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UMBILICAL HERNIA: DISEASE MECHANISM, DIAGNOSIS AND TREATMENT OPTIONS – A REVIEW OF THE LITERATURE

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ABSTRACT

Introduction: Umbilical hernia (UH) is a common abdominal wall defect characterized by the protrusion of abdominal contents through the umbilical ring. UH accounts for 6–14% of adult abdominal wall hernias, with higher prevalence in specific populations such as obese individuals and those with ascites. Untreated UH can lead to complications like incarceration or strangulation. Clinical symptoms include a palpable bulge (90–100%), discomfort (50–70%), and pain (20–40%). Diagnosis is primarily clinical, supplemented by imaging in complex cases.
Objective: This review aim is to discuss current literature on UH, focusing on its epidemiology, clinical presentation, diagnostic approaches and treatment options, with an emphasis on various methods of surgical treatment, their possible effectiveness and when non-surgical management is advised.
Treatment: Surgical treatments, including mesh and suture repairs via open or laparoscopic approaches, are the mainstay, with mesh repairs showing lower recurrence rates (2–8%) compared to suture repairs (6–54%). Laparoscopic techniques offer reduced postoperative complications for larger hernias. Non-surgical management, such as watchful waiting, is limited but may be suitable for small, asymptomatic hernias.
Conclusion: Mesh-based surgery, particularly laparoscopic, are preferred for most umbilical hernia cases due to lower recurrence rates, though treatment should be individually tailored to patient and hernia characteristics.

KEYWORDS

Hernia, Umbilical, Hernia, Surgery, Laparoscopic, Surgery

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Introduction

An umbilical hernia (UH) is defined as a ventral abdominal wall defect occurring within 3 cm above or below the umbilicus, as per the European Hernia Society classification. It results from a failure of the umbilical ring to close completely, allowing protrusion of intra-abdominal contents, such as omentum or bowel, through the weakened area. UH is one of the most common surgical conditions encountered in general surgery, second only to inguinal hernias in adults [1,2].

In adults, UH may develop due to increased intra-abdominal pressure from factors like obesity, pregnancy, or ascites, or due to congenital weaknesses in the abdominal wall. The condition can range from asymptomatic to life-threatening if complications such as incarceration or strangulation occur [3,4].

This review aims to provide a comprehensive overview of UH, covering its epidemiology, clinical presentation, diagnostic methods, and both surgical and non-surgical treatment options, drawing on recent literature to guide clinical decision-making.

Epidemiology

Umbilical hernias account for 6–14% of all abdominal wall hernias in adults, with an estimated incidence of 10–15% in infants, most of which resolve spontaneously by age 2. In adults, UH is more prevalent in women, particularly during pregnancy or postpartum periods, due to increased intra-abdominal pressure [1,5,6].

Obesity (BMI >30 kg/m²) is a significant risk factor, with studies reporting a 2–3-fold higher incidence in obese individuals. Other risk factors include chronic liver disease with ascites, chronic cough, and connective tissue disorders [7,8]. A retrospective study found that UH prevalence is higher in African populations compared to Caucasian populations, potentially due to genetic predispositions in fascial strength [9].

The incidence of UH repair has risen annually, reflecting increased awareness and surgical intervention [10]. If left untreated, UH can lead to serious complications, including incarceration (10–20% of cases) and strangulation (2–5%), which may result in bowel obstruction or ischemia, necessitating emergency surgery with higher morbidity and mortality [11].

Clinical Symptoms

Umbilical hernias typically present with a palpable bulge at or near the umbilicus, observed in 90–100% of patients. This bulge is often reducible, meaning it can be pushed back into the abdominal cavity, but may become irreducible in advanced cases [12,13].

Discomfort or a sensation of pressure is reported in 50–70% of patients, particularly during activities that increase intra-abdominal pressure, such as coughing or lifting [14].

Pain, ranging from mild to severe, occurs in 20–40% of cases and is more common in larger hernias (>2 cm) or those with incarcerated contents [15].

Cosmetic concerns are noted in 30–50% of patients, especially in women [16].

In rare cases (5–10%), patients may present with symptoms of bowel obstruction, such as nausea, vomiting, or constipation, indicating potential complications [17].

Asymptomatic hernias are found in 20–30% of cases, often discovered incidentally during physical examinations [18].

Diagnostic Methods

Diagnosis of UH is primarily clinical, relying on physical examination to identify a reducible or irreducible bulge at the umbilicus. The sensitivity of clinical examination is high (95–98%), but specificity may be lower in obese patients or those with small defects [19,20].

Imaging is reserved for cases where the diagnosis is uncertain or complications are suspected. Ultrasound is the preferred initial imaging modality due to its accessibility, lack of radiation, and ability to assess hernia contents and reducibility (sensitivity 85–90%) [21].

Computed tomography (CT) scans are used for complex cases, such as suspected incarceration or strangulation, offering detailed visualization of hernia size and contents (sensitivity 90–95%) [22].

Magnetic resonance imaging (MRI) is rarely used but may be considered in pregnant patients to avoid radiation [23].

Diagnostic laparoscopy can confirm the presence of additional defects during surgical repair, particularly in patients with previous abdominal surgeries [24].

Surgical Treatment

Surgical intervention is the primary treatment for UH in adults, as spontaneous resolution is rare [25]. Surgical methods are categorized by the use of mesh versus suture repair and by the approach (open versus laparoscopic).

Suture repair versus mech repair

Suture Repair:

Suture repair, such as the Mayo technique, involves primary closure of the fascial defect using non-absorbable sutures [26]. It is commonly used for small hernias (<2 cm) due to its simplicity and ability to be performed under local anesthesia [27].

This method is characterized by lower cost, shorter operative time (20–30 minutes), and suitability for outpatient settings [28]. However, recurrence rates are high, ranging from 6–54%, particularly for defects >2 cm [29]. A randomized controlled trial reported an 11% recurrence rate for suture repair compared to 1% for mesh repair [30]. Risk factors for recurrence include BMI >30 kg/m², diabetes, and wound infection [31]. Postoperative pain is reported in 20–30% of patients, and wound complications (e.g., infection, seroma) occur in 5–10% [32].

Mesh Repair:

Mesh repair involves placing a prosthetic material (e.g., polypropylene or composite mesh) to reinforce the abdominal wall [33]. Mesh can be placed in onlay, sublay, or intraperitoneal positions [34].

Advantages of this method include significantly lower recurrence rates (2–8%) compared to suture repair [35]. A meta-analysis found a recurrence rate of 2.7% for mesh repair versus 8.2% for suture repair [36]. Mesh repairs are preferred for defects >2 cm or in patients with risk factors like obesity [37]. Drawbacks of using a mesh include higher rates of seroma (7.7%) and surgical site infection (7.3%) compared to suture repair (3.8% and 6.6%, respectively) [38]. Mesh placement requires more surgical expertise and longer operative times (40–60 minutes) [39].

Open versus Laparoscopic Surgery

Open Surgery:

Open repair involves a direct incision over the umbilicus to access and repair the hernia [40]. It is suitable for all hernia sizes and can be performed with or without mesh [41].

Open surgery compared to laparoscopic surgery is characterized by shorter operative times (30–45 minutes) and the ability to use local or regional anesthesia [16].

Open mesh repair has a recurrence rate of 2–5% for small hernias and 5–10% for larger ones [42]. However, open repair is associated with higher rates of wound complications, including infection (10–16%)[43]. Patients with BMI >30 kg/m² or defects >2 cm have higher recurrence rates [44].Open repair is preferred in emergency settings or when laparoscopic expertise is unavailable [45].

Laparoscopic Surgery:

Laparoscopic repair uses small incisions and a camera to place mesh intraperitoneally, often following Stoppa's method of posterior patching with large mesh overlap [14]. It is preferred for medium to large hernias (>2 cm) and patients with previous repairs [13].

Advantages include lower recurrence rates (0–9.4%), reduced postoperative pain, shorter hospital stays (1–2 days), and faster return to normal activities (7–14 days) [12]. Laparoscopic repair also allows identification of occult defects [19].

Disadvantages include longer operative times (45–60 minutes), the need for general anesthesia, and higher costs [25]. A meta-analysis showed laparoscopic repair has lower wound infection rates (2.35%) and recurrence rates (4.06%) compared to open repair [42] However, seroma formation is more common (13.9% vs. 4.3%) [37]. Laparoscopic repair is less suitable for very small hernias (<1 cm) due to technical complexity [46].

Non-Surgical Treatment

Non-surgical management of UH is limited and primarily involves watchful waiting for small, asymptomatic hernias (<1 cm) in patients without risk factors for complications [11] This approach is based on the low risk of incarceration in small defects (1–2%) [47].

The main reason for this approach include avoiding surgical risks, such as infection or recurrence, and no need for anesthesia [27]. Watchful waiting is particularly suitable for patients with significant comorbidities, such as uncontrolled ascites or severe cardiopulmonary disease, where surgery poses high risks [8].

Avoiding surgery includes the potential for hernia progression, with studies indicating that 10–15% of small hernias enlarge over time, increasing the risk of complications [7] Patients must be monitored regularly (every 6–12 months) to assess for symptom development or hernia growth [17].

Non-surgical management is not recommended for symptomatic hernias, defects >2 cm, or in patients with risk factors like obesity or ascites due to high complication rates [43]. There is limited evidence on conservative measures like abdominal binders, which may reduce discomfort but do not prevent progression [48].

Conclusions

Umbilical hernia is a prevalent condition requiring tailored management based on hernia size, patient characteristics, and risk factors.

Mesh repairs, particularly laparoscopic, offer superior outcomes with lower recurrence rates (2–8%) compared to suture repairs (6–54%), especially for defects >2 cm or in high-risk patients.Laparoscopic techniques provide additional benefits, including reduced postoperative pain, shorter hospital stays, and lower wound complication rates, making them the preferred approach for medium to large hernias.

Open repairs remain valuable for small hernias or in circumstances where laparoscopic expertise is limited. Non-surgical management is a viable option for small, asymptomatic hernias but requires careful monitoring due to the risk of progression.

Surgeons should weigh the benefits of reduced recurrence against potential complications like seroma or infection when choosing mesh-based repairs.

Umbilical hernias remain one of the more common abdominal hernias, making future research on optimizing mesh materials and standardizing surgical techniques imperative to further improve available treatment.

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