

Laparoscopic Total Extraperitoneal (TEP) Inguinal Hernia Repair under Spinal Anesthesia vs General Anesthesia: A Prospective Study

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Abstract

Objective: To compare the safety, cost and effectiveness of laparoscopic total extraperitoneal hernia repair (TEP) under spinal anesthesia (SA) with those of TEP under general anesthesia (GA).

Materials and methods: Between June 2012 and June 2013, 60 patients undergoing laparoscopic TEP under spinal and general anesthesia at Priest Hospital were prospectively followed. The demographic data, intraoperative events, pain score, analgesic use, anesthesia cost and complications were recorded.

Results: There were 30 patients in each group. Unilateral/bilateral hernias in SA and GA groups were 26/4 and 23/7 respectively. No patient in the SA group was converted to GA. Ten patients (33%) in the SA group complained of shoulder or chest discomfort and required sedation. There were no significant differences in pain scores at 4 and 24 hours, meperidine doses or postoperative complications between the two groups. Cost to the patients was less in the SA group.

Conclusion: Laparoscopic TEP under SA was as safe and effective as that performed under GA but was less expensive. Laparoscopic TEP under SA could be an alternative for patients who have contraindications to GA.

Keywords: Inguinal hernia, laparoscopic total extraperitoneal hernia repair, spinal anesthesia

INTRODUCTION

Laparoscopic inguinal hernia repair has been proved to have many benefits over open inguinal hernia repair, such as less pain, faster recovery, superior cosmesis with a low recurrence rate¹⁻⁵. It has been recommended as the repair method of choice for bilateral and recurrent inguinal hernias¹⁻³. Disadvantages of the procedure included a steep learning curve, longer operative time, greater expense,

and requirement of general anesthesia (GA). It is still controversial as a method of primary unilateral inguinal hernia repair. There are a few articles showing the feasibility, safety and benefits of laparoscopic inguinal hernia repair under epidural and spinal anesthesia (SA)⁶⁻¹⁵. Regional anesthesia is associated with quicker recovery, less postoperative sequelae, less postoperative pain, and lower cost¹⁶⁻¹⁷. In our hospital, we performed laparoscopic inguinal hernia repair by a total

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extraperitoneal approach (TEP) under both GA and SA. The objective of the present study was to compare the safety, cost and effectiveness of laparoscopic inguinal hernia repair under SA compared with GA.

MATERIALS AND METHODS

The study was approved by Ethics Committee of the Priest Hospital. A prospective study was conducted on 60 patients who underwent laparoscopic TEP during June 2012 and June 2013 at the Priest Hospital. All procedures were performed by the same surgeon (P.T.) and the same anesthesiologist (R.S.). Every patient was informed and the consent was obtained before anesthesia and surgery. The choice of anesthesia was decided upon by both the patient and the anesthesiologist (depending on factors such as difficulty of intubation, underlying diseases, history of back pain, previous surgery, patient cooperation and preferences). Patients with complicated and irreducible hernias, with ages less than 18 or greater than 75 years, and non-cooperative patients were excluded from the study. All patients were followed at 7 days and 1 month postoperatively. Demographic data, anesthesia methods, intraoperative events (unstable hemodynamics, shoulder discomfort, conversion to open surgery or GA), pain score, analgesic drugs, anesthetic costs and complications were recorded. The degree of pain was recorded on an 11-point visual analog scale with a range from 0 (no pain) to 10 (excruciating unbearable pain). Seroma was

diagnosed clinically when a palpable cystic lesion of any size was found in inguinal area.

SA was performed with the patient positioned in left lateral decubitus and a 27-gauge spinal needle was inserted at L₃ to L₄ level. After visualizing the cerebrospinal fluid through the needle, 0.5% hyperbaric Bupivacaine (3.2 to 4 mg) was injected and the loss of sensation was tested at appropriate times until T₆ to T₁₀ level sensory loss was achieved. During the operation blood pressure, heart rate, electrocardiogram, oxygen saturation, and end-tidal CO₂ were monitored. Intravenous sedation and other medications were supplemented when required. GA was done using balanced anesthesia technique, with sevoflurane or desflurane as volatile anesthetics.

One gram of Cefazolin was prescribed as a preoperative prophylactic antibiotic. Patients were put in supine position with the arm opposite to the hernia side kept along the body. After anesthesia, the urinary bladder was catheterized. Three midline ports were used (Figure 1) while preperitoneal space was created with a balloon dissector. The operation was performed under 10 to 12 mmHg pneumatic pressure. A 10 cm × 15 cm polypropylene mesh was inserted and fixed with staples.

Continuous data were reported as mean ± S.D. while ordinal data were reported as median (range). Mann-Whitney U test or Chi-Square test was used to test for differences between the groups. A p-value less than 0.05 was considered statistically significant.

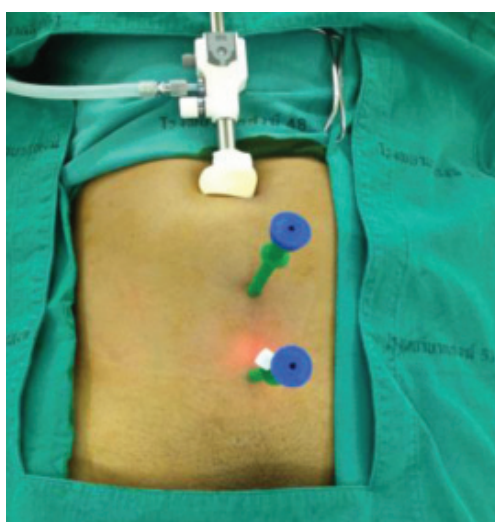


Figure 1 Position of ports



Figure 2 A large hernia

RESULTS

There were 30 patients in each group and 4 in each group had recurrent hernias. Demographic data and operative outcomes are shown in Tables 1 and 2. Unilateral and bilateral hernias were analyzed separately.

In the SA group there were four patients with large hernias (Figure 2). Hypertension was the most common underlying disease in the SA group (7 of 30 or 23%), while in GA group, diabetes was the most underlying disease (4 of 30 or 13%).

In the SA group the loss of sensation varied from levels T6 to T10, mostly at T10 (15 of 30 or 50%). Ten patients (33%) complained of shoulder or chest discomfort and required some sedation (mainly 1 to 3 mg of intravenous midazolam and 3 mg of Morphine). Four patients (13%) had bradycardia (heart rate <60/

min) and required intravenous atropine. Two patients (7%) had hypotension (BP < 90/60 mmHg) and needed intravenous ephedrine. Two patients (7%) had both bradycardia and hypotension, therefore both atropine and ephedrine were administered.

No patient in the SA group was converted to GA. There was one patient who converted from laparoscopic to open hernioplasty due to marked adhesion from the previously unknown urological operation. No patients in this study complained of postural puncture headache or vomiting. The Foley catheter was removed six to eight hours after surgery in the SA group, while in the GA group it was removed before extubation. No patient needed re-catheterization.

There were no differences in pain scores at 4 and 24 hours between the SA and GA groups and meperidine doses used were also similar between the

Table 1 Demographic data and operative outcomes in the unilateral hernia group.

Data and outcomes	Spinal anesthesia (n=26)	General anesthesia (n=23)	p-value
Age (year): mean (sd)	53.9 (13.3)	54.5 (13.6)	0.889
BMI (kg/m ²): mean (sd)	23.6 (3.4)	22.7 (2.0)	0.335
ASA class: median (range)	2 (1 to 3)	2 (1 to 3)	0.405
Operative time (min): mean (sd)	73.5 (30.1)	83.3 (25.8)	0.259
Pain at 4 hrs: median (range)	3 (0 to 5)	3 (0 to 5)	0.503
Pain at 24 hrs: median (range)	2 (0 to 5)	2 (0 to 4)	0.979
Meperidine (mg): median (range)	0 (0 to 60)	0 (0 to 30)	0.586
Seroma: number (%)	3 (12%)	3 (13%)	0.853*
Anesthesia cost (baht): median (range)	2,512.5 (2,330 to 4,580)	4,772.50 (2,130 to 7,825)	< 0.001

All p-values by Mann-Whitney U test except for seroma; *Chi-Square test

Table 2 Demographic data and operative outcomes in the bilateral hernia group.

Data and outcomes	Spinal anesthesia (n=4)	General anesthesia (n=7)	p-value
Age (year): mean (sd)	62.2 (3.9)	61.6 (9.6)	0.897
BMI (kg/m ²): mean (sd)	22.7 (2.8)	23.6 (6.6)	0.800
ASA class: median (range)	2(2-3)	2(1-3)	0.469
Operative time (min): mean (sd)	97.5 (58.5)	134.3 (25.1)	0.304
Pain at 4 hrs: median (range)	2.5(1-5)	3(2-6)	0.244
Pain at 24 hrs: median (range)	2.5(2-4)	3(2-4)	0.760
Meperidine (mg): median (range)	0(0-30)	0(0-30)	0.572
Seroma: number	0	0	NA
Anesthesia cost (baht): median (range)	3,297.5 (2,435 to 4,315)	6,390 (5,890 to 9,405)	0.001

All p-values by Mann-Whitney U; NA: not applicable

two groups. Seroma was the only operative complication seen in the present study. Three patients in each group developed seroma and were conservatively treated. The anesthetic cost was significantly lower in the SA group for both unilateral and bilateral hernia repairs. No patient had recurrent hernia during the follow-up period.

DISCUSSION

We aimed to determine the feasibility and safety of laparoscopic TEP under SA, and so did not design our study as a randomized controlled trial. Anesthetic techniques were chosen dependent on clinical appropriateness. For example, patients who had underlying lung disease, cerebrovascular disease or base of tongue cancer were more suitable for SA and those who had chronic back pain or spine surgery were more appropriate for GA.

The main contributions of the present study were that laparoscopic TEP performed under SA was safe, effective, and had lower cost, when compared with TEP under GA. Large hernia was not a contraindication to performing this procedure under SA. We learned that the level of anesthesia should be at least T10 for a smooth procedure.

Seroma was our most common operative complication, seen both in the SA and GA groups. The major complaint in performing laparoscopic TEP under SA was shoulder or chest discomfort from pneumoperitoneum. In addition to surgical skill, the key to success was to minimize peritoneal tears, to avoid pneumoperitoneum, and a short operative time. In conclusion, laparoscopic TEP under SA was safe, effective and had lower cost. For patients with conditions such as chronic lung disease, difficult airway intubation or contraindications to GA, SA should be an appropriate alternative.

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