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ORIGINAL ARTICLE

Totally extraperitoneal (TEP) endoscopic hernia repair in elderly patients

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Abstract
Background Inguinal hernias are common in elderly males. We addressed outcome following totally extraperitoneal (TEP) hernia repair in patients older than 70 years.
Methods We prospectively collected data of patients >70 years with a unilateral or bilateral inguinal hernia operated in our hospital between January 2005 and January 2010 using the TEP technique.
Results A total of 429 patients underwent TEP hernia repair under general anaesthesia, mostly men ($n = 405$; 94.4 %). Median age was 74 years (range 70–89). The mean pre-operative pain score was 3.7 (SD ± 2.5). Ninety-four percent of patients had an ASA score of 1 or 2. Three hundred thirty-six patients underwent a unilateral repair (78 %). The conversion rate to an anterior procedure was 0.7 % ($n = 3$). In 8 patients (1.9 %), intra-operative complications occurred, and the postoperative course was complicated in 3 patients (0.7 %). Severe complications attributable to the endoscopic approach occurred in 6 patients (1.4 %): a bladder injury ($n = 5$) and a trocar-induced bowel perforation ($n = 1$). The mean postoperative pain score after 6 weeks was 1.6 (SD ± 1.2). Patients were able to resume their daily activities after a median of 7 days (range 1–42).
Conclusion Totally, extraperitoneal endoscopic inguinal hernia repair in elderly patients is associated with low overall complication rates and a fast recovery. In a small proportion of patients, severe complications occur attributable to the endoscopic approach.

Keywords Endoscopic surgery · Inguinal hernia · Elderly · Totally extraperitoneal (TEP) technique

Introduction

Inguinal hernia is common in elderly males, with an estimated incidence in patients older than 70 years of 15:1000 [1, 2]. The geriatric population is a major consumer of healthcare and since the population is ageing, the demand for inguinal hernia repair is expected to rise in future [3, 4].

According to the inguinal hernia guideline of the European Hernia Society, watchful waiting is an acceptable option in elderly patients with no or mild symptoms or in the presence of major co-morbidity [5, 6]. However, 54 % of the patients in whom a watchful waiting policy was initially adhered to, require repair within 5 years due to worsening of complaints, mainly pain [7, 8]. A watchful waiting policy is also accompanied by a small risk (2.5 %) of incarceration [8], which is a condition associated with substantial morbidity and even mortality [9–11].

Open anterior hernia repair under local anaesthesia, instead of general anaesthesia, has been shown to be a safe option in the elderly [8, 12, 13]. Endoscopic correction has several advantages compared to an open correction in terms of postoperative recovery and chronic pain but has to be performed under general anaesthesia [14]. No evident contra-indications regarding the use of general anaesthesia in elderly are shown, but the safety of performing endoscopic hernia repair in elderly patients has rarely been addressed [15, 16].

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Since 2005, our hospital provides a groin hernia service and endoscopic inguinal hernia repair is the preferred technique performed by experienced surgeons. In the present study, we addressed outcome of totally extraperitoneal (TEP) hernia repair in patients older than 70 years.

Patients and methods

In the department of Surgery of the Diakonessenhuis, data of the treatment and short-term outcome of all patients undergoing elective hernia repair have been collected prospectively since 2005. We selected all patients older than 70 years with a unilateral or bilateral inguinal hernia operated in our hospital between January 2005 and January 2010.

Patients were seen at the outpatient clinic for screening for eligibility using the TEP technique as TEP repair is the preferred technique for primary hernia repair in adult patients in our institution. Contra-indications for this technique and thus reasons to opt for an open anterior approach were scrotal hernias, recurrent hernias after a previous preperitoneal mesh repair, incarcerated hernia, a history of previous abdominal operations or a combination with another operation ($n = 47$). In addition, patients deemed unsuitable for surgery under general anaesthesia were operated by an anterior approach too. Reasons to perform an anterior repair were severe cardiopulmonary risk ($n = 32$) and a patient's desire not to undergo general anaesthesia ($n = 23$). These patients (20 % of all inguinal hernia patients >70 years.) were excluded from the present study.

The performed operative technique was the TEP which has been described previously [17]. All procedures were performed by four surgeons with extensive experience with TEP hernia repair (>500 procedures each).

Co-morbidity was analysed using the American Society of Anesthesiologists (ASA) classification system for classifying health and the Charlson index for classifying comorbid conditions [18, 19]. Details of all TEP hernia repairs were prospectively documented in an institutional hernia register. Demographic characteristics, co-morbidities, pre-operative pain and hernia occurrence (primary or recurrent) were recorded preoperatively. Operative time, hernia type (classification according to Nyhus) and perioperative complications were registered on a standard form in the operating room.

Patients were routinely discharged 5 h after the operation after a clinical control with detailed postoperative instructions and analgesics. At the routine visit 6 weeks postoperatively, postoperative complications (haematoma, infection, recurrence, pain), time to return to daily activities and patient satisfaction were registered by filling out forms.

The following outcome items were registered: conversion to an open anterior repair, perioperative and postoperative complications, duration of hospital admission, return to daily activities, postoperative pain defined as persistent pain 6 weeks postoperatively and patient satisfaction. Pain was scored on a numerous rating score (NRS) ranging from 1 to 10.

Results

Between January 2005 and January 2010, a total of 429 consecutive patients older than 70 years underwent TEP hernia repair under general anaesthesia (Table 1). There were 405 men (94.4 %) and the median age was 74 years (range 70–89).

Thirty-three percent had an ASA score of 1, 61 % an ASA score of 2 and 6 % an ASA 3 score. The median Charlson co-morbidity index was 0 (range 0–6) (Table 2). Median duration of complaints was 2 months (1 day–27 years) with a reported mean severity of pain complaints of 3.7 (SD ± 2.5) measured on a 10 point NRS scale (1–10). Ninety-one percent had primary hernias and 78 % underwent unilateral repairs. The conversion rate to an anterior procedure was 0.7 % ($n = 3$). The mean operative times for unilateral and bilateral repairs was 25.1 ± 9.3 and 34.1 ± 11.2 min, respectively.

Table 1 Patient and hernia characteristics

		%
Total number of patients	431	
Sex		
Men	407	94
Women	24	6
Age in years (median)	74 (70–89)	
BMI in kg/m^2 (median)	24 (14–34)	
ASA		
1	143	33.2
2	261	60.6
3	27	6.3
Location of hernia		
Unilateral	336	78
Bilateral	95	22
Primary	393	91
Recurrence	38	8.8
Duration of complaints in months (range)	2 (1 day–27 years)	
Severity of complaints on a NRS 1–10 (mean)	3.7 (SD ± 2.5)	

Table 2 Charlson co-morbidity index [18] (for classifying comorbid conditions)

Score	*N*	%
0	298	69.5
1	109	25.4
2	17	4.0
3	4	0.9
6	1	0.2

N Number of patients

Table 3 Complications in elderly patients (>70 years) undergoing TEP hernia repair

	N	%
Mortality	0	–
Intra-operative complications	8	1.9
Bladder injury[a]	5	
Insufficient exposure resulting from adhesions	2	
Bleeding	1	
Postoperative complications	3	0.7
Postoperative bleeding	1	
Bowel perforation	1	
Bladder fistula necessitating reoperation[a]	1	
Unplanned hospitalisation	9	2.1
Median duration of 2 days (range 1–16)		

N Number of patients

[a] One of the intraoperatively detected bladder injuries resulted in the bladder fistula

In eight patients (1.9 %) intra-operative complications occurred and the postoperative course was complicated in three patients (0.7 %) (Table 3). A bladder injury was the most common complication ($n = 5$). Apart from one patient in whom conversion to an open anterior approach was necessary to repair the injury, four were detected intraoperatively and managed by urethral catheter drainage for 14 days. One of these four patients developed a bladder fistula and underwent a re-operation. Another patient developed a severe deep wound infection. This patient underwent surgery and an orchidectomy and ileocecal resection because of necrotizing fasciitis caused by a trocar-related perforation of the coecum. In one patient, a postoperative bleeding required a blood transfusion. None of the complications was associated with the general anaesthesia, while six patients (1.4 %) had complications that could be attributed to the endoscopic approach and were severe. Nine patients (2.1 %) required unplanned hospitalisation for more than 1 day. There were no postoperative deaths.

After 6 weeks, 411 of 429 (95.8 %) patients had visited the outpatient clinic. Forty patients complained about the presence of a haematoma (9.7 %), and six patients had had a superficial wound infection (1.5 %). All patients were managed conservatively. In one patient (0.2 %), an early recurrence was observed that was subsequently treated by a Lichtenstein procedure.

The mean postoperative pain score after 6 weeks was 1.6 (SD ± 1.2), while the median pain score was 1. Twelve patients (2.9 %) reported relevant moderate to severe pain. Patients were able to resume their daily activities after a median of 7 days (range 1–42).

Discussion

The present study demonstrates that in a selection of elderly patients TEP inguinal hernia repair is associated with a low complication rate and a fast recovery. In a small proportion of patients, severe complications occur that can be attributed to the endoscopic approach.

The strengths of this study are its prospective design and a relatively large and uniform cohort of patients older than 70 years and with a median age of 74 years. Information regarding ASA scores and co-morbidity was available. A limitation of the study was the potential selection bias as a substantial number of patients were excluded as they were operated by an anterior approach ($n = 102$ during the study period). On the other hand, all patients presenting at the outpatient clinic were symptomatic. Furthermore, although co-morbidity was analysed using the ASA score and Charlson co-morbidity score, these assessments of patient co-morbidity do not take the severity of a particular co-morbidity into account.

In the present study, intra-operative complications occurred in 1.9 % and postoperative complications in 0.7 %. No reports regarding the outcome of the endoscopic TEP technique in the selection of elderly patients were available in the literature.

A 3.2 % re-operation rate for TAPP hernia repair in elderly older than 65 years was reported by Farrese et al. [20]. In a meta-analysis regarding outcome after laparoscopic versus open inguinal hernia repair, a relative risk of 1.22 on intra-operative complications was seen in those undergoing laparoscopic inguinal hernia repair [21]. Zhu et al. showed an incidence of 3.0 percent of intra-operative complications in patients treated by TEP hernia repair without describing the age in their meta-analysis [14]. In a previous report from our institution by Schouten, we showed that the intra-operative complication rate was 0.79 % in a cohort of 3432 patients with an inguinal hernia and the direct postoperative complication rate 0.35 %. While the mean age was 53 years treated by the TEP technique, elderly patients (>60 years) had a higher risk of perioperative complications [22, 23]. Bay-Nielsen et al. described that the risk of complications after herniorrhaphy was increased in patients older than 65 years (4.5 %)

compared to younger (2.7 %) [24]. A perioperative complication rate of 4.3 % due to intra-operative bleeding was described by Amato et al. in a study in elderly patients in whom a Rutkow and Robbins or Lichtenstein technique under local anaesthesia for inguinal hernia repair was performed [13]. Nienhuijs et al. reported no procedure-related complications in a prospective study concerning outcome of elderly patients (>65 years) treated by a Mesh Plug Repair under local anaesthesia [12].

No procedure-related deaths were seen in the present study; this is comparable to mortality rates reported by others [5, 11, 24–26]. Schumpelinck et al. described a mortality rate of 0.01 in patients older than 65 who underwent inguinal hernia repair as an elective surgical procedure [26]. In a review by the INCA Trialists Collaboration comparing outcomes of patients with an inguinal hernia who were managed either by a watchful waiting policy or by an operative treatment (irrespective of the technique), the mortality rate was 0.2 % [25].

The European Hernia Society describes a 1 % risk on fatal outcome for elective inguinal hernia repair, not raised compared to the background population [5]. Nilsson et al. states that a higher age does not increase mortality rates in elective hernia surgery above that of the general population [11]. Bay-Nielsen showed that the overall 30-day postoperative mortality after herniorrhaphy was 0.12 %, and 0.015 % in patients older than 65 years [24].

While no general anaesthesia-related complications were observed, procedure-related complications occurred in 1.4 % of the patients. The observed bladder injuries and the trocar-induced bowel perforation, although rare, are complications attributable to the endoscopic approach, although a meta-analysis did not show an increased rate of visceral (bladder) complications following endoscopic repair when compared to anterior mesh [27]. Nonetheless, the severity of the observed complications in the present study, and particularly in the elderly patient warrants caution towards the propagation of the endoscopic approach as the routine technique for elderly men.

In the present study, the mean pain score was 1.6 after 6 weeks and the median score was 1. All patients had resumed their daily activities after a median interval of 7 days (range 1–42). Other authors have already underlined the advantages of endoscopic hernia repair with beneficial outcomes regarding postoperative pain and earlier return to daily activities [14, 22, 28–30]. Slightly higher pain rates are described by others, with incidences of moderate to severe pain (NRS 4–10) of 0.5–2.2 percent after endoscopic hernia repair [28, 29]. In a systematic review by Kuhry et al. outcomes of randomised controlled trials comparing open with endoscopic total extraperitoneal inguinal hernia repair, a median of 12 days (5–17) recovery in favour of the endoscopic technique was seen [30]. Zhu et al. described a recovery period of 13 days and Schouten et al. an average time to return to work or daily activities of 7 days (range 1–42) [14, 22].

Watchful waiting is often advocated in the elderly patients. Although a safe strategy, and the risk of incarceration being low with an estimated incidence of 5 per 1000 patients per year [9, 31], approximately 50 % of the patients will require surgery within 5 years due to progression of their complaints. Since elective surgery is accompanied by less morbidity and mortality than emergency procedures [7, 8, 32], and the life expectancy in this relatively healthy cohort with a median age of 74 years is well over five years [33], this selection of elderly patients gains from elective inguinal hernia surgery [34]

In conclusion, for a selected group of elderly patients with inguinal hernia, TEP is associated with a very low overall risk of complications and a good functional outcome. Although no adverse effects of general anaesthesia were observed, the small proportion of patients developing severe complications attributable to the endoscopic approach still warrants caution to propagate the endoscopic approach as the preferable operative technique.

Compliance with ethical standards

Disclosure C.E.H. Voorbrood, J.P.J. Burgmans, G.J. Clevers, P.H.P. Davids, E.J.M.M. Verleisdonk and T. van Dalen certify that they have no commercial associations (e.g. consultancies, stock ownership, equity interests, patent-licencing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article. A Research Grant has been assigned to the Diakonessenhuis/Hernia Centre Zeist by Johnson & Johnson to partially support all research regarding the endoscopic totally extraperitoneal hernia repair.

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