Case report

Overdose of tetracycline for pleurodesis leading to chemical burns of the pleura

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Abstract

Chemical pleurodesis using tetracycline is an accepted and commonly employed treatment of pneumothorax and pleural effusions. We describe a case of chemical burn of the pleura in a ventilated 41-year-old who came to thoracotomy after 3 days of continuous intrapleural infusion of tetracycline at another hospital. To our knowledge this has not been previously reported although other adverse effects of this procedure are documented. We suggest that damage to the pleura and underlying lung may occur if excessive amounts of tetracycline are used in attempted pleurodesis.

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1. Introduction

Pleurodesis is the obliteration of the pleural space and is used to prevent the recurrence of pneumothorax, haemothorax, pleural effusion or chylothorax. It may occur spontaneously after inflammation or be induced by the insertion of a chest drain, but if not, an irritant may be instilled into the pleural space. Chemical pleurodesis is a common procedure not only during thoracoscopy but also on general wards and intensive care units. The advantages and disadvantages of a range of sclerosing agents such as talc, tetracycline and its derivatives, anti-neoplastic agents and immunomodulating agents have been debated [1]. The antibiotic tetracycline is commonly used and has been recognised as a pleural sclerosant for over a decade [2]. It is easily available, cheap and has been shown to be fairly effective [3]. Some adverse effects of tetracycline pleurodesis have already been reported and we present another complication that was not found in a review of the literature.

2. Case report

A 41-year-old male intensive therapy unit (ITU) patient was referred to our unit with a persistent air leak. He had originally been admitted 4 weeks earlier with an overdose of chlocticromazine and dothiepin complicated by a right basal aspiration pneumonia, which progressed to ARDS. He was ventilated on admission and 15 days later developed a right tension pneumothorax while in the ITU of another hospital. Two chest drains were inserted but there was a persistent air leak for 12 days. An intrapleural tetracycline pleurodesis was attempted via an intrapleural catheter. An infusion of 1 g tetracycline in 50 ml of normal saline was commenced and continued at the rate of 5 ml/h after a bolus of 20 ml. This was continued for 3 days leading to a total dose of approximately 7 g tetracycline. Pleurodesis was not successful and the catheter was removed. The patient was transferred to our hospital for further management.

Since the patient had persistent massive air leak it was decided to perform thoracotomy and tackle the source of air leak. At surgery a large black eschar measuring about 8 ×10 cm was found on the right parietal and visceral pleura (Fig. 1). The tissue appeared burned and charred, and was localised to one congruent area around the site where the intrapleural catheter had been inserted. No other area of the pleura was similarly affected. There was a massive air leak from the charred lung surface. A right pleurectomy and lung biopsy was performed. The histopathology of the pleura showed that the largest area of blackened tissue was 8 cm in diameter and consisted of a superficial layer of necrotic material with discoloration, with underlying granulation tissue and fibrosis suggestive of ‘chemical burn of the pleura’. The lung biopsy showed similar changes with new interstitial fibrosis and granulation tissue.
The surgical pleurodesis was successful and the patient was eventually extubated, rehabilitated and discharged home.

3. Discussion

There has been some debate in the literature as to which is the safest and most efficient agent to use for chemical pleurodesis. Acute respiratory failure is a rare but significant side effect of talc pleurodesis [4]. Anti-neoplastic such as bleomycin may be used for malignant pleural effusions but have not been evaluated for pneumothorax. Immunomodulating agents such as C. parvum and OK-432 are more expensive and difficult to obtain than antibiotics or talc. Thus tetracycline and derivative such as doxycycline have been recommended in recent reviews [1, 5].

Despite this there have been several adverse effects associated with tetracycline pleurodesis. Pain and fever are commonly noted side effects but are also seen when other chemical sclerosant are used. Perhaps more significantly one study claims that a single dose of 20 mg/kg of intrapleural tetracycline administration leads to therapeutic serum levels in four out of five patients and warns that those with sensitivity to the antibiotic, in compromised renal function, may be affected [6]. Indeed, a case of acute renal failure associated with tetracycline pleurodesis was reported in 1993 [7]. Local problems are rare but pyopneumothorax with bronchopleural fistula has been reported following tetracycline pleurodesis in a patient on CAPD [8].

The very effectiveness of tetracycline as a sclerosant depends to some extent on the exciting an inflammatory reaction in two pleural surfaces, and as such some damage to the tissues is to be expected. The pathophysiology includes stimulation of fibroblast proliferation, mesothelial sloughing, pleural fluid clotting, inhibition of fibrinolysis and resultant fibrosis [9]. However we were surprised to see the extent of charring tissue damage caused by the attempted pleurodesis in this case. Contributing factors seem to be the lack of dispersal of the tetracycline, the length of time the intrapleural instillation had been continued for and the total dose of tetracycline. The sahn protocol modified by Guzman et al. suggests one dose of 20–30 mg/kg of tetracycline powder in 50 ml of saline instilled into the pleural cavity after intrapleural administration of 300 mg lidocaine. In their protocol the tube is clamped for 2 h and the patient is repositioned frequently [8]. The total dose given to our patient was several times larger than this, and there may have been problem with regular repositioning of a sedated and ventilated patient.

There appears to be some variation in the protocols used for chemical pleurodesis. In view of the complications previously reported, an the extent of the tissue damage we observed in our patient, we conclude that caution should be employed in the use of tetracycline intrapleurally and that large or repeated doses should be avoided.

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References