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RIGHT SUBDIAPHRAGMATIC ABSCESS FOLLOWING CHOLECYSTECTOMY: A CASE REPORT AND LAPAROSCOPIC MANAGEMENT

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ABSTRACT
Subdiaphragmatic abscess is a rare but clinically significant postoperative complication that may occur following laparoscopic cholecystectomy, commonly secondary to retained infected bile or spilled gallstones. Delayed presentation often poses diagnostic and therapeutic challenges because symptoms may be nonspecific and appear months or years after the initial surgery. We report the case of a 74-year-old male who presented with swelling and discomfort in the right hypochondriac region with a previous history of cholecystectomy. Contrast-enhanced computed tomography of the abdomen demonstrated a right-sided subdiaphragmatic lentiform abscess collection measuring 100 × 80 × 15 mm with involvement of the adjacent rectus abdominis muscle and indentation over the hepatic capsule. Additional findings included mild bilateral perinephric fat stranding, small bilateral inguinal hernias, and atheromatous vascular calcifications. Microbiological evaluation of the drained pus showed no bacterial growth, while CBNAAT testing for tuberculosis was negative. Considering the large size and complex anatomical location of the abscess, the patient underwent diagnostic laparoscopy with adhesiolysis, abscess drainage, and extensive peritoneal lavage. The postoperative recovery was uneventful with significant clinical improvement. This case emphasizes the importance of maintaining a high index of suspicion for delayed postoperative intra-abdominal abscesses in patients with previous laparoscopic cholecystectomy. Cross-sectional imaging plays a crucial role in diagnosis and operative planning. Laparoscopic drainage remains a safe and effective minimally invasive therapeutic option for large or anatomically challenging subdiaphragmatic abscesses, offering effective source control with reduced postoperative morbidity.

KEYWORDS: Subdiaphragmatic abscess, laparoscopic cholecystectomy, retained gallstones, postoperative abscess, laparoscopic drainage, peritoneal lavage.

INTRODUCTION
Subdiaphragmatic abscess is an uncommon but clinically significant postoperative complication that may occur following abdominal surgeries, particularly hepatobiliary procedures such as cholecystectomy. Although laparoscopic cholecystectomy remains the gold standard treatment for symptomatic gallstone disease because of its minimally invasive nature, reduced postoperative pain, and shorter hospital stay, it is not devoid of complications [1]. One of the recognized intraoperative events during laparoscopic cholecystectomy is spillage of bile or gallstones into the peritoneal cavity, which may subsequently act as a nidus for chronic inflammation and abscess formation if not adequately retrieved [1].
The incidence of retained gallstones during laparoscopic cholecystectomy has increased with the widespread adoption of minimally invasive surgical techniques. While most spilled gallstones remain clinically silent, a small proportion may result in delayed complications such as intra-abdominal abscesses, fistulae, adhesions, and abdominal wall collections months or even years after surgery [4]. Subdiaphragmatic abscesses are particularly important because of their proximity to the diaphragm, liver, and thoracic cavity, often presenting with nonspecific symptoms that can delay diagnosis and management.
Cross-sectional imaging, especially contrast-enhanced computed tomography (CT), plays a crucial role in identifying the location, extent, and associated involvement of adjacent structures in postoperative intra-abdominal abscesses [2]. Management strategies include antimicrobial therapy, image-guided percutaneous drainage, and surgical intervention depending on the size, complexity, and accessibility of the collection [2,3]. In selected patients with organized or anatomically challenging collections, laparoscopic drainage offers the advantage of direct visualization, adhesiolysis, complete evacuation of pus, and peritoneal lavage with reduced morbidity compared to open surgery.

We report a rare case of a delayed right subdiaphragmatic abscess in a 74-year-old male with previous cholecystectomy, successfully managed by diagnostic laparoscopy with adhesiolysis and peritoneal lavage. This case highlights the importance of maintaining a high index of suspicion for delayed postoperative complications and demonstrates the effectiveness of minimally invasive surgical management in complex intra-abdominal abscesses.

Case Presentation

A 74-year-old male presented to the Department of General Surgery with complaints of progressive swelling and discomfort in the right hypochondriac region for several days. The patient also reported dull aching pain over the right upper abdomen associated with localized tenderness. There was no history of fever with chills, jaundice, vomiting, altered bowel habits, or significant weight loss. The patient was a known case of previous cholecystectomy performed several years earlier for symptomatic gallstone disease.

On clinical examination, the patient was conscious, oriented, and hemodynamically stable. Local examination revealed fullness and mild tenderness over the right hypochondriac region without obvious skin discoloration or sinus formation. No generalized peritonitis was noted.

Radiological Evaluation

To evaluate the swelling, a contrast-enhanced computed tomography (CT) scan of the whole abdomen was performed from the diaphragm to the pubic symphysis. Imaging demonstrated a right-sided subdiaphragmatic lentiform collection measuring approximately 100 mm × 80 mm × 15 mm involving the anterior right subdiaphragmatic region. Posteriorly, the collection caused indentation over the capsular surface of the liver with associated thickening of the adjacent peritoneal fascia. Involvement of the adjacent right rectus abdominis muscle was also noted.

Additional incidental findings included:

- Mild bilateral perinephric fat stranding
- Intramuscular lipoma in the right serratus anterior muscle
- Microliths/Randall's plaques in the left kidney
- Small bilateral inguinal hernias
- Atheromatous calcification of the aorta and its branches

Based on the radiological findings and previous surgical history, a diagnosis of right subdiaphragmatic abscess in post-cholecystectomy status was established.

Laboratory Investigations

Baseline hematological and biochemical investigations were performed preoperatively.

Hematological Parameters

Investigation	Value
Hemoglobin	11.2 g/dL
Total leukocyte count	14,800 cells/mm³
Neutrophils	82%
Lymphocytes	12%
Platelet count	2.4 lakhs/mm³

Biochemical Parameters

Investigation	Value
Blood urea	32 mg/dL
Serum creatinine	1.1 mg/dL
Total bilirubin	0.8 mg/dL
AST	34 U/L
ALT	30 U/L
Alkaline phosphatase	126 U/L
Serum sodium	136 mEq/L
Serum potassium	4.1 mEq/L

Microbiological Evaluation

Pus obtained intraoperatively was sent for microbiological analysis.

Pus Culture and Sensitivity

- Gram stain:
  - No organisms seen in direct smear
- Culture:
  - No growth in culture

The sterile culture result was likely attributable to prior antibiotic administration before sample collection.

CBNAAT / GeneXpert MTB/RIF Ultra

- Sample: Tissue/Pus specimen
- Result:
  - *Mycobacterium tuberculosis not detected*

These findings ruled out tuberculous etiology of the abscess.

Surgical Management

Considering the size of the abscess, persistent symptoms, and anatomical location of the collection, the patient was planned for surgical intervention.

The patient underwent:

- Diagnostic laparoscopy
- Adhesiolysis
- Drainage of right subdiaphragmatic abscess
- Thorough peritoneal lavage

Intraoperatively, dense adhesions were noted in the subhepatic and subdiaphragmatic regions. Approximately 50ml of purulent fluid collection was identified and completely evacuated. Adhesiolysis was carefully performed to release loculations and facilitate complete drainage. Copious warm saline lavage was administered, and a drain was placed in the subdiaphragmatic space.

Postoperatively, the patient was managed with:

- Intravenous broad-spectrum antibiotics
- Analgesics
- Intravenous fluids
- Proton pump inhibitors
- Respiratory physiotherapy and early ambulation

The postoperative period was uneventful. The patient showed gradual clinical improvement with reduction in abdominal pain and swelling. Drain output progressively decreased, and the drain was removed subsequently. The patient tolerated oral feeds and was discharged in stable condition with advice for regular follow-up.

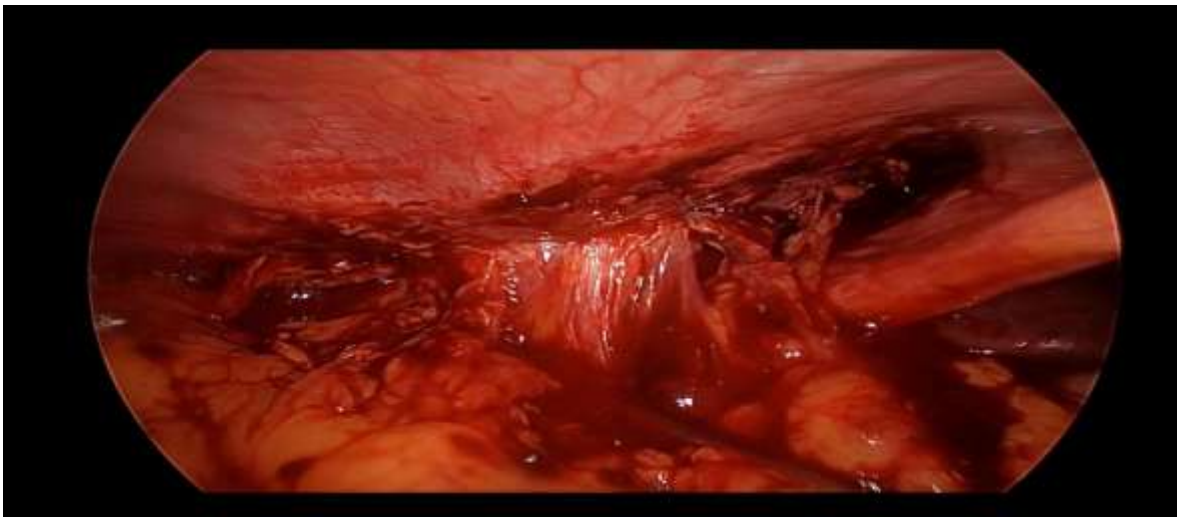

Fig 1 Initial visualization of the right subdiaphragmatic space. The laparoscopic view demonstrates dense fibrinous adhesions and organized collections between the undersurface of the right hemidiaphragm and the hepatic dome.

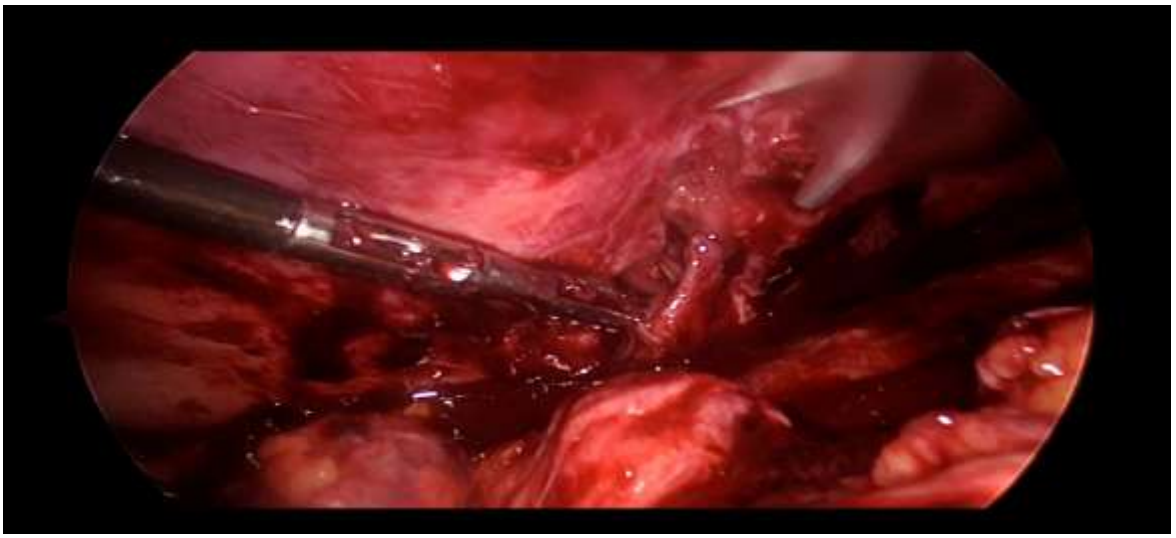

Fig 2 Laparoscopic breakdown of loculations. Blunt dissection is utilized to carefully mobilize the right hepatic lobe, separate the fibrinous bands, and safely enter the primary abscess cavity.

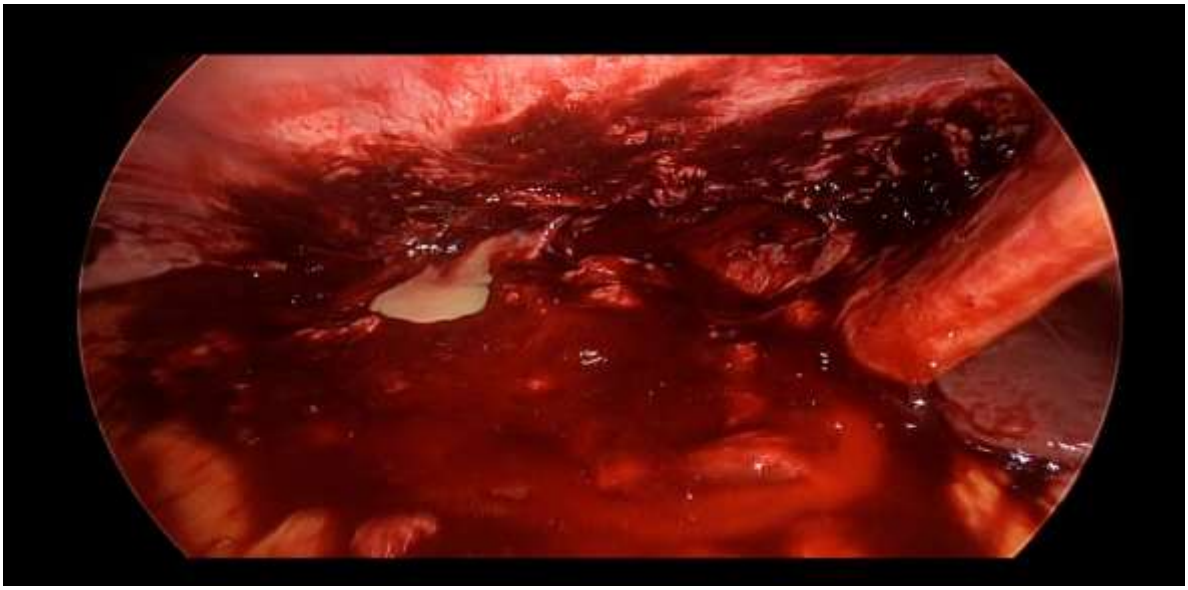

Fig 3 Evacuation of the abscess cavity. Opening the loculated space reveals the release of frank purulent exudate intermixed with serosanguinous fluid pooling in the right subdiaphragmatic space.

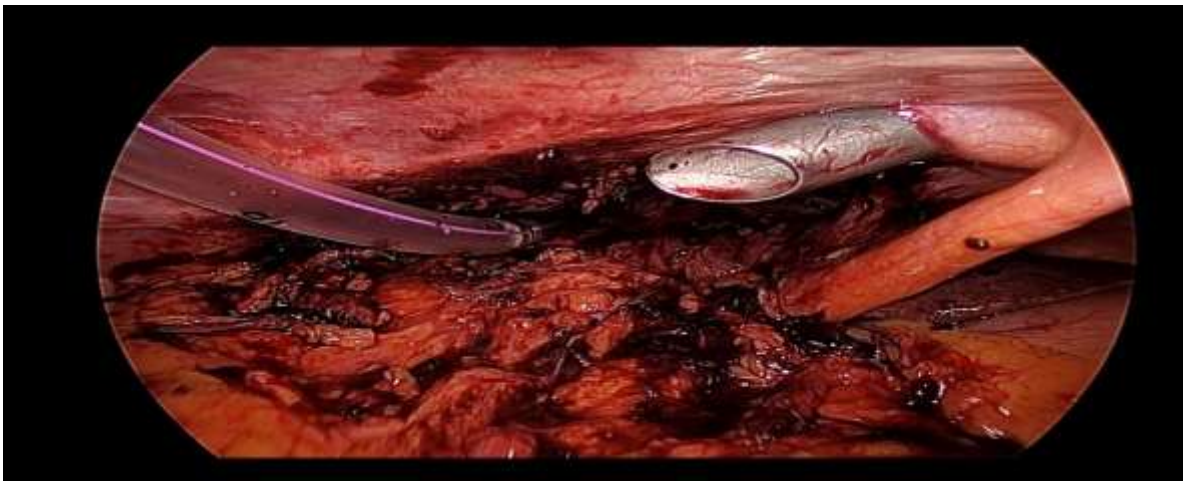

Fig 4 Laparoscopic lavage and clearance. Copious irrigation and targeted suctioning of the right subdiaphragmatic space are performed to evacuate purulent debris, breakdown residual micro-abscesses, and thoroughly wash the cavity prior to drain placement.

DISCUSSION

Laparoscopic cholecystectomy is currently considered the gold standard treatment for symptomatic gallstone disease because of its minimally invasive nature, reduced postoperative pain, shorter hospitalization, and early recovery [1]. However, with the increasing number of laparoscopic procedures, procedure-related complications such as gallbladder perforation with spillage of bile and gallstones are being increasingly recognized [1]. Spillage of gallstones during surgery has been reported in nearly 15–40% of laparoscopic cholecystectomies, although only a small proportion of patients subsequently develop clinically significant complications [8].

Retained or unretrieved gallstones may remain asymptomatic for prolonged periods but can occasionally act as a nidus for chronic inflammation and infection, resulting in delayed abscess formation [4]. Quinn et al. reported delayed gallstone abscess formation presenting nearly ten years after laparoscopic cholecystectomy, emphasizing the prolonged latent period associated with retained stones [1]. Similarly, Perrotti et al. highlighted that retained gallstones may lead to intra-abdominal abscesses, inflammatory masses, adhesions, and chronic sinus tracts long after the primary surgery [4]. In the present case, the patient developed a large right subdiaphragmatic abscess in the setting of previous cholecystectomy, suggesting delayed postoperative infective sequelae possibly secondary to retained infected bile or spilled gallstones.

Subdiaphragmatic abscesses are uncommon but potentially serious because of their close anatomical relationship with the diaphragm, liver, and pleural cavity. Clinical manifestations are often nonspecific and may include abdominal pain, swelling, fever, malaise, or respiratory symptoms, leading to delayed diagnosis [2]. Contrast-enhanced computed tomography remains the imaging modality of choice for evaluating postoperative intra-abdominal collections, as it accurately defines the size, extent, anatomical relations, and involvement of adjacent structures [2]. In the present patient, CT imaging demonstrated a right-sided subdiaphragmatic lentiform collection measuring 100 × 80 × 15 mm with indentation over the liver capsule and involvement of the adjacent rectus abdominis muscle, thereby facilitating precise diagnosis and operative planning.

Microbiological analysis of the drained pus in the present case demonstrated no organisms on Gram stain and no growth on culture, while CBNAAT testing for Mycobacterium tuberculosis was negative. Sterile cultures in postoperative abscesses may occur secondary to prior antibiotic administration or low bacterial burden [3]. Similar culture-negative abscesses related to retained gallstones have been documented in previous reports [5,6]. Exclusion of tuberculous etiology was particularly important in this elderly patient because chronic intra-abdominal collections may occasionally mimic abdominal tuberculosis in endemic regions.

Management of intra-abdominal abscesses generally involves broad-spectrum antimicrobial therapy combined with adequate drainage of the collection [2]. Percutaneous image-guided drainage is widely accepted as the initial minimally invasive approach because of lower morbidity and cost [2,3]. However, surgical drainage becomes necessary in cases involving multiloculated collections, inaccessible anatomical locations, dense adhesions, failed percutaneous drainage, or suspicion of retained gallstones [7]. In the present case, the large organized subdiaphragmatic collection with adjacent muscle involvement and complex anatomical location made laparoscopic drainage the preferred therapeutic option.

Laparoscopic drainage offers several advantages including direct visualization of the abscess cavity, effective adhesiolysis, complete evacuation of purulent material, retrieval of retained debris or gallstones when present, and thorough peritoneal lavage while avoiding the morbidity associated with open surgery [7]. Kaplan et al. demonstrated successful laparoscopic exploration and retrieval of retained gallstones in patients presenting with delayed abscesses following cholecystectomy [7]. Furthermore, Nooghabi et al. emphasized that meticulous retrieval of spilled gallstones and extensive irrigation during the initial surgery are crucial preventive measures against delayed infective complications [8]. Earlier studies by Woodfield et al. and Brockmann et al. also documented that unretrieved gallstones may result in chronic inflammatory complications, abscesses, fistulae, and adhesions requiring surgical intervention [9,10].

The present case highlights the importance of maintaining a high index of suspicion for delayed postoperative complications in patients with previous laparoscopic cholecystectomy presenting with atypical abdominal swelling or pain. Early radiological diagnosis and timely minimally invasive surgical management can significantly reduce morbidity and improve patient outcomes.

CONCLUSION

Subdiaphragmatic abscess is a rare but clinically significant delayed complication following laparoscopic cholecystectomy, frequently associated with retained gallstones or postoperative contamination. The condition may present months or years after surgery with nonspecific clinical features, making early diagnosis challenging. Contrast-enhanced CT imaging plays a vital role in identifying the extent and anatomical relations of the abscess cavity. Although percutaneous drainage may be effective in selected cases, laparoscopic drainage remains a safe and highly effective treatment modality for large, organized, or anatomically difficult collections. Careful intraoperative retrieval of spilled gallstones and adequate peritoneal lavage during cholecystectomy are essential to minimize delayed postoperative complications.

Conflicts of Interest None.

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