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**Clinical Practice Study**

# Analysis of emergency and elective femoral hernia surgery results; Single center experience.

# Acil ve elektif femoral fıtık cerrahisi sonuçlarının analizi; Tek merkez deneyimi

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**ABSTRACT**

Groin hernia surgery is one of the most frequently performed surgical procedures today. Femoral hernias are rare and difficult to diagnose compared to inguinal hernias. In addition, incarceration and strangulation accompanies more frequently than inguinal hernias. Although emergency groin hernia treatment is rare, this frequency increases with advanced age. In this study, we evaluated the results of emergency and elective femoral hernia surgery.

In our study, it was determined that 3252 groin hernia surgeries were performed in our center between January 2010 and December 2019. 100 (3.07%) of these patients were operated for femoral hernia and all were included in the study. Patients were primarily classified as emergency and elective. Patients who underwent emergency femoral hernia surgery were classified as under 65 years old, 65-80 years old and over 80 years old, and the data were analyzed.

Of the 100 patients included in the study who underwent femoral hernia surgery, 41 (41%) underwent emergency surgery and 59 (59%) underwent elective surgery. Of the patients who underwent emergency femoral hernia surgery, 28 (68.3%) were female and the median age was 71 (54-79)/year. In the analysis of the data of patients who underwent emergency femoral hernia surgery and patients who underwent elective femoral surgery; it was statistically more significant that the patient group who underwent emergency surgery was older, taller, had lower body mass indexes and had higher comorbidities. Age in emergency femoral hernia surgery; in our series, it was determined as a parameter that increases the anesthesia risks, strangulation-incarceration rate and mortality of the patients.

In our study, it was determined that the frequency of emergency femoral hernia surgery and mortality increased with age.

**Keywords**: Groin hernia; femoral hernia; emergency; treatment.

**ÖZET**

Kasık fıtığı ameliyatı günümüzde en sık yapılan cerrahi işlemlerden biridir. Femoral fıtıkları, kasık fıtıklarına kıyasla daha az görülür ve teşhis edilmesi daha zordur. Ayrıca inkarserasyon ve strangülasyon inguinal hernilere göre daha sık eşlik eder. Acil kasık fıtığı tedavisi nadir olmakla birlikte ileri yaşla birlikte bu sıklık artmaktadır. Bu çalışmada acil ve elektif femoral fıtık cerrahisi sonuçlarını değerlendirdik.

Çalışmamızda Ocak 2010-Aralık 2019 tarihleri arasında merkezimizde 3252 kasık fıtığı ameliyatı yapıldığı belirlendi. Bu hastaların 100'ü (%3,07) femoral fıtık nedeniyle ameliyat edildi ve tamamı çalışmaya dahil edildi. Hastalar öncelikle acil ve elektif olarak sınıflandırıldı. Acil femoral fıtık ameliyatı olan hastalar 65 yaş altı, 65-80 yaş ve 80 yaş üstü olarak sınıflandırılarak veriler analiz edildi.

Çalışmaya dahil edilen ve femoral fıtık ameliyatı olan 100 hastanın 41'ine (%41) acil cerrahi, 59'una (%59) elektif cerrahi uygulandı. Acil femur fıtığı ameliyatı olan hastaların 28'i (%68,3) kadındı ve ortanca yaş 71 (54-79)/yıl idi. Acil femoral fıtık ameliyatı geçiren hastalar ile elektif ameliyat yapılan hastaların verilerinin analizinde; acil cerrahi uygulanan hasta grubunun daha yaşlı, daha uzun, vücut kitle indekslerinin düşük ve komorbiditelerinin daha yüksek olması istatistiksel olarak daha anlamlıydı. Acil femoral fıtık cerrahisinde yaş; serimizde hastaların anestezi risklerini, strangülasyon-inkarserasyon oranını ve mortaliteyi artıran bir parametre olarak belirlendi.

Çalışmamızda yaşla birlikte acil femoral fıtık cerrahisi sıklığının ve mortalitenin arttığı belirlendi.

**Anahtar kelimeler**: Kasık fıtığı; femoral fıtık; acil; tedavi.

## INTRODUCTION

Groin hernia operations are one of the most frequently performed surgical procedures and are mostly treated in outpatient clinic conditions. Femoral hernias constitute 4-10% of all groin hernias (1,2). Usually, patients present to the hospital with symptoms of local pain or abdominal pain (1). Femoral hernias are difficult to detect clinically and radiologically, and they are also more frequently accompanied by incarceration and strangulation than inginal hernias (3). Therefore, femoral hernias should be kept in mind in the differential diagnosis of acute abdomen cases in the emergency department. There are studies reporting that the risk of mortality increased tenfold in 40% of patients diagnosed with femoral hernia in the emergency department (4,5). In addition, emergency treatment of inguinal hernias is rare and the frequency of emergency treatment for inguinal hernias is reported to increase dramatically with age (6,7). Many surgical techniques have been described in the treatment of femoral hernias, but the diversity in surgical techniques reflects the uncertainty regarding the universally accepted gold standard repair method for femoral hernia treatment (4).

In this study, we aimed to evaluate the results of emergency and elective femoral hernia surgery in the light of literature data.

## MATERIAL and METHOD

In our study, the database of İzmir Katip Çelebi University Atatürk Training and Research Hospital General Surgery Clinic between January 2010 and December 2019 was retrospectively analyzed. It was determined that a total of 3252 groin hernia operations were performed between these years, including 3050 unilateral and 202 bilateral groin hernia operations. 100 (3.07%) of these patients were operated for femoral hernia and all were included in the study.

Demographic data, comorbidities, clinical features, laboratory data, imaging findings, femoral hernia side, operation indication, ASA score, presence of previous groin hernia surgery, presence of accompanying inginal hernia, intraoperative findings, and postoperative (morbidity, hospital stay, recurrence, mortality, etc.) data were analyzed. Patients were first grouped as emergency and elective, and the data were analyzed. Then, patients who underwent emergency femoral hernia surgery were classified as under 65 years old, 65-80 years old and over 80 years old, and the data were analyzed.

Written informed consent was obtained from each patient for publishing their clinical data and using images from the operations. The study was approved by the Instutional Ethics Committee and was conducted in accordance with the principles of the Helsinki Declaration.

### Patients and Surgical Technique

Nasogastric decompression, fluid and electrolyte replacement was the first treatment in the emergency department for all patients who underwent emergency femoral hernia surgery. Abdominal ultrasonography and abdominal X-ray were performed as a routine protocol in all patients who underwent emergency femoral hernia surgery, and patients with ileus were evaluated with computed tomography (CT) to detect the etiology.

The operations were performed under general anesthesia. A single dose of intravenous antibiotic (1st generation cephalosporins) prophylaxis was administered before the incision. Surgical technique selection; It is individualized according to the experience of the surgeon and the current condition of the patient. Oral intake was started 24 hours after surgery in patients who had bowel reduction or bowel resection anastomosis, and these patients were followed in the hospital for at least three days. The patients were followed up with 3-month intervals in the

first year, and then with annual outpatient clinic visits.

### Statistical analysis

Data were evaluated in the statistical package program IBM SPSS Statistics 25.0 (IBM Corp., Armonk, New York, USA). Descriptive statistics were given as number of units (n), percent (%), mean, standard deviation, smallest median (M), 25th percentile (Q1) and 75th percentile (Q3). The normal distribution of the data of numerical variables was evaluated with the Shapiro Wilk test of normality and Q-Q graphs. In non-normally distributed variables, comparisons between groups, comparisons of two groups were made with Mann-Whitney U test, comparisons of more than two groups were made with Kruskal-Wallis analysis. If there was a difference as a result of Kruskal Wallis analysis, Dunn-Bonferroni test was used as a multiple comparison test. Comparisons between groups in normally distributed variables were made with two-group comparisons using an independent two-sample t-test. A value of $p<0.05$ was considered statistically significant.

## RESULTS

Of the 100 patients included in the study who underwent femoral hernia surgery, 41 (41%) underwent emergency surgery and 59 (59%) underwent elective surgery. Of the patients who underwent emergency femoral hernia surgery, 28 (68.3%) were female, 13 (31.7%) were male, and the median age was 71 (54-79)/year. In the analysis of the data of patients who underwent emergency femoral hernia surgery and patients who underwent elective femoral surgery; It was statistically more significant that the main patient group eligible for emergency surgery were older, taller, had lower body mass indexes and had more comorbidities. In the analysis of preoperative data, it was statistically significant that patients who underwent emergency femoral hernia surgery had more gastrointestinal system complaints, leukocyte value, platelet lymphocyte ratio and neutrophil lymphocyte ratio were higher (Table 1).

**Table 1**: Evaluation of predictive factors according to operating conditions.

| | **Emergency** (n=41) | **Elective** (n=59) | **p value** |
|---|---|---|---|
| Age[#] (Years) | 71 (54-79) | 60 (44-71) | <0.001 |
| Gender* (Female) | 28 (68.3) | 39 (66.1) | >0.999 |
| Length[a] (/cm) | 166.12±8.44 | 165.47±8.02 | 0.012 |
| Weight[#] (/kg) | 58 (52-68) | 67 (58-70) | 0,698 |
| BMI[#] | 21.6 (20-23.2) | 24.1 (22-25.8) | <0.001 |
| Comorbidity* (Yes) | 24 (58.5) | 18 (30.5) | 0.007 |
| Complaint* | | | <0.001 |
| GIT complaints | 31 (75.6) | 1 (1.7) | |
| Local complaints | 10 (24.4) | 58 (98.3) | |
| Leukocyte[#] ($10^9$/L) | 9.7 (7.5-11.6) | 6.8 (5.5-7.9) | <0.001 |
| Platelet/lymphocyte ratio[#] | 215.7 (146-285.3) | 134.2 (115-168) | <0.001 |
| Neutrophil/lymphocyte ratio[#] | 5.9 (3.7-8.3) | 2.1 (1.6-2.6) | <0.001 |
| Mean platelet volume[a] | 9.65±1.45 | 10.03±1.27 | 0.166 |
| Preoperative diagnosis of groin hernia* (Yes) | 35 (85.4) | 59 (100) | 0.004 |
| Preoperative diagnosis* | | | <0.001 |
| Physical examination | 5 (12.2) | 0 (0) | |
| Ultrasonography | 13 (31.7) | 57 (96.6) | |
| Computed tomography | 23 (56.1) | 2 (3.4) | |
| ASA score[#] | 3 (2-3) | 2 (1-2) | <0.001 |
| Hernia surgery history* (Yes) | 2 (4.9) | 13 (22) | 0.022 |
| Concomitant inguinal hernia* (Yes) | 1 (2.4) | 16 (27.1) | 0.001 |
| Strangulation, incarceration* (Yes) | 38 (92.7) | 10 (16.9) | <0.001 |
| Organ resection* (Yes) | 16 (39) | 5 (8.5) | <0.001 |
| Surgery time[#] (/min.) | 105 (90-125) | 66 (49-94) | <0.001 |
| Postoperative complication* (Yes) | 10 (24.4) | 2 (3.4) | 0.003 |
| Length of hospital stay (/days) | 5 (3-8) | 1 (1-1) | <0.001 |
| Recurrence* (Yes) | 5 (12.2) | 9 (15.3) | 0.774 |
| Mortality* (Yes) | 2 (4.9) | 0 (0) | 0.166 |
| *; n(%),[#]; median ($Q_1$-$Q_3$), [a]; mean±standard deviation | | | |

Computed tomography was used instead of ultrasonography as a diagnostic tool in emergency conditions compared to elective patients, however, preoperative inguinal hernia was not diagnosed in 6 patients and femoral hernia was not diagnosed in 30 patients in emergency conditions. In the group treated with emergency surgery, previous inguinal hernia surgery and accompanying inguinal hernia were statistically significantly lower than the elective group. However, strangulation and incarceration findings were statistically significantly higher in the emergency femoral surgery group. In the preoperative anesthesia evaluation, ASA scores were statistically higher in the group who underwent emergency femoral hernia surgery compared to the elective group (Table 1).

In the comparison of intraoperative data according to the operating conditions, general anesthesia was used more than spinal anesthesia in emergency conditions. Strangulation was detected in 92.7% in emergency conditions and 16.9% in elective conditions during the operation. In the hernia sac, the small intestine was observed in 63.4% in emergency conditions, and the omentum was observed in 13.6% in elective conditions, and organ resection was required in 39% in emergency conditions. While laparoscopic and ingunal incisions are predominantly used in elective conditions, open methods and midline or suprapubic transverse incisions other than ingunal are preferred as surgical techniques in emergency conditions. An additional midline incision was required at a rate of 24.4% in the treatment of femoral hernia in emergency conditions, and the operation time was found to be statistically higher than elective femoral hernia operations (Table 1 and 2). While postoperative complications and length of stay were statistically higher in femoral hernias operated under emergency conditions, there was no statistical difference between recurrence and mortality results with elective femoral hernia results (Table 1).

**Table 2**: Evaluation of predictive factors according to age variable groups of patients with emergency surgery.

| | **<65 (n=13)** | **65-80 (n=19)** | **≥80 (n=9)** | **p value** |
|---|---|---|---|---|
| Gender* (Female) | 7 (53.8%) | 13 (68.4%) | 8 (88.9%) | 0.238 |
| Length[a] (/cm) | 170 (163-174) | 163 (155-170) | 165 (163-170) | 0.535 |
| Weight[#] (/kg) | 68 (62-72) | 55 (52-72) | 52 (49-62) | 0.096 |
| BMI[#] | 23.2 (21.8-24.6) | 21.5 (20-22) | 20.1 (18.8-22) | 0.104 |
| Comorbidity* (Yes) | 7 (53.8%) | 10 (52.6%) | 7 (77.8%) | 0.43 |
| Complaint*<br>GIT complaints<br>Local complaints | <br>10 (76.9%)<br>3 (23.1%) | <br>13 (68.4%)<br>6 (31.6%) | <br>8 (88.9%)<br>1 (11.1%) | 0.519 |
| Leukocyte[#] ($10^9$/L) | 9.7 (7.5-11.9) | 9.9 (8.2-11.1) | 9.7 (6.2-12.4) | 0.94 |
| Platelet/lymphocyte ratio[#] | 153.3 (118.6-188.7) | 223.1 (166.4-318.8) | 267.5 (219.2-315) | 0.06 |
| Neutrophil/lymphocyte ratio[#] | 3.9 (2.2-6.5) | 5.6 (4.1-8.3) | 8.3 (6-9.1) | 0.096 |
| Mean platelet volume[a] | 8.9 (8.7-9.4) | 9.9 (8.5-10.5) | 9.7 (9.1-10.7) | 0.194 |
| Preoperative diagnosis of groin hernia (Yes)* | 10 (76.9%) | 16 (84.2%) | 9 (100) | 0.375 |
| Preoperative diagnosis*<br>Physical examination<br>Ultrasonography<br>Computed tomography | <br>2 (15.4%)<br>7 (53.8%)<br>4 (30.8%) | <br>2 (10.5%)<br>4 (21.1%)<br>13 (68.4%) | <br>1 (11.1%)<br>2 (22.2%)<br>6 (66.7%) | 0.241 |
| ASA score[#] | 2 (1-2) | 3 (2-3) | 3 (3-3) | 0.004 |
| Hernia surgery history (Yes)* | 1 (7.7%) | 1 (5.3%) | 0 (0%) | >0.999 |
| Concomitant inguinal hernia (Yes)* | 0 (0%) | 1 (5.3%) | 0 (0%) | >0.999 |
| Strangulation, incarceration (Yes)* | 10 (76.9%) | 19 (100%) | 9 (100%) | 0.035 |
| Organ resection (Yes)* | 2 (15.4%) | 9 (47.4%) | 5 (55.6%) | 0.101 |
| Surgery time[#] (/min.) | 105 (90-125) | 115 (99-143) | 100 (73-110) | 0.283 |
| Postoperative complication (Yes)* | 2 (15.4%) | 6 (31.6%) | 2 (22.2%) | 0.721 |
| Length of hospital stay (/days) | 5 (3-6) | 6 (5-8) | 5 (3-7) | 0.547 |
| Recurrence (Yes)* | 2 (15.4%) | 2 (10.5%) | 1 (11.1%) | >0.999 |
| Mortality (Yes)* | 0 (0%) | 0 (0%) | 2 (22.2%) | 0.044 |
| *; n(%),[#]; median ($Q_1$-$Q_3$), [a]; mean±standard deviation | | | | |

In the analysis made according to age groups of femoral hernias operated under emer-gency conditions, no statistical difference was found in terms of gender, height, weight, body mass index and comorbidity. A statistically sig-nificant difference was found between the gro-ups in terms of ASA score, strangulation-incarceration and mortality variables according to the age variable (Table 2).

## DISCUSSION

Abdominal hernia repair is one of the most common surgical procedures, with a high prevalence of 100 to 500 per 100,000 people (8). In cases of abdominal hernia, emergency surgery is required because of 5-13% incarceration (9). And 10-15% of these patients need resection because of intestinal ischemia (10). In these patients, advanced age and inadequate preoperative preparation cause a significant increase in mortality and morbidity rates (9,11).

In studies in the literature, it has been reported that the rate of emergency surgery increases with age, regardless of hernia type (femoral, inguinal, umbilical and incisional) (9,12). In our study, the median age of patients who underwent emergency femoral hernia surgery was 71 (54-79) /year. Although femoral hernias are more common in women, the probability of strangulation/incarceration is higher in femoral hernias, with a rate of 38% (9,13). In our series, 77 (77%) patients and 28 (68.3%) patients who underwent emergency femoral surgery were women. In addition, our strangulation/incarceration rate was 48% (48 patients). When a femoral hernia is detected, surgical treatment should be performed in the early period. The strangulation/incarceration ratio in femoral hernias increases cumulatively over time. In a study by Kulah et al, the rate of strangulation/incarceration was 22% at 3 months, while this rate increased to 45% at 21 months (14). However, it is reported in the literature that 40% of femoral hernias undergo emergency surgery (2). In our series, this rate is 41% and is similar to the literature.

In our study, the frequency of bowel resection was 21% (21 patients). In emergency femoral hernia surgery, this rate is 39% (16 patients). In the current literature, the rate of bowel resection in femoral hernia surgery is reported to be between 22.7 and 43% (15,16). In our study, it was determined that bowel resection was performed at rates similar to the current literature. Emergency surgery is associated with longer hospital stays than elective surgery. Suppiah et al median hospital stay after elective versus emergency surgery was 1 (1-3) versus 8 (5-14) days ($p < 0.001$) (2). In our series, this time was 1 (1-1)/day after elective surgery and 5 (3-8)/day after emergency surgery.

In the literature, it has been reported that the leukocyte count and neutrophil percentage were found to be higher in the patient group with bowel obstruction secondary to femoral hernias (15). However, there is no study comparing the platelet lymphocyte ratio, neutrophil lymphocyte ratio in emergency and elective femoral hernia surgery. In our study, we found that the platelet lymphocyte ratio and neutrophil lymphocyte ratio were higher than the patient group who underwent emergency surgery.

There are several surgical hernia repair techniques for femoral hernia (15,17). In our study, the choice of surgical technique was individualized according to the patient's condition and the surgeon's preference. Laparoscopic technique was not preferred for any emergency operated patient. In the literature, the use of mesh is not recommended in patients with symptoms for more than 24 hours, bowel perforation and severe hernia sac contamination (15). In addition, there are studies reporting that there is no statistically significant difference in terms of recurrence in repairs with and without mesh (17). In our study, the recurrence rate was 12.2% in emergency surgery and 15.3% in elective surgery. The overall recurrence rate is 14%. Postoperative complications and hospitalization times were found to be higher in femoral hernias operated under emergency conditions. This rate is similar to the existing literature (2).

In our study, a statistically significant difference was found in the ASA score, strangulation-incarceration and mortality variables in the analysis between the groups according to the age variable. The difference in the ASA score variable was due to the difference between the low scores of patients under 65 years of age and the high scores of patients over 80. A statistical difference was found because the presence of strangulation-incarceration was observed in all patients aged 65 and over, and the presence of mortality in patients aged 80 and over. Elderly patients have more comorbid diseases, which is reported to be associated with higher ASA scores and postoperative mortality (18).

The biggest shortcoming of our study is that it is retrospective. Also, including only femoral hernias is a single center experience with a relatively small patient population. Finally, the treatment option was based on surgeon preference, which may have some selection bias and may have affected the results.

In conclusion, although emergency femoral hernia surgery did not make a difference in terms of intraoperative complications and recurrence compared to elective surgery, quite different results were observed in terms of patient characteristics, preoperative, intraoperative and postoperative data and results. Age in emergency femoral hernia surgery; In our series, it was determined as a parameter that increases the anesthesia risks, strangulation-incarceration rate and even mortality of the patients.

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