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# Inguinal Hernia: A Narrative Review of Epidemiology, Pathophysiology, and Management

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**Abstract** | **Review Article**

Inguinal hernia is the most common type of abdominal wall hernia, representing a significant proportion of general surgical workload worldwide. It arises due to weakness of the abdominal wall, allowing protrusion of intra-abdominal contents through the inguinal canal. This narrative review summarizes current evidence on the epidemiology, classification, risk factors, pathophysiology, clinical presentation, and management of inguinal hernia. Emphasis is placed on connective tissue alterations, evolving surgical techniques, and factors influencing recurrence and postoperative complications. Surgical repair, either open or laparoscopic, remains the definitive treatment, with mesh-based techniques demonstrating lower recurrence rates. Despite advances, chronic pain and recurrence remain key challenges.

**Keywords**: Inguinal Hernia, Abdominal Wall, Hernioplasty, Mesh Repair, Laparoscopy, Recurrence, Chronic Pain.



## INTRODUCTION

Inguinal hernia is the most prevalent form of abdominal wall hernia, accounting for approximately 75% of all hernia cases [1]. The condition occurs when intra-abdominal contents protrude through a weakened area of the inguinal canal.

The lifetime risk is significantly higher in men (27–42%) compared with women (approximately 3%) [3]. While many cases are symptomatic, some remain asymptomatic and are detected incidentally during imaging.

This review aims to synthesize current evidence on inguinal hernia with emphasis on pathophysiology, risk factors, and management strategies.

### Classification of Inguinal Hernias

Inguinal hernias are classified as indirect, direct, or combined (pantaloon) [1].

Indirect hernias result from persistence of the processus vaginalis and protrude lateral to the inferior epigastric vessels. Direct hernias arise due to acquired weakness of the transversalis fascia within Hesselbach's triangle and occur medial to these vessels [1].

Femoral hernias, although anatomically distinct, remain an important differential diagnosis because of their higher risk of strangulation [4].

### Epidemiology and Risk Factors

The development of inguinal hernia is multifactorial.

Male sex is a dominant risk factor, with large cohort studies showing most repairs occurring in men [2]. Age is also significant, with increased incidence observed in older populations [3].

Connective tissue abnormalities play a central role. Altered collagen composition, particularly an increased type III to type I collagen ratio, reduces tissue strength [5, 6]. Patients with connective tissue disorders have an increased risk of hernia formation [5].

Patent processus vaginalis is another important risk factor, increasing the likelihood of indirect inguinal hernia development [7].

The relationship between body mass index and hernia risk is complex. Some studies report an inverse relationship with primary hernia incidence, whereas obesity may increase recurrence risk [8].

Occupational exposure to heavy lifting and prolonged physical strain may contribute to increased intra-abdominal pressure and hernia development [9].

**Pathophysiology**

Inguinal hernia formation is closely associated with extracellular matrix remodelling and connective tissue weakness.

Matrix metalloproteinases, particularly MMP-2 and MMP-13, have been implicated in collagen degradation and extracellular matrix remodelling. Reduced collagen quality and altered collagen metabolism contribute to weakening of the abdominal wall [5, 6].

Systemic connective tissue disorders further highlight the importance of collagen integrity in maintaining abdominal wall strength [5].

**Clinical Presentation and Diagnosis**

Patients typically present with a groin swelling associated with discomfort or pain that worsens with increased intra-abdominal pressure [1].

Complications include incarceration and strangulation, the latter requiring urgent surgical intervention [4].

Diagnosis is primarily clinical and may be supported by imaging modalities such as ultrasonography, computed tomography, or magnetic resonance imaging when necessary [1].

**Management**

**General Principles**

Surgical repair remains the definitive treatment for inguinal hernia. Watchful waiting may be considered in selected asymptomatic patients [1].

**Open Repair**

Open repair includes tissue-based techniques such as Shouldice, Bassini, and McVay repairs, as well as mesh-based approaches.

The Lichtenstein tension-free mesh repair remains one of the most widely used open mesh techniques because of its low recurrence rate and favourable outcomes [1].

**Laparoscopic Repair**

Laparoscopic approaches include transabdominal preperitoneal (TAPP) and totally extraperitoneal (TEP) repair.

These approaches are associated with faster recovery and reduced early postoperative pain, particularly in bilateral and recurrent hernias [1].

**Postoperative Complications**

Postoperative complications include seroma, hematoma, wound infection, urinary retention, chronic pain, and recurrence [1].

**Chronic Pain**

Chronic postoperative inguinal pain remains an important complication following hernia repair and may be related to nerve injury, mesh-related factors, or perioperative technical factors [1].

**Recurrence**

Recurrence rates are lower following mesh-based repair than tissue-based repair and depend on patient factors, surgical technique, and surgeon experience [1].

## DISCUSSION

Despite advancements in surgical techniques, inguinal hernia repair remains associated with complications such as chronic pain and recurrence. Mesh-based repairs have improved outcomes but introduce new considerations, including foreign-body reactions and mesh-related discomfort.

Emerging research highlights the importance of connective tissue biology, suggesting potential opportunities for future targeted therapies and individualized treatment strategies.

## CONCLUSION

Inguinal hernia is a common condition with multifactorial etiology involving both mechanical and biological factors. Surgical repair remains the cornerstone of management, with mesh-based techniques offering superior outcomes. Continued research into pathophysiology and surgical innovation is essential to further improve patient care.

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