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Regional anaesthesia in the outpatient treatment of bilateral inguinal hernias using totally extraperitoneal laparoscopy

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Abstract

The treatment of bilateral inguinal hernias using totally extraperitoneal laparoscopy is usually done with general anaesthesia. The objective of this article is to evaluate the regional anaesthesia technique in extraperitoneal laparoscopic surgery for treating bilateral inguinal hernias in an outpatient surgery unit. Prospective clinical study of 30 patients with uncomplicated bilateral inguinal hernia undergoing surgery using extraperitoneal laparoscopy. The anaesthetic technique used were spinal regional anaesthesia. We analysed clinical data (age, sex, associated diseases, prior abdominal surgery, site and hernia type), intra-operative complications (bleeding, peritoneal rupture, subcutaneous emphysema, reconversion rate, haemodynamic stability, respiratory problems and degree of satisfaction), postoperative complications (haematomas, urinary retention, post lumbar puncture headaches, nausea, vomiting and postoperative pain) and recurrence rate. All the patients undergoing surgery under-spinal anaesthesia in any case was necessary to reconvert it to general anaesthesia. In conclusion, regional anaesthesia is safe and efficient in an outpatient surgery unit in the treatment of bilateral inguinal hernias.

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1. Introduction

The regional anaesthesia is the anaesthetic technique elected to treat inguinal hernia. The laparoscopy technique used to treat that pathology has modified this concept because it is performed under general anaesthesia. In theory, the extraperitoneal way carried out by laparoscopy, reproduce the same steps than conventional parietal surgery without violation of the intra-abdominal cavity, therefore, can be suggested that, this technique can be made correctly under spinal anaesthesia. The aim of this work is to analyze the viability of this anaesthetic-technique, to treat bilateral inguinal hernia under extraperitoneal laparoscopy. The laparoscopic technique for the treatment of inguinal hernias

was introduced as a less invasive method for repairing the defect and solving the problem, in addition to offering greater patient well-being [1–6]. The surgical technique has gradually become less aggressive, progressing from a purely intra-abdominal laparoscopy to the transabdominal technique but with preperitoneal repair and today to the totally extraperitoneal technique without altering the abdominal cavity [7]. However, until now, the usual way to perform this laparoscopic technique has been with general anaesthesia [8,9]. It might, therefore, seem a contradiction to try to solve a problem with minimally invasive surgery but with possible major anaesthetic aggression, more so if we consider that conventional surgery is being performed more and more with locoregional anaesthesia techniques. The present study is designed to demonstrate that the subarachnoid spinal anaesthesia is another possibility for totally extraperitoneal laparoscopic repair of inguinal hernias, and attempts to show which of them may be more beneficial for the patient and the surgeon.

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2. Material and methods

2.1. Patients

Thirty patients with bilateral inguinal hernia, diagnosed in the outpatients department of the J. Ma Morales Meseguer University Hospital in Murcia, underwent surgery using totally extraperitoneal laparoscopy and spinal anesthesia. The surgery was performed by one surgeon (A. Moreno-Egea) on a day-surgery basis (without hospital admission). Criteria for exclusion from laparoscopic surgery were femoral hernias, incarcerated hernias, inguinoscrotal hernias, Nyhus types I and patients aged under 20 years. Criteria for exclusion from spinal anaesthesia, apart from the contra-indications inherent in this technique (hypovolaemia without correction, coagulation problems and local or general acute infection) were patient refusal, the presence of central or peripheral neurological pathology, pathology of the spinal column, ASA III–IV, intellectual limitations and lack of collaboration.

2.2. Anaesthetic technique

All the patients received premedication at the Surgical Day Hospital with an oral benzodiazepine (diazepam 5–10 mg or lorazepam 1 mg). Eight patients were given an anti-H₂ (i.v. ranitidine) and an anti-emetic (i.v. metoclopramide) because the presence of a hiatus hernia. The procedure began with the establishment of a sterile field and the identification of anatomical landmarks in a theatre fully equipped for patient monitoring. Spinal anaesthesia was performed with the patient on the operating table in the lateral decubitus position with the surgical side down. The puncture was made with a Whitacre needle 25–27 g through L2–L3 or L3–L4 intervertebral space and 12–13 mg of hyperbaric-bupivacaine 0.5% plus 15–25 mg of fentanyl according to the height of the patient was injected. The patient was placed in the supine position, changing the position of the operating table (using different degrees of Trendelenburg), in order to obtain the level of anaesthesia around D6 which is the necessary level for patients comfort. This was tested with ethyl chloride. This group of patients had been sedated with midazolam (0.025 mg/kg) previously. Several patients [9] were also premedicated with atropine (0.5 mg). If during the procedure the peritoneal sac was ruptured a propofol infusion at a rate of 0.8–1.2 µg/ml was started and a 100 µg fentanyl bolus was given. In all the patients 2 g of metamizol was given very slowly. Before the procedure ended the surgeon put into the preperitoneal space 20 ml of ropivacain 0.375% and the skin incisions were infiltrated.

2.3. Surgical technique

Three trocars were placed in the midline. A 1.5 cm horizontal incision was performed infraumbilically. The incision was carried down to the anterior rectus sheath, which was also incised. The rectus muscle was retracted laterally. A dissector balloon (SPACEMAKER® II Surgical Balloon Dissector; GSI, Inc. Cupertino, USA) was inserted behind the muscle and in front of the posterior rectus sheath. An end-viewing telescope was introduced into the device while the balloon was being insufflated. Two 5 mm trocars were placed, one just above the pubis and the other in the midline above it. The entire posterior floor was dissected and the anatomical landmarks recognized. Dissection proceeded laterally between the upper edge of the elements of the cord and the epigastric vessels. It was conducted laterally in the iliac fossa. In the case of external oblique hernias, (indirect) the sac was freed from the elements of the cord and pushed back. If the sac was digitiform, ligature may be indicated. In the case of direct hernias, the fascia transversalis was turned over, then fastened with a stapler at the level of the pubic symphysis, so as to prevent appearance of seroma that could resemble a false recurrence. A 10 × 15 cm multifilament polyester mesh (Parietex®, Prim S.A., Sofradim, Villefranche sur Saone, France) was used to overlap the defect widely and fixed with two or three staples to the Cooper ligament (Tacker®; Origin, California, USA). Once correct positioning of the prosthesis and haemostasis had been checked, exsufflation of the extraperitoneal space was commenced and the peritoneal sac collapsed over the mesh. The trocars were removed under direct vision [10].

2.4. Follow-up

All the patients were included in an assessment protocol during their hospital stay and afterwards at outpatient consultations at 1 week, 1 month, 6 months, 1 year and then yearly (clinical consultation and physical examination). The parameters analysed were: (a) clinical: age, sex, associated diseases, prior abdominal surgery, hernia site and type according to the Nyhus classification; (b) intra-operative complications: preperitoneal bleeding, rupture of the peritoneal sac, subcutaneous emphysema, rate of reconversion, haemodynamic stability (TANI and FC), respiratory problems (pulsoximetry and respiratory rates) and degree of satisfaction; (c) postoperative morbidity: haematomas, urinary retention, transitory pain, postoperative vomiting and nausea; and (d) in the follow-up: rates of readmission and recurrence. Follow-up averaged a minimum of 12 months and was complete in 100% of the patients.

Table 1
General characteristics of patients undergoing surgery using the extraperitoneal laparoscopy technique

	Regional anesthesia (n = 30)
Median age (range)	56.5 (25–76)
Sex (men/women)	29/1
<i>Associated diseases</i>	
Obesity	7 (23.3)
Prostatism	6 (20)
Cardiopathy	2 (6.6)
Diabetes Mellitus	4 (13.3)
Pulmonary diseases	11 (36.6)
Hiatus hernia	4 (13.3)
<i>Surgical history</i>	
Appendectomy	4 (13.3)
Nephrectomy	1 (3.3)
Prostatectomy	1 (3.3)
Cholecystectomy	3 (10)
Herniorrhaphy	4 (13.3)
<i>Type</i>	
II	3 (10)
IIIA	12 (40)
IIIB	14 (46.6)
IV	1 (3.3)

Data are expressed as absolute values, with percentages in brackets.

3. Results

The patient's characteristics are shown in Table 1. Bleeding inside the pre-peritoneal space was treated with local compression without any change in the anaesthetic technique previously chosen. Rupture of the peritoneal sac occurred in four cases (13.33%) but in no case was it necessary to convert spinal anaesthesia to general anaesthesia because of the pneumoperitoneum. The situation was resolved by increasing the degree of the patient's sedation (rate of conversion was 0%). The morbidity is shown in Table 2. Clinical changes during the procedure are shown in Table 3. The admission rate was zero. All the patients were discharged between 9 and

Table 2
Clinical evolution of patients undergoing surgery with the laparoscopic technique under subarachnoid anaesthesia

Mean operative time	43 (30–65)
<i>Intra-operative morbidity</i>	
Preperitoneal bleeding	3 (10)
Rupture of peritoneal sac	4 (13.3)
Rate of reconversion	0
Readmission rate	1 (3.3)
<i>Postoperative morbidity</i>	
Haematomas	4 (13.3)
Urinary retention	2 (6.6)
Transitory pain	3 (10)
Recurrence rate	0

Data are expressed as absolute values, with percentages in brackets. Operative time is expressed in minutes.

14 h post surgery. One patient developed urinary retention and was readmitted to the hospital for 2 days (3%).

4. Discussion

Inguinal hernia repair using the laparoscopic technique is gradually increasing in popularity, although it still accounts for less than 10% of all hernia operations in most countries, except Switzerland, where it represents 21% [11]. This new technique has proved to have certain advantages over the open approach, such as a smaller scar, less pain and physical disability, and less time off work. This last aspect may be of major social interest among patients belonging to the active population [3–6]. For us the laparoscopic technique is not a substitute for conventional surgery but an additional technique that complements the surgeon's therapeutic options and enables us to offer our patients a more complete and better-quality service. We believe that the technique should be performed according to the same anaesthetic and surgical principles as those accepted for open surgery. However, the standard method of performing laparoscopic surgery is with general anaesthesia, which might involve an added risk of respiratory complications (atelectasis, pneumonia, etc.), cardiovascular complications (anaesthetics can reduce the heart function and cause bradyarrhythmia, tachycardia and hypertension, etc.), gastro-intestinal complications (nausea, vomiting, bleeding, etc.) and urinary complications (urinary retention) [2,5,12,13]. For this reason general anaesthesia is usually considered to be contra-indicated in patients with multiple prior surgery, obese patients, those with chronic obstructive pulmonary disease, pregnant women, and patients with alterations in coagulation or portal hypertension [9]. Likewise, hernia patients often present with other diseases, and if we decide to offer them minimally invasive surgery as the best solution we should also be consistent with the anaesthesia technique we chose in order to offer an overall benefit. With this in mind, the extraperitoneal laparoscopic technique under regional anaesthesia means a reduction in the impact of CO₂ insufflation and fewer possible systemic complications, which is more in line with the anaesthetic standards of conventional surgery. Few studies have shown an improved outcome with the use of regional anaesthesia as against general anaesthesia. The present study shows that subarachnoid spinal anaesthesia is a real possibility in an outpatient surgery unit. Katkhouda [14] reported his experience with regional anaesthesia in 28 patients but using transabdominal laparoscopic surgery. The literature includes only one previous reference to the extraperitoneal technique under regional anaesthesia, in which Azurin et al. [15] compared 36 repairs with 16 done under general anaesthesia. They

Table 3
Cardiovascular, respiratory and anesthetic parameters during the surgery

<i>Dermatomeic level</i>	
10 min	T6 15 (50) T5 9 (30) T4 6 (20)
At the end	T6 9 (30) T5 7 (23.3) T4 14 (46.6)
<i>Arterial pressure</i>	
Before	149.5/78.7
5 min after puncture	127.2/68.2
10 min after puncture	127.2/66.3
15 min after puncture	123.1/66.3
30 min after puncture	126.4/65.9
At the end of surgery	126.6/66.5
<i>Cardiac frequency</i>	
Before	73.8
5 min after puncture	81.5
10 min after puncture	73.9
15 min after puncture	72.2
30 min after puncture	70.8
At the end of surgery	70.8
Pulsoximetry	100% (66.6); 99% (16.6); 98% (10); 97% (3.3); 96% (3.3)
Respiratory frequency	16 (14–20)
Reanimation unit stay	79.5 (60–135)

The arterial pressures are expressed in mmHg, the cardiac rates (frequency) are expressed in beats per min, the respiratory frequency in breathes per min, and the reanimation stay in minutes. Dates are expressed in media values, with percentages in brackets.

found no differences between the two groups. In a previous, study we demonstrated that none of the ten patients undergoing surgery with regional anaesthesia and presenting with pneumoperitoneum required conversion due to pain or technical problems. Conversion was always due to surgical problems and never involved any modification in the anaesthesia technique initially chosen. Regarding urinary retention we founded significant differences, unlike the results reported by Finley and Petros (19% retentions rate after general anaesthesia vs. 19% with regional anaesthesia) [16,17]. Like other authors we consider that to become familiar with the technique and perform it with relative security and easily experience of about 30–50 cases is required [2,3,5,18,19]. After such experience in our centre we are able to perform the technique on a standard basis under regional anaesthesia and in an outpatient unit. This has minimized hospital costs and made the extraperitoneal laparoscopic approach more competitive than conventional surgery, whilst matching the results of other centers which already have major experience with the classical techniques [3,11,16]. This study shows that from a surgical point of view there is no justification for choosing general rather than regional anaesthesia. However, only the anaesthesiologist after clinical evaluation of the patient should decide on the most appropriate technical option for treating inguinal hernias using extraperitoneal laparoscopy. In conclusion, general anaesthesia is not indispensable for performing the extraperitoneal laparoscopic technique in the treatment of inguinal hernias. Regional anaesthesia is equally safe and in our study allows earlier patient discharge.

References

- [1] Benchetrit S, Debaert M, Detruit B, Dufillo A, Gaujoux D, Lagrutte J, Lepere M, Martin L, Pavis X, Rico E, Sorrentino J, Therin M. Laparoscopic and open abdominal wall reconstruction using Parietex® meshes: clinical results in 2700 hernias. *Hernia* 1998;2:57–62.
- [2] Champault GG, Nabil R, Catheline JM, Turner R, Boutelier P. Inguinal hernia repair. Totally preperitoneal laparoscopic approach versus Stoppa operation: randomized trial of 100 cases. *Surg Laparosc Endosc* 1997;7(6):445–50.
- [3] Kald A, Anderberg B, Smedh K, Karlsson M. Transperitoneal or totally extraperitoneal approach in laparoscopic hernia repair: results of 491 consecutive herniorrhaphies. *Surg Laparosc Endosc* 1997;7(2):86–9.
- [4] Kozol R, Lange PM, Kosir M, Beleski K, Mason K, Tennenberg S, Kubinec SM, Wilson RF. A prospective, randomized study of open vs. laparoscopic inguinal hernia repair. *Arch Surg* 1997;132:292–5.
- [5] Liem MSL, Haselma JAM, Van Der Graaf Y, Schrijvers AJP, Van Vroonhoven TJMV. Cost-effectiveness of extraperitoneal laparoscopic inguinal hernia repair. A randomized comparison with conventional herniorrhaphy. *Am Surg* 1997;226(6):668–76.
- [6] Schrenk P, Woisetschlager R, Rieger R, Wayarnd W. Prospective randomized trial comparing postoperative pain and return to physical activity after transabdominal preperitoneal, total preperitoneal or Shouldice technique for inguinal hernia repair. *Br J Surg* 1996;83:1563–6.
- [7] Van Garsee L, Himpens JM, Leman G. Preperitoneal laparoscopic hernioplasty: the evolution from transperitoneal to preperitoneal laparoscopic inguinal hernia repair. In: Büchler MW, Frei E, Klaiber C, Metzger A, editors. *Laparoscopic hernia repair. A new standard? Progress and Surgery*, vol. 21. Basel: Karger, 1995:173–6.
- [8] Fisher S, Cassivi S, Paul A, Troidl H. Evidence-based medicine and special aspects in bilateral inguinal hernia repair. *Hernia* 1999;3:89–95.

- [9] Sigurdsson GH, Thomson D. Anaesthesia for inguinal hernia repair. In: Büchler MW, Frei E, Klaiber C, Metzger A, editors. *Laparoscopic hernia repair. A new standard? Progress and Surgery*, vol. 21. Basel: Karger, 1995:41–7.
- [10] Moreno-Egea, Aguayo JL. Intra-operative and postoperative complications of totally extraperitoneal laparoscopic inguinal hernioplasty. *Surg Laparosc Endosc* 2000;10:30–3.
- [11] O’Riordan DC, Kingsnorth AN. Audit of patient outcomes after herniorrhaphy. *Surg Clin North Am* 1998;78(6):1129–39.
- [12] McKernan JB, Laws HL. Laparoscopic repair of inguinal hernias using a totally extraperitoneal prosthetic approach. *Surg Endosc* 1993;7:26–8.
- [13] Topal B, Hurlay P. Totally preperitoneal endoscopic inguinal hernia repair. *Br J Surg* 1997;84:61–3.
- [14] Katkhouda N. Regional anaesthesia in laparoscopic hernia repair. In: Arregui ME, Nagan RF, editors. *Inguinal hernia. Advances or controversies*. New York: Radcliffe Medical Press, 1994:89–93.
- [15] Azurin DJ, Go LS, Cwik JC, Schuricht AL. The efficacy of epidural anesthesia for endoscopic preperitoneal herniorrhaphy: a prospective study. *J Laparosc Surg* 1996;6:369–73.
- [16] Finley RK, Miller SF, Jones LM. Elimination of urinary retention following inguinal herniorrhaphy. *Ann Surg* 1991;57:486–9.
- [17] Petros JG, Rimm EB, Robillard RJ, Argy O. Factors influencing postoperative urinary retention in patients undergoing elective inguinal herniorrhaphy. *Am J Surg* 1991;161:431–4.
- [18] Heikkinen T, Haukipuro K, Leppala J. Total costs of laparoscopic and Lichtenstein inguinal hernia repair. A randomized prospective study. *Surg Laparosc Endosc* 1997;7(1):1–5.
- [19] Houghton SG, Filipi CJ. A suggested method for laparoscopic herniorrhaphy resident training. *Hernia* 1998;2:193–7.