CASE REPORT

Biliopleural fistula following gun shot injury in right axilla

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SUMMARY

A biliopleural fistula (BPF) is a rare and atypical manifestation of thoracoabdominal trauma. A stepwise approach for the management is recommended for a successful outcome. We report a case of a 22-year-old man who was referred to our hospital with respiratory discomfort after sustaining a gunshot injury in the right axilla. On investigations he had haemopneumothorax, central liver contusion with perihepatic fluid and a bullet lodged at the level of right renal hilum. He was at first managed by placing a right intercostal tube drain, which initially drained blood and subsequently started draining bile. He was managed successfully with endoscopic biliary stenting, pigtail drainage of subphrenic collection and antibiotics.

BACKGROUND

Biliopleural fistula (BPF), first described by Graham in 1897, is a rare complication of thoracoabdominal trauma. BPF has also been reported in the literature as a complication of inflammatory or neoplastic conditions affecting the liver, secondary to subphrenic collection, or following hepatobiliary intervention.^{1–5} It presents as a diagnostic and therapeutic challenge. We report a case of BPF following a gun shot injury in the right axilla.

CASE PRESENTATION

A 22-year-old man was referred to our hospital with respiratory discomfort after sustaining a gun shot injury in the right axilla. On examination, the patient was haemodynamically stable with respiratory rate of 32/min. There was an entry wound of about 4 cm in the right axilla with no exit wound. Surgical emphysema was present over right hemithorax and right upper abdomen. On examination, there was decreased air entry in the right infrascapular and infra-axillary region. There was tenderness in the right hypochondrium, there was no guarding, rigidity or free fluid in the abdomen; bowel sounds were normal. There was no haematuria. There was no neurovascular deficit in right upper limb.

INVESTIGATIONS

Contrast-enhanced CT (CECT) of the chest and abdomen ([figure 1](#)) showed subcutaneous emphysema over right lateral hemithorax and right upper abdomen, right hemopneumothorax with underlying lung contusion, linear central liver contusion (grade III liver injury), a thin rim of perihepatic fluid and no evidence of major vessel injury. A bullet was lodged at the level of right renal hilum ([figure 2](#)). Blood investigations were within normal range.

Figure 1 Axial contrast-enhanced CT images at the level of liver showing liver contusion (arrow), right pleural effusion (curved arrow) and subcutaneous emphysema (white arrow) involving right lateral chest wall.

TREATMENT

Tube thoracostomy was performed on the right side, which drained 300–400 mL of blood during the first 2 days; subsequently, the drainage became bilious. Bile drainage from the chest tube was about 300 mL daily (drain bilirubin 37 mg%). A ^{99m}Tc mebrofenin hepatobiliary scan demonstrated and confirmed bilio-pleural communication ([figure 3A, B](#)). In view of the BPF, endoscopic sphincterotomy and biliary stenting was performed. Bile drainage from the chest tube subsequently decreased. The patient developed fever after 6 days of biliary stenting. Ultrasound of the abdomen was performed, which showed a collection in the right subphrenic space that was drained radiologically by pigtail catheter. The fever subsided after drainage of subphrenic collection. Bile drainage from subphrenic pigtail catheter as well as from intercostal tube subsided gradually over 12 days following biliary stenting. Thereafter, chest tube and pigtail catheter were removed.

OUTCOME AND FOLLOW-UP

The patient responded well to drainage of pleural cavity and subphrenic space, biliary stenting, antibiotics and chest physiotherapy. The biliary stent was removed after 6 weeks on an outpatient basis. The patient is doing well after 30 months from stent removal.

DISCUSSION

A BPF is a rare and atypical manifestation of thoracoabdominal trauma and develops secondary to injury to the diaphragm and the adjacent liver.

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Figure 2 Axial contrast-enhanced CT images of the abdomen at the level of the kidney showing a bullet at the level of right renal hilum (arrow).

It may also develop secondary to diffusion of subdiaphragmatic fluid collection to the pleural cavity either via diaphragmatic pores or by lymphatics.⁴ In this case, the cause of biliary effusion was injury to the diaphragm and liver by a bullet (trajectory path).

Figure 3 (A) ^{99m}Tc mebrofenin hepatobiliary scintigraphy in static planar images up to 2.30 h showed biliopleural communication with fistulous tract from the liver to the right intercostal tube at 21 min of the study. (B) Hybrid single-photon emission CT/CT showing tracer activity in the right pleural cavity and subsequently into right chest tube.

A high index of suspicion and early diagnosis of BPFs is essential for successful management. Delay in diagnosis leads to development of complications as bile has a corrosive action both on pleura and lung.^{2–7} BPF may communicate either with the pleural space (pleurobiliary fistula) or with the bronchus (bronchobiliary fistula). Presence of bile on thoracentesis, biliptysis and total bilirubin level higher than the serum are pathognomonic for BPF.² Pleurobiliary fistula may predispose to loculated bilious empyema, which may subsequently entrap the lung and compromise lung functions. Severe cases of bronchobiliary fistula may present with necrotising bronchitis or bronchopneumonia or, rarely, chronic indirect pneumonitis.⁸ Patients may present with breathlessness, biliptysis, fever or cough, depending on the type of fistula.

Hepatobiliary scintigraphy is a dependable non-invasive investigation to confirm biliopleural or biliobronchial communication, but it does not delineate its precise anatomic location.⁶ Abdominal ultrasonography and CT scan do not delineate the presence and location of fistulas either, but they may help in detection of drainable collection. Endoscopic retrograde cholangiopancreatography (ERCP) is the imaging modality of choice for demonstrating the fistulous tract and also to identify any distal obstruction, if present. ERCP also carries the therapeutic potential of sphincterotomy and biliary stenting.^{9–10} Singh *et al*⁶ have recommended ERCP within 72–96 h after drainage of sepsis.

Initial management is always conservative and includes tube thoracotomy, drainage of subphrenic collection, antibiotics,

sphincterotomy and stenting.¹¹ Sphincterotomy decreases the mean basal pressure from 18 ± 3 to 1 ± 1 mm Hg and favours the prograde flow into the duodenum.^{6 9} Stents are removed after healing of fistulous tract. Endoprosthesis over biliary defects has been tried to facilitate early fistula closure.^{12–14}

Antibiotics are an important adjunct to bile drainage because bile is often infected and its stasis encourages bacterial growth; bacteria may also travel along the catheter into the pleural cavity. Pharmacological agents such as somatostatin analogues, which lower the sphincter tone and facilitate biliary decompression, have been suggested, but their role is questionable.^{6 15} Low fat diet has also been recommended along with somatostatin analogue octreotide, antibiotics and drainage of collection for BPFs as initial treatment.⁶

A pleurobiliary fistula secondary to trauma is less severe and a non-surgical approach has been reported to be successful in about 60% of these patients.¹⁶ Surgery should be reserved and is warranted after exhaustion of non-surgical management if the fistula is large, if diseased tissue needs to be debrided, or in

cases of respiratory compromise. Definitive surgery for broncho-biliary fistulas includes excision of fistulous tract and lung tissue that was destroyed by necrotising bronchopneumonia.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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Learning points

- A biliopleural fistula is a rare complication following thoracoabdominal trauma.
- A high index of suspicion and early diagnosis is essential to prevent the development of biliopleural fistula (BPF).
- Endoscopic retrograde cholangiopancreatography is the investigation of choice for demonstrating the fistulous tract.
- A BPF secondary to trauma usually responds to a non-surgical approach.
- Surgery should be reserved for patients who do not respond to non-operative management.

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