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ORIGINAL ARTICLE

Safe and uncomplicated inguinal hernia surgery in the elderly – message from anesthesiologists to general surgeons

Authors' Contribution:
A – Study Design
B – Data Collection
C – Statistical Analysis
D – Data Interpretation
E – Manuscript Preparation
F – Literature Search
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ABSTRACT:

Introduction Elderly patients are often discouraged from surgery due to the risk of complications that increases with age.

Aim We wanted to assess mortality, morbidity, and complications in patients older than 75 years who underwent elective or emergency inguinal hernia repair in a single center.

Methods All patients older than 75 years who were operated on because of inguinal hernia in the Department of General and Colorectal Surgery, Medical University of Lodz between 2003 and 2015 were analyzed. Detailed information was collected with regard to patient demographics, mode of admission, comorbidities, type of intervention, applied anesthesia, and 30-day outcomes. Postoperative outcomes included medical and surgical complications, readmissions, and survival status.

Results One hundred thirty-two patients older than 75 years were operated on for inguinal hernia, 16 (12.1%) in an emergency setting and 116 (87.9%) in an elective setting. Eighteen patients (13.6%) developed complications, 8 (50%) in the emergency group, and 10 (8.6%) in the elective group. In the emergency group, severe medical complications (Clavien-Dindo 4) were frequent, whereas in the elective group, severity of surgical and medical complications was not significantly different (Clavien-Dindo median score 2, p=0.6084), and these complications were classified as mild (Clavien-Dindo 1-2). One death occurred in the emergency group.

Conclusion Inguinal hernia surgery in the elderly may be safe and effective in an elective setting and if regional anesthesia is used. Careful examination of patients before surgery and identification of potential risk factors associated with co-existing diseases are vital for reducing the risk of complications.

Key point: Hernia surgery in patients older than 65 years is a low-risk intervention, if carried out in an elective setting.

KEYWORDS: elderly, inguinal hernia, mesh, surgical outcomes

INTRODUCTION

Hernia surgery is one of the most commonly performed procedures in general surgery. Risk of developing inguinal hernia rises significantly in the elderly due to loss of strength of the abdominal wall and conditions that increase intraabdominal pressure (1,2). Advanced age is also a significant risk factor for increased morbidity and mortality (3). This is largely due to comorbidities that impair the general health status and that may exacerbate in the postoperative period. For that reason, many surgeons recommend watchful waiting policy in patients with asymptomatic hernias (4). On the other hand, about 40% of hernia repairs in patients above 65 years of age, mostly inguinal and femoral, are performed for incarceration or bowel obstruction (1,5). Emergency hernia repair is associated with greater morbidity (up to 50%) and mortality rates (up to 14%) than elective repairs (2).

The rising life expectancy has led to a large number of elderly patients who require surgical intervention. Moreover, the proportion of elderly patients has been also rapidly enlarging. The decision to admit an elderly patient for elective hernia surgery must always be based on a careful assessment of concomitant illnesses and perioperative risk. Recent reports have indicated that postoperative adverse effects affecting the cardiac, pulmonary, and cerebral systems and impairment of cognitive function are the main concerns in elderly surgical patients (6). In the present investigation, we studied morbidity and mortality after hernia repair in elderly patients. We also investigated if mode of admission, gender, preoperative performance status, and surgical intervention are associated with particular complications (surgical, medical) and their severity, which was assessed according to the Clavien-Dindo classification.

MATERIALS AND METHODS

We included all patients older than 75 years who underwent groin hernia repair (inguinal and femoral) between January 1, 2003 and December 31, 2015 in the Department of General and Colorectal Surgery, Medical University of Lodz, Poland.

The protocol for this study was approved by the Ethics Committee of the Medical University of Lodz. Patients gave informed consent to participate in the study and publish the results. Patient anonymity has been preserved throughout the study.

Thromboembolism prophylaxis with low molecular weight heparin was routinely administered one night before operation. Antibiotic prophylaxis was routinely used, preferably with cefazolin and metronidazole, on the day of surgery, within 1 h before surgical incision. The procedures were performed in accordance with tension-free repair as described by Lichtenstien et al., or in selected cases as described by Shouldice or Bassini (7–9). All laparoscopic repairs were carried out by transabdominal preperitoneal approach (TAPP) (10). Discharge of patients after elective hernia repair was scheduled one day after surgery. Patients were followed-up on an outpatient basis at 1 month and then annually up to the third postoperative year.

For the purpose of the study, medical records were reviewed, and patient age, gender, hernia type, duration of symptoms, past medical history, presence of comorbidities, American Society of Anesthesiologists (ASA) score, type of anesthesia, operative details, and complications were noted. Comorbidities were classified according to the Charlson score (11). Complications were scored according to the Clavien-Dindo classifications of surgical complications (12).

The statistical analysis was conducted using STATISTICA software, version 13 PL (Stat-Soft Inc.). Descriptive statistics were calculated, and variables were compared using the chi-square test with Yates' correction and the Student's t test or the Mann-Whitney U test. P value less than 0.05 was considered significant.

RESULTS

During the analyzed period, 132 patients over the age of 75 years were admitted for inguinal hernia surgery, 16 (12.1%) in an emergency setting, and 116 (87.9%) in an elective setting. The median age of patients was 78 years. The male-to-female ratio was 6.77:1 (115/17, p<0.0001). There was no significant difference in age and ratio of elective/emergency admission between genders. Baseline characteristics of the patients, according to mode of admission, are given in Table 1.

Comorbidities with Charlson scores greater than or equal to 4 were present in 67 (50.7%) patients (9 females and 58 males). Although ischemic heart disease was the commonest comorbidity, seen in 46 (40%) of male and 14 (82%) female patients, the presence of congestive heart failure or diabetes with associated complications (myocardial infarction, stent placement/cardiac surgery) were responsible for scores higher than 4.

Surgical repair was mainly performed under spinal anesthesia (n-89, 67.4%) or general anesthesia (n=27, 20.5%), with the remaining patients receiving local (n=14, 10.6%) and epidural anesthesia (n=2, 1.5%).

Three patients (2.3%) were ASA class I, 83 (62.9%) patients were ASA class II, 37 (28%) were ASA class III, and 9 (6.8%) patients were ASA class IV. Patients in the emergency group were more frequently scored as ASA III-IV than patients in the elective group (69% vs. 30%, p= 0.004). Complications were significantly more frequent in ASA III-IV patients in all groups (23% vs. 9%, p= 0.035).

Surgical mesh was applied in 119 patients in the elective group (94%) and in 6 patients (38%) in the emergency group. In 6 patients in the elective group (4%), laparoscopic repair (TAPP) was utilized.

After 132 operations, there were 28 complications in 18 patients (13.6 %). Details of the complications are presented in Table 2. Among them, 6 patients (4.5%) developed surgical complications and 10 (7.6%) developed medical complications. In 2 patients (1.5%), both medical and surgical complications developed. These three patients were in the emergency group. There was no statistically significant difference between the number of patients who developed surgical or medical complications (p=0.502).

Complications, both medical and surgical, were more frequent in the emergency group (n=8, 50% medical n=7 43.8%, surgical n=3 16%, p<0.0001). Also, patients in the emergency group developed more severe complications than patients in the elective group (Clavien-Dindo median score 4 vs. 2, p=0.0327). However, the ratios of surgical/medical complications were not significantly different in both groups. That was due to the fact that medical complications among patients in the emergency group were more severe than surgical complications (Clavien-Dindo median score 2 vs. 4, p=0.0109). This was not observed in elective patients in whom the severity of complications was not significantly different between surgical and medical complications (Clavien-Dindo median score 2, p=0.6084).

Patients who developed complications had a significantly longer length of hospital stay (LOS) than patients without complications (mean - overall 14 vs. 3 days, p<0.001; 8 vs. 3 in the elective group, p=0.001; and 23 vs. 5 in the emergency group, p=0.0133). In the emergency group, medical complications were associated with longer LOS, especially if accompanied by surgical complications. In contrast, in the elective group, surgical complications were responsible for prolonged LOS.

Deaths in the patients occurred only in the emergency group. The cause of death in a 84-year-old patient was cardiac failure that occurred two days after bowel resection for an incarcerated hernia. No elective patient died within 30 days after surgery.

DISCUSSION

Elective repair of groin hernias is a simple and safe surgical procedure in patients of any age, and it is a well-known instance of preventative value of early surgery (2,4,13). Most patients knew of their hernia before acute events, and many were referred to a general surgeon by their GP. However, some surgeons did not offer an elective repair to elderly patients with asymptomatic inguinal hernias (14,15). With the development of local and regional anesthesia, virtually no patient should be refused elective surgery on medical grounds. However, this demands a careful preoperative assessment in order to avoid postoperative adverse outcomes. Postoperative adverse effects affecting the cardiac, pulmonary, and cerebral systems and deterioration of cognitive function are the main concerns in elderly surgical patients (6). In the majority of cases, they result from decompensation of co-existing diseases, mainly pulmonary and cardiovascular. In order to improve perioperative patient care, several medical societies have published recommendations for effective management of comorbidities and pain (16,17). The most frequent cardiac complications in elderly patients are myocardial infarction and myocardial ischemia (6). Clinically stable elderly patients undergoing elective hernia repair usually require no further preoperative testing other than 12-lead electrocardiography (18). Preoperative advanced cardiac tests are not routinely recommended, if the clinical assessment does not indicate a high risk of complications (unstable ischemic heart disease or cardiac arrhythmias). To address potential pulmonary complications in patients undergoing hernia surgery, the presence of dyspnea, smoking, coughing, and wheezing should be recorded in the medical history (19). Moreover, pulmonary function tests, such as the ability to climb several flights of stairs, can offer as much predictive value as spirometry. Nevertheless, patients who smoke cigarettes should quit smoking at least 8 weeks before surgery to minimize high airway reactivity and reduce the risk of bronchospastic obstruction of the airway and mucus retention (6). Antihypertensive therapy should also be administered on the day of surgery. Beta-blockers should be given preoperatively to patients with mild or moderate (20). Moreover, proper control of

hypertension can safely and effectively decrease cerebrovascular morbidity in this group. Elderly patients are also at an increased risk of acute delirium and cognitive impairment postoperatively, which often complicates recovery and delays discharge; however, no modifiable risk factors of these complications, such as the type of anesthesia, were identified (21).

In our study, medical complications were the main source of morbidity in the emergency group, whereas in the elective group, they developed as often as surgical complications and were mild (C-D 1). Moreover, complications were seen only in 7% of elective patients. This emphasizes the role of proper preoperative patient preparation, which can influence the outcome. Conversely, patients operated on in an emergency setting developed severe medical complications, which concerned 53% of patients and lead to death of one patient.

In our Department, initial qualification for operation is carried out on an outpatient basis. When indications for surgery are present, the patient and the doctor discuss the necessity of surgery and potential management of expected complications. If comorbidities are significant, the patient is referred to a relevant consultant (mostly cardiologist) to assess the risk of surgery associated with particular diseases and to receive perioperative management guidelines, including changes in the current treatment regimen (e.g. pharmacotherapy). In special cases, the patient is also referred to the anesthesiologist who decides if the patient can undergo surgery. The choice of anesthesia is also discussed in advance (16). Upon admission, the surgeon once again assesses the patient and analyses medical records, laboratory tests, and letters from consultants. Then, the patient is examined by the anesthesiologist who ultimately qualifies the patient for surgery and decides on the type of anesthesia. On every stage of this process, the patient may be disqualified from surgery, if any of team members feel that the risk of surgery is too high. After surgery, the patient is monitored on an intermediate dependency unit for six hours and later moved to a surgical ward, if no disturbances in the postoperative course are observed. Although this process does not allow one-day surgery that decreases the cost of hospital stay, we believe that it enables precise patient assessment and preparation for surgery. As a result, healthcare costs of treating complications are reduced. A significant role in this process is played by the anesthesiologist who has to identify potential problems and safely guide the patients through the perioperative period. The choice of anesthesia is also an important decision. Available meta-analyses and reports of observational studies do not provide us with definite data concerning advantage of regional over general anesthesia, but avoiding short-term morbidities, including hypotension, delirium, cardiorespiratory complications, and the need for opioid analgesia was observed when regional anesthesia was used (22,23). Regional anesthesia is also preferred, because it reduces the risk of pulmonary edema, decreases blood loss, and permits early detection of any change in mental status (24). That is why regional anesthesia is the anesthesia of choice in patients undergoing elective surgery in our department. Although one case of myocardial infarction occurred, patients receiving regional anesthesia complained mostly of urinary retention that ceased after the first postoperative day. We do not link surgical complications (wound infection and hematoma) with the choice of anesthesia, since the observed complications seem to be dependent only on the surgical technique and accuracy. No postoperative delirium was observed. In emergency operations, regional anesthesia was used as well, with an option of extension to general anesthesia, if an intervention in the abdomen was necessary. Five of 16 patients in the emergency group had regional anesthesia, and one case was converted to general anesthesia in order to resect necrotic sigmoid colon. In this subgroup, only one patient developed complications, but the choice of general anesthesia in the remaining patients was dependent on the general condition and a high probability of intestinal resection, that by itself also increases the risk of complications.

The anesthesiologist can advise the surgeon to carefully take medical history and perform physical examination to determine risk factors that need to be addressed before anesthesia. Good communication is essential to this process. Also, the choice of the most suitable operation technique contributes to better outcomes. The Lichetenstein technique is now universally accepted and considered as the gold standard for hernia repair by the American

Tab. I. Patient characteristics

	ELECTIVE N = 116 (87.9%)	EMERGENCY N = 16 (12.1%)	TOTAL N = 132
Age			
Mean	80	83	80,5
Median	80	81	78
Sex			
Female	14 (12%)	3 (19%)	17 (13%)
Male	102 (88%)	13 (81%)	115 (87%)
Charlson score			
3	61 (52%)	4 (25%)	65 (49%)
4	38 (33%)	3 (19%)	41 (31%)
5	10 (9%)	2 (12%)	12 (9%)
6	6 (5%)	4 (25%)	10 (8%)
7	1 (1%)	3 (19%)	4 (3%)
ASA			
I	3 (3%)	0	3 (2%)
II	78 (67%)	5 (31%)	83 (63%)
III	31 (27%)	6 (38%)	37 (28%)
IV	4 (3%)	5 (31%)	9 (7%)
Anesthesia			
General	17 (15%)	10 (63%)	27 (21%)
Spinal	83 (71%)	6 (37%)	89 (67%)
Local	14 (12%)	0	14 (11%)
Epidural	2 (2%)	0	2 (1%)
Surgery			
Lichtenstein	109 (94%)	6 (38%)	115 (87%)
Bassini	2 (2%)	3 (19%)	5 (4%)
Shouldice	0	2 (13%)	2 (0,75%)
Rutkow	0	1 (6%)	1 (1,25%)
TAPP	5 (4%)	0	5 (4%)
Hernia repair + intestine resection	0	4 (25%)	4 (3%)
Length of stay			
Median	3	6	3

ASA: American Society of Anesthesiologists scale
TAPP: Transabdominal pre-peritoneal approach

College of Surgeons and EU Hernia Trialists Collaboration (25). After mesh implantation in the elective group, only one patient was readmitted because of early hernia recurrence, and superficial wound infection or bleeding were observed in single cases. In no patients, surgical mesh had to be removed. Although this report focuses only on the early postoperative period, no major complications were later observed, since patients are advised to return to the Department in case of any complications. That is why we also used meshes to repair hernias in selected emergency cases. In 6 patients in this group, 2 developed medical complication (stroke) without mesh-associated complications. Recent reports favor mesh use in cases with incarceration, but only after evaluating the risk of surgical site infection, which increase after some procedures, e.g., bowel resection (26,27). Minimal invasive techniques are generally recommended in older patients (28). However, their advantages are not obvious in hernia surgery. TAPP and TEP requires general anesthesia, and many complications, unusual for hernia operations (e.g. bowel obstruction, bladder injury, vascular injury, and nerve injuries), are reported when on the learning curve. In this regard, open techniques are preferred, because they are safe to perform and cost-efficient.

For the anesthesiologist, it is better to operate patients in an elective rather than in an emergency setting. Moreover, during emergency interventions, the extent of surgery is usually larger than during elective procedures, and it may involve intestinal resection. Thus, physiologic reserves are spent for maintaining homeostasis, which leaves small reserves for dealing with complications. However, Komasawa reported a case of a 105-year-old man, weighing 37 kg, with aortic stenosis and regurgitation, who was scheduled for emergency surgery for incarcerated inguinofemoral hernia. General anesthesia was induced with short-acting analgesics and sedatives. The patient was extubated uneventfully in the operating room and discharged without any major complications (29). Also, Higuchi reported a case of a 101-year-old man with incarceration of inguinal hernia and history of cerebral infarction in whom hernioplasty was performed. His postoperative period was uneventful as well (30). Nevertheless, emergency operations are an independent risk factor for morbidity and mortality in elderly surgical patients, and operating such patients in this setting should be avoided when possible. To date, the level of evidence concerning perioperative care in the elderly remains poor. Anesthetists are strongly encouraged to become involved in healthcare teams along with surgeons to properly assess and provide care to patients during hospitalization.

Finally, every surgeon caring for elderly patients needs to know that even minor surgical complication may evolve into serious ones, influencing the general condition. That is why surgical precision and vigilance are of vital importance. Moreover, proper cleaning before operation and maintaining aseptic techniques within the operating field is a fundamental rule that should never be underestimated.

CONCLUSIONS

Inguinal hernia operation in the elderly may be safe and effective, and elective mode and regional anesthesia are preferred. Careful examination of patients before surgery and identifying risk factors associated with comorbidities are vital for reducing the prevalence of complications.

Tab. II. Complications in the analyzed groups of patients classified according to the Clavien-Dindo scale.

	TYPE OF COMPLICATION			
	SURGICAL		MEDICAL	
PATIENT	COMPLICATION	CD SCALE	COMPLICATION	CD SCALE
Emergency admission				
1	Wound hematoma requiring blood transfusion Return to OR	2 3	Urinary retention Pneumonia Renal insufficiency	1 2 4
2			Pneumonia Stroke Pulmonary embolism Sepsis	2 4 4 4
3			Pulmonary failure -unplanned intubation Blood transfusion Cardiac failure – Shock Death	4 2 5
4			Stroke	4
5	Deep wound infection	2	Urinary retention	1
6			Pneumonia, requiring unplanned intubation and on ventilator >48h Cardiac arrest	4 4
7			Stroke	4
8	Seroma and inflammatory invasion of scar Return to OR – evacuation of the seroma and tissue drainage	3		
Elective admission				
9			Urinary retention	1
10			Urinary retention	1
11			Urinary retention Deep venous thrombosis	1 2
12			Urinary retention	1
13	Wound Hematoma	2		
14	Wound Hematoma Superficial wound infection	2 1		
15			Myocardial infraction	4
16	Wound Hematoma	1		
17	30-day recurrence - return to OR	3		
18	Blood transfusion due to the superficial wound bleeding Superficial wound infection	2 2		

CD scale – Clavien-Dindo scale, OR – operating room

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