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**Original Research Article**

# Effect of spraying bupivacaine and dexamethasone on postoperative pain of total extraperitoneal hernioplasty: a retrospective analysis

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## ABSTRACT

**Background:** Several studies on the reduction of pain with the use of local anesthetics after laparoscopic hernia surgeries have been published. We aimed to analyze the results of local anesthesia applied to the patients by retrospectively scanning the files of patients who underwent total extraperitoneal laparoscopic hernioplasty for inguinal hernias.
**Methods:** The files of patients who underwent TEP laparoscopic hernioplasty for inguinal hernias between March 2019 and November 2022 in Ankara Bilkent city hospital general surgery clinic were retrospectively scanned. The pain scoring records in the observation forms of these patients and the analgesics administered were recorded.
**Results:** A total of 374 and 210 patients underwent unilateral and bilateral TEP laparoscopic hernioplasty, respectively. All of the patients, 232 were not administered any local anesthesia, 186 were administered bupivacaine, and 166 were administered bupivacaine+dexamethasone. When the VAS scores of the patients in both main groups were compared, significant differences were found in VAS scores between patients who received bupivacaine and bupivacaine+dexamethasone and those who did not ($p<0.036$ and $p<0.025$). No difference was found between patients who received only bupivacaine and those who were given bupivacaine+dexamethasone.
**Conclusion:** In patients who underwent TEP laparoscopic hernioplasty, spraying bupivacaine into the preperitoneal area after surgery was found to be significantly effective in reducing postoperative pain. The benefits of adding dexamethasone to bupivacaine have not been established.

**Keywords:** TEP laparoscopic hernioplasty, Postoperative pain, Local anesthesia, Bupivacaine, Dexamethasone

## INTRODUCTION

Inguinal hernia surgeries are at the top of operations performed by general surgeons worldwide.[1,2] Postoperative pain management is also important for surgical patients. Laparoscopic total extraperitoneal (TEP) herniorrhaphy is a widely accepted technique for repairing inguinal hernias, and it has the advantage of reducing postoperative pain compared with open repair.[3,4] On the first day after surgery, pain is usually felt in the abdominal wall rather than in the incision sites, as the dissection is performed in the abdominal wall. Local anesthetics, such as lidocaine and bupivacaine, are commonly used as regional anesthesia in most surgical procedures. Local anesthetics increase postoperative analgesia and patient satisfaction when used with a multimodal approach. Even though many studies have been conducted on the use of preperitoneal local anesthetic instillation following TEP laparoscopic hernioplasty, the results remain inconsistent. By applying dexamethasone to the preperitoneal area, inflammation, and therefore pain, may also decrease. Combined infiltration of bupivacaine and dexamethasone

has analgesic benefits in transversus abdominis plane (TAP) blocks, especially in abdominal surgeries with wide dissection.[5-11]

### *Aim and objectives*

In this study, we aimed to retrospectively evaluate the postoperative pain and morbidity of patients who underwent TEP laparoscopic hernioplasty surgery in our hospital in the last 3 years in whom only bupivacaine was sprayed on in the preperitoneal area, bupivacaine and dexamethasone were sprayed together, and no local agent was used.

## METHODS

### *Type of Study*

The files of patients who underwent TEP laparoscopic hernioplasty for inguinal hernias between March 2019 and November 2022 (45 months) in Ankara Bilkent City Hospital General Surgery Clinic were reviewed retrospectively.

### *Inclusion criteria*

All consecutive ASA grades I–III patients deemed medically fit to undergo elective unilateral and bilaterally laparoscopic total extraperitoneal (TEP) inguinal hernia repair between age 18 and 80 years were included in this study.

### *Exclusion criteria*

Patients with comorbidities (diabetes mellitus, COPD, CAD, etc.), those in whom the operation was converted to open surgery after starting laparoscopically, and those who required other interventions due to complications were excluded from the study.

TEP laparoscopic hernioplasty was performed unilaterally in 374 patients and bilaterally in 210 patients with inclusion criteria due to inguinal hernia. All patients were operated on using three trocars: one 10 mm from the umbilicus, one 5 mm from the middle of the umbilical symphysis pubis distance from the midline, and one 5 mm from 2 cm superior to the symphysis pubis; 12×15 mm polypropylene mesh was placed on each side in the preperitoneal area and fixed with an average of 3 or 4 tackers. The pain scoring records in the surgery notes and observation forms of these patients and the analgesics administered were recorded.

### *Statistical analysis*

Sample size was calculated according to the primary outcome measure of post-operative pain assessment at four hours. Sample size was calculated using world health organization sample size determination software. The values were averaged, and the significance of each group was calculated using SPSS-11, $p<0.05$ values were considered statistically significant. The patients were grouped as unilaterally and bilaterally operated on.

## RESULTS

Patients who underwent TEP laparoscopic hernioplasty for inguinal hernias were analyzed in two main groups: unilateral and bilateral. No significant difference was found between the age and gender distributions of these patients (Table 1).

**Table 1: Comparison of basic characteristics of patients.**

| Patient characteristics | Patients who underwent unilateral total extraperitoneal (TEP) laparoscopic hernioplasty | | | Patients who underwent bilateral TEP laparoscopic hernioplasty | | |
|---|---|---|---|---|---|---|
| | Group I: no local anesthesia | Group II: bupivacaine | Group III: bupivacaine+ dexamethasone | Group I: no local anesthesia | Group II: bupivacaine | Group III: bupivacaine+ dexamethasone |
| **Patient number** | 147 | 112 | 115 | 85 | 74 | 51 |
| **Female N (%)** | 29 (19.72) | 18 (16.07) | 26 (22.6) | 14 (16.47) | 12 (16.21) | 9 (17.64) |
| **Male N (%)** | 118 (80.28) | 94 (83.93) | 89 (77.4) | 71 (83.53) | 62 (83.79) | 42 (82.36) |
| **Age, mean±SD** | 46.05±12.1 | 49.2±10.9 | 44.5±10.5 | 54.16±9.5 | 53.42±9.6 | 53.62±8.5 |

These two main patient groups were regrouped separately as patients who did not receive any perioperative local anesthetics, patients sprayed with only 15 cc bupivacaine, and patients sprayed with 15 cc bupivacaine+8 mg of dexamethasone to the operation area. When these three patient groups were compared in terms of the 4th hour VAS values, a significant difference was found between patients in group I and patients in groups II and III who were operated on unilaterally, with $p<0.036$ and $p<0.032$, respectively. Even though at a lower value, a significant difference was observed between patients in group I and patients in groups II and III who underwent bilateral TEP laparoscopic hernioplasty, with $p<0.043$ and $p<0.041$, respectively.

**Table 2: VAS scores and need for analgesia according to the groups.**

| Characteristics | Group I: no local anesthesia | Group II: bupivacaine | Group III: bupivacaine+ dexamethasone | P value (groups I-II) | P value (groups I-III) | P value (groups II-III) |
|---|---|---|---|---|---|---|
| **Patients who underwent unilateral total extraperitoneal (TEP) laparoscopic hernioplasty** | | | | | | |
| Patient number | 147 | 112 | 115 | | | |
| Median pain score (VAS) postoperative 4th hour | 7.24 | 3.32 | 3.44 | 0.036 | 0.032 | 0.065 |
| Median pain score (VAS) postoperative 24th hour | 3.68 | 2.11 | 2.41 | 0.072 | 0.078 | 0.083 |
| **Administered analgesia** | | | | | | |
| Opioid dose (mg) | 50.00 | 0.00 | 0.00 | 0.01 | 0.01 | 1 |
| IV analgesic (paracetamol mg)/24 hours | 2000 | 500 | 400 | 0.025 | 0.020 | 0.70 |
| Number of patients who do not need any analgesics | 0 | 10 | 11 | 0.8 | 0.8 | 1 |
| **Patients who underwent bilateral TEP laparoscopic hernioplasty** | | | | | | |
| Patient number | 85 | 74 | 51 | | | |
| Median pain score (VAS) postoperative 4th hour | 7.32 | 3.08 | 3.04 | 0.043 | 0.041 | 0.073 |
| Median pain score (VAS) postoperative 24th hour | 3.11 | 2.48 | 2.36 | 0.065 | 0.061 | 0.086 |
| **Administered analgesia** | | | | | | |
| Opioid dose (mg) | 55.00 | 0.00 | 0.00 | 0.011 | 0.011 | 1 |
| IV analgesic (paracetamol mg)/24 hours | 2000 | 500 | 500 | 0.02 | 0.02 | 1 |
| Number of patients who do not need any analgesics | 0 | 4 | 3 | 0.85 | 0.85 | 1 |

Tramadol hydrochloride ampoule used as an opioid.

No significant difference was found in the VAS scores between patients in group II and group III who were operated on both bilaterally and unilaterally. No significant difference was observed in the VAS scores 24 h after the operation in any of the groups (Table 2). The main difference was in the need for analgesics in patients who were operated on both bilaterally and unilaterally. No opioid analgesics were needed in groups II and III of the patients in the two main groups. Patients in group I required an average of 5 mg of tramadol hydrochloride in the first 4 h postoperatively. This caused a significant difference with the other groups. Opioid analgesia was not needed by patients in groups II and III. A significant difference was also observed in the intravenous (IV) paracetamol dose in the first 4 h postoperatively. The dose of paracetamol administered to patients who needed IV analgesia was significantly lower in groups II and III compared with that in group I. A few patients in groups II and III needed no analgesia. However, all patients in group I were given IV 1 g of paracetamol twice.

## DISCUSSION

While minimally invasive surgery is associated with a reduction in postoperative pain, it is not completely painless. Patients undergoing laparoscopic repair of inguinal hernias may experience postoperative pain requiring narcotic analgesic drugs. Postoperative pain control reduces the need for analgesic drugs, postoperative complications, length of hospital stay, and expenses.[5] In our study, we observed that postoperative pain decreased more in patients who received local anesthesia. Success in pain control by spraying local anesthetic into the preperitoneal dissection area was first reported by O'Riordain et al.[5] In a similarly designed prospective randomized study, Bar-Dayan et al. reported relief of pain for up to 4 h postoperatively compared with the placebo in patients given 80 mg of bupivacaine in the preperitoneal space.[12] In a randomized controlled trial of 90 patients, Hon et al. reported significant reductions in pain scores

when 0.5% bupivacaine was infiltrated before the skin incision and after insertion of the first working port.[13]

In contrast, some studies in the literature claim that preperitoneal local anesthesia is not effective enough in pain control. Some studies, such as the randomized controlled trial conducted by Abbas et al have shown that infiltration of bupivacaine into the preperitoneal space has not provided any significant relief of postoperative pain.[14] In a randomized controlled study conducted by Saff et al., 60 ml of 0.125% bupivacaine was infiltrated into the preperitoneal space in 42 patients, and no significant difference was observed between the patients receiving bupivacaine and the control group in terms of postoperative pain scores, need for analgesic medication, and length of hospital stay.[7] In the same study, TAP block application is shown to be more effective.[7] Similarly, other studies have shown that TAP application may be more effective. However, these studies have reported very limited effectiveness.[15,16] For the first time, Sakamoto et al. stated that spraying dexamethasone together with bupivacaine into the preperitoneal area provides better results in terms of analgesic need and pain scoring in the first 24 h compared with that in TAP application and in the placebo.[17] VAS is generally used as pain scoring in studies. However, VAS scoring reflects the patient's perception rather than the objective severity of the pain; thus, other scoring systems, especially in elderly patients, may be appropriate and preferred.[18,19] In our study, since routine VAS scoring was used in all postoperative patients in our hospital, evaluation was made according to the VAS. In our study, patients who underwent TEP laparoscopic hernioplasty were grouped according to whether they were operated on unilaterally or not, and these patients were grouped as those who did not receive local anesthetic spraying, patients who received bupivacaine alone, and those who received a combination of bupivacaine and dexamethasone. The VAS scores and analgesic needs of the cases sprayed with bupivacaine in the preperitoneal area were lower in accordance with many publications in the literature, and the difference was also significant. Spraying the preperitoneal area with bupivacaine and dexamethasone was not superior to spraying only bupivacaine. Studies have shown that the addition of dexamethasone sodium phosphate increases the duration of various regional anesthesia techniques.[20-24] Furthermore, the addition of dexamethasone may also be effective for postoperative seroma. However, in our study, since almost all the patients were discharged on the first postoperative day, the postoperative seroma and pain levels after this time could not be evaluated.

## CONCLUSION

Spraying a long-acting local anesthetic into the preperitoneal space during TEP repair reduces early postoperative pain and ultimately decreases the dose of postoperative analgesic medication. In addition, infiltration of bupivacaine into the preperitoneal space is easy, safe, and effective. Therefore, bupivacaine infiltration into the preperitoneal space during laparoscopic repair of an inguinal hernia can be safely considered to provide comfort in the early postoperative period.

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