RESEARCH PAPER

Utilization of a Pre-Existing Umbilical Hernia Sac as a Camera Port in Laparoscopic Cholecystectomy with Simultaneous Mesh Hernioplasty: A Case Report

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ABSTRACT

Background: Laparoscopic cholecystectomy (LC) is the gold standard treatment for symptomatic cholelithiasis. When a concomitant umbilical hernia is present, it presents both a surgical challenge and an opportunity for efficient port placement. Traditionally, surgeons create a separate supra- or infraumbilical port to avoid the hernia defect. We present a case in which a pre-existing umbilical hernia sac was strategically utilized as the camera port site, followed by definitive mesh repair.

Case Presentation: A 70-year-old male presented with one month of right hypochondrial pain. Imaging and clinical examination confirmed symptomatic cholelithiasis with a small, reducible umbilical hernia. Laparoscopic cholecystectomy was successfully performed using the umbilical hernia sac as the camera port via an infraumbilical incision. Following completion of cholecystectomy, open mesh hernioplasty using polypropylene mesh was performed in the same operative session with uneventful recovery.

Conclusion: Using a pre-existing umbilical hernia sac as a laparoscopic camera port is a safe, feasible, and cosmetically favorable technique in carefully selected cases. This innovative approach avoids the creation of an additional fascial defect while enabling simultaneous definitive hernia repair, thereby improving operative efficiency and reducing postoperative morbidity.

Keywords: *laparoscopic cholecystectomy; umbilical hernia; laparoscopic port placement; mesh hernioplasty; cholelithiasis; laparoscopic access techniques*

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INTRODUCTION

Since its introduction in 1989, laparoscopic cholecystectomy has revolutionized the surgical management of gallbladder disease, becoming the gold standard with success rates exceeding 90% for uncomplicated cholelithiasis.1-3 The procedure offers significant advantages including reduced postoperative pain, shorter hospital stays, faster return to work, and superior cosmetic outcomes compared to open cholecystectomy.4 The umbilical port remains the preferred site for camera trocar placement due to its central location, ease of access, reduced neurovascular injury risk, and inherent cosmetic advantage.5

Umbilical hernia is among the most common ventral hernias, with an incidence of 0.5–2% in adults and significantly higher prevalence in elderly populations.6,7 The coexistence of umbilical hernia and cholelithiasis is not uncommon, particularly in elderly patients, creating a surgical dilemma. Studies show that approximately 10–15% of patients undergoing cholecystectomy may have concurrent abdominal wall hernias.8 Currently, surgeons employ several approaches: (1) avoiding the hernia defect with separate port placement and deferring hernia repair; (2) primary suture repair after LC with risk of higher recurrence (10–30%);9 or (3) mesh-based repair performed either laparoscopically using intraperitoneal onlay mesh (IPOM) technique or via conventional open approach.

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Each strategy carries distinct advantages and limitations in terms of operative time, tissue trauma, hernia recurrence rates, and postoperative complications.10 Creative utilization of existing anatomical structures offers an elegant solution to this surgical challenge. We present a case in which the umbilical hernia sac was strategically and safely converted into a camera port, transforming a potential obstacle into a practical advantage. This innovative approach enabled efficient simultaneous completion of both procedures in a single operative session while avoiding creation of additional fascial defects.

CASE PRESENTATION

Patient Demographics and Clinical Presentation

A 70-year-old male presented to the outpatient surgery clinic with a one-month history of intermittent right hypochondrial pain. The pain was dull in character, without associated fever, jaundice, vomiting, or alteration of bowel habits. The patient had no history of previous abdominal surgery or significant medical comorbidities. His medical history included well-controlled hypertension managed with antihypertensives.

Physical Examination

On physical examination, the patient exhibited mild tenderness on palpation in the right hypochondriac region without peritoneal signs. A small, soft, easily reducible umbilical swelling was noted with a positive cough impulse. The bulge had a firm fascial defect edge on reduction. There were no signs of incarceration, strangulation, erythema, or acute inflammation. No other abdominal pathology was appreciated.

Radiological and Laboratory Investigations

Ultrasonography of the abdomen revealed multiple gallstones (largest 1.2 cm) with a normal caliber common bile duct (4 mm), and no evidence of acute cholecystitis. A small umbilical hernia defect, approximately 1.2 cm in diameter with preperitoneal fat protrusion, was incidentally noted. The hernia appeared uncomplicated with no features suggestive of incarceration. Routine laboratory investigations including complete blood count, liver function tests, and serum electrolytes were within normal limits. The patient's American Society of Anesthesiologists (ASA) physical status classification was II.

Operative Planning and Informed Consent

After detailed discussion with the patient regarding the planned laparoscopic cholecystectomy and simultaneous umbilical hernia repair, the innovative approach of utilizing the hernia sac as the camera port was explained. The advantages of addressing both conditions during a single operative session, potential risks, alternative approaches, and expected outcomes were thoroughly discussed. The patient expressed understanding and provided informed consent for the procedure.

SURGICAL TECHNIQUE

The patient was positioned supine and after achievement of general anesthesia with endotracheal intubation and pneumoperitoneal insufflation, was placed in supine position with slight reverse Trendelenburg to optimize visualization.

Step 1: Access Through the Umbilical Hernia Defect

An infraumbilical incision incorporating the natural skin fold was made in a graceful curved pattern to follow natural skin tension lines. The umbilical cicatrix was identified and used as a landmark. Meticulous dissection through the skin and subcutaneous tissue was performed, carefully preserving the round ligament (ligamentum teres) remnant. Dissection was carried down to expose the anterior rectus sheath and the hernia defect. The peritoneal sac was carefully identified and gently dissected from its fascial attachments.

Critical inspection of the hernia sac was performed to evaluate for adhesions and their anatomical relationships. In this case, the sac contained only preperitoneal fat with no adherent viscera, making it an ideal candidate for the intended technique. The sac was deliberately opened under direct visualization in a controlled manner. A 10 mm Veress needle was carefully inserted through the opened hernia sac and advanced into the peritoneal cavity. Proper placement was confirmed by the aspiration test (negative for blood or bowel), drop test (sterile saline droplet fell freely), and insufflation test (no resistance to CO_2 insufflation).

Pneumoperitoneum was established gradually with carbon dioxide insufflation to a pressure of 12 mmHg to optimize visualization while minimizing cardiopulmonary effects. A 10 mm trocar was then carefully advanced through the hernia defect under laparoscopic visualization. A 30-degree angled laparoscope was introduced and the abdomen was inspected to confirm proper positioning and rule out visceral injury.

Step 2: Laparoscopic Cholecystectomy

Two additional trocars were placed under laparoscopic visualization:

- 10 mm epigastric port at the midline, 3 cm below the xiphoid process (for specimen retrieval and instrument manipulation)
- 5 mm right midclavicular port at the level of the costal margin (for Calot's triangle dissection and cystic artery identification)
- 5 mm right anterior axillary port at the level of umbilicus (for fundus retraction and gallbladder manipulation)

Standard laparoscopic cholecystectomy was performed using well-established principles:

- Fundus retracted cephalad using retracting forceps, creating Calot's triangle

- Systematic dissection and clearance of peritoneal attachments around the Calot's triangle
- Achievement of the Critical View of Safety (CVS)—clear visualization of only two structures crossing the hepatocystic triangle: the cystic artery and cystic duct—before any clipping
- Cystic artery clipped first using titanium clips, followed by cystic duct clipping
- Gentle separation of the gallbladder from the liver bed using electrocautery with careful attention to hemostasis
- Specimen placed in an endoscopic extraction bag and retrieved via the epigastric port

Hemostasis of the liver bed was confirmed with careful inspection. The hepatic bed was irrigated and inspected for bile leakage or bleeding. The abdomen was thoroughly irrigated with warm normal saline to clear any residual bile or debris. No bleeding or bile leakage was noted.

Step 3: Umbilical Hernia Repair

Following confirmation of hemostasis and completion of laparoscopic inspection, the pneumoperitoneum was carefully desufflated and the laparoscope was withdrawn. The fascial defect and hernia sac were now clearly visualized under direct vision. An open retrorectus tension-free mesh hernioplasty was performed, adhering to principles established by Rives and Stoppa that have demonstrated superior outcomes compared to other techniques.11-13

The anterior rectus sheath was dissected and the rectus muscles were separated in the midline. The retrorectus space was carefully developed with blunt dissection to create an adequate pocket for mesh placement, with planned overlap of 3-4 cm beyond the fascial defect in all directions. A 15 × 12 cm piece of polypropylene (Prolene®, Ethicon) mesh was cut to size and carefully positioned in the retrorectus space. The mesh was secured to the rectus sheath using a systematic pattern of interrupted 2-0 non-absorbable sutures (polyester) placed approximately 1 cm apart along all edges, providing secure fixation.

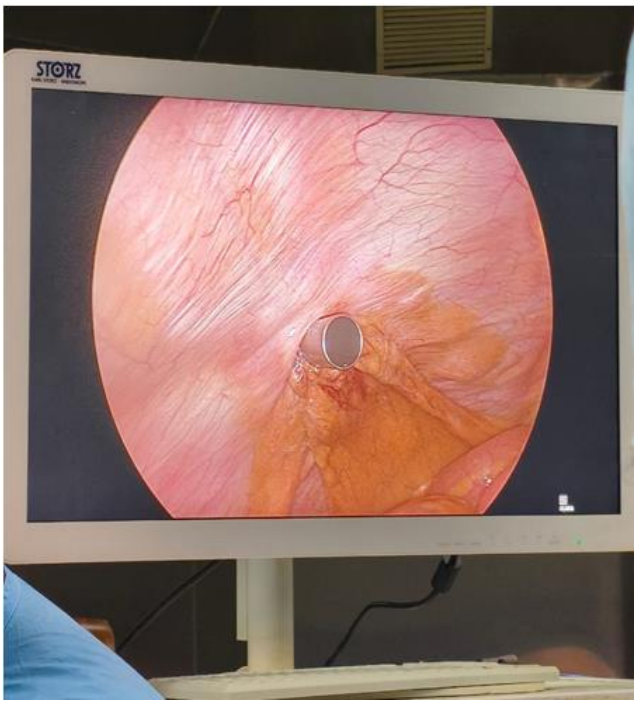
The anterior rectus sheath was meticulously closed with 2-0 absorbable suture (polyglactin) in a continuous running fashion, ensuring complete coverage of the mesh and restoration of fascial integrity. The subcutaneous layer was approximated with careful hemostasis using 3-0 absorbable suture, taking care to obliterate any potential spaces where seroma could form. The skin was closed with a running subcuticular 4-0 absorbable suture with careful attention to wound edge alignment for optimal cosmesis.

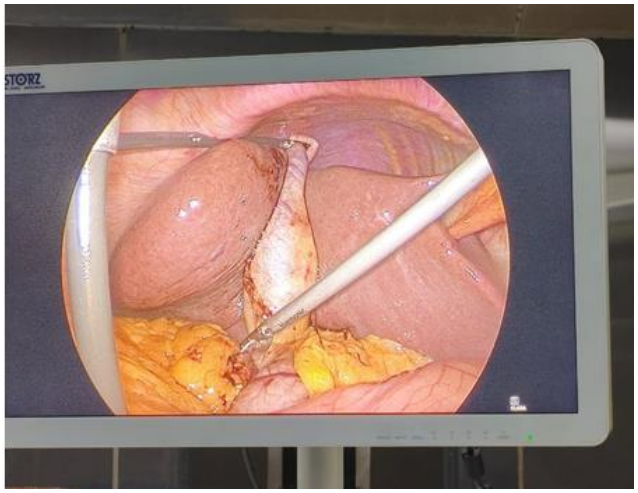
POSTOPERATIVE COURSE AND FOLLOW-UP

The patient tolerated the procedure without intraoperative complications. Total operative time was 75 minutes (45 minutes for cholecystectomy, 30 minutes for hernia repair). Estimated blood loss was minimal (approximately 30 mL). Postoperative pain was effectively controlled with multimodal analgesia including non-steroidal anti-inflammatory drugs and acetaminophen, with minimal opioid requirement.

Oral intake was successfully resumed within 6 hours of surgery without nausea or vomiting. The patient ambulated well on postoperative day 1. Prophylactic antibiotic coverage was continued for 24 hours post-operatively. The patient was discharged on postoperative day 2 in excellent condition with appropriate discharge instructions including wound care, activity limitations, and follow-up scheduling.

Follow-up examination at two weeks postoperatively revealed excellent wound healing with minimal scar erythema and no signs of infection, seroma formation, hematoma, or wound dehiscence. The patient had resumed normal daily activities. At three-month follow-up, the incision had healed beautifully with excellent cosmesis. Clinical examination revealed no palpable hernia bulge, no cough impulse, and no evidence of recurrence. The patient remained completely symptom-free with no abdominal pain or hernia-related concerns.





DISCUSSION

The concurrent presentation of symptomatic cholelithiasis and umbilical hernia in elderly patients represents a common clinical scenario that requires thoughtful surgical planning. The incidence of umbilical hernia in patients over 60 years approaches 2.5–3%, with approximately 10–15% of cholecystectomy candidates having coexistent abdominal wall hernias.6-8 Current practice regarding management of these combined pathologies remains variable, with no clear consensus on the optimal approach.

Traditional Approaches to Concomitant Pathology

Management strategies currently employed in practice include: (1) performance of LC with separate umbilical or alternative port placement, deferring hernia repair for a future planned procedure; (2) primary suture repair of the hernia after cholecystectomy; and (3) mesh-based repair using either laparoscopic IPOM or open retrorectus techniques.10 Each approach has distinct implications for operative time, tissue trauma, recovery, and long-term outcomes.

Primary suture repair of small umbilical hernias without concomitant procedures carries reported success rates of 90–95%; however, when combined with other procedures, recurrence rates increase to 10–30% due to increased fascial stress and compromised healing.9 Primary repair fails to address the underlying fascial weakness and lacks evidence for long-term durability, particularly in elderly populations with diminished collagen synthesis and tissue

Laparoscopic IPOM techniques have gained popularity due to lower pain profiles and faster recovery; however, long-term seroma formation, mesh migration, and port-site hernia rates can be significant.14,15 The retrorectus open mesh technique, as employed in our case, demonstrates consistently superior outcomes with hernia recurrence rates of 0–5% and superior long-term patient satisfaction.11-13

The Novel Technique: Strategic Use of Hernia Sac as Port

The approach presented in this case report—utilizing the hernia sac itself as the camera port access site—offers several compelling advantages that have not been extensively documented in the surgical literature:

1. Elimination of Additional Fascial Defects

A primary advantage is the complete elimination of creating a new fascial defect. Standard LC requires a 10 mm umbilical fascial defect for camera trocar placement. When combined with hernia repair, conventional approaches create two separate fascial defects: one for the camera port (which typically heals by secondary intention) and another resulting from the hernia itself. The cumulative fascial disruption increases the risk of port-site hernias, a complication reported in 0.5–2% of laparoscopic cases but up to 5–10% when multiple fascial defects exist.16 By strategically utilizing the existing hernia defect as the port site, fascial continuity disruption is minimized to a single existing defect, theoretically reducing overall hernia risk.

2. Conversion of Anatomical Challenge to Surgical Advantage

The hernia sac represents an existing anatomical pathway to the peritoneal cavity. Rather than avoiding this structure, utilization of the sac transforms it into a strategic advantage. The infraumbilical approach affords excellent cosmetic placement while providing safe peritoneal access. The curved infraumbilical incision following natural skin tension lines produces superior cosmetic outcomes compared to traditional umbilical incisions.

3. Enhanced Safety Through Direct Visualization

Critical to the safety of this technique is the ability to inspect the hernia sac under direct visualization before trocar insertion. This allows identification and assessment of sac contents, evaluation of adhesions, confirmation of absence of incarcerated bowel, and careful controlled opening of the sac. This methodical approach minimizes the risk of visceral injury compared to blind trocar insertion. The surgeon gains anatomical knowledge of the specific patient's hernia before establishing pneumoperitoneum, allowing risk stratification and technique modification as needed.

4. Simultaneous Definitive Treatment in Single Session

This approach enables simultaneous completion of both cholecystectomy and definitive hernia repair in a single operative session. This represents significant efficiency gains: one anesthesia induction, single operative time, reduced total surgical cost, elimination of need for future hernia repair surgery, and improved patient acceptance. Studies demonstrate that staged procedures carry cumulative morbidity and extended disability compared to single-session surgery.17 Patients achieve complete resolution of both conditions during initial surgery.

5. Improved Postoperative Quality of Life and Cosmesis

By avoiding creation of multiple fascial defects and maintaining laparoscopic technique for cholecystectomy, postoperative pain is minimized, enabling faster functional recovery. The infraumbilical curved incision provides excellent cosmetic placement with superior scar concealment compared to traditional umbilical approaches. Patients achieve symptom resolution for both conditions simultaneously.

TECHNICAL CONSIDERATIONS AND SAFETY MANDATES

Successful and safe application of this technique requires meticulous adherence to several critical principles:

Patient Selection: This technique should be strictly reserved for carefully selected patients: (1) elective cases with uncomplicated symptomatic cholelithiasis; (2) small to moderate hernia defects (typically ≤3 cm); (3) uncomplicated, easily reducible hernias without incarceration or strangulation; (4) minimal or absent sac adhesions; and (5) absence of acute cholecystitis or bile peritonitis. Patients with significant medical comorbidities or compromised immune status are poor candidates.

Sac Inspection and Assessment: Meticulous dissection and inspection of the hernia sac under direct vision is mandatory. The surgeon must carefully identify the relationship of sac contents to viscera, note any adhesions, confirm viability of any enclosed bowel, and assess sac thickness and integrity. In cases with questionable adhesions or suspicious findings, conversion to standard port placement is prudent.

Controlled Pneumoperitoneum Establishment: Use of a Veress needle with confirmation of proper placement via aspiration, drop, and insufflation tests is essential before advancing the larger trocar. Conservative initial insufflation pressure (8–10 mmHg) allows inspection of the insertion site before increasing to operative pressure.

Laparoscopic Oversight: The 30-degree angled laparoscope provides optimal visualization of trocar insertion and early intra-abdominal structures, allowing recognition of inadvertent visceral trauma or unexpected pathology.

Mesh Selection and Fixation: Use of appropriate mesh material (polypropylene for retrorectus placement) with adequate sizing (3–4 cm overlap in all directions) and secure fixation with interrupted, non-absorbable sutures ensures optimal long-term reinforcement and recurrence prevention.

LIMITATIONS AND CONTRAINDICATIONS

This technique carries important limitations that must be respected:

Acute cholecystitis with purulent inflammation, bile peritonitis, or perforation creates a contaminated operative field unsuitable for mesh placement due to unacceptable infection risk. Standard port placement with deferred hernia repair is appropriate in such cases.

Incarcerated or strangulated hernias require urgent decompression and assessment of bowel viability; the controlled, elective approach described here is contraindicated.

Large defects (>3–4 cm) with significant intraperitoneal adhesions are not suitable for this technique; conversional approach with separate port placement is safer.

Patients with suspected enterobiliasis, complex biliary pathology requiring ERCP or cholangiography, or anatomical variants should be managed conventionally.

Patients with contraindications to laparoscopy (uncorrected coagulopathy, severe cardiopulmonary disease precluding pneumoperitoneum) are not candidates.

Clinical Implications and Future Directions

This case demonstrates that thoughtful surgical planning and creative technical approaches can transform potential challenges into strategic advantages. The technique expands the armamentarium available to surgeons managing patients with concomitant cholelithiasis and umbilical hernia. While our single case report provides proof of concept, the generalizability and optimal patient selection criteria require further investigation.

We anticipate that prospective case series comparing this technique with conventional approaches would provide valuable data regarding operative time, blood loss, pain profiles, recovery parameters, recurrence rates, and patient satisfaction. Longer-term follow-up (>1 year) will be important for definitive assessment of hernia recurrence and patient outcomes. Development of standardized selection criteria and technique protocols would facilitate broader adoption and study.

CONCLUSION

Utilization of a pre-existing umbilical hernia sac as a camera port during laparoscopic cholecystectomy is a feasible, safe, and cosmetically favorable technique when judiciously applied in appropriately selected patients. This innovative approach elegantly eliminates the need for creating an additional fascial defect while enabling simultaneous definitive hernia repair, thereby maximizing operative efficiency, reducing overall surgical trauma, and improving patient outcomes. The technique exemplifies how careful patient selection, meticulous surgical technique, and creative problem-solving can improve surgical care. Success requires strict adherence to selection criteria, mandatory direct visualization and assessment of the hernia sac before trocar insertion, and recognition of absolute contraindications. While this report describes a single successfully executed case, we believe the technique merits consideration in the surgical armamentarium for selected patients with uncomplicated cholelithiasis and reducible umbilical hernias. Future prospective studies and case series are warranted to establish optimal patient selection criteria, document long-term outcomes including hernia recurrence rates, and compare this approach with conventional management strategies. We recommend consideration of this approach by experienced laparoscopic surgeons managing patients who meet the stringent selection criteria delineated in this report.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest related to this work..

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