Spontaneous Tension Hemothorax in a Young Male with a Nuss Implant

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Abstract
A 19-year-old male presented with upper abdominal pain, shortness of breath and loss of consciousness. X-rays revealed a tension hemothorax and a chest tube was inserted evacuating 2500 ml of blood. Bleeding in the tube ceased after the initial evacuation and the patient was monitored closely and could be discharged in good health on the second day after admission. We hypothesize, that the tension hemothorax was preceded by a spontaneous pneumothorax which caused a tear in scar tissue following the Nuss procedure five months previously.

Keywords: Nuss procedure; Spontaneous tension hemothorax; Emergency thoracoscopy

Introduction
Tension hemothorax is a rare condition characterized by mediastinal displacement caused by a large volume of blood within the pleural cavity. Spontaneous cases are extremely rare and there has only been, to our best knowledge, two cases reported in the English literature [1,2]. In contrast, primary spontaneous pneumothorax is common with a reported male incidence of 18-28 pr. 100,000 per year [2]. In 0.5-12% of these cases, spontaneous pneumothorax can be complicated by a hemothorax [3]. Spontaneous hemopneumothorax is a rare condition characterized by accumulation of blood within the pleural cavity in association with a spontaneous pneumothorax [4]. Although extremely rare, spontaneous hemopneumothorax can become life threatening due to the hemodynamic instability and ventilatory collapse [5].

This case presents a young male developing a spontaneous tension hemothorax, preceded by a spontaneous pneumothorax which we hypothesize caused a tear in scar tissue following the NUSS procedure five months prior. This is, to our best knowledge, the first incidence of development of a tension hemothorax in a Nuss patient.

Case Presentation
A 19-year-old male was admitted to the emergency department in a secondary centre. Ten hours prior he experienced reduced endurance and dyspnoea during a running session. Over the following seven to eight hours the symptoms worsened and he gradually developed right-sided upper abdominal pain radiating to the back, shortness of breath and loss of consciousness. There was no history of trauma before onset of symptoms. Five months earlier he had undergone the NUSS procedure using a one 11-inch. Pecus bar and the procedure as well as the postoperative stay had been unremarkable.

At admission, physical examination revealed pallor, hypotension (96/58 mmHg), tachycardia (109 beats/minute), tachypnea (17-35 beats/minute) and frequent desaturation. ECG was normal. No traumatic injuries or abnormalities were noted upon inspection of chest, back or abdomen.

Tension pneumothorax was suspected why a peripheral venous catheter was inserted at intercostal space two revealing that blood, not air, was under pressure. The procedure relieved the respiratory distress instantly. The X-ray showed right-sided hemothorax and mediastinal displacement to the left, but normal position of the Nuss implant (Figure 1A). A chest tube was inserted and 2500 ml was evacuated from the right pleural cavity.

Biochemical testing showed a drop of haemoglobin to 5.6 mmol/L. A CT angiography was performed, but did not reveal any site of active bleeding. The patient was transferred to our tertiary centre, where X-ray upon arrival (12 hours after insertion of the chest tube) showed minimal fluid accumulation in the right pleural cavity and full expansion of the lungs (Figure 1B). TTE did not reveal any cardiac cause for the hemothorax. Therefore he was monitored closely for drop in haemoglobin level and hemodynamic instability but his vital signs remained stable and the chest tube could be removed two days after admission. The follow up X-ray was normal besides a small apical pneumothorax and the patient was discharged two days after admission.

Discussion
Life threatening tension hemothorax is most often caused by penetrating or blunt trauma to the chest or as a complication to a procedure [4]. Spontaneous tension hemothorax is extremely rare and has, to our best knowledge, only been reported twice in the English literature [1,2]. Here, we report the first incidence of a patient with tension hemothorax, who had undergone the Nuss procedure five months prior.

Spontaneous pneumothorax is by far the most common cause of hemothorax, where 0.5%-12% of all cases are complicated by a hemothorax [3,4]. Spontaneous pneumothorax is defined as accumulation of more than 400 ml of blood in the pleural cavity in association with a spontaneous pneumothorax [4]. The bleeding can be caused by a torn adhesion between the parietal and visceral pleura, rupture of vascularized bullae and underlying lung parenchyma or an aberrant vessel between the parietal pleura and bullae. More rare causes of hemothorax are coagulopathy, aortic dissection or rupture, neoplasia or endometriosis [4]. Kelly et al. [6] evaluated 2,378 pectus excavatum patients, where 1,215 underwent the pectus excavatum repair [6]. They reported four late hemothoraces. However, two were secondary to trauma, whereas the source of bleeding was not identified in the remaining two cases (0.16%) and therefore could be considered as a spontaneous hemothorax.

Upon the patient's arrival, we suspected bar displacement as a cause of...
important, to bear this complication in mind when receiving patients with sudden onset of chest pain or dyspnea especially younger patients who have undergone thoracic surgery.

References

Figure 1: A: X-ray at secondary centre with right-sided tension hemothorax and mediastinal shift. B: X-ray at our centre 24 hours after debut of symptoms showing the chest tube, pleural cavity and a small apical pneumothorax.