



## Review of Literature and Case Report

# Thoracic spine injury associated with Thoracic duct injury and chylothorax

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### Abstract

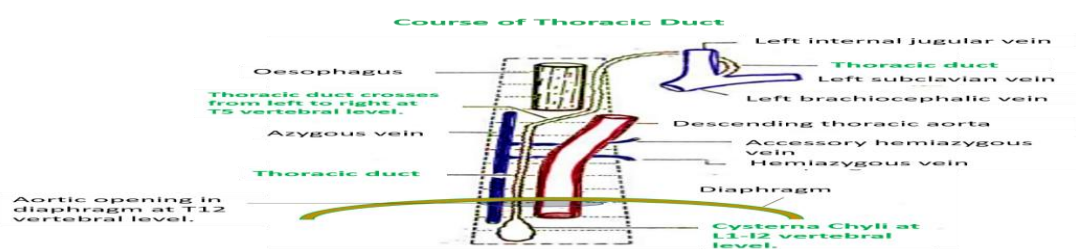
Chylothorax is a rare form of pleural effusion it can be associated with dorsal spine injury and subluxation of dorsal spine. We present a rare case of a thoracic duct injury secondary to a blunt thoracic spine fracture and subluxation: A 28 year old boy sustained spinal injury at D8-D9 level presented with paraplegia with chest injury, haemothorax. I.C.D was done to manage the haemothorax. Following Enteral feeding on third day he developed milky white drainage from I.C.D, differential diagnosis was empyema. Pleural fluid analysis revealed high level of triglyceride and low level of cholesterol, suggestive of chylothorax. Which was treated conservatively.

**Keywords:** Dorsal Spine Injury, Thoracic Duct Injury, Chylothorax, Pleural Fluid Analysis.

### Introduction

In human anatomy, the thoracic duct is the larger of the two lymph ducts of the lymphatic system. It is also known as the left lymphatic duct/ alimentary duct/chyliferous duct/ and Van Hoorne's canal. The other duct is the right lymphatic duct. It carries chyle, a liquid containing both lymph and emulsified fats, rather than pure lymph. The thoracic duct originates in the abdomen at the cisterna chyli located over the

second lumbar vertebra (Fig. 1). The duct extends into the thorax through the aortic hiatus and then passes upward into the posterior mediastinum on the right before shifting toward the left at the level of the fifth thoracic vertebra. It then ascends posterior to the aortic arch and into the posterior neck to the junction of the subclavian and internal jugular veins. Thus when it ruptures, the resulting flood of liquid into the pleural cavity is known as chylothorax.



**Fig-1** Schematic representation of most common anatomic arrangement of the thoracic duct

### Pathophysiology of Chylothorax

Chylothorax forms when the thoracic duct, which carries dietary fat in the form of chylomicrons, becomes disrupted. Chylomicrons are formed in the intestine, after which they enter the intestinal lacteal vessels and are then transported to the cisterna chyli. The thoracic duct, a 2- to 3-mm-wide thin-walled conduit, leaves the cisterna chyli and passes through the aortic hiatus of the diaphragm on the anterior surface of the vertebral body between the aorta and the azygos vein into the posterior mediastinum. The thoracic duct then ascends extrapleurally in the posterior mediastinum along the right side of the anterior surface of the vertebral column. Between the level of the fourth and sixth thoracic vertebrae, the duct crosses to the left side of the vertebral column and continues cranially to enter the superior mediastinum between the aortic arch and the subclavian artery and the left side of the oesophagus.

The exact diagnosis of chylothorax is based on the presence of chylomicrons in the pleural fluid. Chylomicrons are molecular complexes of proteins and lipids that are synthesised in the jejunum and transported via the thoracic duct to the circulation. They are only found in the circulation postprandially with a peak 3 h after eating. On occasion chylomicrons have been demonstrated in haemothorax directly after a meal but repeated thoracentesis sampling over hours will help demonstrate a true chylothorax. Staats et al. introduced criteria for the biochemical diagnosis of chylothorax. They noted that a pleural fluid triglyceride of >110 mg/dl had a 1% chance of being non-chylous and that a triglyceride of <50 mg/dl had a 5% chance of being chylous. As a result, pleural fluid triglyceride levels >1.24 mmol/l (110 mg/dl) with a cholesterol <5.18 mmol/l (200 mg/dl) is diagnostic of chylothorax.

### Case Presentation

**Patient History:** A young 28 years male met with road side accident. He suffered fracture of D8/D9

along with multiple ribs fracture on rt side (Fig. 2&3).

**Examination:** General examination showed, Paraplegia and bladder bowel involvement with respiratory involvement due to rt side pleural effusion (Fig.3 & 4). Drainage of the RT haemothorax led to the diagnosis of a traumatic chylothorax

**Laboratory examinations:** Pathological examination of drainage fluid showed no growth and the culture was sterile ruling out empyema. Pleural fluid analysis revealed triglyceride 575mg/dl (>110 mg/dl) and cholestral 27mg/dl (cholesterol <5.18 mmol/l (200 mg/dl) , confirming the diagnosis of Chylothorax.

### Radiological findings



**Fig.2** showing fracture D8-D9



**Fig.3** MRI dorsal spine



**Fig.3** X-Ray -right side pleural effusion



**Fig.4** Milky white pleural fluid from I.C.D.

### Discussion

During a high-speed road traffic accident, a 28-year-old boy suffered D8-D9 fracture and subluxation of his thoracic vertebrae and right side pneumothorax. The day after admission and commencement of nasogastric feeding, milky fluid was noted in his right chest drain. Pleural effusion fluid was serous before the commencement of Ryles tube feeding.

**Differential Diagnosis:** Oesophageal leak, Empyema, Chylothorax.

**Management:** Patient was kept on parenteral fluids and enteral feeding was stopped completely. The chylothorax quickly resolved and both drains were removed after 15 days. Initial treatment of chylothorax aims to decompress the pleural space and minimise chyle production by not feeding the patient via the enteral route. Most recommendations are for conservative management for 2 or more weeks, unless certain parameters like average daily chyle loss of  $> 1.5$  l for a 5-day period, or imminent nutritional complication are seen which require surgical intervention.

### Conclusion

In this case, surgical management of the chylothorax and spinal fractures was planned. However, conservative management of chylothorax was successful, highlighting the fact that early aggressive surgical intervention for chyle leaks in blunt trauma is not necessary.

### References

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