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# Acupuncture-induced haemothorax: a rare iatrogenic complication of acupuncture

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## ABSTRACT

This paper reports a rare iatrogenic complication of acupuncture-induced haemothorax and comments on the importance and need for special education of physicians and physiotherapists in order to apply safe and effective acupuncture treatment. A 37-year-old healthy woman had a session of acupuncture treatments for neck and right upper thoracic non-specific musculoskeletal pain, after which she gradually developed dyspnoea and chest discomfort. After some delay while trying other treatment, she was eventually transferred to the emergency department where a chest X-ray revealed a right pneumothorax and fluid collection. She was admitted to hospital and a chest tube inserted into the right hemithorax (under ultrasound guidance) drained 800 mL of bloody fluid (haematocrit (Hct) 17.8%) in 24 h and 1200 mL over the following 3 days. Her blood Hct fell from 39.0% to 30.8% and haemoglobin from 12.7 to 10.3 g/dL. The patient recovered completely and was discharged after 9 days of hospitalisation. When dyspnoea, chest pain and discomfort occur during or after an acupuncture treatment, the possibility of secondary (traumatic) pneumo- or haemopneumothorax should be considered and the patient should remain under careful observation (watchful waiting) for at least 48 h. To maximise the safety of acupuncture, specific training should be given for the safe use of acupuncture points of the anterior and posterior thoracic wall using dry needling, trigger point acupuncture or other advanced acupuncture techniques.

parallel increasing tendency for side effects and complications that can occur as a result of direct trauma or inflammation. We present the first known report from Greece of a rare iatrogenic complication of acupuncture which we hope will alert practitioners and other health-care staff to suspect, promptly diagnose and quickly admit similar cases for intensive care in the future.

## CASE REPORT

A 37-year-old woman presented with acute thoracic and neck pain to a private practice acupuncture practitioner. The patient was healthy with no other known significant medical conditions, although she had been a heavy smoker for the previous 15 years (2–3 cigarette packs per day) and marginally underweight with a body mass index of 18.2. The patient had previously successfully undergone several acupuncture sessions at the same private acupuncture clinic for stress management and posture-related musculoskeletal pain without complaining of any side effect.

On the day of presentation she requested acupuncture treatment for pain that had commenced during the past 12 h and extended from the right shoulder region (rhomboid major muscle), above the elevator scapulae and trapezoid muscles and into the suboccipital region and the head (figure 1A). It was described by her as 'muscular pain' and was accompanied by muscular stiffness and decreased range of motion.

The practitioner inserted approximately 20 needles locally and regionally, connecting two pairs with an electroacupuncture device. At the end of the session the therapist tried to 'deactivate' a trigger point which he located by



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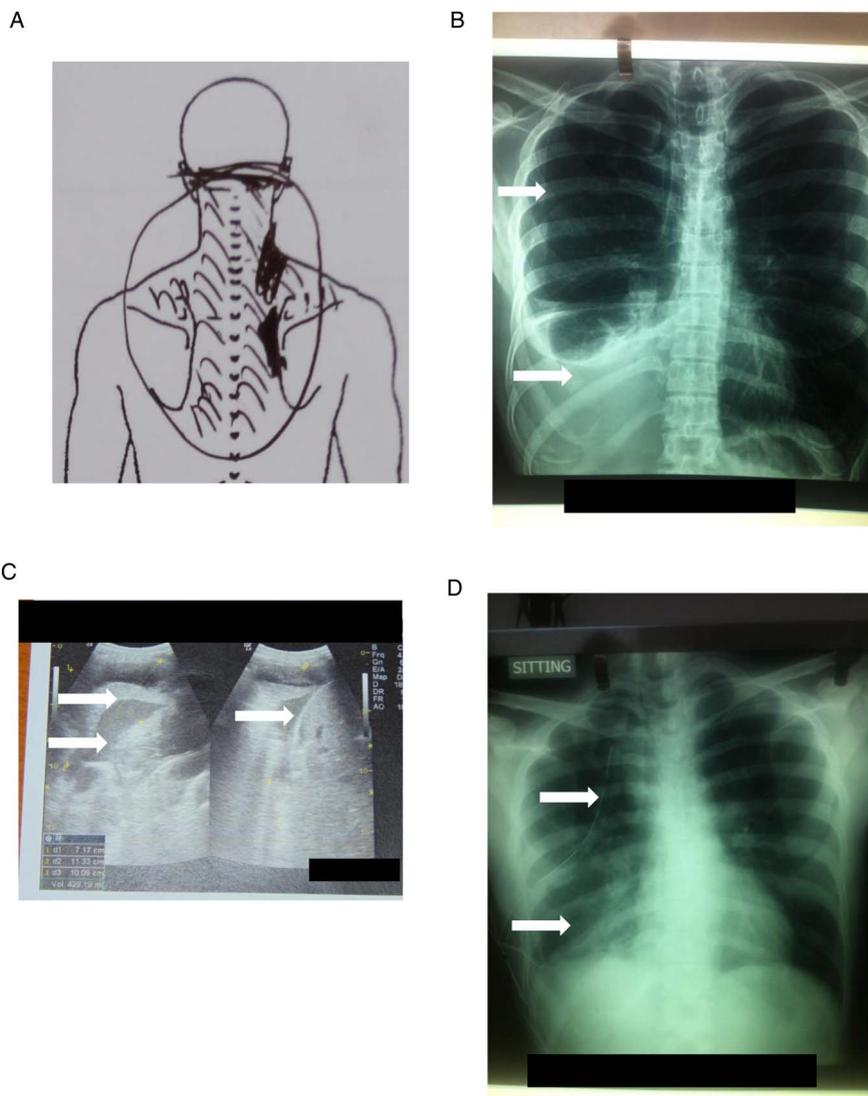


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## INTRODUCTION

Acupuncture is an alternative complementary medical therapy that has gained increasing popularity in the treatment of various conditions in the Western world.<sup>1</sup> Because of its increasing use, there is a



**Figure 1** (A) Pain diagram showing the referred pain area over the cervical and interscapular region. (B) Admission X-ray showing pneumo-haemothorax in the right chest (arrows indicate fluid collection). (C) Ultrasound image demonstrating the pleural effusion and the collapsed right lung. The collection fluid is located between the base of the lung and the diaphragm over the liver (arrows). (D) Chest tube inserted at the right base.

palpating the elevator scapulae muscle. He used a dry needling technique (intramuscular stimulation) by manipulating a needle that was already in place. According to the patient, he used intense manipulation. At this point the patient felt an acute local and intense pain which remained unchanged even after the needle was removed.

The same evening, 4–5 h after treatment, the pain became more intense. The patient contacted the acupuncturist who advised her to treat the pain with pain killers and bed rest. The next day (24 h after the treatment), the same acute pain reappeared and extended to the anterior chest wall, including almost the whole right hemithorax. It was intensified during inspiration and speech. She called her acupuncturist who advised her to visit the emergency (A&E) department of the nearest hospital. She did not follow his advice but, instead, thinking that she might have a muscular pain,

tried to obtain pain relief by visiting a physiotherapist. The physiotherapist, without contacting the acupuncturist, tried to help her with light massage, local manual manipulation and superficial heat therapy with warm packs at the region where she first felt the pain.

The next day (48 h after the episode) she was in a better condition and able to undertake her daily tasks. At some point the chest pain reappeared. She felt exhausted and thought she was feverish (indeed, she had a fever of 37.8°C) and she felt that she was about to faint and gradually developed shortness of breath (later, during our interview with the patient, she mentioned that she had shallow breathing and was out of breath while speaking). She again called her acupuncturist and was again advised to attend an A&E department in order to have a chest X-ray.

This time she followed his advice and went to a private radiology clinic where a chest X-ray revealed

pneumothorax and fluid accumulation in the right pleural space (figure 1B). It was then that she finally visited the A&E department of the nearest private hospital on duty with signs of dyspnoea and intense pain over the right hemithorax. She was tachypnoeic, with a respiratory rate of 30–32 breaths/min, a pulse rate of 110/min, blood pressure 92/64 mm Hg, decreased chest expansion with active accessory respiratory muscles, dullness to percussion and reduced breath sounds over the right hemithorax. Pneumothorax was suspected and a diagnostic fluid aspiration (under X-ray) was performed. The fluid sample was bloody (haematocrit (Hct) 17.8%, haemoglobin (Hb) 6.1 g/dL, red blood cells  $1.90 \times 10^6/\mu\text{L}$ ), confirming the diagnosis as traumatic haemothorax (criteria: pleural effusion with a Hct value >50% of that of the circulating serum Hct). Admission blood Hct was 39%, Hb 12.7 g/dL, platelets 174 000/ $\mu\text{L}$ , white blood cells 12 550/ $\mu\text{L}$ .

Chest drainage was immediately performed under general anaesthesia, with insertion of a drain (intercostal catheter F32) through a 1 cm incision at the sixth intercostal space in the mid-axillary line in order to remove the fluid from the pleural cavity. The following blood examination (in the afternoon on the same day) showed that Hct had fallen to 30.8% and Hb to 10.3 g/dL. Through the tube, 800 mL of bloody fluid were aspirated in the first 24 h. The dyspnoea was gradually relieved over the course of 4–6 h. Meanwhile, a repeat blood test the following day showed that the Hct and Hb remained unchanged (Hct 29.8% and Hb 10 g/dL). The patient was not transfused and was kept under observation with intravenous pain killers and antibiotics (fluoroquinolone/ciprofloxacin). Two pleural fluid cultures were negative. Three days after the pleural drainage, even though the vital signs and respiration were improved, an ultrasound examination following a new X-ray showed the continued presence of fluid in the pleural space which was not properly drained by the tube (figure 1C), so a second chest tube was inserted to the right lung base (figure 1D). The total amount of bloody fluid drained by the chest tubes was 2000 mL before their removal on day 5 after admission. Blood tests on day 5 revealed an increase in Hct to 30.3% and Hb was 10.1 g/dL. The patient was discharged from the hospital on the ninth day with a fully expanded lung and normal lung function. The patient remained asymptomatic at follow-up 10 days after discharge.

#### Haemothorax mechanism

A haemothorax, pneumothorax or both can occur when the chest wall is punctured, allowing blood, air or both to enter the pleural space, and dyspnoea and chest pain result.<sup>2</sup> Traumatic haemothorax develops when trauma to the chest or lung wall occurs with concomitant rupture of a small contractile vessel,

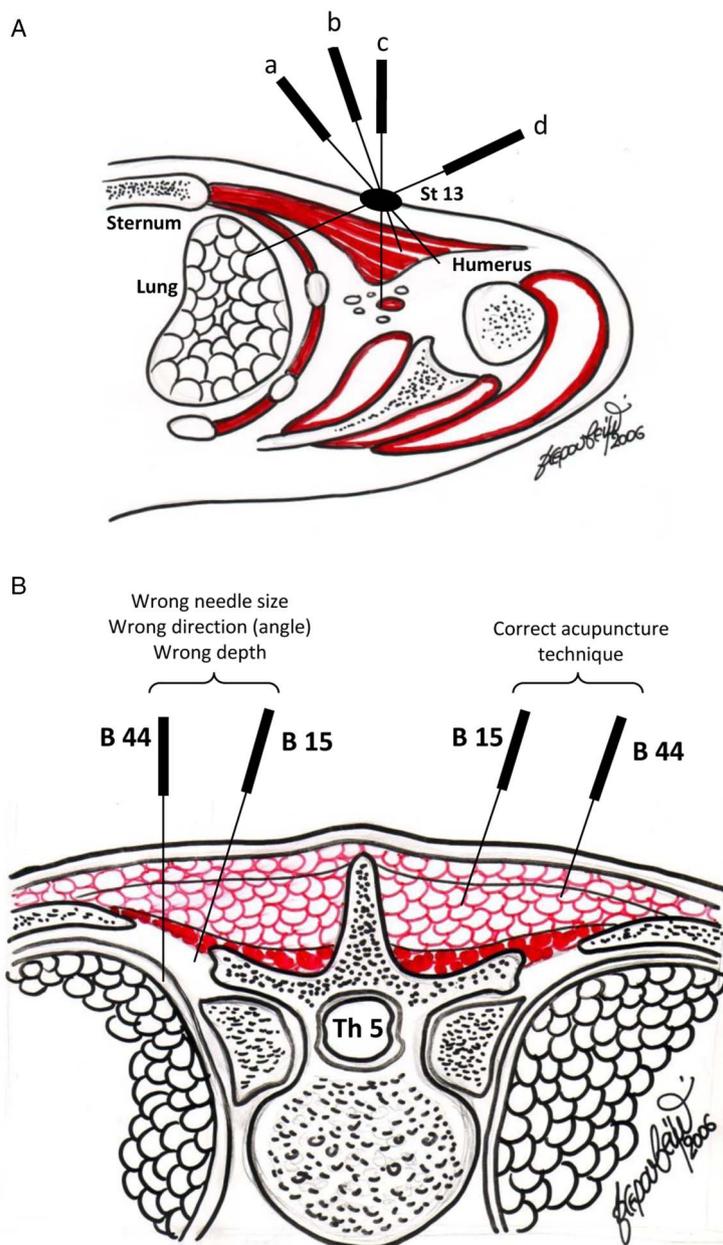
vascular bulla or lung parenchyma at the apex of the lung, or an aberrant thin-walled vessel. Penetrating chest trauma such as acupuncture lacerates a blood vessel and causes trauma-related blood loss into the pleural cavity.<sup>3</sup> Sometimes haemothorax can be a major complication not due to acupuncture treatment but as a result of bleeding from insertion of a thoracic catheter (the differential diagnosis can be made by measuring the Hct and Hb levels of the pleural effusion).

#### DISCUSSION

Traumatic events in acupuncture treatment are usually caused by improper insertion or manipulation at high-risk acupuncture points. The depth, direction and angle of needle insertion, especially in the chest region, are crucial. The lung surface is about 10–20 mm beneath the skin in the region of the medial scapular or mid-clavicular line (figure 2A). This may explain the high incidence of pneumothorax from needling in these areas.<sup>4,5</sup> Preventing iatrogenic complications is therefore crucial.<sup>6</sup> Inspection and history can provide us with valuable information.

We suggest that high-risk patients are those with a thin body status, thin chest wall, atrophic neck and thoracic muscles, a history of chronic respiratory diseases and heavy long-time smokers. However, obese patients can also be at risk as it becomes more difficult to gauge the depth of the needle tip. We consider high-risk techniques to include deep intramuscular stimulation and dry needling techniques, especially when they are applied on acupuncture points situated in the thoracic region, thoracic erector muscles (bladder meridians), rhomboids, trapezius, the subclavicular and supraclavicular region, intercostal spaces, suprascapular and infrascapular fossae. Finally, we consider high-risk regions to be all the following acupuncture points: ST11, ST12, LU1, LU2, ST2, KI27, KI26, KI22, ST18, BL41 and BL50. Acupuncture points situated in the mid-axillary line (SP17, SP21, GB21 and BG22) have to be punctured with caution (depth, direction and angle), and the acupuncturist must know the anatomy of the above regions and the anatomical structures and layers that are located beneath the acupuncture points, preferably using illustrations that present the cross-sectional anatomy, especially for high-risk acupuncture points (figure 2B). Acupuncture in the above areas should therefore be applied with caution.<sup>7,8</sup>

We recommend that any patient who develops shortness of breath, chest pain and/or thoracic (interscapular) pain following acupuncture applied to the chest region (anterior or posterior thoracic wall) should always be suspected of pneumothorax or haemothorax, which is a serious and potentially life-threatening complication that can be treated successfully if the patient follows the instructions of his/her doctor.



**Figure 2** The importance of the depth and angle during acupuncture treatment. (A) The acupuncture point ST13 is located in a high-risk body region. Needles (a) and (b) are placed in the correct direction and depth; needles (d) and (c) could damage the large vessels or right pleura. In the same region, acupuncture points ST12, LU1 and LU2 are also in a high-risk anatomical region. (B) Cross-sectional anatomy images provide valuable information, indicating the safe depth, direction and angle of needle insertion in order to prevent inappropriate needle technique.

## CONCLUSIONS

To our knowledge, this is the first known report of haemothorax occurring in Greece following routine acupuncture treatment. Because of its widespread use, acupuncture is often assumed to be safe, but serious and sometimes fatal adverse events have been reported.

It is important that patients who have been treated with acupuncture are strongly encouraged to contact their acupuncturist first if they develop any new-onset symptoms following acupuncture. Their acupuncturist is more likely than someone unfamiliar with

acupuncture to consider the possibility of acupuncture-induced complications including haemothorax. Knowledge of these incidents should change our practice (and alertness) and discipline to instructions would profoundly reduce fatal events caused by acupuncture. The acupuncturist should consider following up the telephone conversation to ensure that the advice given has been followed.

We recommend a review of—and, if necessary, improvement to—acupuncture training for safety including new educational guidelines (or red flags) and special acupuncture training for treating high-risk

areas based on the cross-sectional anatomy of chest and thoracic acupuncture points. We intend to design specific training that gives precise guidance on the exact location, underlying anatomy, depth and spatial distribution of acupuncture points as well as the position of vessels, nerves, muscles and viscera.

**Correction notice** This article has been corrected since it was published Online First. The provenance and peer review statement has been corrected.

**Contributors** TT participated actively from the first moment with the patient as part of the medical staff at the emergency department and, with AE and KYM, conceived the idea of publishing this case report. SV helped with treatment and ultrasound images and diagnostics. YA and GG contributed to refinement of the study. All authors approved the final manuscript.

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