

CHYLOTHORAX AFTER BLUNT CHEST TRAUMA: A REPORT OF 2 CASES

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Chylothorax is a rare complication of blunt chest trauma and is associated with fracture-dislocation of the thoracic spine in only 20% of these cases. Two cases of chylothorax after blunt chest injury are described in this paper; 1 was related to a fracture of the third thoracic vertebra. Closed chest drainage and total parenteral nutrition led to resolution of the condition within 3 weeks in both cases. In general, traumatic chylothorax should be managed conservatively for at least 4 weeks before surgical intervention is considered.

Complication rare découlant d'un traumatisme contondant au thorax, le chylothorax est associé à des dislocations et fractures de la colonne thoracique dans 20 % seulement de ces cas. On décrit dans cette communication deux cas de chylothorax après un traumatisme contondant au thorax. Dans un des deux cas, il y avait fracture de la troisième vertèbre thoracique. Un drainage thoracique fermé et une nutrition parentérale totale ont permis de régler le problème en moins de trois semaines dans les deux cas. En général, il faudrait traiter le chylothorax d'origine traumatique de façon conservatrice pendant au moins quatre semaines avant d'envisager une intervention chirurgicale.

The management of chylothorax, defined as the accumulation of lymph in the pleural space usually because of a leak from the thoracic duct or one of its major branches, presents a challenge to surgeons. Although most cases of chylothorax are related to previous surgery or a malignant condition, over 100 cases of traumatic chylothorax have been reported in the world literature since 1965.¹ The cause of most cases associated with blunt chest trauma has been attributed to a sudden hyperextension of the spine causing stretching and rupture of the thoracic duct.^{2,3} In only a small subset of these patients is the rupture associated

with a thoracic vertebral fracture-dislocation.

We report 2 cases of chylothorax due to blunt trauma, 1 of which was associated with a thoracic vertebral fracture.

CASE REPORTS

Case 1

A 17-year-old boy was involved in a high-speed automobile crash in which he was the unbelted driver. Initial assessment at the Sunnybrook Regional Trauma Unit identified a number of injuries, including a minor closed head injury, a fracture of the left condylar

neck of the mandible and an open fracture of the right patella. A chest radiograph demonstrated a pneumomediastinum and bilateral pulmonary contusions. The vertebral column appeared normal radiographically.

The respiratory status of the patient quickly deteriorated, necessitating orotracheal intubation. A hematoma of the trachea and right main-stem bronchus was visualized on bronchoscopy. Bilateral chest tubes were inserted, and these immediately drained milky fluid. The patient underwent surgical repair of the open patellar fracture.

The diagnosis of chylothorax was confirmed with the measurement of a

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high triglyceride count in the pleural fluid, and the boy was treated with total parenteral nutrition and bowel rest. The chylous fluid drainage diminished gradually from 140 mL/d initially to scant drainage by day 17. The boy resumed a normal diet, the chest tube was removed and he was discharged home. A follow-up chest radiograph 2 weeks later showed complete resolution of the chylothorax and pulmonary contusions.

Case 2

A 24-year-old man suffered a minor closed head injury, a fracture of the left seventh rib and a left hemothorax in a snowboarding accident. He

also had fractures of C2, T3 and the transverse processes of L1–5, with no neurologic deficits. A chest radiograph demonstrated an abnormal mediastinum (Fig. 1), and a chest tube was inserted for a left hemothorax. A chest CT scan revealed a small left posterior mediastinal hematoma associated with the fracture of T3 (Fig. 2). A thoracic aortogram was normal.

On the second day of admission, the chest tube drained 240 mL of milky fluid identified as chyle, with a triglyceride level of 8.91 mM. A bipedal lymphangiogram demonstrated an interruption of the thoracic duct at T3 (Fig. 3).

The patient was treated with total

parenteral nutrition and bowel rest, and the chylous drainage consistently decreased until day 19 when it was clear and minimal. He resumed a regular diet and the chest tube was removed. A chest radiograph 1 month after discharge showed resolution of the abnormal mediastinum with no pleural effusion.

DISCUSSION

Traumatic injury to the thoracic duct may occur after cervical, thoracic or abdominal surgical procedures or as a result of penetrating or blunt trauma. Chylothorax is a rare complication of blunt chest trauma, as the thoracic duct is generally well protected by the spine posteriorly and mediastinal contents anteriorly. Although thoracic or lumbar spinal injury is a common occurrence after blunt chest trauma, very few patients will have an associated chylothorax. Gartside and Hebert⁴ identified only 1 case of chylothorax out of 925 trauma patients who had sustained fractures of the thoracic or lumbar spine over a 12-year period. Despite this rare occurrence, the association of spinal fracture with thoracic duct injury is seen in approximately 20% of cases of traumatic chylothorax.³ The first reported case of chylothorax associated with thoracic vertebral trauma was described by Hahn in 1899 in a patient who had been run over by a wagon.² Including our second case, only 18 such patients have been reported in the literature since then.^{2,3}

The most common mechanism of injury to the thoracic duct after blunt trauma appears to be sudden hyperextension of the spine.^{2,3} This results in rupture of the duct, due to stretching over the vertebral bodies, or a shearing of the duct by the right crus of the diaphragm.⁵ The most common site for the development of a traumatic

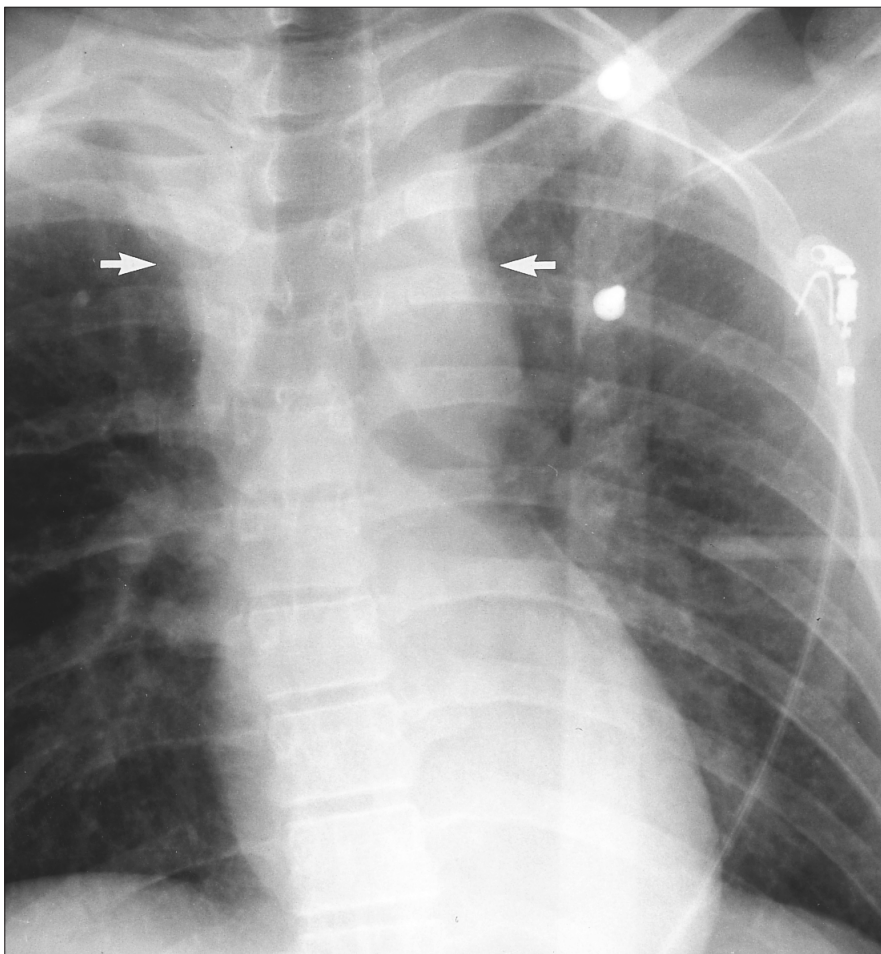


FIG. 1. Chest radiograph showing an abnormal mediastinum (arrows) after blunt chest injury.

chylothorax appears to be at the level of the lower thoracic vertebral segments.⁵

The management of chylothorax after trauma differs from that related to other causes. For example, when nontraumatic chylothorax is associated with lymphatic or venous obstruction, specific treatment of the underlying process is required for success. If widespread malignant disease is present, chemical pleurodesis may be a reasonable choice before operative intervention is considered.⁶ In addition, when a chylothorax develops in association with trauma, the patient often has a variety of other injuries that may influence treatment.

Based on our limited experience and the current literature, we recommend an algorithm for the management of blunt traumatic chylothorax (Fig. 4). The diagnosis is usually made clinically, based on the appearance of the pleural fluid — either milky fluid or fat droplets floating in bloody fluid observed during closed chest drainage. The diagnosis is confirmed by the finding of free microscopic fat with positive Sudan III staining and a triglyceride count greater than 1.24 mM.⁶ If

the patient requires a thoracotomy for repair of other injuries such as spinal instability, concomitant surgery for the torn thoracic duct may also be considered. Otherwise, these patients should be managed conservatively with closed chest drainage to enable full expansion of the lung and apposition of the visceral pleura.⁶ An important aspect in management includes nutritional support and correction of any fluid and electrolyte imbalances. Although a diet consisting of medium-chain triglycerides has been advocated,⁷ total parenteral nutrition and bowel rest may be most effective because oral intake of any kind may increase lymph flow and perpetuate the leak.

In general, if the chest tube drainage persists and is greater than 500 mL/d after 2 weeks of conservative therapy, operative intervention should be planned. However, there is no consensus on the length of time before surgical therapy should be considered in the patient whose drainage has significantly decreased. Although 4 further weeks of chest drainage has been suggested empirically,⁴ some have favoured a more aggressive approach, with immediate thoracotomy

and thoracic duct ligation if the leak has not resolved after 2 weeks of observation.³ It has been suggested that this more expedient algorithm may be more appropriate for cases of chylothorax associated with thoracic vertebral trauma or penetrating thoracic trauma. Whereas most cases of chylothorax will resolve spontaneously after 2 weeks of conservative management,⁶ a recent review suggests that a duct closure rate of only 50% can be expected for cases of chylothorax occurring in conjunction with injuries of the thoracic spine.³ Further, Worthington and colleagues⁸ reported a uniform failure of conservative management in 8 patients with thoracic duct injuries as a result of penetrating trauma, all of whom were successfully treated with surgery. However, in the setting of blunt thoracic trauma, we generally recommend up to 4 more weeks of conservative management if necessary. If the chest tube drainage has not markedly decreased by then, surgical treatment should be considered. The site of the thoracic duct interruption should be identified by lymphangiography. A post-lymphangiography chest CT scan may better delineate the relationship of the tear



FIG. 2. CT scan showing a left posterior mediastinal hematoma (arrow) in association with a fracture of T3. A thoracic aortogram was normal.

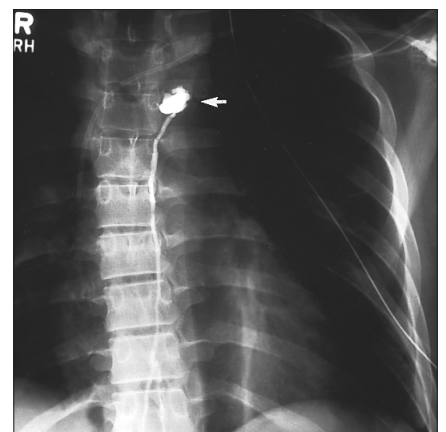


FIG. 3. Bipedal lymphangiogram showing the site of interruption of the thoracic duct with resultant chyloma (arrow) adjacent to a thoracic vertebral fracture.

to other structures in the mediastinum. The surgical techniques commonly used are either direct ligation of the thoracic duct leak or mass ligation of the duct just above the diaphragm. Van Pernis⁹ reported that the thoracic duct is a duplicate structure from T12 to T8 in 40% of patients; therefore, mass ligation may be the most effective method to avoid missing a major channel.^{10,11} Mass ligation may be performed through a right lateral thoracotomy or by thoracoscopic techniques.¹²

In the present report, complete res-

olution of a traumatic chylothorax in 2 patients with different blunt chest injuries was observed after 3 weeks of conservative management. The outcome in these two patients suggests that as long as consistent reduction and clearing of chest drainage occurs, observation of these patients is safe and appropriate.

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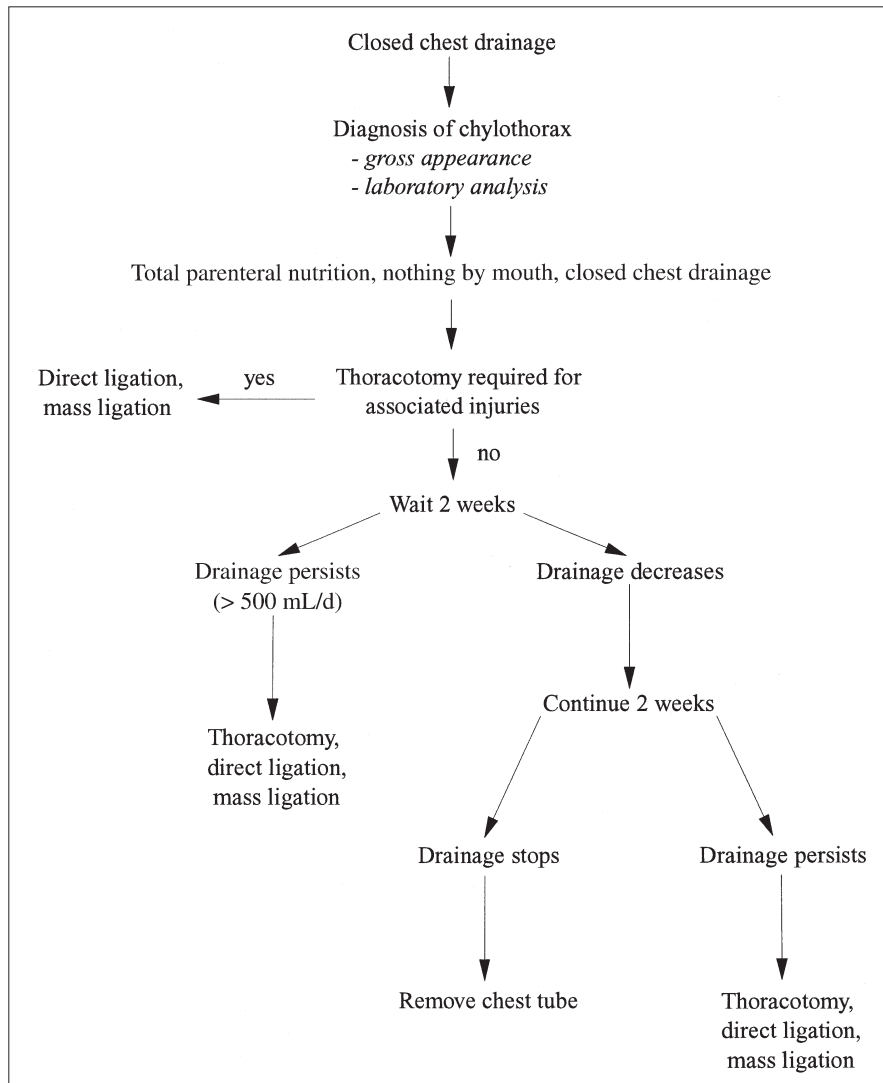


FIG. 4. Treatment algorithm for chylothorax after blunt trauma.