

Total Extraperitoneal Preperitoneal Laparoscopic Hernia Repair Using Spinal Anesthesia

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ABSTRACT

Background: Laparoscopic herniorrhaphy is a well-debated approach to inguinal hernia repair. Multiple technical and outcome variables have been compared with those of traditional open inguinal hernia repairs. One of these variables is the choice of anesthesia. To date, no reports describe the use of spinal anesthesia for laparoscopic hernia repairs. We present herein a review of our experience with spinal anesthesia for the total extraperitoneal preperitoneal laparoscopic hernia repair (TEP).

Methods: We prospectively reviewed 30 patients undergoing TEP while under spinal anesthesia. Methods of anesthesia, surgical procedure, operative and anesthesia delivery times, as well as outcomes were reviewed. Patients were followed up over a 2-year period. Short- and long-term results of the surgical procedure and anesthesia delivered were noted.

Results: All patients underwent successful laparoscopic hernia repair while under spinal anesthesia without conversion to general anesthesia. Forty-four hernias were repaired in 30 patients. Short- and long-term follow-up (2 years) revealed no significant untoward affects from the spinal anesthesia in this series of patients. Aside from inguinodynia in 3 patients in the short-term, no other short-term or long-term untoward sequelae occurred.

Conclusions: Spinal anesthesia is a feasible, and in our experience, the preferable method of anesthesia for total extraperitoneal laparoscopic hernia repair.

Key Words: Laparoscopic hernia repair, Spinal anesthesia, Totally extraperitoneal preperitoneal hernia repair, Hernia, Inguinal surgery, Laparoscopy, Regional anesthesia.

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INTRODUCTION

Although laparoscopic hernia repair continues to gain acceptance in the surgical forum as more surgeons obtain training experience, it continues to be hindered by perceived technical concerns not commensurate with the time-tested open hernia repair. The choice of anesthesia is among the list of concerns. Cost and recurrence have also been issues, but once a surgeon has performed a certain number of cases, the recurrence rate equals that of open repair.¹ Although the cost of the procedure is higher, analyses based on societal costs have demonstrated an overall favorable profile.² One perceived disadvantage of the total extraperitoneal laparoscopic hernia repair (TEP) is the need for general anesthesia.^{1,3,4} This is the form of anesthesia used by most laparoscopic hernia surgeons. There are, however, incidental reports of the use of epidural and local anesthesia for TEP.⁵⁻⁸ These methods have not gained momentum for various reasons, but they are part of the armamentarium for laparoscopic hernia repairs. To date, we have seen no reports that discuss the use of spinal anesthesia. We report herein our experience with this mode of anesthesia as our primary choice for TEP repairs.

METHODS

A prospective series of 30 consecutive patients undergoing TEP by a single surgeon from November 13, 2003 through January 12, 2004 were selected for this study. Each patient underwent initial spinal anesthesia and conscious sedation. For the spinal placement, all patients were in the sitting position, and Portex (Keene, NH) Model 15545C-21 spinal kits were used. The lower back was prepped with Betadine and draped in a sterile fashion. Xylocaine 1% was infiltrated subcutaneously followed by an 18-gauge introducer needle. A 25-gauge Whitacre needle was advanced until CSF returned. Patients randomly received either Xylocaine 5% (75 mg) provided in the kit or preservative-free Xylocaine 2% (60mg, AstraZeneca Pharmaceuticals LP, Wilmington, DE), intrathecally as the primary anesthetic. Patients were then placed supine for the duration of the procedure. No additional local anesthetic was used in the port sites or instilled extraperitoneally. Sedation was provided with midazolam (2 mg),

fentanyl (100 μg), and a propofol infusion ranging from 0 $\mu\text{g}/\text{kg}/\text{min}$ to 100 $\mu\text{g}/\text{kg}/\text{min}$. Additional supportive therapy, such as ephedrine and glycopyrrolate, were administered as needed. Breakthrough pain was controlled with up to 50mg of IV ketamine.

The surgical technique uses the Autosuture Balloon Dissector (US Surgical, Norwalk, CT) and a 10-mm structural balloon, insufflation to 12 mm Hg with CO_2 , and dissection of the inguinal region including skeletonization of the cord for placement of a 15-cm by 12-cm polypropylene mesh wrap. This is then secured with the Onux Salute tacking device or the Protack (US Surgical, Norwalk, CT).

RESULTS

Our study included 28 males and 2 females. The procedure length averaged 28 minutes for a unilateral hernia repair, 37 minutes for a bilateral hernia repair, and 43 minutes for a hernia repair with a combined procedure. The range was 19 minutes to 59 minutes.

The average time from entrance to the OR to initial incision, essentially the anesthesia administration time, averaged 17 minutes (range, 11 to 28). The total time from OR room entrance to departure to PACU averaged 55 minutes (range, 38 to 78). The 30 patients had 44 hernias. There were 41 inguinal hernias, 2 umbilical hernias, and 1 femoral hernia. Three of the inguinal hernias were direct hernias that were found incidentally at the time of the planned contralateral repair. There were 28 (68%) direct hernias, 10 (24%) indirect hernias, and 3 (8%) recurrent direct hernias. The 2 umbilical hernias were repaired simultaneously through the infraumbilical port-site incision. One patient had a hydrocelectomy, one a cystoscopy, and another had a bilateral vasectomy at the time of the laparoscopic hernia repair. The vasectomy was performed laparoscopically, and the hydrocelectomy was performed by an open procedure.

There were 12 patients (40%) with visualized peritoneal tears. No attempts were made to repair these tears. No patient required conversion to general anesthesia, and of the 30 patients, no conversions to an open repair were necessary. Intraoperative or immediate postoperative symptoms ranged from none to shoulder pain or chest discomfort. These were treated with titration of sedatives and narcotics. Average propofol dose was 233 mg (range, 0 to 400), and only 4 patients received ketamine (20 mg to 50 mg).

All patients recovered in the PACU and received ketorolac 30 mg IV upon admission. Seven patients required sup-

plemental fentanyl (50 μg) in recovery, and one other patient was given morphine sulfate IV (4 mg). Once the spinal anesthesia had worn off, as evidenced by the ability to ambulate and urinate, the patients were discharged home. No patients required Foley catheterization, and no unanticipated admissions occurred. All patients followed up with the surgeon within a 2-week to 3-week timeframe. All were allowed to ambulate that day and return to normal activity and exercise when they felt able, which was generally a 2-day to 6-day period.

All patients were questioned about the procedure and anesthesia. No reports were made of spinal headaches or transient neurological symptoms (TNS). All patients were satisfied with their anesthesia and immediate postoperative pain control. Follow-up of these patients over a 25-month to 28-month period has revealed no recurrences. Three patients returned beyond the initial postoperative period (>2 months) with inguinodynia, but in all cases these resolved by 6 months. No patients in this study had residual or chronic inguinal pain. Long-term sequelae related to the hernia repair or spinal anesthesia was not reported.

DISCUSSION

We set out to discuss the feasibility of spinal anesthesia as an option for analgesia in a totally extraperitoneal laparoscopic hernia repair (TEP). This technique has been used at our institution for the past 10 years in well over 1500 laparoscopic hernia repairs. The literature on laparoscopic versus open hernia repair is filled with important discussions on controversial aspects of these repairs. These include indications, recurrence rates, cost, return to normal activity, long-term complications, and learning curves. However, one seemingly undebatable point was the choice of anesthesia. Open hernia repair proponents appropriately target the need for general anesthesia in laparoscopic hernia repairs as a negative trait of the procedure. This has not been readily defended. A spattering of reports discusses the feasibility of hernia repairs with local and epidural anesthesia. The block provided by a spinal anesthetic is denser and less patchy compared with an epidural. The onset time and time to complete block are also considerably faster with spinal anesthesia. Theoretically, if enough time were allowed and enough local anesthetic administered epidurally, the same anesthetic level should be achieved by an epidural.

The use of local and epidural anesthesia for TEP repairs has not been widely accepted, nor widely known. In fact, a previously consulted laparoscopic surgeon told 2 pa-

tients in this study that the procedure could not be done under spinal anesthesia. This lack of awareness prompted a prospective review by us to verify the feasibility of spinal anesthesia.

The use of general anesthesia has been the mainstay of laparoscopic hernia repair for a variety of reasons. These reasons include, the assurance of complete analgesia, the ability to “learn” or “teach” in a more relaxed setting; the familiarity of general anesthesia during the learning curve; the fear, either real or implied, that a patient undergoes “a needle in the back” versus “being completely asleep and not knowing what is going on.”

The TEP repair, being completely extraperitoneal allows the use of regional or local anesthesia with conscious sedation much like an abdominoplasty or liposuction.^{9,10} Even with leakage of CO₂ into the peritoneal cavity through a peritoneal tear during dissection, regional anesthesia can be used. Most patients felt mild shoulder or chest discomfort, but for those patients whose discomfort was significant or who began moving, conscious sedation was used. Conscious sedation facilitates spinal anesthesia for laparoscopic hernia repairs as it does local anesthesia for open hernia repairs. In fact, in another arm of this study, we compared the amount of sedation used in TEP versus open hernia repair, and found no differences at all. The spinal itself can provide enough patient comfort without the use of propofol for sedation. Several patients in our study and numerous others since have had TEP repairs performed while completely awake, watching the procedure on a monitor. Surprisingly, insufflation was well tolerated. The longer the procedure, however, the increased potential existed for peritoneal insufflation and subdiaphragmatic irritation presenting as shoulder pain or chest pressure. Both of these issues were easily remedied by increasing the propofol infusion rate, or in 4 patients a small dose of ketamine was administered intravenously. The duration of the surgery is important so the spinal must last long enough. Due to our previous experience with this technique, we used Xylocaine as the main spinal medication. Longer-acting anesthetics, such as bupivacaine, should have similar success rates but have not been studied. The short duration of surgery limits the discomfort from peritoneal tears even when TEP was combined with other urologic procedures.

All risks of spinal anesthesia are still present, and side effects such as hypotension, bradycardia, urinary retention, and other such things, should be expected in their usual rates. An oversedated patient or patients with delayed gastric emptying run the risk of aspiration.

However, this risk is still present with general anesthesia using a Laryngeal Mask Airway (LMA), as well as the higher incidence of postoperative nausea associated with general anesthesia. TNS and postdural puncture headache are also issues that patients should be made aware of. Contraindications to general anesthesia for cardiopulmonary reasons may, however, preclude a patient from undergoing laparoscopic hernia repair at all were it not for the option of spinal anesthesia. Spinal anesthesia is not meant to replace general anesthesia for TEP but can be used as another tool in the armamentarium of anesthetic choices. At our institution, spinal anesthesia is the preferred method. Recovery room and discharge times seem comparable to those of general anesthesia but were not studied. Although our study did not compare general anesthesia with spinal anesthesia, the purpose of this report is to demonstrate that laparoscopic hernia repair performed extraperitoneally can safely and effectively be performed with the patient under spinal anesthesia, allowing the surgeon and anesthesiologist a full compliment of analgesia for laparoscopic hernia repairs.

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