

Thoracobiliary fistula.

A rare complication of thoracoabdominal trauma



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Thoraco-fistula. A rare complication of thoracoabdominal trauma

Thoracobiliary fistulas (bronchobiliary and pleurobiliary) are rare complications of thoracoabdominal trauma. Owing to their rarity, there is little consensus on the optimal management. The diagnostic suspicion however must be considered and it's important the correct selection of diagnostic imaging techniques.

Biliptysis is the pathognomonic physical finding of bronchobiliary fistulas. Demonstration of high bilirubin levels in the pleural effusion is diagnostic for a pleuro-biliary fistula.

The optimal treatment of bronchobiliary fistulas is operative, in order to prevent their dramatic consequences. For pleurobiliary fistulas, a light aggressive conservative approach is an appealing option in the beginning. Newer endoscopic techniques increase the non-operative approach.

KEY WORDS: Biliptysis, Thoracoabdominal trauma, Thoracobiliary fistula.

Introduction

Thoracobiliary fistulas are commonly reported complications of liver abscesses⁴. Congenital³, iatrogenic⁶ and neoplastic⁵ forms have also been reported. However, they are a rare and unusual complication of thoracoabdominal trauma and they present a formidable challenge to the trauma surgeon¹. This complication was first reported by Graham in 1897⁶. In 1994, Rothberg et al reviewed these complications and reported only 34 cases of thoracobiliary fistulas in the English literature. Thoracobiliary fistula may communicate with either the pleural space (Pleurobiliary fistula) or the bronchus (Bronchobiliary fistula).

A high index of suspicion and early diagnosis are mandatory in order to successfully manage this complication.

Given their rarity, there is little consensus on the optimal management.

Epidemiology

In a review of the existing literature⁷, the age of presentation ranged from 6 to 43 years, with a male to female ratio of 2:1. Seventy-five percent of cases were due to penetrating injuries and the remaining cases were secondary to blunt trauma. The time interval between the injury and the diagnosis of thoracobiliary fistulas ranges from 2 to 73 days, with a median of 12 days.

Pathophysiology

Thoracoabdominal injuries involving the lungs, diaphragm and liver constitute the ideal clinical setting for the development of a thoracobiliary fistula (TBF). These fistulas are potentiated by the pressure gradient between the biliary system (positive intra-abdominal pressure) and the bronchial system (negative intrathoracic

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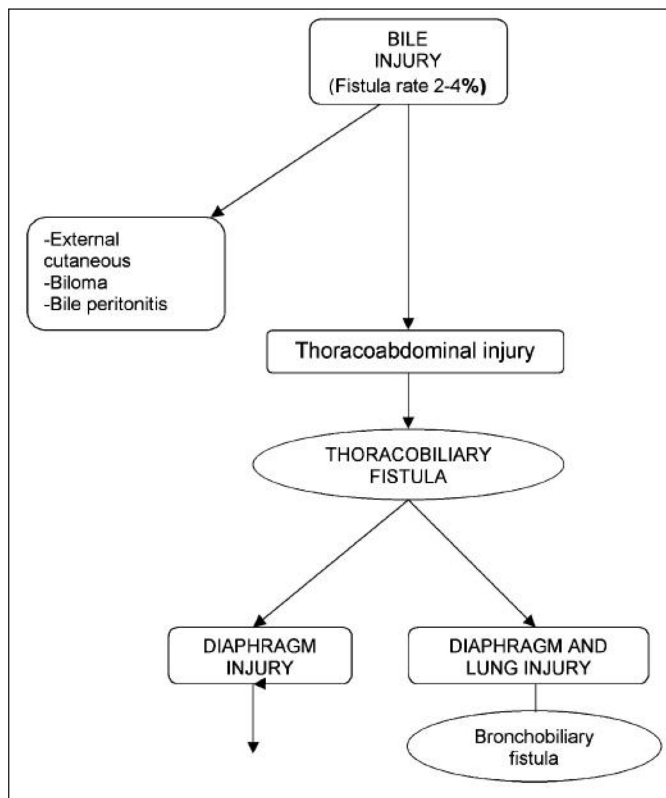


Fig. 1: Traumatic bile fistulae.

pressure). This pressure gradient can be reversed by positive pressure ventilation of the patient. Positive pressure ventilation can attenuate the contamination of the bronchial tree with bile ⁸.

Clinical manifestations

TBF usually presents as a persistent or delayed pleural effusion. Right pleuritic chest pain, sometimes radiating to the right shoulder or right upper quadrant pain and tenderness are also common presenting symptoms ¹⁰. Fever, chills or leukocytosis are noted in half the cases⁹. Biliptysis is a dramatic manifestation and is pathognomonic of a bronchobiliary fistula ⁵. Biliptysis may vary from expectoration of bitter-tasting, bile-stained sputum

TABLE I – Common manifestations in 16 cases of traumatic Thoracobiliary Fistulas (TBF)

Symptoms	No. of Patients
Fever and/or chills	13
Pleuritic chest pain	12
Productive cough	10
RUQ pain	
Bile expectoration	7
Dyspnea	6
Hemoptysis	4

to large amounts of frank bile (occasionally approaching a litre). Jaundice is an infrequent finding (10), if the biliary system is not obstructed. Bilirubin estimation in the sputum and/or pleural effluent confirms the diagnosis (with bilirubin level usually in the range of 4 to 10 mg/dl) ¹¹.

Complications

Bile is caustic to the bronchial mucosa and is also a potential source of bacterial contamination ⁸. Pleurobiliary fistula may predispose to a loculated bilious empyema. The subsequent development of pleural adhesions may entrap the lung, compromising lung function ⁴. Bronchobiliary fistulas may predispose to a devastating acute necrotizing bronchiolitis. Rarely, a chronic indirect pneumonitis may develop ⁵.

Diagnostic evaluation

A high index of clinical suspicion is essential in the setting of a combined hepatic and thoracic trauma. The chest radiograph uniformly reveals a right-sided pleural effusion and an elevated right hemidiaphragm, with or without a parenchymal lesion ¹⁰.

Computed tomography is invaluable for assessing the extent of the hepatic injury and for identifying any adjacent potentially infected fluid collection. However CT is unable of confirming the presence and demonstrating the location of a TBC ¹².

Many authors recommend noninvasive nuclear techniques (Hepato-imino-diacetic acid scan) as methods of low cost for demonstrating the flow of bile into the chest. This method is of dubious diagnostic value in providing precise anatomic information ¹³.

ERCP appears to be the most useful diagnostic modality nowadays, in order to locate the biliary injury and localize the site of the TBF. It also has the potential of performing an endoscopic sphincterotomy and/or stent placement, in order to facilitate nonoperative closure of these fistulas ^{12,14}.

Recently Magnetic Resonance Cholangiopancreatography (MRCP) has been used for the demonstration of pancreaticopleural fistulas and can be potentially useful in the diagnosis of TBF ¹⁵.

Management

The optimum strategy for thoracobiliary fistulas remains controversial. On the other hand, there appears to be consensus regarding the need for early surgical intervention for a bronchobiliary fistula ^{1,12}, to prevent the development of a serious form of necrotizing bronchiolitis. Using a transthoracic approach, the lung is freed from

the diaphragm and decorticated. The fistula tract and the associated necrotic pulmonary parenchyma are resected. A wedge resection, segmentectomy or lobectomy may be necessary. Wedge resection is the preferred method, since it leaves less residual space within a contaminated thoracic cavity.

Additionally, a laparotomy may be also indicated, in order to drain any subphrenic and peri/intrahepatic septic collections.

In contrast to bronchobiliary, pleurobiliary fistulas are considered a less sinister condition, and a conservative approach is indicated ^{7,16}.

Tube thoracostomy drainage is unequivocal, along with the administration of antibiotics (which is empiric initially and culture-directed thereafter). The non-operative approach has a failure rate of 38% ⁷. In case of failure, prompt surgical intervention is indicated. One must notice, however, that the high rates of failure of the conservative approach were reported during the pre-endoscopic era, when less sophisticated imaging techniques were available. Somatostatin was also proposed as beneficial ¹⁷, because in the context of trauma there is no distal obstruction of the biliary tree. During the initial phase of treatment, stabilization of the patient's respiratory status is necessary. Intubation is considered as an option, in order to control the patient's airway and respiratory distress. Some authors propose the use of Positive Pressure Ventilation for bronchobiliary fistulas, in order to reverse the pressure gradient and attenuate fistula flow ⁸. There are reports in the English literature of cases of non-operative management of bronchobiliary fistulas due to amoebic or pyogenic liver abscesses as well as traumatic biliary fistulas ^{18,19}. In 2002, Navsaria et al reported a case of a traumatic bronchobiliary fistula successfully managed by the conservative approach ⁹.

Some authors recommend routine biliary decompression for all patients with thoracobiliary fistulas ¹⁵. The fistula tract is a route of least resistance, which favors the diversion of bile flow. After sphincterotomy the basal sphincter of Oddi pressures drop significantly (according to Geenen et al) ²¹, favoring the flow of bile towards the duodenum rather than into the fistula tract. Post-sphincterotomy a resolution of symptoms was reported within 48 hours.

In 1990, Yilmaz et al, reported the successful management of 11 patients with bronchobiliary fistulas, using endoscopically placed nasobiliary drains (20). This points out the significance of biliary decompression in these patients. Nevertheless, the dilemma remains between routine decompression ¹⁵ and decompression only when there is evidence of biliary obstruction ⁷.

The use of pharmacologic agents that lower the sphincter of Oddi pressure has been suggested ²². The role of endoscopically placed intrabiliary stents is also under investigation ²².

TABLE II – Management plan for thoracobiliary fistulas.

Clinical manifestations

History of thoracoabdominal trauma
Fever, chills, leukocytosis (50%)
Pleural effusion

Chest x-Ray

Pleural effusion

Bile estimation

Bile in pleural effluent or sputum confirms diagnosis

Computed Tomography

Grades liver injury
Detects collections in chest, liver and subphrenic space
Guides percutaneous drainage

ERC

Delineates anatomy and localizes injury
Therapeutic sphincterotomy and stenting possible
Major duct injury may prompt early surgery

Indications for Surgery

Failed conservative measures
Uncontrollable pulmonary or abdominal sepsis
Respiratory compromise

Conclusions

Thoracobiliary fistula is a rare complication of thoracoabdominal trauma. Their low incidence cannot be attributed neither to the low rate of thoracoabdominal injuries involving the lung, liver and diaphragm, nor to a high immediate mortality. They are rare because most surgeons carefully seek injuries of the diaphragm and treat appropriately liver injuries. On the other hand a thoracobiliary fistula may develop if a traumatic rupture of the diaphragm and associated liver injuries are overlooked or not treated appropriately. One can argue that with the increasing use of nonoperative management for thoracoabdominal trauma, these complications may become more common.

Fortunately the existing evidence do not reveal an increase of the number of thoracoabdominal fistulas ⁸. Navsaria et al proposed the management plan listed in Table II.

Riassunto

Le Fistole Biliotoraciche (biliobronchiali e biliopleuriche) rappresentano complicanze rare dei traumi toraco-addominali. Considerata la loro modesta incidenza clinica, non vi è univocità bibliografica riguardo la loro diagnosi e terapia. È comunque necessario, ai fini di una corretta diagnosi, valutarne la possibile presenza adottando le opportune indagini diagnostiche per immagini.

Il sintomo classico e patognomonico delle fistole biliotoraciche è senza dubbio la biliotossia, che unita al rilievo di elevati livelli di bilirubina nel liquido pleurico, consente di formulare diagnosi di fistola bilio-pleurica.

La chirurgia ha un ruolo fondamentale nel trattamento delle fistole biliobronchiali, allo scopo di evitare l'insorgenza di drammatiche complicanze. Il loro trattamento può essere, almeno nelle fasi iniziali, moderatamente aggressivo.

Le moderne tecniche endoscopiche, d'altro canto, avvalorano e rafforzano le possibilità di un trattamento non chirurgico di tali fistole.

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