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## Retrospective analysis of inguinofemoral hernias

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### Abstract

We aim to present the operative findings of inguinal and femoral hernias that were operated. The records of 732 patients who underwent surgery for inguinal and femoral hernia between March 2000 and January 2013 were evaluated retrospectively. The number, sex, and age of patients, type and side of hernias, the existence of strangulation, structure, and content of hernia sac were recorded. 684 (93.4 %) of patient is male, 48 (6.5 %) of patient is female. The average age was 46.2. The rate of inguinal hernia was 96.7 %. However, the rate of femoral hernia was 3.2 %. Inguinal hernia 97.9 % and femoral hernia 2 % was found among males. Inguinal hernia 79.1 % and femoral hernia 20 % was found among females. Indirect hernia rates were 70.4 % among males and 75 % among females. Direct hernia rates were 20.7 % among males and 4.1 % among females. Hernias were located in 59 % on right-side, in 37 % on left-side, in 3.1 % on bilateral. The strangulated hernia was seen at 3.1 % in all cases. Strangulation rate was higher among women (6.2 % - 2.9 %). The strangulation rate was 16.6 % in femoral hernia, but this ratio was 2.6 % in inguinal hernia. Hernia sac consisted of peritoneum frequently (99.4 %). The structure that was found mostly in hernia sac was omentum majus (40.4 %). Inguinal hernias are encountered more than femoral hernias. The strangulation rate in femoral hernias is higher than in inguinal hernias. Since the strangulation rate is higher in femoral hernias, the surgical urgency of this type of hernias is higher than inguinal hernias. At the same time, because the internal organs can form the hernia sac or the organ inside the sac, the surgeon should pay maximum attention during the operation.

**Keywords:** Inguinal hernia, femoral hernia, strangulated hernia, surgery

### Introduction

One of the most common surgical diseases is groin hernias. Groin hernia repair is one of the most common surgical operations. The rate of inguinal hernia repair is 10 per 100,000 people in the United Kingdom and 28 per 100 000 people in the United States [1].

Learning of the inguinal region anatomy following the nineteenth-century cadaver dissections has made significant progress in the surgery of inguinal region hernias. The publications of surgeons such as Cooper, Franz Hasselbach, Antonio Scarpa and Jules-Germain Cloquet on the formation mechanisms and treatment of inguinal hernia formed the basis of modern surgery [2].

Most abdominal anterior wall hernias are inguinal hernias, followed by femoral and umbilical hernias, respectively.

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Gallegos et al. reported that 439 of 476 hernias were inguinal, and 37 were femoral hernias [3]. Femoral hernias account for 2% to 8% of all groin hernias in adults. A femoral hernia is more common in females than in males [4].

The proportion of indirect hernias in groin hernias is higher than direct and femoral hernias. Inguinal hernia may be congenital or acquired. Most inguinal hernias in the young population are indirect hernias of congenital origin. These occur when the processus vaginalis remains open [5]. Direct hernias are mostly acquired and are found in adults. They emerge from the Hasselbach triangle in the inguinal region. Disorders of collagen metabolism (low levels of hydroxyproline) have been implicated in these hernias [6].

Smokers, patients with positive family hernia history, patent processus vaginalis, collagen disease, patients with an abdominal aortic aneurysm, after an appendectomy and prostatectomy, with ascites, on peritoneal dialysis, after long-term heavy work or with the chronic obstructive pulmonary disease have an increased risk of inguinal hernia. This is not proven concerning (occasional) lifting, constipation and prostatism [7].

The patient with groin hernia has complaints of swelling and pain in the inguinal region. Surgical treatment is usually used to treat groin hernias. Hernia surgery aims to prevent possible strangulation and related complications.

## Materials and Methods

The records of 732 patients who underwent surgery for inguinal and femoral hernia between March 2000 and January 2013 were evaluated retrospectively.

The number of inguinal and femoral hernia, distribution by gender and age, type (femoral-direct-indirect-pantaloon), and side of hernia, whether they were a recurrent or strangulated hernia, concomitant pathologies, structure, and content of hernia sac, type of anesthesia and type of surgery were recorded.

The distribution of inguinofemoral hernia according to gender and age, the rate of hernia types and its distribution by gender and age, the rate of hernia side and its distribution by gender, rate of recurrent hernia and its distribution by gender, incarceration rate and its distribution by age, gender and hernia types, and the rate of concomitant pathologies and its distribution by gender were compared with those obtained from the literature and the results were evaluated.

## Results

93.4% (684) of the patients were male, and 6.5% (48) were female. The age range of the patients was 2 to 86 years. The mean age was 46.2 years. Most of the patients (78%) were 40 years or older.

The age range of males was 2 to 86 years. The mean male age was 46.8 years. The age range of female was 3 to 73 years. The mean female age was 36.5 years.

96.7% of all hernias were inguinal, and 3.2% were femoral hernias. According to anatomical localization, hernias were inguinal (indirect, direct, pantaloon) and femoral hernia. Indirect hernia rate was 73.1%, direct 20.3% and pantaloon 6.4% (Table 1).

**Table 1.** Hernia types according to anatomical localization (n = number, % = percentage)

Hernia types	n	%
Inguinal Hernia	708	96.7
Indirect	518	73.1
Direct	144	20.3
Pantaloon	46	6.4
Femoral hernia	24	3.2

97.9% (670) of the male had an inguinal hernia, and 2% (14) had a femoral hernia. 79.1% (38) of the female had inguinal, and 20% (10) had a femoral hernia.

The indirect hernia was detected in 70.4% of males, while indirect hernia was found in 75% of females. 20.7% of males and 4.1% of females had a direct hernia. 6.7% of the male had pantaloon hernia, while the female had no pantaloon hernia. 2% of the male had a femoral hernia, while 20% of females had a femoral hernia (Table

2). The mean age of indirect hernia was 45.6 years, the mean age of direct hernia was 53.9 years, and the mean age of femoral hernia was 51.9 years.

**Table 2.** Distribution of hernia types by gender (n = number, % = percentage)

Sex	Indirect hernia n/%	Direct hernia n/%	Pantaloon hernia n/%	Femoral hernia n/%
Male	482/70.4	142/20.7	46/6.7	14/2
Female	36/75	2/4.1	0	10/20

59% of the hernias were located on the right side, 37% on the left, and 3.1% bilaterally. Both sexes had the right dominance. Bilateral hernia incidence was higher in males than in females (Table 3).

**Table 3.** The distribution of hernia sides by gender

Sex	Right	Left	Bilateral
Male	59.2%	19.8%	21%
Female	56.2%	41.8%	2%

5% (37) of all patients were operated for recurrent inguinal hernia. 4.8% (33) of males and 8.3% (4) of females were operated for recurrent inguinal hernia.

The incarcerated hernia was seen in 3.1% of all cases (20 males - 3 females). The incarceration rate was higher among females than males (6.2% - 2.9%). 60.8% of incarcerated hernia cases were over 40 years of age.

Incarceration was seen in 4 femoral hernias (3 females and one male), and the incarceration rate was 16.6% in femoral hernias. 19 incarceration was detected in an inguinal hernia, all of them were male, and the incarceration rate of inguinal hernia was 2.6% (Table 4). Most of the incarcerated inguinal hernias were indirect hernia (89%), and a small number of them were direct hernia (10.5%).

**Table 4.** Distribution of incarcerated hernias (n=number of incarcerated hernias, incarceration percentage = %)

Distribution of incarcerated hernias	n	%
Incarcerated femoral hernias	4	16.6
Incarcerated inguinal hernias	19	2.6

5.1% (38) of the patients had concomitant pathology. These were more common in men. Concomitant pathologies were often related to male reproductive organs (12 hydrocele, eight cord cysts, seven varicocele, four undescended testes, three epigastric herniae, three umbilical herniae, one Spigelian hernia).

The hernia sac was mostly consisting of the peritoneum (99.4%). It consisted of caecum in two cases, sigmoid colon in one case and bladder in one case (0.54%).

Most of the hernia sacs were empty (55.7%). The most common structure in hernia sac was omentum majus (40.4%). Intestines were last seen (3.8%).

Spinal (73.3%), general (25.5%), epidural, and local anesthesia were used. Mesh herniorrhaphy was performed in 77% of the cases, and herniorrhaphy without mesh was performed in 23%.

## Discussion

Hernia in Latin means rupture. Hernias occur in any part of the body but often occur in the anterior abdominal wall, especially in the inguinal region. Hernias in the inguinal region develop anatomically from the myopectineal orifice described by Fruchaud [8].

Abdominal hernias are common, with a prevalence of 1.7% for all ages and 4% for those over 45 years of age. Inguinal hernia accounts for 75% of abdominal wall hernias, and the lifetime risk of inguinal hernia is 27% in men and 3% in women [1].

The incidence of inguinal hernia in males and females is given differently in different sources (M / F = 25, M / F = 12) [9,10]. William B. Coley et al. reported that 756 of 937 inguinal hernia cases were male, and 181 were female [11]. In Seward Erdman's study, 1093 of 1154 inguinal hernia were seen in males and 61 in females. The age range of these patients ranged from 6 months to 70 years [12]. 684 of the 732 patients were male, and 48 were female in our cases. The age range was 2 to 86 years. The mean age was 46.2 years. The mean age was 46.8 years for males and 36.5 years for females.

It was reported that inguinofemoral hernias were more common between the two and third decades [11]. In another report, inguinofemoral hernias were found to be more between the third and fourth decades [13]. Most inguinofemoral hernias in our study were observed over the fourth decade.

In groin hernias, inguinal hernias are more common than femoral hernias. In one study, only 66 femoral hernias were found in the groin hernia series of 1003 cases [11]. Femoral hernias are ten times more common in females. Although the proportion of femoral hernia among females is higher, an inguinal hernia is still the most common type of hernia in the female. A femoral hernia is rare among males [9]. Seven hundred eight of the groin hernias were inguinal, and 24 were femoral in our study. 97.9% of the male had an inguinal hernia, 2% had a femoral hernia, 79.1% of females had inguinal, and 20% had a femoral hernia.

According to the anatomical localization, groin hernias are inguinal (indirect, direct, pantaloon) and femoral hernia. In 1093 cases of inguinal hernia series, the indirect hernia rate was 68.4%, direct hernia rate was 25.8%, and pantaloon hernia rate was 5.8% [12]. We found an indirect hernia rate as 73.1%, direct rate as 20.3%, and pantaloon rate at 6.4%.

Among the male, indirect hernias are reported to be twice the direct hernias [9]. In the literature, the mean age of indirect hernia was 27.8 years, and the mean direct age was 38 years. It is stated that direct hernias are acquired in later life rather than developmental defects [12]. Femoral hernias are reported to be more common between 40 and 70 years of age [4]. In our study, the indirect hernia rate was 70.4%; the direct hernia rate was 20.7% in males. The mean age of indirect hernia was 45.6 years, the direct mean age was 53.9 years, and the femoral mean age was 51.9 years.

Both indirect and femoral hernias are more common on the right

side. One reason is the usual slow descent of the right testis into the scrotum during fetal development and the delay in atrophy of the processus vaginalis. Another reason is that the left femoral canal is tamponed by the sigmoid colon [9]. Groin hernias are more frequent on the right in both sexes. In a groin hernia series of 1600 cases, 41.6% right, 30.1% left, 28.3% bilateral hernia was found [13]. We found 59% right, 37% left, 3.1% bilateral hernia. There is a right dominance in both sexes. Bilateral hernia rate was higher in males (M=21%, F=2%).

In the studies, the rate of cases operated with a diagnosis of recurrent hernia was found to be 5.6% [12]. In our study, the rate of cases operated for recurrent hernia was 5%. The rate of patients who were operated on with a diagnosis of recurrent hernia was 8.3% among females and 4.8% among males.

Incarceration is the inability to insert the contents of the hernia sac into the abdomen. Strangulation is the disruption of the blood circulation of the organs in the hernia sac. This is a serious situation. Incarceration is common in indirect and femoral hernias. The reason for this is that the neck region of the hernia sac is narrow in such hernias. Indirect hernias, incarceration is not common as the neck region of the hernia sac is large. Strangulation occurs in 1-3% of the groin hernias and is usually more common in advanced ages [6]. Femoral hernias have a higher incarceration rate, so femoral hernias are more urgently operative than other hernias [3].

Incarcerated hernias are usually seen in older ages. In the study of Lawrence S. Fallis, 22 (1.4%) of 1600 cases were operated with the diagnosis of an incarcerated hernia; only one patient underwent small bowel resection [13]. The incarcerated hernia was found in 23 (3.1%) of our patients. The incarceration rate was higher among females (F=6.2%, M=2.9%). 60.8% of our incarcerated hernia cases were over 40 years of age. There was incarceration in 4 femoral hernias (in 3 females and 1 male), and the incarceration rate in femoral hernias was 16.6%. Strangulation occurred in 2 femoral hernias (2 females), and one underwent omentum resection, and the other underwent small bowel resection. Incarceration was detected in 19 of the inguinal hernias. The incarceration rate in inguinal hernias was 2.1%, and all of these patients were male. Most incarcerated inguinal hernias were indirect hernias (89%).

Hernia sacs are usually consisting of the peritoneum. In sliding hernias, a part of the hernia sac consists of internal peritoneal organs. The rate of sliding hernia has been reported as 3.3% in the literature [13]. In our study, hernia sacs mostly consisted of the peritoneum (99.4%). Our sliding hernia rate was 0.54% (2 caecum, 1 sigmoid colon, one vesica urinaria).

Hernia sacs may have abdominal organs. In our study, 55.7% of hernia sacs were empty, 40.4% had omentum, and 3.8% had intestines.

There may be concomitant pathologies in groin hernias. Concomitant pathologies were reported in 10.4% of the cases. Most of these pathologies were related to male reproductive organs [13]. In our series, 38 patients (5.1%) had concomitant pathologies, and as in the literature, concomitant pathologies were mostly related to male reproductive organs.

## Conclusion

As a result, since incarceration and strangulation rates are higher in the femoral region hernias, the urgency of this type of hernias is higher than inguinal hernias. Also, hernia sac can consist of internal organs, or there may be organs in the hernia sac, so it should be careful during surgery to avoid any complications.

## Competing interests

*The authors declare that they have no competing interest.*

## Financial Disclosure

*There are no financial supports.*

## Ethical approval

*This study was approved by the Institutional Ethics Committee and conducted in compliance with the ethical principles according to the Declaration of Helsinki.*

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