

## An Update on the Management of Femoral Hernias: Narrative Review Article

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**Abstract:** Femoral hernias are a rare presentation of groins hernias, but it is associated with an increased risk of complications like strangulation and obstruction. It is seen in older patients and the diagnosis is usually late. The surgical treatment of femoral hernias can be divided into open femoral hernia repairs that include the low, inguinal or preperitoneal approach. The laparoscopic methods include the transabdominal preperitoneal (TAPP) and the total extraperitoneal (TEP) repairs. As there is no consensus on what the best surgical procedure for femoral hernias is, we have conducted this review article to look at the surgical management of femoral hernias.

**Keywords:** Femoral Hernia, Femoral Hernia Management, Femoral Hernia Repair, Open Repair, Laparoscopic Hernia Repair.

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### INTRODUCTION

Femoral hernias are seen in about 2% to 4% of all cases of groin hernias and it is 8 to 10 times more likely to be seen in females than males. Femoral hernias are associated with a higher risk of strangulation and obstruction, as the hernia protrudes through the femoral ring into the femoral canal that is bounded anteriorly by the inguinal ligament, posteriorly by the Cooper's ligament, laterally by the femoral vein and medially by the lacunar ligament (Cezar Uili COELHO *et al.*, 2021.). The etiology of femoral hernias is unknown, with several theories that are postulated including the increased intra-abdominal pressure which causes a weakness over the anterior abdominal wall. It is commonly seen in adults between the age of 40 to 70 years old and it is more common on the right side rather than the left (Hachisuka, 2003). The worldwide incidence and prevalence of femoral hernias has been gradually increasing in the Asian countries like India and China. It is seen in older male patients especially in the lower- and middle-income group (Ma *et al.*, 2023).

The diagnosis of a femoral hernia is made clinically with a swelling presenting below and lateral to the pubic tubercle, but it can be difficult to differentiate

it from an inguinal hernia especially in obese patients. Up to 40% of femoral hernia cases present as an emergency with female patients and the elderly undergoing emergency femoral hernia repair (Dahlstrand, 2018). Due to the high likelihood of a missed diagnosis and patients presenting with symptoms of strangulation and obstruction that requires bowel resection in addition to hernia repair has led to a high morbidity and mortality (Ogbuanya *et al.*, 2020).

The surgical treatment of femoral hernias has been traditionally performed by three open procedures which include the low or femoral approach, where an incision is made over the swelling that is below the inguinal ligament and once the hernia is reduced and the sac is ligated, the femoral ring is closed with non-absorbable sutures. As this method was associated with a high recurrence rate, the introduction of the mesh plug to cover the defect was introduced. One advantage of this procedure was that it could be done under local anesthesia. The high or inguinal approach involves the opening the transversalis fascia and ligation of the femoral hernia sac after reduction of its contents, this is followed by a suture repair by approximating the iliopubic tract and lacunar ligament to Cooper's ligament with non-absorbable sutures. The third approach is the

preperitoneal approach that was popularized by McEvedy, where the rectus sheath is opened and once the preperitoneal space is entered, the femoral sac is identified and reduced. This is followed by insertion of a mesh in the preperitoneal space to strengthen it. This approach can also be done laparoscopically via the Total Extra Peritoneal (TEP) and the Trans Abdominal Pre-Peritoneal (TAPP)(Shamim, 2022; Swartz & Felix, 2013; Towfigh, 2019).

As femoral hernias are a rare but important surgical procedure that is performed by general surgeons, we have conducted this review article to investigate the diagnosis and treatment of femoral hernias. We have also looked at the various open surgical procedures that are done for femoral hernias, their approaches, advantages

and disadvantages. We have also briefly looked at the role of laparoscopic surgery in the surgical management of femoral hernia. A literature review was made on PubMed, Google Scholar, Semantic Scholar, and Cochrane databases to look for original articles, observational studies, clinical trials, clinical reviews, review articles and meta-analysis from 1940 to 2024. The following keywords were used “femoral hernia management”, “femoral hernia repairs”, “open repair”, “laparoscopic hernia repairs”, and “femoral hernia”. All articles were in English language only and further article were obtained by manual cross checking. Case reports, commentaries and editorials were excluded. All articles with adults’ patients were included in this review. Pediatric patients and pregnant patients were excluded from this review.

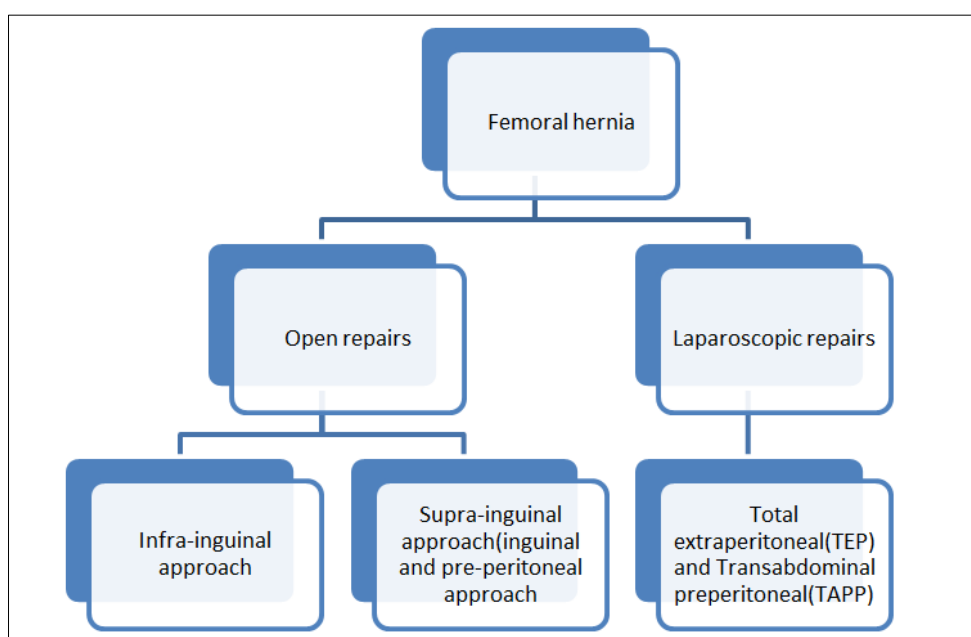


Image I

## DISCUSSION

### Open Femoral Hernia Repair Low or Femoral Approach

This approach involves placing an incision over the swelling and the dissection of the hernia sac is done below the inguinal ligament, once the hernia has been reduced, the sac is ligated, and the femoral ring is closed with non-absorbable sutures. This repair is ideal for an elective femoral hernia repair but cannot be used for a strangulated or obstructed femoral hernia as access to the peritoneal cavity is limited (Glassow, 1973; Ponka & Brush, 1960.). A variant to this repair involves placing a plug mesh over the femoral ring and anchoring it over the inguinal and lacunar ligament. This repair is under no tension, and it was associated with minimal morbidity and mortality. The recurrence rate is also lower than the standard suture repair (Pangeni *et al.*, 2017; Robnns & Rutkow, 1998). This approach was compared to the inguinal approach by Xie *et al.*, prospectively in the elective repair for femoral hernia and the femoral

approach was associated with reduced operative time and had comparable morbidity, mortality and recurrence rates with the inguinal approach (Xie *et al.*, 2019).

### Inguinal Approach

This procedure for the repair of a femoral hernia is done via an inguinal incision which was popularized by Lotheisen, and once the femoral hernia is reduced, the posterior inguinal wall is incised, and the upper cut edge is sutured to the Coopers ligament over the iliopectineal line. This repair is under tension and can lead to recurrence (Hermann Fischer & NEW YORK, 1919; Lytle, 1957.). Mc Vay modified this repair for the elective management of femoral hernias by approximating the internal oblique, transverses abdominis and transversalis fascia with interrupted sutures beginning from the pubic tubercle to the femoral defect. This repair is also under tension and associated with pain over the groin(Ponka & Brush, 1960.; Ryan, 2001.).

### Preperitoneal Approach

This approach involves access to the preperitoneal space and is ideal for obstructed and strangulated femoral hernias, as bowel manipulation and resection can be performed via this incision. The vertical paramedian incision that was done by McEvedy or a transverse incision can be done to gain access to the preperitoneal space, once the femoral hernia sac is opened and the contents reduced, the sac is ligated and the femoral canal is closed with non-absorbable sutures. The disadvantages of this procedure are the risk of bleeding and hematoma formation and the long-term risk of an incisional hernia if there is an inadequate closure of the anterior abdominal wall (Babar *et al.*, 2010; O'Dwyer, 2013).

The placement of a mesh in the pre-peritoneal space was introduced to decrease the risk of recurrence. A prospective study by Aksoy *et al.*, who used a tension free three-dimensional Cooper ligament repair for 63 patients with a femoral hernia and this repair was associated with reduced morbidity, mortality, recurrence rate and chronic pain (Aksoy, 2018). A similar study by Gonullu *et al.*, on the use of the tension free Cooper ligament repair with mesh also concluded that the procedure was effective and safe (Gonullu, 2005).

An open midline pre-peritoneal approach was proposed for an obstructed or strangulated femoral hernia. The preperitoneal space is assessed and after the contents of the femoral sac are dealt with a mesh is inserted into the pre-peritoneal space and anchored to the Coopers ligament and inguinal ligament (Mandalà *et al.*, 2018; Sorelli *et al.*, 2009). Jiang *et al.*, compared this repair with the inguinal approach for strangulated or incarcerated femoral hernias and the midline approach was associated with reduced post operative morbidity and mortality. This approach allows for both resection of the bowel and repair of the hernia defect with the use of the mesh (Jiang *et al.*, 2019). A retrospective study by Liu *et al.*, comparing the preperitoneal repair with mesh versus the open sutured repair for the emergency femoral hernias concluded that the morbidity and mortality were almost similar between both groups but the sutured repair group was associated with a higher recurrence rate (Liu *et al.*, 2020). A retrospective study by Mike *et al.*, on the use of mesh repair for femoral hernias also found that it was associated with reduced morbidity and mortality (Mike & Kano, 2013).

A study on the national register on the patients with a femoral hernia who underwent an emergency repair was conducted by Dahlstrand *et al.*, out of 2980 cases of femoral hernia, 1430 presented as an obstructed or strangulated hernia which accounted for 35.9% of all cases of femoral hernia. The pre-peritoneal approach was used, and the femoral hernia defect was closed with a mesh. The emergency femoral hernias were associated with a higher mortality when compared with the elective repair (Dahlstrand *et al.*, 2009).

Chia *et al.*, compared all the three classical approaches for the treatment of emergency femoral hernia repair. 190 patients were included in this study, and all the three repairs were effective in the treatment of femoral hernia with comparable mortality and recurrence rates but the preperitoneal approach was superior due to its ability to perform bowel resection and reducing the need for performing a laparotomy (Chia *et al.*, 2017). A similar study by Kunduz *et al.*, who compared the various surgical techniques for femoral hernia repair also concluded that there were not much differences between all the various surgical procedures with regard to morbidity, mortality and recurrence rate (Kunduz *et al.*, 2019). A retrospective study by Alimoglu *et al.*, on the surgical treatment of femoral hernias concluded that the risk of strangulation and obstruction is high and the preperitoneal approach is the best method to treat this condition (Alimoglu *et al.*, 2006).

The pre-peritoneal repair was compared with the mesh plug repair by Chen *et al.*, prospectively and thought there was no difference regarding the post operative morbidity, length of hospital stays and mortality, the pre-peritoneal approach is associated with reduced recurrence rate, foreign body sensation and seroma formation (Chen *et al.*, 2010).

### Laparoscopic Femoral Hernia Repair

This method of repair is mainly meant for elective femoral hernia repair and its advantage is that a large mesh can be used to cover the pre-peritoneal space including the area over the internal ring, Hasselbach's triangle and the femoral ring. The laparoscopic repair can be done with the Total Extraperitoneal Repair (TEP) and the Transabdominal Preperitoneal (TAPP). The choice of which technique will depend on the experience of the surgeon and type of clinical presentation with recurrent femoral hernias are suitable for this type of repair (Kane & Jacob, 2018; Yalarnati, 2004.). The quality of life and outcomes of laparoscopic femoral hernia was compared with open femoral hernia repair by Cox *et al.*, prospectively, and the conclusions from this study was that there were no differences with regards to both types of repair (Cox *et al.*, 2017).

Laparoscopic femoral hernia has been attempted for strangulated and obstructed femoral hernia repair but it is still in the early stage as experience of performing the hernia repair, performing bowel resection and anastomosis requires advanced laparoscopic training. The patient factors are also important with the emergency presentation of femoral hernias is seen in predominantly elderly patients who have co-morbidities, hence performing a laparoscopic repair may be associated with complications (Yau *et al.*, 2007).

A systematic review by Shuttleworth *et al.*, on the utility of minimally invasive surgery in the emergency management of femoral hernia concluded that minimally invasive surgery is feasible, but repair

with mesh is not recommended. Further randomized studies will need to be conducted to look at the efficacy of minimally invasive surgery in the emergency management of femoral hernia (Shuttleworth *et al.*, 2023).

### Risk Factors for Complications of Femoral Hernias

Up to 40% of femoral hernias present as a strangulated or obstructed hernia and this can affect their outcome. Among the risk factors for complications include increasing age, female patients, a high American Society of Anesthesia (ASA) score and presence of comorbidities. Additional risk factors include patients with chronic obstructive pulmonary disease and cirrhosis. The late presentation of these cases can also affect the outcome (Alfieri *et al.*, 2018; Liu *et al.*, 2018). Delay in treatment and deciding on the type of hernia repair also important factors that can determine the outcomes like mortality. Surgery should not be delayed and preoperative assessment with imaging like ultrasound may be useful in helping not to miss a diagnosis of femoral hernia (TOSUN *et al.*, 2020). The presentation of bowel obstruction is another factor that leads to complications as these cases are usually associated with increased operative time, increased morbidity, mortality and length of hospital stay. The recurrence rate is also higher in these types of patients hence planning the management is important (Gonzalez-Urquijo *et al.*, 2021). Most patients who present with complications like strangulation and incarceration were not aware of the clinical symptoms and would present to the hospital at a later stage. This factor is important as it affects the type of surgery performed and its outcome (Dahlstrand *et al.*, 2014).

### CONCLUSION

There is no consensus on what the best repair for a femoral hernia is, with its clinical presentation being an important factor. As up to 40% of cases are present as an emergency, and the type of surgery performed is usually decided by the operating surgeon. As most of the emergency presentation is usually treated by the junior surgeons and hence the decision of which repair will be decided by the clinical condition of the patient. The pre-peritoneal approach is the best when performing for an elective or emergency femoral hernia repair. The use of mesh in the pre-peritoneal space is increasingly being used to reduce the recurrence rate. The traditional approaches are still being used for elective femoral hernia repairs. Although laparoscopic femoral hernia repair is feasible in the management of elective cases, it requires training, and it is not recommended for complications like obstruction of strangulation.

**Conflict of Interest:** there is no conflict of interest

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