

Outcomes of Geriatric Patients Who Underwent Incarcerated Inguinal Hernia Repair

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ABSTRACT:

Outcomes of geriatric patients who underwent incarcerated inguinal hernia repair

Objective: Comorbidities in geriatric patients increase the surgical risk. Inguinal hernias are more prone to incarceration in geriatric patients compared to young patients. In this study, we aimed to evaluate the outcomes of geriatric patients, who underwent surgery for incarcerated inguinal hernia.

Material and Methods: Between January 2010 and December 2014, chart reviews of patients with inguinal hernia were retrospectively performed. Data of patients older than 65 years who underwent inguinal hernia repair due to incarceration were included in this study. Demographics, surgical data, postoperative period, length of hospital stay, morbidity and mortality were recorded.

Results: Data of 72 patients were included in this study. 73% of the patients were male, and the mean age was 77±7 years; 25% of patients were with American Society of Anesthesiologists Scoring System (ASA) III, 70% were with ASA IV and 5% were with ASA V. Additional intestinal resection was required in 21% of the patients. Seventy-one patients were transferred to the postoperative intensive care unit. Postoperative complication rate was 24%, and overall mortality rate was 11%. Mortality rate was 25%, in patients with ASA V, 16% in patients with ASA IV. Length of intensive care and hospital stay was highest in patients with ASA IV (5.18±12.74 and 9.64±14.35 days, respectively).

Conclusions: Morbidity and mortality rate were observed higher in geriatric patients, who underwent inguinal hernia repair due to incarceration. Therefore, careful preoperative preparation should be done in these patients. The patients should undergo elective surgery, and patient and relatives should be informed about morbidity and mortality.

Keywords: Geriatric patients, inguinal hernia, incarceration, surgical repair

ÖZET:

İnkarsere inguinal herni nedeniyle opere edilen geriatric hastalarımızın deęerlendirilmesi

Amaç: Geriatric hastalara eşlik eden ko-morbid faktörler cerrahi riski arttırmaktadır. Inguinal herniler yaşlı hastalarda genç hastalara göre daha sık inkarsere olmaktadır. Bu çalışmada amaçımız, inkarsere inguinal herni nedeni ile opere edilen geriatric hastaların deęerlendirilmesi idi.

Gereç ve Yöntemler: Ocak 2010 - Aralık 2014 tarihleri arasında hastanemiz genel cerrahi kliniğinde yapılan tüm inguinal herni operasyonlarının kayıtları incelendi. Bunların içinden 65 yaş üzerinde olan ve inkarsere nedeni ile opere edilen hastaların verileri bu çalışmaya dahil edildi. Demografik özellikler, operasyon notları, postoperatif yoğun bakım ihtiyacı, hastanede yatış süresi, morbidite ve mortalite kaydedildi.

Bulgular: Bu çalışmaya toplam 72 hastanın verileri dahil edildi. Hastaların %73'ü erkek, yaş ortalaması 77±7 yıl, %25'i ASA III, %70'i ASA IV ve %5'i ASA V idi. %21 hastaya inkarsere inguinal herni onarımı yanı sıra intestinal rezeksiyon da uygulanmıştı. Yetmişbir hasta postoperatif yoğun bakım ünitesine transfer edilmişti. Total komplikasyon oranı %24, mortalite oranı %11 saptandı. ASA V olan olgularda mortalite %25, ASA IV olanlarda %16 ve ASA III olan olgularda %0 olarak saptandı. En uzun yoğun bakımda ve hastanede yatış süreleri ASA IV olanlarda 5.18±12.74 ve 9.64±14.35 gün olarak saptandı.

Sonuçlar: İnkarsere herni nedeniyle opere edilen geriatric hastalarda morbidite ve mortalite artmış olarak saptanmıştır. Bu nedenle bu hastalarda preoperatif hazırlığın özenle yapılmasını, hastaların mümkünse elektif opere edilmesini, hasta ve yakınlarının morbidite ve mortalite ile ilgili ayrıntılı bilgilendirilmesini önermekteyiz.

Anahtar kelimeler: Geriatric hasta, inguinal herni, inkarsere, cerrahi tedavi

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INTRODUCTION

According to the World Health Organization (WHO) guidelines, geriatrics are defined as the population with an age of 65 years or over (1). According to the latest reports, the rate of aged population will increase from 12% to 22% from 2015 to 2050 (2). In our country, there are over six million people with an age of 65 years or over, and this constitutes about 8% of our population (3). Especially the comorbid factors including mostly diabetes, coronary artery disease, end-stage renal disease, and chronic obstructive pulmonary diseases, that increase with age make the operations more risky. These situations make the anesthetists and surgeons reluctant to perform surgical repair under general anesthesia. Therefore, the elective operation rates decrease in older and high-risk patients whereas the rates of emergency surgery increase (4).

The factors that determine the postoperative complication in patients with inguinal hernia include advanced age, short-term history of hernia, femoral hernias and comorbidities (5). Many studies have reported higher morbidity and mortality in elderly patients, particularly those undergoing emergency surgery for incarcerated inguinal hernia (5,6). The reported complications include the wound infection, seroma, hematoma, pneumonia and the myocardial infarction.

American Society of Anesthesia (ASA) score, as shown in Table-1, is a scoring system used by the anesthetists to determine the perioperative morbidity and mortality of the patients in the preoperative period (7). ASA I and II are considered as low-risk, ASA III as moderate-risk, and ASA IV

and V as high- risk patients. Considering above classification, expected mortality is between 0.06-0.08%, 0.27-0.4%, 1.8-4.3%, 7.8-23% and 9.4-51%, respectively (8).

The aim of this study is to evaluate our results in geriatric patients performed surgical repair under emergency conditions due to incarcerated inguinal hernia.

MATERIAL AND METHODS

Between January 2010 and December 2014, chart review of patients aged 65 years old or older who underwent emergency surgery due to incarcerated inguinal hernia at General Surgery Clinic were retrospectively performed. A total of 72 patients who met these criteria were included into the study. The patients' demographic characteristics (age, gender, comorbid factors, ASA score), surgical procedures, additional procedures, postoperative period, intensive care and hospital stay, and morbidity - mortality rates were recorded. The surgical techniques; were classified as Lichtenstein technique, mesh reinforcement with 2/0 prolene, polypropylene mesh repair and/or intestinal resection.

SPSS 22.0 software was used for the data analysis. Mean±standard deviation was used for the descriptive statistics of the data. In the analysis of quantitative data Mann-Whitney-U test and independent samples T-test were used. In the analysis of qualitative data Chi-square test, and Fischer test were used. The compatibility of the model obtained as a result of logistic regression analysis was tested with 'Model Chi-square' test, and the significance of the presence

Table-1: American Society of Anesthesiologists (ASA) Scoring System

ASA 1	A normal healthy person, with no disease or systemic problem except a surgical pathology that causes no systemic problem
ASA 2	A person with a mild systemic disease due to a reason that requires surgical intervention or another disease (such as mild anemia, chronic bronchitis, hypertension, emphysema, obesity, diabetes).
ASA 3	A person with a severe disease that limits the activity, but not leaving without power (such as hypovolemia, latent heart failure, previous myocardial infarction, advanced diabetes, limited pulmonary function).
ASA 4	A person with a severe disease that causes the loss of entire power and is a constant threat to life (such as shock, decompensated heart or respiratory system disease, renal or liver failure).
ASA 5	A person who is about to die, and not expected to survive more than 24 hours even he is operated or not, who is operated as a last hope.
E	When emergency surgery is required, the letter "E" is added after the number of the classification.

of each independent variable in the model was tested with Wald statistics.

RESULTS

There were 60 male (83%) and 12 female (17%) patients with a mean age of 77 ± 7 years (Table-2). Of the patients, 18 (25%) were ASA III, 50 (70%) were ASA IV and 4 (5%) were ASA VE (Table-3). Sixty-eight (94%) patients underwent surgery under general anesthesia, and four (6%) under spinal anesthesia. Fifty-five patients (76%) underwent

inguinal hernia repair with mesh and 17 (24%) patients underwent inguinal hernia repair and intestinal resection. In one patient, appendix and Meckel's diverticulum were observed in the hernia sac. In four patients who underwent laparotomy and bowel resection died. In the postoperative period, all patients but one (98%) were admitted to intensive care unit. The duration of stay in intensive unit was 4.04 ± 10.7 (range: 1-82) days and hospital stay was 7.9 ± 12.2 (2-82) days. The duration of stay in the intensive care unit of 55 patients who didn't undergo bowel resection was 1.61 ± 1.55 days, the duration of

Table-2: Demographic data

Age (years)		77±7
Gender (F/M) n (%)	60/12	(83%/17%)
Diabetes Mellitus n (%)	12	(15%)
End-stage Renal Failure n (%)	2	(2%)
Chronic Obstructive Pulmonary Disease n (%)	65	(79%)
Coronary Artery Disease n (%)	50	(61%)
Hernia repair with mesh n (%)	55	(76%)
Hernia repair (mesh reinforcement)+ resection n (%)	17	(24%)

Table-3: Mortality and morbidity regarding ASA scores

ASA	Age (years)	ICU stay (days)	Hospital stay (days)	Morbidity n (%)	Mortality n (%)
III (n=18)	76.27±7.16	1.05±0.41	3.83±1.61	4 (22)*	0 (0)
IV (n=50)	78.04±8.05	5.18±12.74	9.64±14.35	15 (30)**	8 (16)
V (n=4)	71.75±3.09	3.25±4.5	4.5±3.69	1 (25)***	1 (25)

*All wound infection.

**7 patients wound infection, 5 patients hematoma, 3 patients anastomosis leak.

***1 patient hematoma.

Table-4: Characteristics of patients with mortality

	ASA	Age	Gender	COPD	CAD	DM	ESRF	Bowel Resection	Laparotomy	Anastomosis Leak	Death reason
1	IV	91	M	+	+	-	-	+	+	+	Sepsis
2	IV	84	M	-	-	+	-	+	-	+	MI
3	IV	67	M	+	-	-	-	-	-	-	Respiratory Failure
4	IV	89	F	+	+	+	+	+	-	-	MI
5	IV	71	M	-	+	-	-	-	-	-	Respiratory Failure
6	IV	69	M	-	+	+	+	+	+	-	Respiratory Failure
7	IV	70	M	+	+	+	-	+	+	-	Respiratory Failure
8	IV	73	F	+	-	-	-	+	-	-	Respiratory Failure
9	V	70	M	+	+	+	+	+	+	-	Respiratory Failure

COPD: Chronic Obstructive Pulmonary Disease, CAD: Coronary Artery Disease, DM: Diabetes Mellitus, ESRF: End-Stage Renal Failure, MI: Myocardial Infarction, ASA: American Society of Anesthesiologists

Table-5: Predictive factors for postoperative complications

	Univariate Model			Multivariate Model		
	OR	95% GA	p	OR	95% GA	p
Age	1.01	1.07 - 0.96	0.730			
Gender	1.02	3.57 - 0.29	0.972			
ASA score	7.99	3.57 - 3.53	0.000			
Length of stay (days)	1.41	3.57 - 1.24	0.000	1.99	2.59 - 1.54	0.000
DM	2.59	0.28 - 7.40	0.076			
ESRF	13.4	0.28 - 63.91	0.001	22.3	3.2 - 156	0.002
COPD	0.50	0.28 - 4.17	0.521			
CAD	0.31	0.28 - 0.98	0.051			
SICU Stay	1.27	3.57 - 1.10	0.001	1.72	1.31 - 2.25	0.000
Oblique Incision/Laparotomy	26.9	170.4 - 4.25	0.000			
Spinal /General Anesthesia	11.4	71.7 - 1.80	0.010			

COPD: Chronic Obstructive Pulmonary Disease, CAD: Coronary Artery Disease, DM: Diabetes Mellitus, ESRF: End-Stage Renal Failure, MI: Myocardial Infarction, SICU: Surgical Intensive Care Unit
 p<0.05 is considered statistically significant, ASA: American Society of Anesthesiologists

Table-6: Predictive factors for mortality

	Univariate Model			Multivariate Model		
	OR	95% GA	p	OR	95% GA	p
Age	1.0	0.9 - 1.1	0.483			
Gender	0.6	0.1 - 2.9	0.530			
ASA score	17.1	4.6 - 63.9	0.000	13.8	2.4 - 80.9	0.004
Length of stay (days)	1.1	1.0 - 1.2	0.004			
Complication	0.1	0.0 - 0.3	0.000			
DM	9.7	35.1 - 2.7	0.001			
ESRF	39.6	100 - 7.4	0.000	36.8	2.8 - 489	0.006
COPD	26.3	5.4 - 127.0	0.000			
CAD	0.2	0.6 - 0.0	0.009			
SICU Stay	1.4	1.2 - 1.6	0.000			
Oblique Incision/Laparotomy	249	24 - 2569	0.000	132.4	10.4 - 1694	0.000
Spinal /General Anesthesia	31	5 - 211	0.000	14.7	1.2 - 188.0	0.039

COPD: Chronic Obstructive Pulmonary Disease, CAD: Coronary Artery Disease, DM: Diabetes Mellitus, ESRF: End-Stage Renal Failure, MI: Myocardial Infarction, SICU: Surgical Intensive Care Unit
 p<0.05 is considered statistically significant, ASA: American Society of Anesthesiologists

hospital stay was 5.16±3.92 days; and 17 patients who underwent bowel resection, the duration of stay in the intensive care unit and hospital was 11.88±20.53 and 16.76±22.49 days, respectively (p=0.0003, p=0.0004).

Complications were observed in 20 patients (27.7%) and the most common complication was wound infection (n=11, 55%). In three patients (15%) with anastomosis leak, ASA score was ASA IVE. Postoperative complications were observed in 6 patients (35.2%) with bowel resection, and in 14 patients (25.4%) without bowel resection. In patients without bowel resection, postoperative complications (25.4%) were, wound infection (65%), and hematoma (35%); whereas in patients with bowel resection,

complications (35%) were anastomosis leak (50%), wound infection (33%), and hematoma (17%). Sixty-three patients (83%) were discharged from the hospital with complete healing, 9 patients (ASA IV: 8 patients and ASA V: 1 patient) died in the postoperative period, (1 patient: sepsis, 2 patients: postoperative myocardial infarction, 6 patients: respiratory complications) (Table-4). Seven (41.17%) patients with bowel resection and 2 (3.63%) without bowel resection died. In the regression analysis, the independent predictors of postoperative complications were renal failure, length of stay in the intensive care and hospital stay (Table-5). Independent factors of mortality included ASA score, renal failure, the type of incision and the type of anesthesia (Table-6).

DISCUSSION

After first definition of inguinal hernia repair technique in 1887 by Bassini's which is called with his own name, several techniques without mesh such as Shouldice, Darning, Desarda, Modified Bassini have been reported. In the current era tension-free hernia repair with polypropylene mesh has become the gold standard (9). In the surgery of strangulated (both stuck and with impaired circulation) hernias, the hernia repair techniques using mesh are still a debate due to infection risk. Comparison of the Bassini technique and the tension-free mesh reinforcement techniques in strangulated hernias, no significant difference was detected between both techniques considering postoperative complications. In the group in which mesh was used, no recurrence has occurred, whereas in those who underwent Bassini repair, recurrent hernia was observed 11% (10). Today, the recommended technique for incarcerated and strangulated hernias is the tension-free hernia repair with polypropylene mesh (11). In our study, all patients with incarcerated and strangulated hernias except those with bowel resection (with necrosis) were performed hernia repair using polypropylene graft, and no complication was observed associated with prolen graft.

The incidence of inguinal hernias, which is one of the most common reasons for surgery in general surgery, increases with age. The weak collagen tissues in elderly patients, high incidence of chronic obstructive pulmonary diseases and the elevated intraabdominal pressure play an important role for this issue (12). Moreover, in elderly patients, hernias are more prone to incarceration compared to younger patients (13). Increased comorbid factors in elderly patients compared to young patients and subsequent higher morbidity and mortality rates lead surgeons to prefer conservative treatment in this population. When comparison was made between emergency and elective repair of inguinal hernia in geriatric patients.

Those who underwent surgery under emergency conditions had higher mortality and morbidity rates. Incarcerated hernias detected in elderly patients

have usually been performed repair under emergency conditions (14).

The mortality and morbidity of the inguinal hernia surgery performed in geriatric patients were found to be higher, compared to the young patients group (15). However, the age has not been found as predictor for morbidity and mortality, whereas comorbid factors that increase with age were found (16). Especially in elderly patients coronary artery disease, chronic obstructive pulmonary diseases, diabetes and the end-stage renal failure increase with aging (10). In our study, we also detected chronic obstructive pulmonary diseases in a majority of the patients (80%). Incarcerated hernias were observed to be more frequent in male patients, and in female patients, the femoral and umbilical hernias were observed to be more frequently incarcerated (15). Our study results were found to be consistent with these results; 83% were male. The duration of incarceration was seen to be an important factor in bowel resection and the risk for resection was observed to be increased in patients with an incarceration of 6 hours and more (17). In our study, the data related with the duration of incarceration cannot be evaluated due to lack of records.

In the previous studies in elderly patients, it was recommended to reduct the incarcerated hernia if possible; however, in the long-term studies, the reduction has been shown to be not important because of risk of recurrent incarceration (18). Mortality and morbidity of the patients who underwent surgery under emergency conditions were shown to be higher than surgical repair under elective conditions.

Laparotomy and resection interventions were associated with high mortality and morbidity rates (19). In this study, bowel resection was required in 23.6% of patients; 41.1% died of these patients,. When the total mortality rate was evaluated, 63.6% of the patients who died underwent bowel resection. Within the independent parameters that have effect on postoperative complications, renal failure, and the length of stay in the intensive care unit and hospital were detected; Independent predictive factors which have effect on mortality were ASA score, renal failure, the type of incision and the type

of anesthesia. The low albumin levels in elderly patients has been shown to be related with wound infections. Besides, the low albumin levels were also associated with longer hospital stay in elderly patients (15).

Martínez-Serrano et al. (20), reported mortality rate as 4.5% in patients who underwent emergency abdominal wall hernia repair. Mean age was 66.6 ± 18.1 years, and the patients who died were 70 years old or over. They detected that the postoperative mortality risk increased 1% with every year of age, and this incidence was 2.4 times higher in patients with ASA III and IV compared to patients with ASA I and II. In patients with bowel resection, it was found to be 3.4 times higher. In our patient group, the mortality was found to be 11%. We believe that this difference was due to the higher mean age of the study group (77.3 years), In addition, mean age of 9 patients who died was 82.7 years; and all of them were ASA IV and ASA VE. The expected mortality rate in the ASA IVE patient group is 7.8-23% and in the ASA V patient group, 9.4-51% (8). In our study, similar results to the lower limit of the expected mortality in the same risk group were observed. We believe that the low mortality was associated with timing of surgery.

Surgery should be preferred under emergency conditions without delay, following an appropriate preoperative preparation, with required consultations, (cardiology and respiratory diseases) and follow-up in the intensive care unit in the early postoperative period. The recent studies showed that the low mortality and morbidity rates can be achieved with elective surgeries which were performed with a comprehensive geriatric assessment and preoperative preparation (21).

Because the bowel necrosis in incarcerated hernias requires resection, it prolongs the length of hospital stay and increase the complication rates. The bowel resections in incarcerated hernias have been shown to be associated with mortality and morbidity (22). We also found that the length of

stay in the intensive care unit and hospital was higher in patients who underwent bowel resection. In terms of morbidity and complications, we also detected that the bowel resection was a predictive factor. Despite these, in some studies, it was reported that the resection performed for necrosis didn't affect the mortality, while increased the complications such as wound infection, resulting in, longer hospital stay (23). In this study, within all postoperative complications seen in patients without bowel resection (25.4%), wound infection was the most common with a rate of 65% whereas anastomosis leakage was the most common with a rate of 50%, in patients who underwent bowel resection, We believe that these results might be different due to the characteristics of patient populations.

CONCLUSIONS

Geriatric patients with high comorbid factors and high ASA scores can undergo to inguinal hernia repair following adequate preoperative preparation under elective conditions, resulting in low mortality and morbidity. In our opinion, the older age and higher ASA scores should not be the factors to delay the surgery. Providing appropriate technical conditions, preparation preoperative preparation and postoperative intensive care unit conditions, the geriatric patients with high ASA scores can be surgically treated for inguinal hernia without significant morbidity and mortality. However, it should be noted that surgery of the same patient population may lead to mortality under emergency conditions.

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