

dl, sodium 130 mEq/l, and potassium 4.5 mEq/l. Cell blood count showed hemoglobin 8.2 g/dl, Mean corpuscular volume (MCV) 86.8 fl, Mean corpuscular hemoglobin (MCH) 27.3 pg, leukocytes 17,300 with neutrophils 14,992 K/ul, platelets 754,000 K/ul, C-reactive protein 148 mg/l, and sedimentation rate 22 mm/hour. Chest x-ray revealed an area of consolidation in the basal region of the right chest (Figure 1). Abdominal ultrasound showed an occupying liver lesion in segment VII and

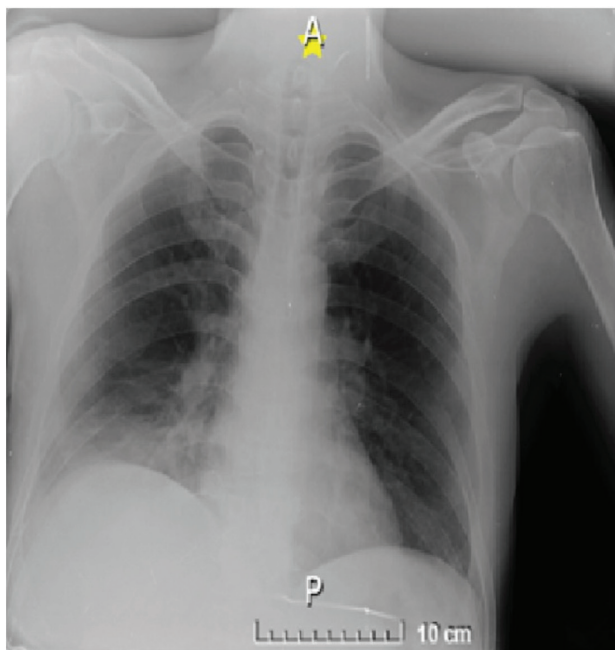


Figure 1. Posteroanterior chest film showing right basal density and an elevation of the right hemidiaphragm.



Figure 2. Hepatic Doppler ultrasound showing the presence of an ill-defined heterogeneous oval lesion of 81 x 66 x 64 mm, avascular, localized in segment VII with signs of extension to the right pleural cavity.

multiple single liver cysts (Figure 2). Triphasic abdominal tomography showed rounded density in hepatic segment VII, 58 x 7 x 67 mm, with a volume of 149.5 ml, compatible with the abscess and with the presence of a fistula to the pleural cavity and right lower lung lobe (Figure 3). In the blood cultures, the growth of *S. intermedius* was obtained on the fifth day, while the sputum cultures for bacteria and mycobacteria were negative.

The patient received treatment with third generation cephalosporin and metronidazole for 6 weeks. In addition, a guided drainage by fluoroscopy with placement of a 12 F catheter was carried out obtaining purulent material, leaving it for drainage (Figure 4). During the procedure the patient presented with a cough with purulent and bloody expectoration. A cavitogram confirmed the presence of a hepatobronchial fistula (Figure 5). Because of the persistence of drainage and evidence of a fistula, surgical management was undertaken through a right posterolateral thoracotomy. At

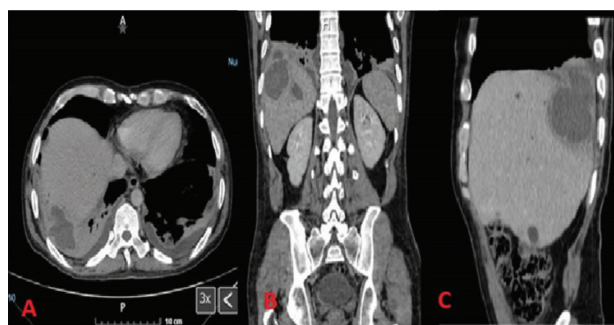


Figure 3. Triphasic computed tomography showing bilateral pleural effusion with atelectasis and consolidation in the right inferior lobe. Hepatic segment VII showing a round, defined, hypodense collection (27-30 UH) of 58 x 74 x 67 mm, with a volume of 149.5 ml. The contrasted phase showing annular enhancement and communication with the pleural cavity. (A) Late axial. (B) Late coronal. (C) Venous sagittal.

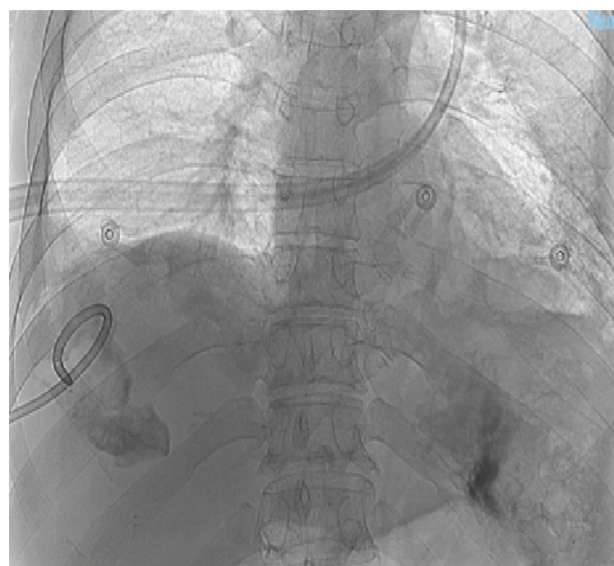


Figure 4. Percutaneous drainage by fluoroscopy.

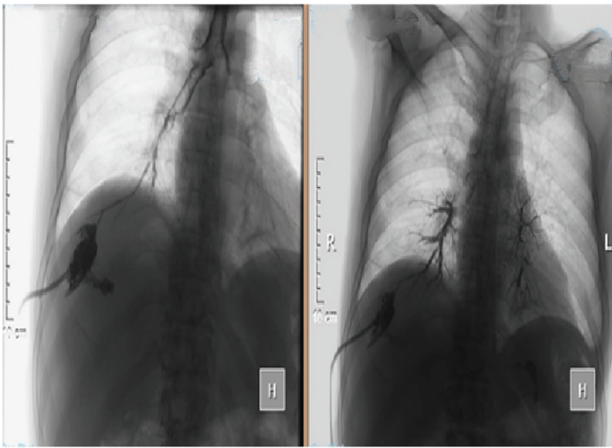


Figure 5. Cavitography hepatobronchial fistula passing through the right hemidiaphragm.

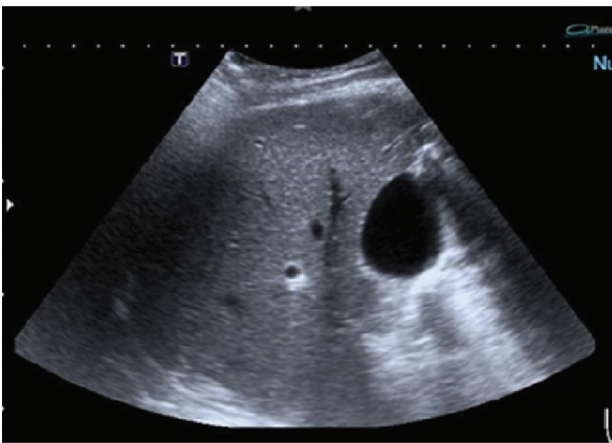


Figure 6. Ultrasound of hepatic Doppler control showing changes in hepatic echogenicity and absence of lesions.

surgery, there was a diaphragmatic defect which was repaired. The drainage catheter was removed without incidents and with a control ultrasound (Figure 6) with resolution of the lesion. The postoperative period was uneventful and the patient was discharged 4 weeks after hospitalization, completing treatment at home with levofloxacin plus metronidazole oral for 2 weeks.

Discussion

This is the case of a 50-year-old male with the diagnosis of hepatobronchial fistula secondary to a pyogenic hepatic abscess by *S. intermedius*.

Hepatobronchial fistula is an infrequent entity and is even rarer when secondary to a pyogenic abscess caused by *S. intermedius* [1]. This agent belongs to the *S. anginosus* group (also known as *S. milleri* group) a *Streptococcus viridans* subgroup that comprises three different species: *S. anginosus*, *S. intermedius*, and *Streptococcus constellatus* [5]. The members of the *S. anginosus* group are known by their pathogenicity and tendency to form abscesses. The precise responsible virulent factors are not well understood, and it is believed that polysaccharide

capsules pyogenic exotoxins and hydrolytic enzymes play an important role [6]. *Streptococcus intermedius* produces a unique form, intermedilysin, which is a cytolytic toxin specific for human cells that seems to be a virulent factor for the liver and other deep-seated abscesses [7].

The members of the *S. anginosus* group are part of the gastrointestinal tract microbiota [8]. They are able to cause a variety of abdominal infections such as hepatic abscess, cholangitis, peritonitis, appendicitis, subphrenic abscess, pelvic abscess, abdominal wound infections, and postoperative infections after visceral trauma or elective surgery [8]. Furthermore, they can cause clinical infections in the oral cavity and endodontic, infections of head and neck, central nervous system, chest, as well as endocarditis, bacteremia, and others [8].

Clinical manifestations include fever, which is present in 90% of the cases and abdominal symptoms like pain and tenderness over the right upper quadrant in 50%-75% of the cases. About 50% of the patients with hepatic abscesses show hepatomegaly and jaundice. Other symptoms are nausea, vomiting, anorexia, weight loss, and malaise [9]. Laboratory findings include bilirubin and/or hepatic enzymes' elevation in up to 50% of the cases as well as raised alkaline phosphatase in 67%-90% of the cases [9]. Other alterations include leukocytosis, hypoalbuminemia, and anemia (normocytic and normochromic). These data were present in our patient.

Chest x-rays may show an elevated right hemidiaphragm, a right basal infiltrate, or a right pleural effusion in 25%-35% of the cases [10]. Our patient presented with these images on admission (Figure 1). The presence of a fistula can be demonstrated by the appearance of a “smoke pile” on a plain x-ray. Computed tomography allows the outlining of a hepatic abscess and the assessment of pulmonary involvement, being in some studies more sensitive for hepatic abscesses than echography (95% vs. 85%), respectively [10]. Blood cultures are positive in up to 50% of the cases [11]. Several cultures should be obtained, both aerobic and anaerobic, before antibiotic administration. All aspirated material should be Gram-stained as well [11].

Zerem and Hadzic [12], in a study of 30 patients, observed that unilocular liver abscesses of less than 5 cm are acceptably treated by percutaneous drainage through catheter placement or needle aspiration. The latter can be repeated in up to 50% of the cases. The catheter should be left in place until drainage is minimal, usually 7 days [12]. On the other hand, abscesses larger than 5 cm are treated by catheter placement or surgery, as was the case in our patient, in whom closure of the diaphragmatic defect was also carried out. Surgery has a higher success rate [12].

In most cases of hepatobronchial fistula, surgical intervention is warranted and is considered a gold standard because of the aggressiveness of the disease, as well as the possibility of a rapid deterioration [13].

The surgical approach through thoracotomy has become the most commonly used. The surgical steps are as follows: adequate subcostal drainage under direct vision, safe closure of the diaphragmatic perforation, decortication of the involved pulmonary lobe, and lobectomy of the devitalized portion due to the fistulous tract [13]. Other procedures may involve decompression and drainage by radiologic endoscopic and interventionists means, which when combined, generally yield a favorable clinical outcome [13].

Liao et al. [14] reported the spontaneous closure of a fistula (up to 60% in posttraumatic ones) after subcutaneous drainage, while others stress that conservative measures have protracted the healing process, requiring a long-term drainage and risk of new sources of infection. Beta-lactamic antimicrobials are commonly used in infections by *S. anginosus*, with ceftriaxone being the preferred agent [15]. Further treatment should be governed by the culture results and antimicrobial susceptibility tests. Irrespective of the identified causative agent, treatment with antibiotics should be maintained for 4-6 weeks [16]. Patients who have had a good response to initial drainage should receive 2-4 weeks of parenteral treatment, whereas patients with an incomplete drainage should be treated parenterally for 4-6 weeks [16]. The remaining course can be completed with oral medication according to the culture results and susceptibility with levofloxacin 750 mg per day plus metronidazole [16].

Follow-up x-rays should be carried out in case of persisting clinical symptoms or if the drainage was not satisfactorily carried out [17].

Hepatobronchial fistulas have a mortality risk of up to 10.3% mainly because of surgical complications [17]. The operative mortality rate varies from 5% to 50% in underdeveloped countries to 2%-12% in developed countries and generally depends on underlying comorbidities, extension of the disease, and degree of the inflammatory process [17].

Conclusion

This is a rare case of hepatobronchial fistula secondary to *S. intermedius* infection; although benign in nature, it carries an unacceptable mortality risk of up to 10.3% as mentioned. With the introduction of less invasive techniques, the results have improved significantly. Current data suggest a hybrid approach (surgical plus interventional and radiological) individualized for this rare clinical entity, for each patient according to the etiology and severity of the disease.

List of Abbreviations

fl	femtoliter
gr/dl	grams per deciliter
K/ul	thousands per cubic millimeter
mEq/l	milliequivalent per liter
mg/dl	milligrams per deciliter

mg/l	milligrams per liter
mm/h	millimeters per hour
pg	picogram
S	<i>Streptococcus</i>
U/L	units per liter

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication

Written consent was obtained from the patient.

Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.

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Summary of the case

1	Patient (gender, age)	Male, 50-year-old
2	Final diagnosis	Hepatic abscess by <i>S. intermedius</i> complicated with hepatobronchial fistula
3	Symptoms	Fever, long-standing bacteremia, and weight loss
4	Medications	Third generation cephalosporin and metronidazole for 6 weeks
5	Clinical procedure	A guided drainage by fluoroscopy with placement of a 12 F catheter was carried out obtaining purulent material. At surgery there was a diaphragmatic defect which was repaired.
6	Specialty	Internal medicine