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Original Article

Comparison of Total Extraperitoneal Laparoscopic Surgery for Inguinal Hernia Repair between Elderly and Non-Elderly Patients

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SUMMARY

Introduction: With the increase in global life expectancy, more elderly patients are being treated in outpatient clinics of hospitals. Morbidity and mortality rates are higher in elderly patients than in non-elderly patients after laparoscopic surgery because of the high incidence of comorbidities, such as cardiac, pulmonary and renal disease, and decreased performance. The aim of this study was to compare the outcomes of total extraperitoneal laparoscopic surgery for inguinal hernia repair between elderly and non-elderly patients.

Materials and Methods: Between March 2012 and January 2019, 210 patients underwent laparoscopy for inguinal hernia repair. Patients were categorised into two groups based on age: group 1 (< 65 years) and group 2 (≥ 65 years). Demographic data and surgical outcomes of patients were retrospectively analysed from hospital records.

Results: In total, 108 (51.4%) patients in group 1 and 102 (48.6%) patients in group 2 with mean ages of 46.5 and 70.8 years, respectively, underwent surgery. Thirty six patients in group 1 and 102 patients in group 2 had comorbidities. The incidences of postoperative complications were eight (7.4%) and three (2.9%) in groups 1 and 2, respectively. The mean follow-up period was 28.4 and 26.7 months in groups 1 and 2, respectively. Although three cases of recurring hernia were identified in group 1, one was reported in group 2.

Conclusion: Although morbidity and mortality are higher in elderly patients, laparoscopic inguinal hernia repair can be performed safely.

1. Introduction

Over the last few decades, there has been a remarkable worldwide increase in the proportion of the elderly. Persons over the age of 65 years are the fastest growing segment of the population as a result of increased life expectancy and decreased birth rates. With the age, surgically curable diseases have been encountered more commonly.[1] Increased life expectancy necessitates the need for improved health services for the elderly because of the prevalence of age-related diseases. In Turkey, according to the Turkish Statistical Institute (TUIK), the average life expectancy in 2017 was 78 years (75.3 years among men and 80.7 among women).[2]

Inguinal hernia is one of the most common pathologies encountered in general surgery;[3] in the United States alone, more than 800,000 patients undergo surgery annually.[4] Concurrent with increasing life expectancy, there is an increase in the number of patients with inguinal hernia who are admitted to outpatient clinics for general surgery. Decreased organ function and comorbidities render elderly patients vulnerable to postoperative morbidity and mortality compared with younger patients.[5,6] With the improvements in anesthesia, surgical technique and perioperative care provide many elective surgical procedures to be applied safely in elderly patients, functional status and quality of life are often advanced after surgery.[1] Surgical procedures for inguinal hernia repair include open methods, such as the Lichtenstein method, and minimally invasive methods, such as laparoscopy. Compared with open techniques for inguinal hernia repair, laparoscopy offers several advantages, including improved cosmetic appearance, lesser postoperative pain, reduced hospital stay and early return to work.[7] Two main laparoscopic techniques — transabdominal preperitoneal (TAPP) and total extraperitoneal (TEP) — have been described for inguinal hernia repair.[8] The success of the method largely depends on the surgeon's experience in laparoscopy and the appropriateness of the technique for the patient.[9]

Carbon dioxide pneumoperitoneum increase the intra-abdominal pressure during laparoscopic surgery may negatively affect the cardiovascular and respiratory systems in elderly patients. But successful laparoscopic surgeries in elder patients has reduced concerns of pneumoperitoneum related complications.[1] To overcome such cardiopulmonary problems during laparoscopic surgery, total extraperitoneal (TEP) hernia repair may be an alternative surgical approach especially in elderly patients. In the literature there are many reported studies including different laparoscopic surgical outcomes related to complications and recurrences of hernia but

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comparing studies especially in terms of age classification are very limited. The aim of this study was to compare the outcomes of TEP between elderly patients and non-elderly patients.

2. Materials and method

A retrospective analysis was performed on clinical data obtained from 210 patients diagnosed with inguinal hernia who underwent TEP performed by the same surgeon between March 2012 and January 2019 in the general surgery outpatient clinic. The study was approved by Kartal Dr. Lutfi Kirdar Training and Research Hospital Ethics Committee (date: 28.01.2019, no: 2019/514/146/5). Patients were divided into two groups — those < 65 years (group 1) and those ≥ 65 years (group 2). Patients excluded from the study included those who declined laparoscopic hernia surgery, those with scrotal hernia and those found unsuitable for general anaesthesia.

All patients were operated under general anaesthesia and were administered a single intravenous prophylactic dose of cephalosporin prior to surgery. Most patients with bilateral hernia had a Foley catheter inserted, and the bladder was decompressed. Surgery was performed on all patients in a supine position; one 10-mm trocar was inserted preperitoneally for the camera, and two 5-mm trocars were inserted between the umbilicus and pubic area for the dissector and the grasper. A polypropylene mesh approximately 10 × 14 cm was laid on one side, and laparoscopic tackers (Protack; Coviden, Norwalk, CT, USA) held the mesh in place in all patients undergoing bilateral inguinal hernia repair. Mesh was not fixed in patients undergoing unilateral hernia repair.

The preoperative factors were age, gender, ASA (American Society of Anesthesiologists) score, body mass index (BMI), concomitant disease, type and laterality of hernia and recurrence that previously underwent open hernia repair. All patients took postoperative pain treatment with nonsteroidal anti-inflammatory (diclofenac sodium) analgesia unless contraindication (renal pathology, gastrointestinal problems...) and proton pump inhibitor for possible gastrointestinal complications; oral intake was initiated 6 h after surgery and all patients were discharged on postoperative day 1. All patients were routinely followed upon postoperative day 10 and at the 3rd, 6th and 12th month postoperatively (after 12th month data were collected by phone call). Postoperative factors were duration of surgery, preoperative and postoperative complications, mesh fixation and postoperative recurrence.

2.1. Statistical analysis

Continuous variables were presented as mean ± standard deviation for normal data distribution or median for skewed data distribution. Categorical variables were presented as frequency (%). Paired t-test was used for normally distributed data, and chi-square test for those who did not distribute normally. $p < 0.05$ was considered statistically significant. Statistical analyses were performed using SPSS, version 20.00 (Chicago, IL, USA).

3. Results

A total of 210 patients with inguinal hernia underwent surgery performed by the same surgeon. Patient demographics are shown in Table 1. Group 1 comprised 108 (101 men, 7 women) patients, and group 2 comprised 102 (96 men, 6 women) patients. The mean age of patients was 46.5 ± 10.9 years in group 1 and 70.8 ± 6.3 years in group 2. The mean BMI was 25.4 ± 3.5 kg/m^2 in group 1 and 24.8 ± 3.8 kg/m^2 in group 2 ($p < 0.4$).

ASA I group 1 (n = 43, 39.8%) and group 2 (n = 0, 0.0%); ASA II group 1 (n = 61, 56.5%) and group 2 (n = 15, 14.7%); ASA III group 1 (n = 4, 3.7%) and group 2 (n = 87, 85.3%), and was statistically significant between groups ($p < 0.001$). Regarding comorbidities, thirty six (33.4%) patients in group 1 and 102 patients (100%) had comorbidities (Table 1). Most commonly encountered comorbidities were hypertension (HT) and diabetes mellitus (DM). Unilateral hernia was reported in 71 patients (65.7%) in group 1 and 87 patients (85.3%) in group 2, whereas bilateral hernia was reported in 37 patients (34.3%) in group 1 and 15 patients (14.7%) in group 2 ($p < 0.07$). Eleven patients (10.1%) in group 1 and twelve patients (11.7%) in group 2 pre-procedure recurrent hernia were diagnosed, all of these patients were underwent open technique previously (Table 2).

The mean follow-up period was 28.4 ± 14.2 months in group 1 and 26.7 ± 13.1 months in group 2 ($p < 0.51$). The mean duration of unilateral inguinal hernia surgery was 38.6 ± 9.1 min in group 1 and 37.9 ± 6.4 min in group 2. The mean duration of bilateral hernia surgery was 60.6 ± 10.8 min in group 1 and 65.2 ± 6.9 min in group

Table 1
Demographic data.

	Group 1: < 65 years	Group 2: ≥ 65 years	Total	p-value
Number of patients	108 (51.4%)	102 (48.6%)	210	
Age, years	46.5 (± 10.9)	70.8 (± 6.3)	58.3(± 14.8)	0.001
Sex				
Female	7 (6.4%)	6 (5.9%)	13 (6.1%)	
Male	101 (93.6%)	96 (94.1%)	197 (93.9%)	
BMI, kg/m^2	25.4 (± 3.5)	24.8 (± 3.8)	25.3 (± 3.6)	0.400
ASA				0.001
1	43 (39.8%)	0 (0.0%)	43 (20.5%)	
2	61 (56.5%)	15 (14.7%)	76 (36.2%)	
3	4 (3.7%)	87 (85.3%)	91 (43.3%)	
Morbidity				0.001
None	72 (66.6%)	0 (0.0%)	72 (34.3%)	
HT	14 (13%)	21 (20.6%)	35 (16.7%)	
Other cardiovascular disease	2 (1.9%)	9 (8.8%)	11 (5.2%)	
DM	11 (10.1%)	16 (15.7%)	27 (12.9%)	
DM + HT	7 (6.5%)	20 (19.6%)	27 (12.9%)	
BPH	0 (0.0%)	15 (14.7%)	15 (7.1%)	
DM + HT + pulmonary + BPH	0 (0.0%)	9 (8.8%)	9 (4.2%)	
HT + pulmonary	2 (1.9%)	12 (11.8%)	14 (6.7%)	

BPH: benign prostatic hypertrophy, ASA: American Society of Anesthesiologists, BMI: body mass index, HT: hypertension, DM: diabetes mellitus.

2 ($p < 0.25$). Perioperative complication occurred in twelve (11.1%) patients in group 1 (eight peritoneal tearing, four bleeding) and nine (8.8%) patients in group 2 (six peritoneal tearing, three bleeding) ($p < 0.93$). Postoperative complications were reported in eight patients (four urinary retention and four seroma) in group 1 and three patients (urinary retention) in group 2 ($p < 0.29$). Postoperative complications were classified according to the Clavien-Dindo classification and all of them was grade 1. Postoperative urinary retention were encountered in seven patients (4 patients in group 1 and 3 patients in group 2) within postoperative first day and were treated by urinary catheter. In group 1, seroma was seen in 4 patients postoperative within 10 days in outpatient clinic and two of them were drained with needle injection and healed uneventfully on postoperative day 20 and other two patients healed without any intervention. Recurrence of inguinal hernia was reported in three (2.8%) patients in group 1 and one in group 2 ($p < 0.36$) (Table 3).

4. Discussion

Prior to the introduction of laparoscopic surgery, open tension-free hernia surgery (Lichtenstein) was considered to be the best method for inguinal hernia repair.[10] Studies on the best treatment modality have demonstrated that TEP causes less pain, requires reduced need for postoperative analgesia, provides better cosmetic result and results in early return to activities of daily living and work compared with open techniques.[11] Furthermore, as TEP is performed in the extraperitoneal area, there by requiring fewer postoperative adhesions and causing lesser intra-abdominal organ injuries, it is considered superior to TAPP.[12] Nevertheless, TEP has certain disadvantages, including limited surgical field, occurrence of peritoneal tearing during the procedure and requirement of more surgical experience.[13,14]

In a comprehensive trial, the mean duration of TEP was reported to be between 55 and 95 min, which was associated with the number of surgeries performed. In a prospective study of 30 cases, Krishna et al. reported a mean duration of 62.13 min.[15] In comparison, our analysis found that the mean duration for unilateral hernia surgery was 38.6 min and 37.9 min in group 1 and group 2 patients, respectively. For bilateral hernia surgery, the mean duration was 60.6 min and 65.2 min in group 1 and group 2 patients, respectively.

In a TEP series comprising 40 patients who underwent TEP, Lau and Lee reported that 7.8% developed seroma.[16] In a retrospective study of 44 patients who underwent TEP, Vărcus et al. found that 2.2% developed seroma.[17] In another study, Fitzgibbon et al. reported that 3.4% patients developed seroma and 1.2% developed hematoma.[18] In this study, although 3.7% patients in group 1 developed seroma, no cases of seroma were reported in group 2. Furthermore, hematoma was not observed at follow-up in both groups. While an average of 1-day hospitalisation was reported by Shinde[18] and Ceccarelli et al.,[20] which was similar to our present findings, Prasant et al.[21] reported a 2.26-day hospitalisation period.

In the long term, recurrence of hernia is an important issue for patients undergoing inguinal hernia repair, irrespective of whether it

Table 2
Clinical findings.

	Group 1: < 65 years	Group 2: ≥ 65 years	Total	p-value
Type				0.090
Direct	61 (56.5%)	75 (73.5%)	136 (64.8%)	
Direct + direct	28 (25.9%)	5 (4.9%)	33 (15.7%)	
Direct + pantaloon	6 (5.6%)	9 (8.8%)	15 (7.1%)	
Pantaloon	13 (12.0%)	13 (12.8%)	26 (12.4%)	
Laterality				0.072
Unilateral	71 (65.7%)	87 (85.3%)	158 (75.2%)	
Bilateral	37 (34.3%)	15 (14.7%)	52 (24.8%)	
The number of recurrence with previous hernia repair				0.488
Yes	11 (10.1%)	12 (11.7%)	23 (10.9%)	
No	97 (89.9%)	90 (88.3%)	187 (89.1%)	

Table 3
Operative findings and surgical results.

	Group 1: < 65 years	Group 2: ≥ 65 years	Total	p-value
Operation time	45 (± 14.2)	41.9 (± 11.7)	44.1 (± 13.6)	0.259
Unilateral	38.6 (± 9.1)	37.9 (± 6.4)	37.9 (± 8.2)	
Bilateral	60.6 (± 10.8)	65.2 (± 6.9)	61.4 (± 10.3)	
Peroperative complication				0.935
No	96 (88.9%)	93 (91.2%)	189 (90.0%)	
Peritoneal tear	8 (7.4%)	6 (5.9%)	14 (6.7%)	
Hemorrhage	4 (3.7%)	3 (2.9%)	7 (3.3%)	
Mesh fixation				0.076
Yes	64 (59.3%)	42 (41.2%)	106 (50.5%)	
No	44 (40.7%)	60 (58.8%)	104 (49.5%)	
Postoperative complication (Clavien Dindo Classification)				0.297
No	100 (92.6%)	99 (97.1%)	199 (94.8%)	
Urinary retention (Grade 1)	4 (3.7%)	3 (2.9%)	7 (3.3%)	
Seroma (Grade 1)	4 (3.7%)	0 (0.0%)	4 (1.9%)	
Follow up	28.4 (± 14.2)	26.7 (± 13.1)	27.9 (± 13.8)	0.516
Recurrence				0.360
No	105 (97.2%)	101 (99.0%)	206 (98.1%)	
Yes	3 (2.8%)	1 (1.0%)	4 (1.9%)	

is open or laparoscopic. Previously, Fitzgibbon et al. reported no recurrence of hernia for an average of 23 months (15–34 months) in 87 patients during follow-up.[18] Additionally, Belyansky et al.[22] reported a recurrence of 0.42%, and Fine et al.[23] reported a recurrence of 2.63%.

In comparison, recurrence was reported only in three (2.8%) patients in group 1 and one (1.0%) in group 2 in the present study, in which patients were followed up for 28.4 months and 26.7 months, respectively. The recurrence rate in this study was consistent with that reported in the literature.

5. Conclusion

Due to totally extraperitoneal procedure, TEP is an effective and safe technique for inguinal hernia repair in elderly patients. Although TEP has several advantages, such as low recurrence rate, better cosmetic results, less pain and early return to daily activity, it also has certain disadvantages, such as unconventional anatomical route of surgery and a narrow dissection plan. In conclusion, we believe that the TEP technique can be performed safely in elderly patients by surgeons with advanced laparoscopic surgical experience.

Conflict of interest

All authors declare that there is not any conflict of interest.

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