline group they observe nausea 5/16 members and 11/16 members respectively. All above the studies results are in correlation with the present study when comparison between group I and group II.

Complications

No complications were observed in the present study. Most of the studies till date did not have any complications. But Farooque et al and Carney et al¹³ described liver laceration during landmark based TAP block. But after laparotomy observed that enlarged liver. Before performing TAP block organomegaly has to be excluded as a precautionary measure.

CONCLUSION : Addition of dexamethasone as an adjuvant to ropivacaine in TAP block prolongs the time for first rescue analgesia decreases VAS scores decreases requirement of total rescue analgesia for 48 hours post operatively decreases incidence of postoperative nausea and vomiting.

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