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The use of ilioinguinal and iliohypogastric nerve block anesthesia in inguinal bladder hernia repair

Minimally invasive anesthesia technique in inguinal bladder hernia repair

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Abstract
Aim: There are data showing that the use of minimally invasive anesthesia methods (local anesthesia, nerve blocks) as an alternative to traditional anesthesia methods used in inguinal hernia repair surgery is safe and effective. During the COVID-19 pandemic, which affected the whole world, we aimed to evaluate the use of minimally invasive anesthesia methods in patients with inguinal bladder hernia, as well as their perioperative and postoperative results in our pilot study.
Material and Methods: We evaluated the perioperative and postoperative data of five patients with inguinal bladder hernia, who underwent surgery with local anesthesia and ilioinguinal/iliohypogastric nerve blockade, four of which were performed during the COVID-19 pandemic.
Results: It is possible to perform inguinal bladder hernia surgery with local anesthesia and ilioinguinal/iliohypogastric nerve block, including in secondary cases. Better hemodynamic stabilization in the intraoperative period reduces the need for narcotic analgesics by providing effective analgesia in the postoperative period, as well as reducing the risk of contamination in airway control.
Discussions: Performing inguinal bladder hernia surgery using local anesthesia and ilioinguinal/iliohypogastric nerve block provides reliable and effective analgesia during the perioperative and postoperative periods.

Keywords
Bladder Hernia, Ureteroinguinal Hernia, Nerve Block, Minimal Invasive Anesthesiology

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Introduction

Inguinal bladder hernia, which was first described by Levine in 1951, is a rare condition despite the proximity of the bladder to the inguinal canal [1]. Bladder herniation occurs in 1-4% of all inguinal hernias, but its incidence can be up to 10% in obese men aged over 50 years [2]. Risk factors include male sex, advanced age, chronic urinary obstruction, weak pelvic floor muscles, and obesity [3].

Surgical correction of hernia after bladder reduction is the standard treatment today. In rare cases, where reduction of the hernia is not possible during the operation, the procedure of resection of the irreducible part of the bladder followed by herniorrhaphy is performed [4]. Rapid recognition of inguinal bladder herniation and detection with appropriate preoperative imaging methods may allow modifications in the surgical approach and reduce postoperative complications [5].

Bladder hernia repair is very similar to inguinal hernia repair surgery in terms of the incision and surgical procedure performed. Publications on bladder hernia are limited to case reports and small case series. Although there are no detailed data on the anesthesia methods used in bladder hernia repair, it can be assumed that the same anesthetic methods are used due to the similarities of the procedure with inguinal hernia repair. Currently, general anesthesia, spinal or epidural anesthesia, nerve blocks and/or local anesthesia are used in inguinal hernia repair [6]. Some factors such as surgeon's habits, patient preference, method reliability, ease of use, and cost are decisive in the selection of the anesthesia method to be performed during inguinal hernia repair [7].

During the COVID-19 pandemic, which affects the whole world, morbidity and mortality due to surgeries performed under general anesthesia may be seen at higher rates [8]. For this reason, it has become important to prefer safer anesthesia methods to a greater extent compared with the past.

It has become even more important that the commonly used anesthesia methods (general anesthesia, spinal anesthesia) have various risks and that these risk factors should be avoided as much as possible during the pandemic period. The main purpose of this study was to evaluate the perioperative and postoperative outcomes of five patients who underwent bladder hernia repair with ilioinguinal/iliohypogastric nerve block (IHNB) anesthesia, two of them in the pandemic period, because it was safer for the patients, and also, to examine the use of anesthesia methods such as nerve block, transversus abdominis plane block and local anesthesia, which are mostly used in inguinal surgeries, in terms of inguinoscrotal urologic surgical procedures.

Material and Methods

Five patients who were operated with the diagnosis of bladder hernia between December 2019 and November 2020 with the ilioinguinal/iliohypogastric nerve block anesthesia method were included in the study. Consent was obtained or waived by all participants in this study. Nigde Omer Halisdemir University Non-Invasive Clinical Research Ethics Committee issued approval 2020/12.

All five patients included in our study were diagnosed as having inguinal bladder hernia in the evaluations made upon their admission to the emergency or urology department with symptoms of inguinal pain, swelling, and urination problems, and were referred to the urology ward. One of the patients had undergone an inguinal hernia repair surgery on the same side about 40 years ago, and he had ipsilateral hydroureteronephrosis secondary to bladder hernia (Figures 1 and 2). The demographic and clinical data of the patients are summarized in Table 1.

Anesthetic - Surgical Technique and Follow-up

The patients underwent surgery jointly with general surgery. Before the surgery, a 30-mL mixture was prepared for each patient to perform tumescent anesthesia-aided ilioniguinal and IHNB: 13 mL 0.5% bupivacaine hydrochloride, 4 mL sterile serum 8.4% sodium bicarbonate, and a total of 13 ml 2% lidocaine hydrochloride 10 mg/ml with adrenaline tartrate (1: 1000) 5 μg / mL). A 5-cm, 21-G peripheral nerve block needle (Pajuk®, stimupleks HNS12 Germany, Germany) was chosen to perform IHNB because it has a line that facilitates drug injection, the resistance of the tissues can be felt more easily, and the placement of the needle tip can be preserved. During the procedure, the nerve was precisely localized using linear probe ultrasonography (Mindray® DP 20) to determine the nerve traces (Figure 3). The needle was inserted perpendicular to the skin. The ilioinguinal nerve and iliohypogastric nerves were visualized under ultrasonography and each nerve was blocked using 5 mL of the local anesthetic mixture [9].

Pressure was applied to the injection area for 2 minutes after the needle was withdrawn. The patient was taken to the operation room and the prepared local anesthetic mixture was administered to the patient using a step-by-step technique, 10 mL under the skin and the subcutaneous area around the incision, and the other 10 mL under the fascia, around the funiculus (spermatic cord) and the tissues at the base of the hernia sac as tumescent anesthesia. Surgery was allowed in patients who developed sensory blocks between the T10-L1 dermatomes. The sensory block was checked using the pin-prick test.

The Lichtenstein free tension mesh herniography technique was used after performing ilioinguinal/IHNB in all three patients. The skin, subcutaneous fascia, and external oblique fascia were passed through an approximately 7 cm incision over the inguinal canal parallel to the inguinal ligament. The hernia sac was found and released using sharp-blunt dissection from the spermatic cord and surrounding structures. The hernia sac was opened and the bladder was found to be herniated. The bladder was reduced through the hernia sac into the abdomen. Inversion was performed to the hernia sac. An approximately 10x10 cm polypropylene patch was prepared to cover the hernia defect in the inguinal area. The spermatic cord was passed through the notch and opened in the patch. The polypropylene patch was fixed to the pubis, inguinal ligament, and rectus sheath using a 2/0 Prolene suture.

Ethical Approval

Ethics Committee approval for the study was obtained.

Results

The first patient was evaluated as being American Society of Anaesthesiology (ASA) III. The surgery was completed in 50 minutes. The visual analog scale (VAS) value, which was evaluated as 3 at the 1st hour after the operation, decreased to 1 at the end of the 6th hour and there was no change in the level of pain at the 24th-hour follow-up examination. No analgesia was required in the postoperative period.

The second patient was 80 years old and was evaluated as ASA III. Serum creatinine was 1.7 mg/dl and was relatively higher than that of other patients. The patient had a history of inguinal hernia operation performed on the same side about 40 years ago. He had hydroureteronephrosis (HUN) on the left side and CT images showed that the left ureter was located in the hernial sac (Case 2). At the end of the operation, which lasted 70 minutes, the VAS value measured in the first hour after surgery was 4. In the postoperative period, additional analgesics are used in patients with VAS 4 and above. Therefore, the patient was administered a single dose of 75 mg of diclofenac. The VAS

Table 1. Demographic and preoperative data of patients.

	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5
Sex	Male	Male	Male	Male	Male
Age	74	80	60	58	63
BMI	32.9	31.5	27.4	30.1	30.8
Comorbidity	DM, HT, CAD, COPD	DM	HT	HT, DM	HT
Creatinine	1.2	1.7	0.9	0.93	1.5
HUN	No	Yes	No	No	No
Side	Right	Left	Left	Left	Right
Surgical history	No	Yes	No	No	No
ASA	III	III	II	III	II

BMI: body mass index, DM: diabetes mellitus, HT; hypertension, CAD: coronary artery disease, COPD: chronic obstructive pulmonary disease

Table 2. Perioperative and postoperative patient data.

	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5
Average BP	120	85	105	110	100
Average heart rate	95	85	100	82	76
SPO2	93	92	97	95	95
Need for Sedation	Midazolam 2 mg	Midazolam 4 mg	Midazolam 4 mg	Midazolam 4 mg	Midazolam 2 mg
Operation Time (min)	50	70	45	50	55
VAS 1	3	4	4	4	5
VAS 6	1	2	1	2	2
VAS 24	1	1	0	0	1
Need for Additional Analgesic	None	Diclofenac 75 mg	Diclofenac 75 mg	Diclofenac 75 mg	Diclofenac 75 mg

BP: blood pressure, VAS: visuel analog scale

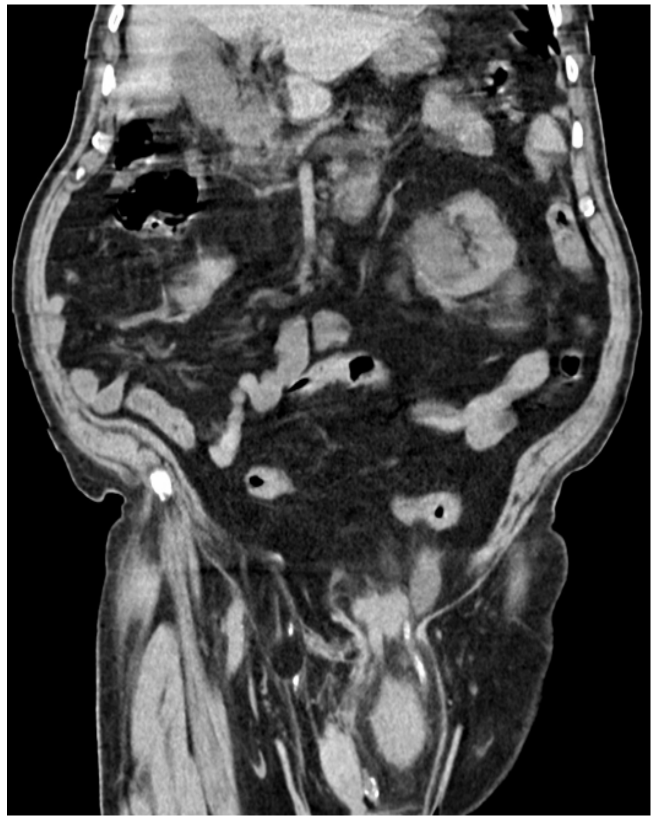

Figure 2. Case 2 CT Coronal Section Left Ureter Accompanying Inguinal Bladder Hernia

Figure 1. Case 2 CT Coronal Section Left Ureterohydronephrosis

Figure 3. USG-Guided Nerve Blockage

level, which decreased to 2 at 6 hours, decreased considerably at 24 hours, and he was discharged without the need for additional analgesia.

The third patient was a 60-year-old man. He presented with left inguinal pain, swelling in the left groin and difficulty urinating. After the diagnosis of the left inguinal bladder hernia, it was classified as ASA II in the preoperative evaluation. The operation lasted 45 minutes. Postoperative VAS 1st hour score was 4, the 6th- hour score was 1, and the 24th- hour score was 0. 75 mg Diclofenac was administered as a postoperative analgesic.

The fourth patient was a 58- year- old man. He was diagnosed with the left inguinal bladder hernia. The body mass index was 30.1. It was evaluated as preoperative ASA III. The operation was completed in 50 minutes. Postoperative VAS scores were recorded as 4 in the 1st hour, 2 at 6 hours and 0 at 24 hours. He did not need narcotic analgesics.

The fifth case was a 58-year-old male patient. DM and HT comorbidities were present. An inguinal bladder hernia was detected on the left side. It was considered ASA III. The operation time was 55 minutes. Postoperative VAS values were 5 at 1 hour, 2 at 6 hours and 1 at 24 hours. Diclofenac 75 mg was administered as a postoperative analgesic. Perioperative and postoperative data of all five patients included in the study are summarized in Table 2.

Discussion

It has been reported that herniation of the bladder can occur in the inguinal canal, femoral ring, scrotum, even the ischiorectal fossa or obturator foramen [10,11]. Bilateral hydroureteronephrosis, vesicoureteral reflux, bladder necrosis, and scrotal abscess may accompany the herniation of the bladder into the inguinal canal [12]. Displacement of the bladder floor and/or joining of the ureter to the inguinoscrotal hernia sac, and obstruction of the ureter cause hydronephrosis [13]. One of our patients (Case 2) had ipsilateral hydroureteronephrosis on the left due to a leftward shift of the bladder floor and distal displacement of the distal end of the left ureter.

In their systematic review, Branchu et al. examined the results of 65 patients, and they reported that 38 patients with bladder hernia had inguinal swelling, 30 patients had lower urinary tract symptoms (LUTS), 25 patients had pain in the inguinal region, and five patients had acute renal failure. Various complications developed in the postoperative period in eight of these patients [14]. All three patients in our study had signs of LUTS and swelling in the inguinal region. One of our patients underwent inguinal hernia repair surgery on the same side many years ago. Preoperative diagnosis of inguinal bladder hernia is important in terms of patient preparation, surgical planning, and complication prevention [5]. However, only 7% of inguinal bladder hernias can be detected before surgery, most can be diagnosed intraoperatively, and 16% can be diagnosed postoperatively due to complications such as bladder injury and urine leakage [15]. Anamnesis, a careful physical examination, and the use of imaging methods may contribute to increasing pre-operative diagnosis rates. It was possible for all five of our patients to be diagnosed with inguinal bladder hernia preoperatively and to shape their treatment plans accordingly. There were no complications in the perioperative and postoperative period in patients.

Spinal anesthesia is used in many centres as the main anesthesia method for inguinal hernia surgery in current practice. Although spinal anesthesia is effective, complications such as postoperative hypotension formation due to decreased peripheral vascular resistance, delayed mobilization due to long-term motor paralysis, urinary retention, and headache after dural puncture may develop [6,16]. Although general anesthesia is not used as much as spinal anesthesia, it continues to be one of the basic anesthesia methods used in hernia repairs today [17]. However, especially during the COVID-19 epidemic, general anesthesia is considered one of the procedures with a high risk of contamination due to the application of endotracheal intubation for airway control and the need for mechanical ventilation. The use of local anaesthesia and nerve block has recently come to the fore when minimally invasive techniques have become popular in anesthesia for inguinal hernia repair [18,19]. Nowadays, especially in experienced hernia centres, local anesthesia and ilioinguinal/IHNB are more preferred [20]. Although ilioinguinal and IHNB is an easy and safe method, it was reported that complications such as colon perforation, hematoma, abscess, transient femoral nerve palsy, and local anesthetic toxicity could develop [21,22]. Therefore, it must be performed by experienced surgeons or anesthetists. Our anesthetic and surgical procedures were also performed by our team, which has gained competence and experience in this field with previous studies [23].

The COVID-19 pandemic occurred in December 2019 in Wuhan, China, and then affected the whole world [24]. In a study originating from China in the early period of the pandemic, it was reported that 15 (44%) of 34 patients who had asymptomatic COVID-19 disease before surgery were found to develop pneumonia afterwards and required intensive care follow-up. In addition, seven (20%) of the patients who needed intensive care died [7]. In today's conditions, although the search for effective and more reliable anesthesia methods has continued, and the development of the situation has increased the importance of using and developing more reliable anesthesia methods. Before the pandemic period, we preferred to use local anesthesia and ilioinguinal/IHNB methods to reduce the risk level of our first patient due to comorbidities in his surgery. We had to perform the treatments of our other four patients during the pandemic period. We preferred local anaesthesia + ilioinguinal and IHNB because it was a safer anaesthesia method in this period.

It is suggested that inguinal hernia repair with local anaesthesia and ilioinguinal / iliohypogastric anesthesia provides less cardiovascular imbalance, earlier mobilization, and effective postoperative pain control, as well as a decrease in hospital costs and increased patient satisfaction [25]. Shortening the duration of hospital stay is important in terms of reducing the risk of hospital infection, reducing the financial burden of insurance institutions, and improving the effectiveness of the existing hospital capacity. However, the importance of this situation has further increased due to the strain on the capacity of the health system during the pandemic period. Although one of our patients had a secondary procedure in terms of postoperative pain control, a single dose of a non-steroidal anti-inflammatory drug was administered to two of our patients, and none of our patients required narcotic analgesics in the postoperative period.

The most important limitation of our study was that it was conducted with a very small case series. However, data on patients with inguinal bladder hernia in the literature are also limited to case reports or small case series. Another limitation was that the study was conducted retrospectively and there was no control group.

Conclusion

The use of nerve block in urologic surgeries is mostly limited to postoperative pain control and bladder tumors and transurethral surgeries to prevent obturator reflex by performing obturator nerve block. It will be possible to perform some urologic procedures, especially inguinoscrotal surgeries, with anesthesia provided with local anesthesia + ilioinguinal and IHNB. However, prospective randomized controlled studies are needed on this subject.

As a result of our case series study, anesthesia provided using ilioinguinal/IHNB can be used as an alternative anesthesia method in light of data obtained both perioperatively and postoperatively in the repair of inguinal hernia of the bladder. Although it has some limitations in terms of surgeon habits and comfort, we evaluated that it could be an effective and reliable anaesthetic method option for patients.

Performing inguinal bladder hernia surgery using local anesthesia and ilioinguinal/IHNB provides effective analgesia in the perioperative and postoperative period. In addition, it does not result in risk factors such as hypotension, late mobilization, and postoperative headache, which may develop due to spinal anesthesia. In addition to being more reliable for patients, ilioinguinal/IHNB brings advantages such as a reduction in hospital costs and early discharge. However, it would be appropriate for each center to make a selection considering their own experience and conditions.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

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