



CASE REPORT / ПРИКАЗ БОЛЕСНИКА

Subcutaneous onlay laparoscopic approach (SCOLA) in the treatment of epigastric hernia in an obese patient: a feasible minimally invasive option – a case report and literature review

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SUMMARY

Introduction Primary ventral hernias are a common surgical entity, with epigastric hernias representing a specific subtype. The evolution of minimally invasive surgery has led to the development of various techniques, including the subcutaneous onlay laparoscopic approach (SCOLA). This report aims to present a case of an epigastric hernia in an obese patient successfully treated with the SCOLA technique and to review the relevant literature.

Case outline A 31-year-old female patient with a body mass index of 36.7 kg/m² presented with a symptomatic epigastric hernia. The diagnosis was confirmed by clinical examination and ultrasound, which revealed a 4.3 cm fascial defect containing preperitoneal fat. The patient underwent elective SCOLA repair. The procedure involved creating a subcutaneous working space above the anterior rectus sheath, hernia sac reduction, primary closure of the fascial defect, and placement of a TiO₂ mesh fixed to the anterior rectus sheath. The surgical procedure was completed successfully without intraoperative complications. The patient was discharged on the first postoperative day. On day 14, the skin sutures were removed, revealing a well-healed wound. Follow-up examinations at three, six, and 12 months revealed no evidence of recurrence or mesh-related complications.

Conclusion The SCOLA technique represents a safe and effective minimally invasive option for the treatment of primary epigastric hernias, particularly in obese patients. It combines the benefits of mesh reinforcement with a completely extraperitoneal and extrafascial position, avoiding intra-abdominal mesh placement and its associated risks.

Keywords: epigastric hernia; SCOLA; minimally invasive surgery; ventral hernia; obesity

INTRODUCTION

Minimally invasive surgical approaches to ventral hernia repair continue to present a challenge for many surgeons, despite their well-documented advantages over open surgery. The first minimally invasive technique for ventral hernia repair was described by LeBlanc and Booth in the early 1990s, marking a significant milestone in the field [1]. Since that time, there has been a continuous effort to establish minimally invasive approaches as the standard of care, leading to the development of numerous techniques. These range from intraperitoneal onlay mesh (IPOM) procedures to various preperitoneal and extraperitoneal approaches, each with specific indications and technical nuances [2].

In recent years, Claus and Malcher introduced a completely novel concept: the subcutaneous onlay laparoscopic approach (SCOLA) [3]. Originally described for the treatment of ventral hernias associated with rectus abdominis diastasis (RAD), this technique has since been applied to a broader spectrum of conditions. Contemporary literature documents its

use in primary ventral hernias, including umbilical and epigastric hernias, both with and without concomitant diastasis [4, 5].

A primary ventral hernia is defined as a defect in the anterior abdominal wall that occurs in the absence of prior trauma or surgical intervention. These hernias are characterized and classified according to their localization and size [6]. Clinically, patients most commonly present with a visible bulge on the anterior abdominal wall, accompanied by varying degrees of discomfort, pain, and functional limitations that correlate with the size of the hernial defect. Diagnostic options include clinical examination, ultrasound imaging, and computed tomography, which together provide comprehensive anatomical information essential for surgical planning [6, 7].

Surgical intervention remains the only curative treatment modality. It is now widely accepted that minimally invasive approaches have become superior to open surgery in terms of postoperative recovery, wound complications, and hospital stay. However, the choice of operative technique depends significantly on the surgeon's experience, patient-specific

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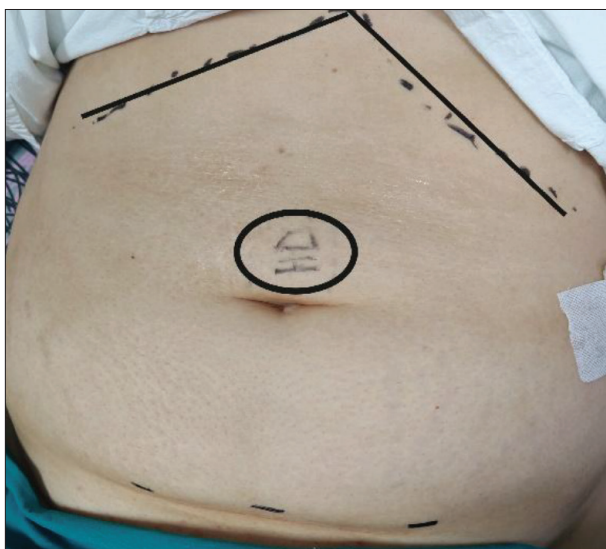


Figure 1. Preoperative marking of anatomical landmarks and planned port positions on the anterior abdominal wall

characteristics, and the availability of appropriate equipment [7, 8, 9].

The aim of this report is to present a case of a minimally invasive approach to primary ventral hernia repair in an obese patient, utilizing the SCOLA technique, and to provide a detailed description of the operative method.

CASE REPORT

A 31-year-old female patient with a body mass index of 36.7 kg/m^2 was admitted to the Department of Minimally Invasive Surgery for elective surgical treatment of an epigastric hernia. The diagnosis had been established prior to hospitalization through clinical examination and ultrasound imaging of the anterior abdominal wall. Ultrasound examination confirmed a hernial defect located approximately 4 cm above the umbilicus, with hernial contents corresponding in density to adipose tissue. The diameter of the fascial defect was measured at 4.3 cm.

Preoperatively, anatomical landmarks were marked on the patient's anterior abdominal wall, including the costal margins, the position of the hernial defect, and the planned port insertion sites. Additionally, the anesthesiology team

administered a bilateral rectus sheath block to achieve prolonged postoperative analgesia (Figure 1).

Following standard preparation of the operative field and under general endotracheal anesthesia, a 12 mm skin incision was made in the midline, at the level of a line connecting the anterior superior iliac spines. Dissection was carried down to the anterior sheath of the rectus abdominis muscle. A 12 mm working port was inserted, through which a laparoscope was introduced. Using the laparoscope, the subcutaneous space was developed laterally on both sides. Subsequently, two additional 5 mm working ports were inserted at the pre-marked positions.

Using an ultrasonic dissecting device (Harmonic scalpel), the working space was further developed along the anterior rectus sheath, progressing cranially toward the hernial defect. The defect was clearly identified, and the hernia sac was opened, revealing preperitoneal adipose tissue as its contents (Figure 2). Dissection was continued proximally toward the xiphoid process to ensure adequate space for mesh placement.

After achieving sufficient working space, the fascial defect was primarily closed using 2-0 Prolene sutures. An oval TiO_2 -coated mesh, measuring $15 \times 12 \text{ cm}$, was then introduced and positioned over the closed defect. The mesh was secured to the anterior rectus sheath with interrupted 2-0 Prolene sutures. Additionally, the umbilicus was fixed to the anterior rectus sheath using a 2-0 V-Loc™ suture to restore normal anatomical contour (Figure 3).

The subcutaneous space was desufflated, and all skin incisions were closed with interrupted sutures. The patient was discharged on the first postoperative day. Skin sutures were removed on postoperative day 14, revealing a well-healed surgical site (Figure 4). Follow-up examinations were performed at three, six, and 12 months postoperatively. No recurrence or postoperative complications were observed during this period.

Written consent was obtained from the patient for the use of medical documentation for publication.

DISCUSSION

The SCOLA technique represents a recent addition to the spectrum of minimally invasive anterior abdominal wall

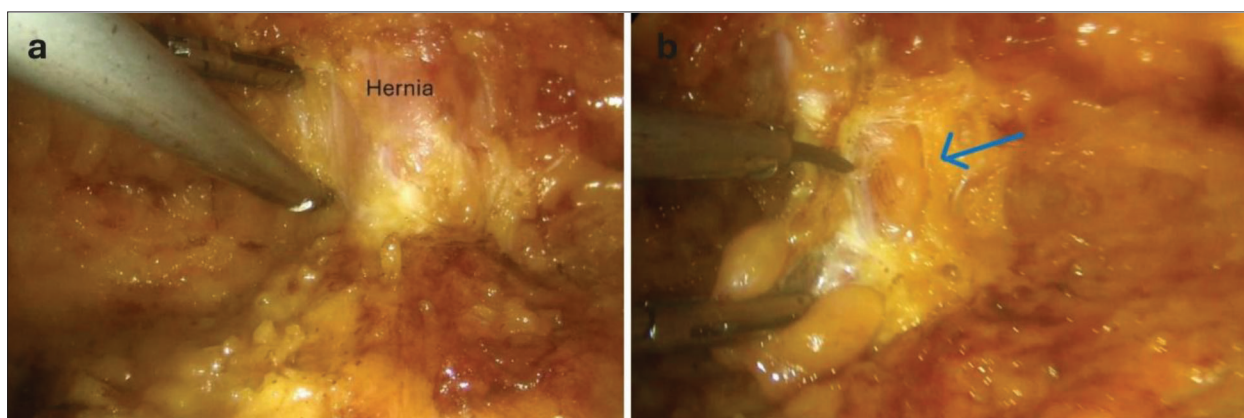


Figure 2. a, b: Intraoperative view: the hernial defect is identified, and the hernia sac is opened, revealing preperitoneal adipose tissue

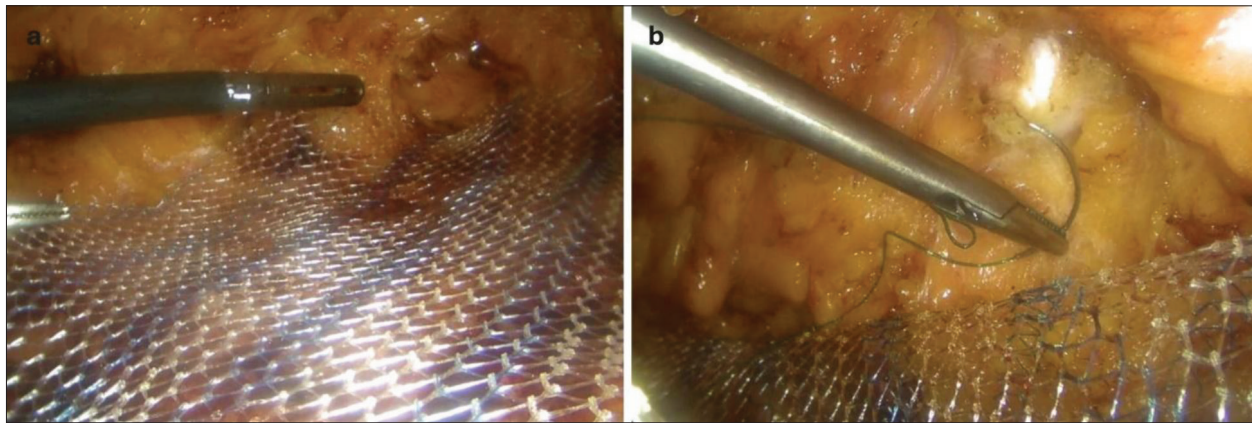


Figure 3. Intraoperative view: the TiO₂-coated mesh is positioned and fixed to the anterior rectus sheath with interrupted sutures following primary defect closure



Figure 4. Postoperative appearance at 14 days following suture removal, showing well-healed incisions and restored umbilical contour

hernia surgery. Initially described by Claus et al. in 2018 for the treatment of ventral hernias associated with rectus diastasis, its application has progressively expanded [3]. Our case demonstrates the successful application of this technique in an obese patient with a primary epigastric hernia, contributing to the growing body of evidence supporting its broader utility [4, 5, 8].

Obesity presents a particular challenge in ventral hernia repair. This patient population is at increased risk for wound complications, recurrence, seroma formation, and surgical site infections following both open and laparoscopic procedures [7]. In our patient, with a BMI of 36.7 kg/m², the choice of surgical technique was carefully considered. Traditional IPOM repair, while effective, requires entry into the peritoneal cavity and placement of an intra-abdominal mesh, which carries risks of mesh migration, visceral adhesions, and other complications [2, 9]. Recent comparative studies have demonstrated that the material cost of IPOM plus is significantly higher than that of SCOLA, which is an important consideration in contemporary healthcare systems [3, 4]. The SCOLA technique elegantly circumvents these issues by maintaining the mesh in a completely extraperitoneal and extrafascial position.

From a technical standpoint, our approach followed the principles outlined by Claus and Malcher [3], with certain modifications tailored to our patient's anatomy. Primary closure of the fascial defect prior to mesh placement, a maneuver emphasized by several authors, was performed to restore the functional integrity of the abdominal wall and to reduce the likelihood of seroma formation [4, 7]. Mehta et al. [5], in their prospective study of 33 patients undergoing SCOLA, reported no recurrences during follow-up periods ranging from 4 to 18 months, supporting the efficacy of this approach.

The choice of mesh material represents another critical consideration. We utilized a TiO₂-coated mesh, which has demonstrated favorable tissue integration properties and reduced inflammatory response in experimental studies. In the context of SCOLA repair, where the mesh is placed directly beneath the subcutaneous tissue, such properties are particularly advantageous. The fixation technique, utilizing interrupted transfascial sutures, ensures stable mesh positioning while minimizing the risk of migration. Additionally, we performed umbilicopexy to restore the natural umbilical contour, an often overlooked but aesthetically important step that contributes to patient satisfaction [10].

When comparing SCOLA to other minimally invasive approaches, several distinct advantages emerge. Unlike IPOM, it avoids peritoneal entry, thereby reducing the risk of organ injury and adhesion formation. Deshpande et al. [4] conducted a prospective observational study comparing IPOM plus with SCOLA for medium ventral hernias (2–4 cm) and found that postoperative pain was significantly lower in the SCOLA group on postoperative day 1, at discharge, and at first follow-up. This finding aligns with our experience, as our patient required minimal postoperative analgesia and was discharged on the first postoperative day. Compared to TAPP or eTEP, SCOLA does not require dissection of the retrorectus space, which can be technically demanding and time-consuming, particularly in obese patients [6, 10]. Furthermore, in patients with concomitant rectus diastasis, SCOLA offers the unique advantage of addressing both pathological conditions through a single approach [1, 8, 11].

The diagnostic pathway in our patient followed established recommendations. Ultrasound examination proved sufficient for accurate diagnosis and measurement of the fascial defect, consistent with the experience of other authors who advocate for ultrasound as a first-line imaging modality in suspected ventral hernias [6]. While computed tomography provides additional anatomical detail and is invaluable in complex or recurrent cases, our experience suggests that in straightforward primary hernias with clear clinical presentation, ultrasound alone may be adequate for surgical planning.

Postoperative recovery in our patient was rapid, with discharge on the first postoperative day and return to normal activities within two weeks. This favorable outcome aligns with published series reporting reduced postoperative pain, shorter hospital stays, and earlier return to work following SCOLA repair compared to open and intraperitoneal techniques [4, 8].

The absence of recurrence at 12-month follow-up is encouraging, although longer-term surveillance is necessary. Current literature reports low recurrence rates following SCOLA repair, with most series documenting follow-up periods of 12–24 months [4, 5, 8]. Nevertheless, the principle of mesh reinforcement of a primarily closed defect, which forms the basis of this technique, is well-established in hernia surgery and provides a sound biomechanical rationale for its efficacy.

Several limitations of this report should be acknowledged. As a single case report, our findings cannot be generalized without confirmation in larger series. Additionally, the follow-up period, while adequate for assessing early

outcomes, is insufficient to draw definitive conclusions about long-term recurrence rates. Seroma formation, reported in 10–30% of SCOLA cases in larger series [3, 4, 5], was not observed in our patient, possibly due to meticulous surgical technique. However, the primary value of this report lies in its detailed technical description and demonstration of feasibility in a challenging patient population.

The SCOLA technique represents a safe, feasible, and effective minimally invasive option for the treatment of primary epigastric hernias, particularly in obese patients. It combines the benefits of mesh reinforcement with the advantages of an extraperitoneal approach, avoiding intra-abdominal mesh placement and its associated risks. Our experience demonstrates that with appropriate patient selection and meticulous surgical technique, good outcomes can be achieved.

Ethical compliance statement: We confirm that we have read the journal's position on issues involving ethical publication and affirm that this work is consistent with those guidelines.

Ethical standards: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Conflict of interest: None declared.

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Супкутани онлеј лапароскопски приступ (SCOLA) у лечењу епигастричне херније код гојазног болесника: изводљива минимално инвазивна опција – приказ болесника и преглед литературе

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САЖЕТАК

Увод Примарне вентралне херније представљају чест хируршки ентитет, при чему епигастричне херније чине специфичан подтип. Развој минимално инвазивне хирургије довео је до појаве различитих техника, укључујући и поткожни онлеј лапароскопски приступ (SCOLA). Циљ овог рада је да прикаже случај епигастричне херније код гојазне болеснице успешно лечене SCOLA техником, уз опис оперативне технике и преглед литературе.

Приказ болесника Болесница старости 31 годину, са индексом телесне масе $36,7 \text{ kg/m}^2$, јавила се са симптоматском епигастричном хернијом. Дијагноза је потврђена клиничким и ултразвучним прегледом, којим је откривен фасцијални дефект од 4,3 cm са садржајем који је чинило преперитонеално масно ткиво. Болесници је урађена елективна SCOLA репарација. Процедура је подразумевала стварање поткожног радног простора изнад горње фасције правога мишића (*musculus rectus abdominis*), репонирање хернијалне кесе,

примарно затварање фасцијалног дефекта и постављање TiO_2 мрежице фиксиране за предњу фасцију правога мишића. Хируршка процедура је успешно завршена без интраоперативних компликација. Болесница је отпуштена првог постоперативног дана. Четрнаестог дана након операције уклоњени су кожни шавови, при чему је рана уредно зарасла. На контролним прегледима након три, шест и 12 месеци није било знакова рецидива нити компликација повезаних са мрежицом.

Закључак SCOLA техника представља сигурну и ефикасну минимално инвазивну опцију за лечење примарних епигастричних хернија, посебно код гојазних болесника. Она комбинује предности ојачања мрежицом са потпуно екстраперитонеалним и екстрафасцијалним приступом, чиме се избегава интраабдоминално постављање мрежице и пратећи ризици.

Кључне речи: епигастрична хернија; SCOLA; минимално инвазивна хирургија; вентрална хернија; гојазност