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TITLE: THE GHOST OF CHEST DRAIN PAST

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**SUMMARY**

We present an interesting radiological appearance following chest drain removal in a young woman with congenital pulmonary surfactant deficiency. A distinct curvilinear tract was observed following chest drain removal and persisted for over two weeks. We discuss the case and the relevance of the underlying lung disease.

**THE GHOST OF CHEST DRAIN PAST**

A 20-year-old woman with recurrent left-sided pneumothoraces underwent video-assisted thoracoscopic pleurectomy and wedge resection of a left apical bulla. Past medical history included ABCA3 pulmonary surfactant dysfunction and subsequent interstitial lung disease with diffuse ground glass changes suggestive of a desquamative interstitial pneumonitis (DIP). She was a life-long non-smoker. Spirometry revealed forced vital capacity 0.97 litres, 32% predicted and TLCO 27% predicted. The operation was uneventful but there was a persistent post-operative air leak requiring prolonged pleural drainage but no other intervention. Histology of the resected lung tissue confirmed sub-pleural fibrotic disease with dilated airspaces including blebs and bullae. After ten days of pleural drainage, the air leak resolved and the drain was ready for removal (Figure 1A). Following uncomplicated chest drain removal, a chest radiograph revealed the presence of a well-defined curvilinear tract in the area vacated by the drain (Figure 1B). Initially there was concern this may represent air re-accumulating in the pleural space or structural damage by the chest drain, but the patient remained well and went home the next day. A follow-up radiograph in clinic two weeks later showed partial resolution of the abnormality (Figure 1C) and after two months there was complete resolution (Figure 1D).

Pulmonary surfactants are essential for reducing airway surface tension in the lung. Inherited surfactant deficiencies are rare but can be associated with acute respiratory distress in the neonatal period and progressive interstitial disease later in childhood [1, 2]. DIP has been reported to be the predominant form of ILD associated with an ABCA3 pulmonary surfactant disorder.[3] In this case we hypothesise that increased lung stiffness secondary to sub-pleural fibrosis resulted in delayed re-expansion of the lung into the space occupied by the chest drain. The changes persisted for over two weeks, in keeping with the severe restrictive lung disease seen in this patient. To our knowledge this is the first case-report to demonstrate a well-defined tract left behind by an intercostal drain. Other reports of the “ghost drainage” sign [4] have demonstrated smaller areas of banded atelectasis following chest drain removal. These images serve to highlight the degree of architectural and fibro-elastic disturbance associated with the interstitial lung diseases related to pulmonary surfactant dysfunction.

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All authors wrote, revised and approved the final manuscript.

**REFERENCES**

1. Hamvas, A., *Evaluation and management of inherited disorders of surfactant metabolism.* Chin Med J (Engl), 2010. **123**(20): p. 2943-7.

2. Hamvas, A., F.S. Cole, and L.M. Nogee, *Genetic disorders of surfactant proteins.* Neonatology, 2007. **91**(4): p. 311-7.

3. Bullard, J.E., et al., *ABCA3 mutations associated with pediatric interstitial lung disease.* Am J Respir Crit Care Med, 2005. **172**(8): p. 1026-31.

4. Rizzardi, G., L. Bertolaccini, and A. Terzi, *There is a hole in the lung!* J Thorac Dis, 2010. **2**(4): p. 253.