Hydrothorax, a Complication of the Insertion of Central Venous Cannulae

M. C. P. Apps, J. M. F. Clark, and S. J. Skeates
Intensive Therapy Unit, The Middlesex Hospital, London, England

Abstract. Hydrothorax developing in a patient after insertion of a central venous cannula is described. The cannula appeared to be in the superior vena cava on chest X-ray, and the condition only became apparent 48 hours after insertion.

Key words. Central venous cannula, Complication, Hydrothorax.

Insertion of central venous cannulae is associated with many hazards. Cannulae inserted through sharp needles may become damaged, broken and embolise. Perforation of the great veins or the right atrium may lead to hydromediastinum or hydropericardium, possibly leading to tamponade. Insertion of a cannula into the subclavian veins may be associated with pneumothorax, hydrothorax, chylothorax or haemothorax following damage to the subclavian artery.

Langdon (1) and Johnston (2) have described aberrant positioning of central cannulae, observed on post-insertion chest X-ray, and have emphasized the importance of such a chest X-ray so as to correct the position of the cannula, and identify complications.

A patient is described with a cannula delivering fluid into the left pleural cavity. A chest X-ray after insertion P. A. appeared normal, with the tip of the cannula in the superior vena cava and the condition only became apparent over the next 48 hours.

The patient, Mr. C. was a 53 year old publican, admitted to the Intensive Therapy Unit following resuscitation after a cardiac arrest. He had a long history of chronic bronchitis, with considerable effort restriction. On admission he was found to have paradoxical movement of part of his chest wall, a flail segment, and was unable to breathe because of pain from this. He was ventilated, a tracheostomy was performed, and he was gradually weaned off IPPV. He was fed intravenously, because of inability to tolerate feeding by nasogastric tube. Central venous cannulae were used for this, inserted into both antecubital fossae, and both subclavian veins in rotation. The site was changed regularly, on one occasion because of local infection.

On inserting a new cannula it was not found possible to use either infraclavicular route to the subclavian veins, and so a supraclavicular route was used to insert a left subclavian cannula. An intra-Medicut cannula was used; blood could be aspirated from the cannula, which was inserted to 25 cm and secured to the skin. Afterwards there was slight bleeding around the cannula for 10 minutes controlled with local pressure. A P. A. chest X-ray was taken, the tip of the cannula appeared to be in the superior vena cava, and there was some left sided basal consolidation, present on previous films (Fig. 1).

Fig. 1. Chest X-ray taken immediately after insertion of the subclavian cannula. The tip of the cannula is marked
After insertion of the cannula the patient complained of a left sided pleuritic chest pain, localised to the site of one of his broken ribs. He became pyrexial, $T = 38^\circ C$, and developed some bronchospasm. On examination he had coarse crepitations on both sides of his chest, with some rhonchi, more marked on the left than the right. Previous sputum had grown pseudomonas spp. “light growth” and so it was thought that he had a chest infection with this and he was treated with gentamicin. Chest X-ray after 24 hours showed a patchy consolidation on the left side of the chest, with a small left basal effusion. During this period he was being fed with Vamin and Intralipid.

Over the next 24 hours his condition deteriorated; he became breathless, distressed, tachypnoeic, with poor air entry on the left side of his chest, and many coarse crepitations. His urine output was poor. IPPV was re-started, but he did not respond to intravenous sedation given via the subclavian cannula.

On examination the left side of his chest was dull to percussion, with little air entry, and many crepitations. His central venous pressure rose to 23 cm $H_2O$. His chest X-ray showed complete opacity of the left side of the chest (Fig. 2).

On attempting to withdraw blood from the cannula, only IV feed was obtained. Chest aspiration yielded a creamy fluid, and insertion of chest drain was followed by drainage of 3 1/2 litres of this fluid. Dye inserted through the cannula passed freely into the left pleural cavity (Fig. 3). The cannula was removed and the tip cultured; organisms of the coliform group were grown.

A new central venous cannula was inserted via a cut-down in the right arm. His central venous pressure fell to +8 cm $H_2O$. He was given intravenous fluids and his urine output improved. He was electively ventilated for a further 24 hours, and then weaned off IPPV uneventfully. His chest drain was removed after 72 hours. He continued on gentamicin for his infection, and his temperature settled. He made a full recovery.