

■ Original Article

Investigation of the complication, morbidity and mortality factors affecting the clinical hospitalization process after femoral hernioraphy

Femoral herniorafi sonrası klinik yatış sürecini etkileyen komplikasyon, morbidite ve mortalite faktörlerinin araştırılması

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ABSTRACT

Aim: The study aims to investigate the risk factors of patients with femoral hernia as well as factors that affect the hospitalisation process, morbidity and mortality, particularly in terms of gender.

Material and Methods: A total of 65 femoral hernia surgeries were performed in 29 Mayıs Public Hospitals between January 1, 2015 and June 30, 2019. Six patients with incomplete or unclear data were excluded, and the data of 59 patients were analysed. Percentage and frequency were used for discrete variables, whereas mean and standard deviation for continuous variables. Student's t-test was used for independent variables according to the distribution status, whereas chi-square test was used for dichotomous variables, and the results for binary logistic regression were obtained.

Results: Males were significantly more likely to have femoral hernia risk during old age [66.11years vs. 52.68 years ($p=0.004$), adjusted odds ratio (AOR): [0.87 (0.784, 0.969)]($p=0.011$)]. In student's t-test, male patients had shorter length of hospital stay (LOS). However the p value was found 0.79. In the binary multiple logistic regression for LOS value; In terms of gender, body mass index (BMI, kg/m²), age and complications; P value was found as 0.07 and ; AOR was found 2.2. With this result; The females have got the more LOS value than men as statistically, for $p=0.1$ value.

Conclusion: Femoral hernia frequently occurs in women; however, we found that its higher incidence is also can be found in men during old age, and after surgery, men are generally discharged earlier than women.

Key words: Femoral hernia; sex; morbidity; mortality; length of clinical hospitalisation; complication

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ÖZ

Amaç: Femoral herni operasyonu geçiren olguların, bu fitik türündeki risk faktörlerini irdeleyerek hastane yatış sürecini, morbidite ve varsa mortaliteyi etkilen faktörlerin özellikle cinsiyet bakımından araştırılması amaçlanmıştır.

Gereç ve Yöntemler: 1 Ocak 2015–30 Haziran 2019 tarihleri arasında 29 Mayıs Devlet Hastanesinde 65 femoral herni operasyonu uygulanan hasta tespit edildi. Eksik ya da verileri net olmayan 6 hasta çalışmaya dahil edilmeyerek toplamda 59 hasta verileri analiz edildi. Kesikli değerler için yüzde ve frekans, sürekli değişkenler için ortalama ve standart sapma kullanılmıştır. Dağılım durumuna göre bağımsız değişkenler için student t test kullanılırken kesikli değişkenlerde ki kare testi kullanılmış ve final istatistikler binary lojistik regresyon elde edilmiştir.

Bulgular: Erkek cinsiyet belirgin derecede daha ileri yaşta femoral herni riski taşırken bayanların daha genç yaşta femoral herni riskine sahip olduğu görüldü [66.11 yaş vs 52.68 yaş ($p=0.004$), AOR: 0.87(0,784-0,969)($p=0,011$)]. Student t testinde diğer erkekler daha kısa hastane yatış süresi(LOS) ' ne sahip olmakla beraber p değeri 0.79 olarak bulundu. LOS değeri için ikili çoklu lojistik regresyonda; Cinsiyet, vücut kitle indeksi (BKİ, kg / m²), yaş ve komplikasyonlar açısından; P değeri 0,07 olarak bulundu ve; AOR: 2.2 bulundu. Bu sonuçla; Kadınlar, $p=0.1$ değeri için istatistiksel olarak erkeklerden daha fazla LOS değerine sahipti. Her iki cinsiyet arasında vücut kitle indeksinin hem univariate (tek değişkenli) analizlerde hem de ikili regresyon sonucunda cinsiyete göre femoral herni açısından bir farkı olmadığını saptadık.

Sonuç: Femur fitiği sıklıkla kadınlarda görülür; Bununla birlikte, yüksek insidansının, yaşlılık döneminde erkeklerde de görülebileceğini bulduk ve ameliyat sonrası erkekler genellikle kadınlardan daha erken taburcu edildi.

Anahtar kelimeler: Femoral herni; cinsiyet; morbidite; mortalite; klinik yatış süresi; komplikasyon

Introduction

Nowadays, any mention of femoral hernia tends to first bring to mind a clinical condition that is observed in women. However, it is actually a type of hernia that is also observed in men. In addition, it should always be treated early in terms of strangulation and incarceration, which is an important consideration from a surgical standpoint. A total of 46% patients may develop this undesirable medical condition [1]. Therefore, we examined 59 patients with femoral hernia with high rates of complications, such as strangulation and incarceration, and compared our findings with those reported in literature by investigating the factors affecting the length of hospital stay [(LOS)], morbidity and mortality (if any), particularly in terms of gender.

Material and Methods

Following the Etlik Zübeyde Hanım Gynecology Training and Research Hospital TUEK approval (Approval No. 90057706-799 that was granted in the meeting number 11 dated 04 July 2019), 1359 hernia patients who underwent femoral herniorrhaphy at 29 Mayıs Public Hospital between January 1, 2015, and June 30, 2019, were screened, and 65 who underwent femoral hernia surgeries were identified. Six patients with missing or unclear data were excluded. All subjects provided written informed consent before participation in the study.

Statistical Analysis

Percentage and frequency were used for discrete variables, whereas mean and standard deviation were used for continuous variables. Normality was tested using the Kolmogorov–Smirnov test. Student's t-test was used for independent variables, whereas chi-square test was used for discrete variables. The final results were obtained using binary logistic regression test.

Results

Eleven (18.64%) patients were men whereas 48 (81.36%) were women, with the female gender being more prominent compared with the male gender. However, male patients were significantly older compared with female ones. Incarceration was identified in 5 of 11 patients with strangulation, and spinal anaesthesia was performed in all cases except one patient who was switched from spinal anaesthesia to laryngeal mask airway during general anaesthesia. Regarding the distribution of complications, wound infection was identified in one case, whereas incarceration was identified in another. Another patient had deep vein thrombosis (DVT), four had constipation and two had severe pain. According to chi-square test and student's t-test, no significant difference was observed for hernia side, type of anaesthesia applied, complication rates, LOS, LOS 3 (Length of stay hospital for ≥ 3 days) and body mass index (BMI) (25, 30 and 40 kg/m²; Table 1).

Table 1. Demographic characteristics

	Men: 11(18.64%)	Women: 48(71.36%)	P
Age	66.11 ± 7.08	52.68 ± 12.26	0.004
BMI (kg/m ²)	25.56 ± 22.81	21.49 ± 22,32	0.605
LOS(days)	1.82 ± 0.87	1.92 ± 1.15	0.79
BMI < 25 (kg/m ²)	5	25	0.718
BMI < 30 (kg/m ²)	3	8	
BMI < 40 (kg/m ²)	3	15	
LOS 3	1	8	0.543
Anaesthesia LMA	0	1	0.401
General Anaesthesia	2	3	
Spinal Anaesthesia	9	44	
Complications	1 vs 10	8 vs 40	0.528
Hernia side	Right	7 (11.86%)	28 (47.46%)
	Left	3 (5.01%)	18 (30.51%)
	Bilateral	1 (1.70%)	2 (3.39%)

*LOS 3: Length of hospitalisation for ≥3 days

According to binary logistic regression analysis, men were associated with a risk of femoral hernia at an older age, whereas women had a risk of femoral hernia at a younger age [66.11 ± 7.08 years vs. 52.68 ± 12.26 years (p = 0.004)]; Adjusted odds ratio (AOR): [0.87 (0.784, 0.969); p = 0.011]. In contrast, as per student's t-test, men had shorter LOS found (p > 0.05).

Furthermore, multiple binary logistic regression analysis performed by including BMI, age, LOS, type of anaesthesia applied and presence or absence of complications showed that the pvalue decreased to 0.07. In addition, we found that, women had a 2.2-fold higher risk of hospital stay compared to men in terms of long-term hospital stay, in [1.82 vs. 1.92 (p = 0.790), AOR: 2,197 (0.939, 5.139) (p=0.07)].

No difference was observed in BMI between men and women in terms of femoral hernia in both univariate and binary multiple regression analyses (Table 2). Moreover, no mortality was observed in the study.

Table 2. Final statistics using multivariate and univariate analyses

	Univariate analysis			Multivariate analysis	
	Men	Women	P<0.05	Adjusted odds ratio [Exp(B)] (90% CI)/Adjusted mean difference (90% CI)	P< 0.1
Age (years)	66.11 ± 7.08	52.68 ± 12.26	0.004	0.87 (0.784, 0.969)	0.01**
LOS (days)	1.82 ± 0.87	1.92 ± 1.15	0.79	2.197(0.939, 5.139)	0.07*
BMI	25.56 ± 22.81	21.49 ± 22.32	0.605	0.998 (0.940, 1.060)	0.954

*In terms of age between for both male and female, there is statistical significance (p<0.05)(Confidence interval for %95)
 **In terms of LOS between for male and female there is statistical significance(p<0.07)(in confidence rate is %90)
 LOS: Length of hospitalisation (days)
 BMI: Body mass index (kg/m²)

Discussion

In 1988, Gilbert made seven separate intraoperative classifications in terms of functional as well anatomical standpoint. This classification was made by considering the presence or absence of a hernia sac, width of the inner and outer mouth of the area of hernial weakness and condition of the hernia channel back-wall integrity; femoral hernias were classified into category VII [2]. Femoral hernias occur when structures lose their normal anatomic position from a weak point in the medial area of the thigh to the inferior because of conditions that aggravate muscle weakness, such as compression and constipation. Other leading causes of femoral hernia are cough, exercise and obesity [3]. Meta-analysis of some observational studies reported that the most prominent risk factor for femoral hernias is female gender. However, there are several other risk factors for the development of femoral hernias. In the present study, factors affecting the outcome of femoral inguinal hernia development were retrospectively investigated. According to a previous study [4], approximately 60% femoral hernias occur on the right side of the body, 30% on the left side and 10% are bilateral. In the present study, 59.32% femoral hernias were on the right side, 35.52% on the left side and 5.09% were bilateral. Although these results are consistent with those previously reported, no significant difference was observed between male and female gender in terms of the anatomical side of femoral hernia (p = 0.693).

Burcharth et al. [5] reported that 3% of 46,717 inguinal

hernia cases were femoral hernias, and femoral hernia cases peaked between the ages of 80 and 90 years in both men and women. In the present study, the rate of femoral hernia among 1,359 hernia cases was 4.34%. The mean age of the patients in the study was significantly higher in men than that in women, suggesting that the incidence of femoral hernia among men may approach the incidence observed in women with increasing age. However, all our cases with femoral hernia occurred at a younger age compared to the above mentioned large series study [66.11 years vs. 52.68 years ($p=0.004$)], [AOR: 0.87 (0.784, 0.969; $p = 0.01$; Table 2)]. Cushieri A. reported that femoral hernia is a type of hernia most prone to strangulation, and its female-to-male ratio is 4 to 1 [6]. In our study, incarceration was detected in 5 of 11 cases with strangulation.

Femoral hernias are more common in women than in men because of the weaker transversal fascia, which leads to the protrusion of the preperitoneal fat or viscus to the femoral ring and femoral canal [7]. In addition, the larger size of the pelvis in women compared to that in men is an important factor [8]. The presence of femoral hernia in children is typically due to a prominent connective tissue disease [9,10]. Physiological and enzymatic deficiencies in addition to anatomic factors may be involved in the development of hernia. The occurrence of inguinal hernia is observed in Marfan syndrome, Ehlers-Danlos syndrome and Hurler-Hunter syndrome, wherein collagen metabolism does not function completely and effectively [11,12]. Thus, our finding that older men have increased risk for femoral hernia development, suggests that this condition may occur as a result of lost or reduced activity in connective tissue and enzymatic activation with advanced age [AOR: 0.87 (0.774, 0.969) ($p:0.01$)] Table 2].

Increasing age poses a significant risk for femoral hernia, particularly in men (Table 2); however, in both genders, we did not find any difference in femoral hernia risk with respect to BMI. In 2019, Köckerling et al. [13] reported that age is a risk factor for femoral hernia, which is in agreement with our study. In addition, they reported that increased BMI is a risk factor. In the present study, all operations were performed with open surgical technique. Furthermore, Köckerling et al. recommended either complete extraperitoneal patch or transabdominal preperitoneal patch for surgical inguinal hernia repair and emphasised that these methods can be an alternative to the Shouldice method in open surgical technique [13]. However, they reported that if there is no finding of femoral hernia, the Lichtenstein method would

cause additional burden, especially in terms of postoperative recurrence, pain and recurrences, and this would become more prominent especially in patients with advanced age and higher BMI [13].

Wolf and Schumpelick performed an eight-year case series on femoral hernias in 1994 and reported that five patients had bilateral hernia, 55 had right-sided femoral hernia and 29 had left-sided femoral hernia and 35.1% cases were operated due to strangulation. In addition, they identified obstruction of the small intestine segment in seven patients and reinforced the tissue defect using the double-layer technique. Two patients had superficial wound infection, five had seroma and no mortality occurred in any patient. In addition, the mean LOS was 5.5 days after surgery [14]. LOS was shorter in the present study, with a mean LOS of 1.82 ± 0.87 and 1.92 ± 1.15 days in men and women ($p = 0.79$), respectively. Multiple regression analysis revealed that men were discharged earlier with [AOR: 2.197 (0.939, 5.139) and ($p = 0.07$)].

Although the overall statistical approach is based on for confidence interval of 0.05, this is not a rule. Moreover, the combination of statistical results with clinical interpretations essentially reveals their meaning. In this study, we found that, because of the number of cases in this study,

women had a 2.2-fold higher risk of hospital stay compared to men in terms of long-term hospital stay, in $p = 0.07$.

This value was not significant for $p < 0.05$, but on the other hand it was significant for $p < 0.1$. In other words, it can be assess insignificant in 95% confidence interval ,but furthermore it can be assess significant in 90% confidence interval. This result is attributed to the low number of cases as mentioned above. But we believe that this point may be a cornerstone for multicenter and prospective further studies.

One of our two patients who had wound site infection was strangulated, whereas the other patient was not strangulated; we believe that this patient could be predisposed to surgical site infection due to the fact that the patient was not operated under elective conditions. In a large series study on hernial surgery, Olsen[15] et al. reported that intestinal obstruction and necrosis may be risk factors for surgical site infection. They found that the ratio of obstruction and necrosis in inguinal and femoral hernia cases was 7.5% and 0.8%, respectively, and these rates were higher than those for other obstructive hernial conditions. Furthermore, they reported that 3% cases were operated under emergency conditions [15]. Another complication observed in the present study was DVT. The affected patient was >60 years and his BMI was $>40\text{kg/m}^2$. In 2018, Hoffman et al. performed

a risk evaluation for thromboembolic cases in hernia surgery, and emphasised an age limit of 60 years and BMI of 30 kg/m² [16]. Furthermore, we think that the operation of this case under emergency conditions may have contributed to the risk of venous thrombosis.

In the present study, considering the patients who experienced difficulties due to constipation, the common feature of all these patients was that they were operated for the resection and anastomosis of incarcerated small bowel loops after strangulation. Akrami et al. also reported this in a case presentation and described the same condition [17]. A predisposing factor for pain could not be identified in a patient with severe pain in the femoral herniorrhaphy site during hospitalisation, as Fränneby et al. [18] had emphasised. We believe that a rigorous technique in dissection will probably reduce the risk of pain and recurrence.

Limitations of the Study

The retrospective nature of this study may have not allowed adequate postoperative surveillance, and the study was therefore conducted within the limits of the data available in the documented case records. A multicenter prospective study is planned as the next step.

Conclusion

The risk of emergency surgery should always be considered in women and particularly older men with femoral hernia. The risk of femoral hernia may be higher in elderly men than that in the young population. This diagnosis should not be overlooked by clinicians in cases presenting with chronic pelvic pain, and patients should be promptly directed to an evaluation for general surgery.

Declaration of conflict of interest

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