Case Report

Subclavian vessel injury from chest-drain malposition in the treatment of a pneumothorax in the presence of a lateral third open clavicular fracture✩,✩✩

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ABSTRACT

Objective: We report the unorthodox injury of the subclavian vessels by the malposition of a chest drain, for the treatment of a pneumothorax in the presence of a lateral third open fracture of the left clavicle. This case presents the first report of a ruptured subclavian vein and cephalic vein after the insertion of a chest drain for a pneumothorax. A systematic search performed in MEDLINE, EMBASE, Cochrane Library, and Web of Science found no similar cases documented in the literature. Methods: A Chest tube was inserted into the second intercostal space mid-clavicular line. Immediately postinsertion the left-hand digits were cyanosed with an absent radial pulse. An intraoperative haematoma was noted surrounding the chest drain insertion point. Vascular surgeons provided assistance and detected ruptured cephalic and subclavian veins and a punctured subclavian artery. The subclavian artery was repaired and both veins tied. The chest drain was re-inserted as per the ATLS protocol into the 4th intercostal space mid-axillary line. Upon healing of vascular repair of the subclavian artery injury the clavicle fracture was treated by use of a hook plate. Results: The patient made a good recovery, follow-up radiographs showed signs of fracture healing with complete resolution of pneumothorax and the patient was discharge from the department of orthopedic care. Conclusion: We believe that strict adherence to ATLS principles is vital as fractures of the lateral third of the left clavicle can distort anatomical landmarks. This can increase the incidence of injury to subclavian vessels due to malposition of the chest drain. Insertion of the chest drain in the fourth intercostal space mid-axillary line provides sound decompression of a pneumothorax as per ATLS protocol and reduces iatrogenic risk.

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Introduction

Thoracic injuries account for 25% of deaths due to trauma. Drainage of the pleural space by tube thoracotomy (chest drain) is the commonest intervention in thoracic trauma providing definitive treatment in majority of cases [1]. Although a comparatively straightforward procedure that is an essential procedure that should be familiar to respiratory physicians, emergency physicians, and surgeons caring for thoracic trauma patients, it is an invasive procedure that could lead to complications. These can be divided into infective, including empyema and surgical site infection, or technical, which can be caused by poor thoracic anatomical knowledge or inadequate experience. The rate of tube thoracotomy-induced empyema can reach 16% [1]. Common technical complications include blocked drain, subcutaneous emphysema, nerve injuries, and tube malposition [2]. Studies have suggested that higher complication rates are associated with blunt trauma, patients with a higher ISS score, and patients with chest drains placed by emergency physicians rather than surgeons. Despite confounding factors that preclude a clear explanation, these findings suggest that tube thoracotomy is not as straightforward as it seems, and requires ample experience, and a careful understanding of the underlying anatomy.

This case presents the first report of a ruptured subclavian vein and cephalic vein after the insertion of a chest drain for a pneumothorax. A systematic search performed in MEDLINE, EMBASE, Cochrane Library, and Web of Science found no similar cases documented in the literature.

Case report

A 26-year-old patient involved in motorcycle accident was admitted with an open fracture of the lateral third of the left clavicle. A radiograph confirmed off-ended fracture with a left-hand sided pneumothorax (Fig. 1). No chest CT scan was performed on the patient. A Chest tube was inserted into the second intercostal space mid-clavicular line (Fig. 2). Immediately postinsertion the left-hand digits were cyanosed with an absent radial pulse. Feeble pulse returned upon repositioning of the left arm. The patient was operated on with plating of the clavicular fracture. An intraoperative haematoma was noted surrounding the chest drain insertion point. Vascular surgeons provided assistance and detected ruptured cephalic and subclavian veins and a punctured subclavian artery. The subclavian artery was repaired and both veins tied. The chest drain was repositioned at the fourth intercostal space, in the mid-axillary line (Fig. 3). A postoperative repeat chest radiograph confirmed better inflation of lungs. A left-sided radial pulse returned to good volume and character.

Procedure

The chest drain was re-inserted as per the ATLS protocol into the fourth intercostal space mid-axillary line. Upon healing of vascular repair of the subclavian artery injury the clavicle fracture was treated by use of a hook plate (Fig. 4). Follow-up radiographs showed signs of fracture healing with complete resolution of pneumothorax and the patient was discharge from the department of orthopedic care.

Discussion

Chest injuries causes one-fourth of all trauma deaths and occur in 50% of fatal accidents. Tube thoracostomy (chest tube) is a lifesaving procedure and frequently indicated for either trauma or non-traumatic conditions. Although sometimes regarded as a straightforward procedure that is given
space respectively. These landmarks are very important for insertion of chest tube. From our experience, we recommend that open fractures of the clavicle can disturb the landmark for insertion of chest tube at mid-clavicle line second intercostal space. Hence, in such cases strict adherence at ATLS principles for chest tube (i.e, mid-axillary line fourth intercostal space) insertion minimizes iatrogenic complications.

This case report emphasizes the strict adherence to ATLS principles. The clavicle fractures can distort anatomical landmarks. This can increase the incidence of injury due to malposition of the chest drain. Hence, we recommend insertion of chest drains in the fourth intercostal space mid axillary line as per ATLS protocol to reduce any iatrogenic risk.

For many procedures whereby tube thoracostomy is warranted, more patients will be harmed by the failure to place a chest drain than my subsequent complications. This case adds a unique example to the multitude of complications encountered in the literature, and emphasizes the need for further education to perform this life-saving procedure, including technical assistance as part of hospital protocol if necessary.

Provenance and peer review

Not commissioned; externally peer reviewed.

Patient consent statement

Patient consent for publication has been obtained.

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