CASE REPORT

A Case of Bilateral Subphrenic Abscess Mimicking Bilateral Postoperative Pleural Effusion

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Abstract

Despite the development of effective antibiotics, subphrenic abscess continues to be a significant clinical problem. The formation of the subphrenic abscess occurs after intestinal contents and gut bacteria contaminate the abdominal cavity. Here, we report a case of a bilateral subphrenic abscess mimicking a bilateral pleural effusion and the symptoms appeared 1 year after the last abdominal operation. The uniqueness of this case was its late presentation and bilateral distribution, mimicking a bilateral pleural effusion.

Keywords: Bilateral, Mimicking, Pleural effusion, Subphrenic abscess.

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Learning Points

- Subphrenic abscess with bilateral distribution mimicking bilateral pleural effusion.
- It developed postoperatively 1 year after the surgery.
- A chest radiograph both in posterior–anterior and lateral view supplemented with abdominal ultrasound or CT scan aids in the diagnosis of subphrenic abscess.
- A primary subphrenic abscess is very rare, whereas secondary abscess is more common, with right-suprahepatic space having majority of the incidences.
- Interventional radiology-guided drainage is the most preferred treatment modality, the failure of which would demand for surgical interventions.

Background

Subphrenic abscess, often known by the famous aphorism, pus somewhere, pus nowhere, and pus under the diaphragm is characterized by a collection of infected fluid between the diaphragm, liver, and spleen. The subphrenic space lies between the diaphragm above and the transverse and mesocolon below.[1] The exact frequency of subphrenic abscess is not known and is considered very rare.[2] It typically develops 3–6 weeks after abdominal surgery involving the stomach, duodenum or colon, bile ducts, appendix, or a splenectomy.[3] Chest X-rays often show abnormalities in the lungs such as basal atelectasis, lower lobe consolidation, or pleural effusion.[4] Treatment includes drainage and appropriate antibiotics. Here, we report a case of a bilateral subphrenic abscess mimicking a bilateral pleural effusion, and the symptoms appeared 1 year after the last abdominal operation. The uniqueness of this case was its late presentation and bilateral distribution, mimicking a bilateral pleural effusion.

Case Description

A female in her late 30s presented with a history of high fever for 2 months followed by a productive cough for 3 weeks. Fever was intermittent in nature, often lasting for 3–4 hours, and was associated with chills and rigor. Systemic symptoms included malaise, weight loss, and anorexia. The patient underwent several laparotomies and abdominal surgeries prior to this episode. The first one was 4 years back when she underwent repair of bowel due to uterine perforation following medical termination of pregnancy. The second and third one were 2 and 1 year back for appendicectomy and repair of incisional hernia, respectively. She had no history of diabetes, hypertension, alcohol intake, smoking, any recent travel, blood transfusion, or keeping any pets. No history of any long-term medication or immunosuppressive drugs was present. Clinical examination revealed moderate pallor, grade-3 clubbing, bipedal pitting edema with tachycardia, and tachypnea. She was febrile with a temperature of 38 °C, blood pressure was 112/70 mm of Hg, and oxygen saturation was 95% on room air. On systemic examination, there were bibasilar coarse crepitations with multiple old-healed abdominal scars.

Investigations

The investigation panel revealed hemoglobin (Hb) of 8.8 grams/deciliter, a total white cell count (WCC) of 15,000/cubic millimeter with differential count (DC) as neutrophils (*N*) = 83%. C-reactive

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Table 1: Final investigation panel showed the following

Investigations	*Results*	*Reference range*
Hemoglobin (Hb)	8.8 gm/dL	Male: 13–18 gm/dL Female: 11.5–16.5 gm/dL
Total leukocyte count (TC)	15,000/mm^3	4000–11,000/mm^3
Differential leukocyte count (DC)	*N* = 83%, L = 15%, M = 01%, E = 01%	*N* = 40–60%, L = 20–40%, M&E = 2–8%
Platelet count	263,000/cmm	1.5 lac–4.5 lac/cmm
Blood urea nitrogen (BUN)	12.0 mg/dL	6–24 mg/dL
Serum urea	18.71 mg/dL	5–20 mg/dL
Serum creatinine	0.96 mg/dL	Male: 0.74–1.35 mg/dL Female: 0.59–1.04 mg/dL
Calcium	9.31 mg/dL	9–10.5 mg/dL
Corrected calcium	10.9 mg/dL	9–10.5 mg/dL
Phosphorus	3.36 mg/dL	3.4–4.5 mg/dL
Alkaline phosphatase (ALP)	172 IU/L	44–147 IU/L
Albumin	2.8 gm/dL	3.5–5.5 gm/dL
C-reactive protein (CRP)	72 mg/dL	<4.0 mg/dL

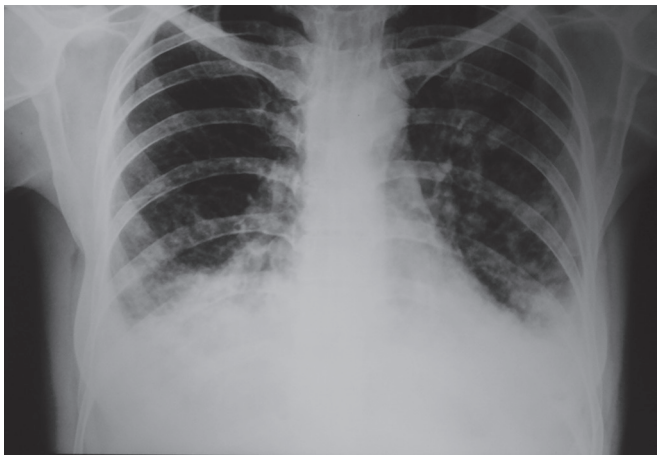

Fig. 1: Chest radiograph in PA view of an adult female showing loss of bilateral diaphragmatic shadow with obscured costophrenic angle

protein (CRP) = 72 mg/dL (Table 1). A chest radiograph revealed loss of bilateral diaphragmatic shadow with obscured costophrenic angle (Fig. 1). Based on the chest radiograph, a contrast-enhanced computed tomographic (CECT) scan of the thorax and abdomen was done, which showed bilateral subphrenic abscess (Fig. 2). Serology for hepatitis C (HCV) and hepatitis B (HBV) was negative and nonreactive for human immunodeficiency virus (HIV) I and II. Sputum for acid-fast bacilli (AFB) was negative on two samples; sputum for Gram stain and culture grew *Escherichia coli*-extended spectrum beta-lactamase (ESBL) strain and the patient was started on intravenous meropenem.

Differential Diagnosis

The causes of postoperative pleural effusion and differential diagnosis include reactive pleural effusion secondary to diaphragmatic irritation, basal atelectasis, pulmonary embolism, bilateral basal pneumonia, heart failure, hypoalbuminemia due to any cause like chronic liver disease, nephrotic syndrome, subphrenic abscess, or any underlying gastrointestinal malignancy.[4]

Treatment

Following CT scan, an ultrasound-guided pigtail catheter was inserted to drain the abscess. Culture of pus revealed growth of *E. coli*. Culture for *Mycobacterium tuberculosis* was negative. Antibiotic was given according to the culture and sensitivity report, which showed sensitivity to Meropenem to which the patient responded well.

Follow-up

Follow-up ultrasound scan (US) of the abdomen revealed no significant collection. During discharge, the patient was afebrile with normal white cell counts and improved CRP levels. She remained well and had a successful recovery.

Discussion

The formation of the subphrenic abscess occurs after intestinal contents and gut bacteria contaminate the abdominal cavity. A primary subphrenic abscess develops without the introduction of bacteria into this space. Although this is rare and the exact incidence is largely unknown, approximately 80% of subphrenic abscesses follow intra-abdominal surgery.[5] The incidence of subphrenic abscess is approximately 50% on the right side, 40% on the left side, and 25% bilateral subphrenic abscess can be found.[2,6] There is strong evidence that bilateral cases are associated with malignant diseases of the surrounding organs such as the stomach and cecum. This is caused by a perforation of the intestine leading to subsequent peritonitis.[4] In all cases of contralateral and bilateral effusion, the subphrenic abscess is generally unilateral and almost always on the right side.[1] Rare cases with only extraperitoneal or both extraperitoneal and intraperitoneal involvement have also been reported.[2] In a study by Harley et al. with 182 cases, 10 reported bilateral abscesses (5.4%), of which 9 died (90% mortality). The high mortality rate is remarkable.[6]

Predisposing factors include abdominal surgery such as gastric and intestinal perforation with significant contamination of the gastrointestinal and hepatobiliary tract accounting for 52% of cases, colon and abdominal trauma accounting for 19% of cases,

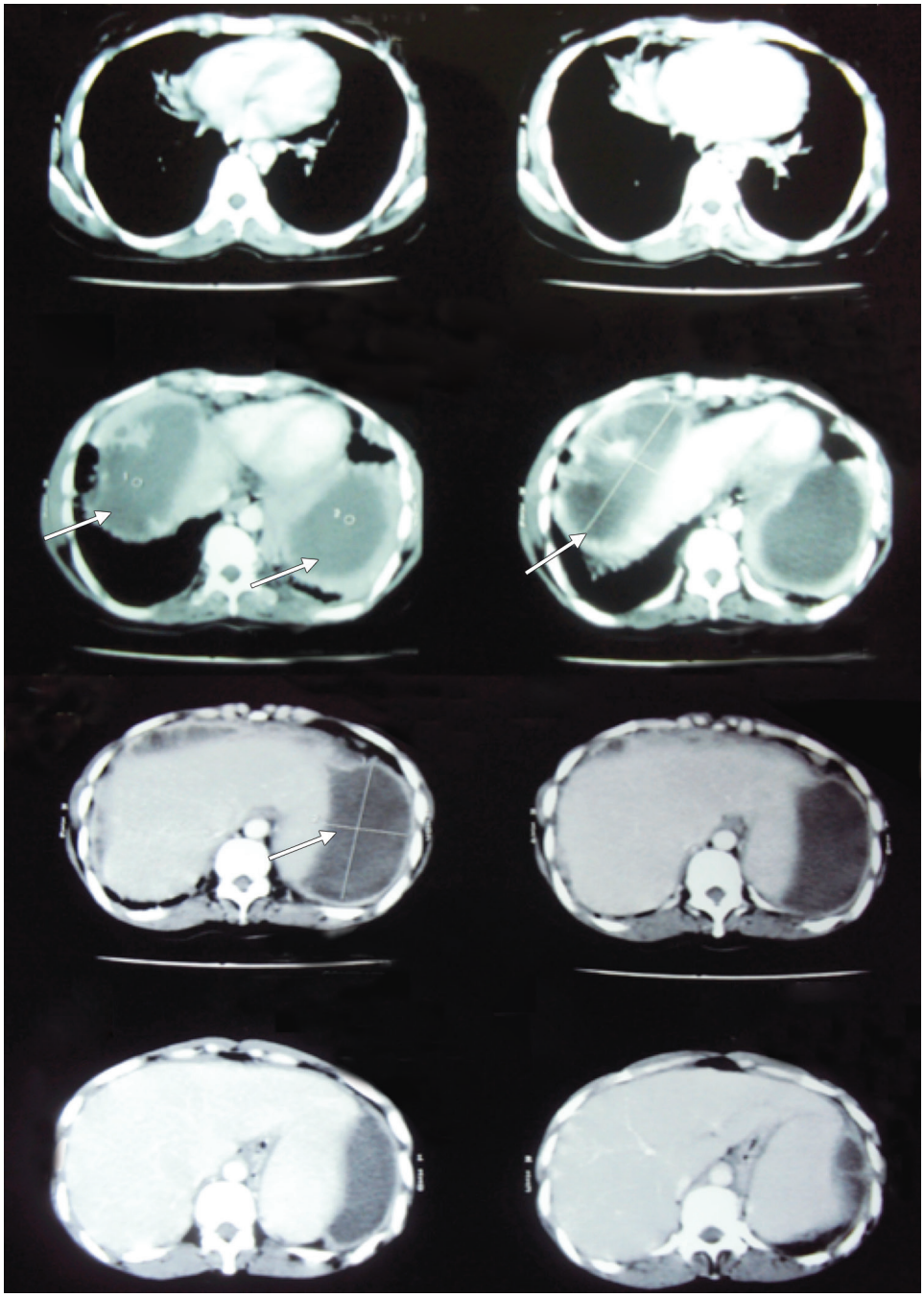

Fig. 2: Axial CT scan with contrast of thorax and abdomen showing bilateral large subdiaphragmatic abscess (marked with arrows)

and appendicitis with perforated appendix, accounting for about 8% of the total number of cases.[3] The most common pathogens come from organisms found in the gut and cecum (aerobic bacteria such as *E. coli, Enterobacter, Staphylococcus aureus, Enterococcus* spp., and anaerobes such as *Bacteroides fragilis, Clostridium* spp., *Peptostreptococcus*, and *Prevotella*.[7]

The clinical picture of a patient with a subphrenic abscess can be dominated by either thoracic or abdominal symptoms. In Carter and Brewer's series of 125 cases, chest findings dominated the clinical picture in 44% of patients.[1] The clinical presentation varies according to the anatomical location of the subphrenic abscess and presents with fever, upper-quadrant pain, tender ribs, shoulder pain, abdominal tenderness, or dyspnea. Patients may also present with hiccups, cough, or unexplained pulmonary manifestations such as pneumonia, pleural effusion, and basal atelectasis. Rarely, it can occur with unexplained pyrexia.[8]

The subphrenic region lies between the diaphragm above and the transverse and mesocolon below. It is further divided by the liver into the suprahepatic and infrahepatic compartments. The suprahepatic compartment is further divided into right and left by the falciform ligament. The pathogenesis of the pleural effusion associated with a subphrenic abscess is thought to be related to the diaphragmatic inflammation resulting from the adjacent abscess. This in turn increases the permeability of capillaries in the

diaphragm, leading to peritoneal exudation and accumulation of pleural fluid.[9]

The examination panel often shows leukocytosis with neutrophilia in addition to increased CRP levels and ESR. Radiographic abnormalities on a chest X-ray may include pleural effusion, pneumoperitoneum, gas in the abscess or a sinogram, filling defect in the gastric silhouette, basal pneumonitis, compression atelectasis, or an elevated diaphragm on the affected side. Sometimes, a lateral chest X-ray can be helpful in locating the subphrenic abscess or elevated portion of the diaphragm.[4] Blood and sputum cultures suggestive of polymicrobial bacteria strongly suggest a subphrenic abscess.[6] Abdominal ultrasound is the gold standard for right-sided subphrenic abscesses with high sensitivity for fluid collection.[8] CT scan is considered to diagnose any patient with suspected intraabdominal abscess and helps to detect left-sided subphrenic abscess. Abdominal magnetic resonance imaging (MRI) and an indium-111-labeled leukocyte scan can be useful for hidden intraabdominal or subphrenic abscesses.[10] Although the literature is still sparse against a background of elevated inflammatory markers with an unknown source of infection (unexplained fever or abscess), fluorodeoxyglucose (FDG) positron emission tomography (PET) can help diagnose a subphrenic abscess. The regions that show stronger absorption of the tracer can indicate the disease. A PET scan can also show cancerous tissue that is not visible on a CT scan. It is a painless, simple, nondisruptive, and relatively quick method.[11]

The two most important aspects of treatment are the administration of appropriate antibiotics and drainage and supportive therapy. Broad-spectrum parenteral antibiotics should be initiated empirically at the time of diagnosis to cover both aerobes and anaerobes, such as the combination of cephalosporins and metronidazole, with antibiotic switching after maintaining susceptibility if resistant. Antifungals against *Candida* spp. may be indicated in immunocompromised patients.[12] Azoles are considered when the patient is sensitive and stable.[13]

Percutaneous CT-guided drainage is considered the gold standard of care and is highly effective with low morbidity and mortality compared with surgical drainage.[14,15] For persistent drainage that may indicate an intestinal fistula, diagnosis with contrast-enhanced CT scan and treatment by transmural drainage with endoscopic ultrasound may be helpful.[16,17] Endoscopic drainage allows assessment of the collection, creation of an internal fistulous tract even in collections that do not protrude into the lumen, avoidance of intervening vessels, and placement of internal drainage stents. The different types of stents used are plastic double-pigtailed stents, fully covered self-expanding metal stents, and lumen-contiguous metal stents. However, they are associated with longer hospital stays and a higher rate of reoperations.[18]

If percutaneous or endoscopic drainage fails, surgical drainage by either an open or a laparoscopic method may be indicated.[8,14] Often, an abscess under the left half of the diaphragm is missed. Abscesses on the left are bounded by the spleen, stomach, and left lobe of the liver. As a result, diaphragm elevation is minimal and easily overlooked on radiological examination. The presence of gas in the abscess can also be mistaken for gas in the stomach or colon. Because of the surrounding viscera, left-sided abscesses are more difficult to drain. They are also associated with malignant diseases. Therefore, stubborn left-sided abscesses should be treated surgically.[19]

The above case reported a history of multiple laparotomies and abdominal surgeries. Her first operation was a reconstructive operation 4 years ago that occurred as a complication of a medical abortion. The next was an appendectomy a year later and the last was repairing an incisional hernia again a year later. The patient received an ultrasound-guided pigtail catheter to drain the abscess. The culture report tested positive for *E. coli* and was sensitive to meropenem. The patient responded well. Early detection and treatment with drainage and appropriate antibiotics give a good prognosis. Systemic inflammatory response syndrome (SIRS), which develops tachycardia, hypotension, and low urinary output, develops in the majority of patients who do not receive prompt treatment. This will eventually lead to sepsis, multiple organ failure, and death.[15]

Conclusion

A subphrenic abscess often presents a diagnostic dilemma. It is one of the most important causes of persistent pyrexia, which is often diagnosed late. In most cases, the abscess becomes clinically apparent within 6 months from the day of surgery, but prolonged inactivity may be associated if there is a history of repeated use of antibiotics or if the organism is tubercular in origin.[20] Immediate consultation with an inter-professional group of specialists is recommended to improve results.

Our patient presented with chest symptoms and a chest X-ray suggestive of a bilateral pleural effusion, which ultimately turned out to be a case of bilateral subphrenic abscess due to a Gram-negative organism. An interesting aspect of this case is that the symptoms appeared a year after the last operation and mimicked a bilateral pleural effusion.

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