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Comparison of local and spinal anesthesia techniques in inguinal hernia repair

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Abstract

The aim of this study is to evaluate the safety and effectiveness of local anesthesia in surgical treatment of inguinal hernia, compared with spinal anesthesia. Ninety-six patients who underwent hernia repair between December 1999 and April 2002 were included prospectively. The patients were assigned randomly to two groups according to their admission numbers. Group I included 47 patients undergoing surgical treatment of inguinal hernia with local anesthesia; Group II included 49 patients having inguinal hernia repair with spinal anesthesia. The early complication rates, length of the hospital stay, and costs were evaluated prospectively. Early complication rates were 14.8 and 32.6%, respectively; there was no significant difference between the two groups. The length of hospital stay and cost were significantly lower in Group I than in Group II. In conclusion, local anesthesia is a safe and cost-effective method in the treatment of inguinal hernia.

Keywords: Inguinal hernia; Hernia repair; Herniorraphy; Local anesthesia

1. Introduction

Inguinal hernia repair is a common procedure in general surgery. Surgical treatment of the hernia is elective and should be carried out under optimal conditions since most inguinal hernias in adults occur in healthy, physically active people. Modern hernia surgery should not only have a low recurrence, but also employ simple and efficient surgical and anesthetic techniques, which result in early patient mobilization. Previous studies have demonstrated the feasibility of using local anesthesia in inguinal repair, as well as achieving almost immediate patient mobilization without increasing postoperative complications. This type anesthesia can be safely done as an outpatient basis [1–3]. Spinal anesthesia may also be used for inguinal hernia repair in outpatients.The aim of this study is to compare the safety and effectiveness of local infiltration with spinal anesthesia in the surgical treatment of inguinal hernia on an outpatient basis.

2. Patients and methods

Ninety-six patients undergoing surgical treatment of inguinal hernia at Pamukkale University Hospital between December 1999 and April 2002 were assigned randomly to two groups prospectively to evaluate the effect of local infiltration and spinal anesthesia.

2.1. Patient population

The 96 patients included 92 males and had a mean age of 40.32 ± 10.54 (S.D.) years. Fourteen patients had recurrent inguinal hernia and six had bilateral inguinal hernia. If they were older than 16 years, had an inguinal skin free of infection and agreed to participate in this study comparing local or spinal anesthesia, they entered the trial. The following parameters excluded patients from the study: incarcerated hernia, hydrocele, femoral hernia, diabetes mellitus, coagulopathy, and general anesthesia.

The patients were assigned randomly to two groups according to their admission numbers. Those with even admission numbers (Group I) had local infiltration, and

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those with odd admission numbers (Group II) had spinal anesthesia.

Patients were fasted for 8 h. A second-generation cephalosporin was injected intravenously 1 h preoperatively as routine antibiotic prophylaxis. When the patients were transferred to the operating room; a 16-gauge cannula was inserted in a peripheral vein in the ante-cubital fossa. All patients had an IV line, and hemodynamic monitoring (ECG, pulse oximetry, non-invasive measurements of arterial pressure, and heart rate). All operations were performed with standardized peroperative analgesia and sedation using midazolam and fentanyl, and no patients were given any intraoperative sedation in either group.

2.2. Local infiltration technique

The patient was placed the supine position. The inguinal area was shaved and thoroughly cleansed with povidon iodine. We used 15 ml 0.5% prilocaine and 5 ml 0.25% bupivacaine for local infiltration. After the surgical field has been prepared, a series of intracutaneous injections with the 22-gauge needle was made along the course of the incision. Approximately 10 ml of the anesthetic solution was injected into the skin. Subcutaneous infiltration was next carried out. The incision was made through the skin down to aponeurosis of the external oblique muscle. Then, infiltration was carried out along the line of the next incision with 10 ml of anesthetic solution. After 3–5 min, the aponeurosis was incised, exposing the spermatic cord and the internal oblique muscles. Two or 4 ml of the anesthetic solution was infiltrated around the ilioinguinal nerve and the inguinal branch of the iliohypogastric nerve, care being taken to avoid intraneural injection or traction. The final step was to inject 8–10 ml of solution into the region of the internal inguinal ring to block the genitofemoral nerve and edges of the peritoneal sac.

The patients in this group were administered Ringer's Lactate solution (LR) 1000–1500 ml during the operation.

2.3. Spinal anesthesia technique

Through the venous cannula, the spinal group patients received 500 ml of LR for initial fluid administration over 10–15 min.

Spinal anesthesia was induced immediately after initial fluid administration. It was performed by using 27-gauge Quincke-type spinal needle at the L2–3 or L3–4 intervertebral space with the patient in lateral decubitus position with the operative side depend. All patients received 2 ml of 0.5% hyperbaric bupivacaine. The patients were kept in lateral decubitus position for 5 min and then repositioned in the supine position. If the patients underwent bilateral herniorraphy, the patients were repositioned in the supine position immediately after the bupivacaine injection.

The surgical procedure was started when the level of sensory block was satisfactory for the operation. The patients were given LR solution 1500–2000 ml during the operation in addition to the initial 500 ml.

2.4. Surgical procedure

The tension-free hernioplasty as described by Lichtenstein was performed in all operations [4]. In order to retain 8×16 cm Polypropylene mesh graft in the right position we used continuous polypropylene 2-0 or 0 suture. In addition to the Lichtenstein repair technique, we did a purse-string suture at the base of the indirect hernia sac in order to ligate and resect it.

2.5. Postoperative care

Pain was scored with Visual Analog Scale (VAS) at the postoperative fourth hour. All patients in both group were evaluated every hour for the first 8 h after the end of surgery for early postoperative complications. If any complication was seen (such as pain at incision, transient urinary retention, headache or hematoma under the incision or in the scrotum), patients were not discharged on the same day and were kept at the hospital until they were free of the complaints. Discharge of patients after hernia repair under local or spinal anesthesia was scheduled for 8 h after the end of surgery if any complication was not seen. Enteral nutrition was started 2 h after the end of surgery. Patients came for outpatient follow-up at 7 days after surgery.

2.6. Statistical analysis

VAS pain scores, early postoperative complications, length of hospital stay, and hospital costs and were determined for each group. VAS scores, length of hospital stay, and hospital costs were analyzed by use of the Student's t-test; early postoperative complications rates were analyzed by use of Yates's χ^2 (continuity correction) test (SPSS, version 10.0).

3. Results

Ninety-six patients with inguinal hernia were enrolled. The early postoperative complication rates were 14.8 and 32.6% for Group I and II, respectively. There was no mortality in either group.

Patients in Group II (spinal) had experienced nausea and vomiting during spinal anesthesia. They were treated with metoclopramide. No patients had any of these symptoms after the operation.

There were 47 patients in Group I (local). Their length of hospital stay was 1–4 days. Group II (spinal) had 49 patients and the length of hospital stay was 1–6 days. Early postoperative complication rates mean pain scores, hospital costs and mean hospital stay for each group is shown in Table 1. There were no statistically significant differences between Group I and II in early postoperative complication rates and pain scores ($P > 0.05$).

Early postoperative complications that occurred in the first 8 h after operation are shown in Table 2. Early postoperative complications in local anesthesia group were hematomas under the incision or in the scrotum in three patients. The hematomas resolved spontaneously. These patients were kept at the hospital for follow up, and they were discharged 2–4 days after the operation. Two patients had persistent incisional pain. They were treated with analgesics and discharged 1 day after the operation. One of the patients was kept at the hospital for 1 day because of urinary retention.

Early postoperative complications in spinal anesthesia group were subcutaneous hematomas under the incision or in the scrotum in two patients. They resolved spontaneously. These patients were kept at the hospital for follow up, and they were discharged 2–6 days after the operation. Three patients had persistent incisional pain. They were treated with analgesics and discharged 1 day after the operation. Six patient had headache. They were treated with bed rest and had oral analgesic treatment and discharged 1–3 days after the operation. Four patients had urinary retention. One of them had his bladder catheterized, and the others resolved spontaneously. All patients with urinary retention were discharged 1 day after the operation.

All the patients were called at their homes daily for their possible complaints, and they were invited to come to the clinic to evaluate wound infection on the fifth day postoperatively. Two patients in both of the groups had wound infection on day 5 postoperatively. All were healed uneventfully with appropriate antibiotic therapy and wound care.

The length of hospital stay was significantly longer in Group II than in Group I ($P < 0.001$). Total hospital cost was significantly lower in Group I than in Group II ($P < 0.001$).

4. Discussion

We believe that in the patients who require repair of inguinal hernia, spinal and local anesthesia offer advantages. Both spinal and local anesthesia involve limited body areas and do not interfere with the function of other organs and ventilation. Spinal anesthesia can produce a complete sensory and motor blockade. The success of local anesthetic technique, consisting of blockade of the ilioinguinal and iliohypogastric nerves and infiltration of the surgical layers, depends on a thorough understanding of the anatomy of the nerves. Local anesthesia can reduce pain after the procedure and provide benefit by a lower incidence of postoperative narcotic analgesic requirement [5,6].

The major disadvantage of spinal anesthesia is the possibility of hypotension secondary to the production of sympathetic blockade. In this clinical research we did not any experience any hypotensive effect as the patients were administered LR solution 1500–2000 ml during the operation in addition to the initial 500 ml to lessen venodilation effect of sympathetic blockade [7]. However, it is possible that the incidence of nausea, which occurred during spinal anesthesia was related to hypovolemia.

Spinal headache may occur in 2–10% of patients [1,7]. In the literature, the frequency of postural puncture headache was 3.8% for a similar population [8]. In this study, the main reason for delay in hospital stay is care of spinal headache in six patients (12.2%). The reported headaches were postural. However, spinal headaches could be treated on an ambulatory basis.

Urinary retention in five patients had cause of increased the duration of hospital stay in five patients. In ambulatory surgery, bupivacaine may delay the recovery of motor function and cause urinary retention [9,10].

The most important complication of local infiltration is a systemic toxic reaction, which can be reduced by limiting the total dosage and avoiding intravascular injection. Local infiltration is seldom followed by major complications [11]. In this study, during the operation no more than 40 ml of our anesthetic mixture were applied to the tissues, and no complications were observed. It has been suggested that at least 70 ml of

Table 1
Results of treatment

	Early postoperative complications	Hospital stay in days (mean ± S.D.)[a]	VAS (mean ± S.D.) postoperative fourth hour	Hospital cost ($) (mean ± S.D.)[b]
Group I, number (%)	7 (14.8)	1.35 ± 0.71	5.91 ± 1.08	142.17 ± 5.40
Group II, number (%)	16 (32.6)	2.68 ± 1.18	6.44 ± 1.00	158.40 ± 5.50

S.D., standard deviation.
[a] In Group I the length of hospital stay is significantly shorter than in Group II ($P < 0.001$).
[b] In Group I the hospital cost is significantly lower than in Group II ($P < 0.001$).

Table 2
Early postoperative complications

	Hematoma	Infection	Headache	Urinary retention	Persistent incisional pain	Total
Group I, number	3	1	–	1	2	7
Group II, number	2	1	6	4	3	16

the local anesthesia mixture have to be completely resorbed to provoke cardiotoxic symptoms [12]. More abrupt onset of side effects may be produced if local anesthetic is injected whilst the tip of the needle is in vein. It is important to aspirate before injecting local anesthetic. It has been recommended to keep the needle tip moving when infiltrating large volumes of local anesthetic [13].

Outpatient inguinal herniorraphy requires an anesthetic technique that provides safety and comfort for the patient, suitable conditions for the surgeon, and allows early discharge. The anesthetic techniques used for outpatient herniorraphy play a major role in successful management of these patients. We prefer local anesthesia, which allows early return of motor and bladder function, thus avoiding prolonged immobilization. The use of local anesthetics also allows the patient to remain awake, therefore, being capable of responding to sensory stimuli, and to cooperate easily by performing a stress test, such as the Valsalva maneuver or coughing [14].

Pain is an important problem after ambulatory hernia repair. Choice of surgical technique for open repair of inguinal hernia has no influence on postoperative pain [15]. We prefer anterior tension-free repair of all inguinal hernias. The Lichtenstein repair can easily be performed under local anesthesia because of its simple technique [16]. In our series, persistent postoperative pain in five patients is among the reasons for length of stay in both groups. This data may be related to our surgical procedure. We did a purse-string suture at the base of the indirect hernia sac (peritoneum). Although pain sensation is usually blocked by the anesthetic, traction on certain tissues the particularly the peritoneum, is uncomfortable [13].

In both groups minor surgical complications increased the duration of hospital stay. However, because of the increased morbidity related to the spinal anesthesia technique from headache and urinary retention, the duration of hospital stay increased more than the local anesthesia group, the difference is significant statistically. Considering the contraindications to spinal anesthesia such us hemorrhagic diatheses, we believe that local anesthesia is a choice for the most of the patients.

We think that local infiltration is feasible in surgical treatment of all types of inguinal hernias, including bilateral, unilateral or recurrent. In our series, 14 patients had recurrent, and six had bilateral. Some authors conclude that simultaneous anterior tension free repair under local infiltration anesthesia is the treatment of choice in case of bilateral inguinal hernias [17].

Laparoscopic preperitoneal herniorraphy has the advantage of being a minimally invasive procedure with a recurrence rate comparable to open preperitoneal repair [18]. However, surgeons have been reluctant to adopt this procedure because it requires general anesthesia. Ferzli et al. concluded that the extra peritoneal laparoscopic repair of inguinal hernia is feasible under local infiltration anesthesia [19].

Local anesthesia allows a very important reduction hospital costs. The equipment consists from only a syringe and anesthetic solution. Prolonged hospitalization and the material and equipment costs are the main reason for the higher cost with the spinal anesthesia. In our series, total hospital cost was significantly lower in local infiltration group than in spinal anesthesia group.

5. Conclusions

When anesthesia related complications, hospitalization time, cost effectiveness, and applicability to all patients were take into the consideration, local anesthesia can be recommended as a safe and effective technique for inguinal hernia repair in ambulatory surgery patients.

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