Pneumothorax sustained during acupuncture training: a case report

Acupuncture is a safe procedure when performed by a trained health professional,[1] and sound anatomical knowledge is pivotal in the training process. Pneumothorax is the most common serious traumatic complication of acupuncture.[2] I believe your readers will be interested in the diagnosis and management of a pneumothorax sustained by a student at the 2nd Post-Graduation Course on Medical Acupuncture of the University of Minho.

Surface and functional anatomy and needling safety have been mainstays at the Medical Acupuncture Post-Graduation Courses held in both the Medical Sciences Faculty at the New University of Lisbon and at the Health Sciences School of the University of Minho. In a total of six programmes, over 120 medical doctors have been trained. This is the first serious adverse event sustained during training.

THE ACUPUNCTURE TRAINEE

A 30-year-old male medical doctor attended the training programme. His weight was 62.5 kg, height 169 cm, body mass index of 21.9 and no prior smoking habits. He reported mild chest pain and respiratory crepitus the day after an acupuncture training session.

The symptoms started about 1 h after having been needled on the right anterior scalene by one of the instructors (with more than 10 years of experience in needling). Earlier the same day, needling of the thoracic and lumbar erector spinae and upper trapezius muscles by other students had been performed under supervision.

Needling of the anterior scalene was performed after location of anatomical landmarks (clavicle, posterior border of the clavicular head of the sternocleidomastoid and external jugular vein) and identification of the anterior scalene by asking for a strong sharp inspiration. A 0.30×40 mm coated steel needle (TeWa, PD Vertriebs GmbH) was inserted to a depth of approximately 15–20 mm. Direct stimulation of the inserted needle using a hand-held electroacupuncture device (Pointer Excel II, Tens Plus Industrial Company, Hong Kong) at 1 Hz was performed to check if the insertion had reached the anterior scalene.[3] As stimulation was performed, a sudden movement of the right upper extremity occurred (shoulder abduction, elbow flexion and wrist extension), probably due to stimulation of the nearby brachial plexus.

This is the doctor's own account of the event:

> On 30 May 2014, around 6pm, I was needled on my right anterior/mid scalene muscle. During electroacupuncture (EA) an involuntary jerk of my upper right limb occurred. There was no significant pain or other symptoms at that time. About 1 h later I began feeling a slight pain and crepitus on the right upper chest with every deep breath. No shortness of breath was felt at that time or during the whole episode. I immediately thought I had a pneumothorax but, since the symptoms were so mild, I decided to wait.
>
> The next morning (31 May) the symptoms persisted and shortly afterwards a dry cough began, mostly on deep breathing. After clinical evaluation at the Post-Graduation Course, I went to the ER. Around 11am X-rays taken on deep inhalation and exhalation confirmed the diagnosis of pneumothorax. I remained at the ER during the afternoon on high debit oxygen. A re-evaluation X-ray was taken at 7pm and the pneumothorax had slightly increased. At this time it was decided to exsufflate the pneumothorax. 380 ml of air were drained. No chest tube was needed. Oxygen therapy was maintained until 10am next morning (1 June). A control X-ray showed only a small amount of air near the apex of the lung (seen in inhalation and slightly increasing on exhalation). Oxygen saturation remained at 99–100% throughout the episode. I was discharged with the recommendation of absolute rest at home. Re-evaluation was done 2 days after discharge (3 June), at which time I was mostly asymptomatic. On that day an X-ray showed a very thin line of air on the apex of the lung, only visible in exhalation. A period of 10 days of rest and about one month without exercise was recommended. A new re-evaluation with a CT scan was scheduled for 1 month after discharge (figure 1).

COMMENT

Needling into the supraclavicular and parasternal regions poses the greatest risk of pneumothorax; insertions on the thoracic paravertebral region and over the rib cage also have a high risk.[4] In this case the pneumothorax was most likely caused by deepening or angulation of the acupuncture needle during electrical stimulation of the anterior scalene, even though the possibility of any of the earlier needling in the right upper trapezius or thoracic erector spinae muscles cannot be excluded, as needling to the paravertebral, infraclavicular and lateral thoracic regions may also cause injuries to the pleurae and lungs.[4]

Whereas in a patient with a poor physical condition even a small pneumothorax may induce severe symptoms,[5] small pneumothoraces developing slowly in an otherwise healthy patient may not be severe enough for a patient to seek immediate medical help. In this case the patient was never dyspnoeic during the event. Oxygen saturation levels were always above 98%, even before oxygen therapy. Pain was never significant. The onset of symptoms was fast, but not severe enough for a medical doctor (and an acupuncture student), who recognised the early symptoms and considered the possibility of having sustained such a lesion, to look for help.

The rate of absorption of intrapleural gas in untreated lesions is about 1.25% of the thoracic volume per day.[5] Small mildly symptomatic pneumothoraces may reabsorb spontaneously. If a patient

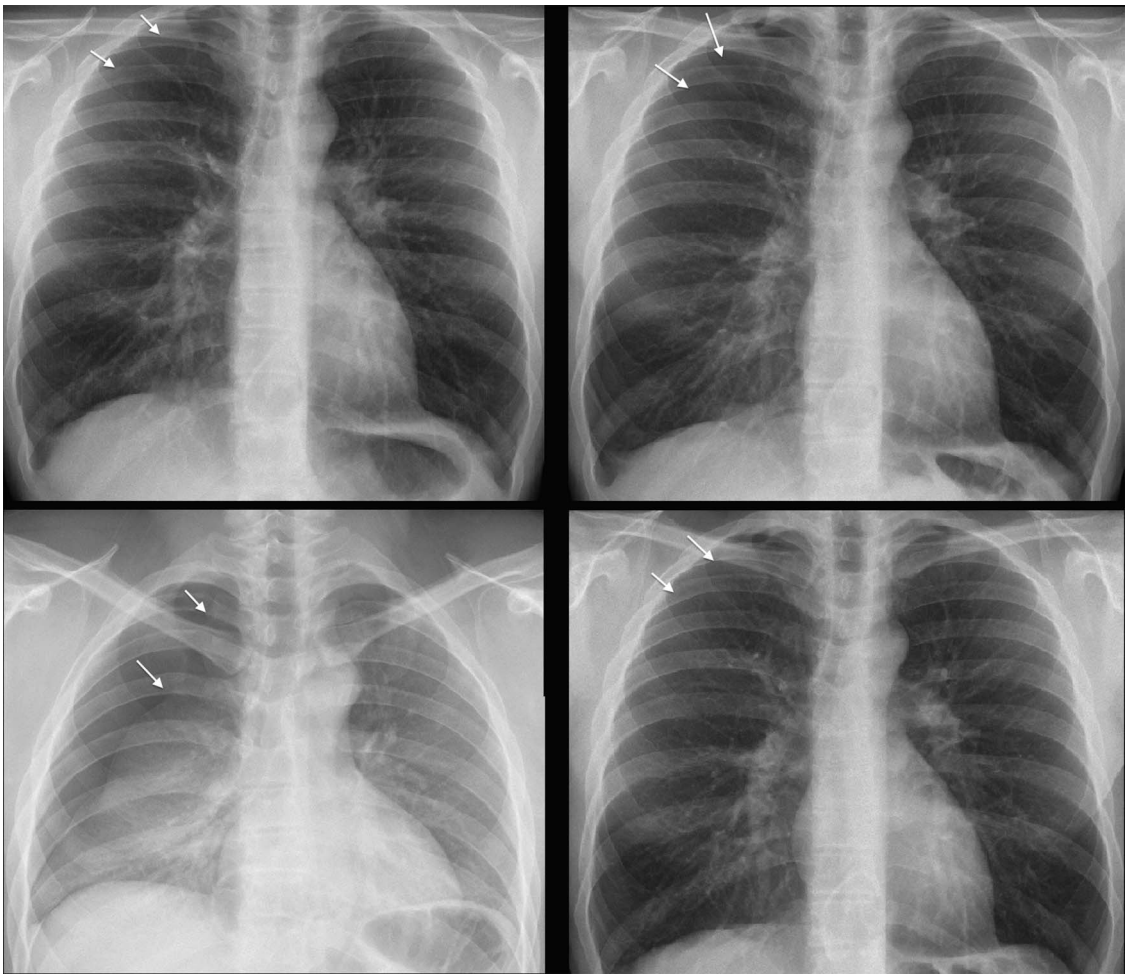

Figure 1 Composite X-ray images of the event. Upper left: first inspiration X-ray taken on 31 May (14 h after onset of symptoms), showing a small amount of air in the apex of the lung and down along the rib cage (arrows). Upper right: second inspiration X-ray on 31 May (25 h after onset of symptoms). An increase in the size of the pneumothorax is seen (arrows). Lower left: X-ray taken at same time as upper right, in expiration. The lung is seen partially collapsed (arrows). Lower right: X-ray taken on 1 June (11 h after exsufflation), showing only a small amount of air near the apex of the right lung (arrows). The air image seen projected over the lower thoracic spine was present in a previous X-ray, probably corresponding to a hiatal hernia.

is unaware of the possibility of the occurrence of pneumothorax after needling and is not alerted to early symptoms, the diagnosis may be delayed or the lesion may even go undiagnosed. These facts could be responsible for underdiagnosing and under-reporting of this serious adverse event.

Iatrogenic pneumothoraces pose less concern regarding recurrence, and management depends on the clinical profile and underlying patient disease.[5] Oxygen is reabsorbed 63 times faster than nitrogen, so substituting nitrogen for oxygen in the intrapleural space with oxygen therapy will accelerate absorption rates by 3–4 times,[5] which is especially important in large volume pneumothoraces. Early diagnosis and high debit oxygen therapy will thus hasten recovery and avoid complications. Simple exsufflation therapy or chest tube placement are treatment options in large volume pneumothoraces or in patients with chronic obstructive pulmonary disease.[5]

Safety aspects of needling need to be a major aspect of acupuncture training, but no amount of training and experience can guarantee that an adverse event will not occur. Patients receiving acupuncture should be informed of the possibility of this adverse event and of the early signs of pneumothorax, especially if needling is performed in areas of increased risk, so that they seek proper medical care soon after installation.

António Paulo Martins da Encarnação,[1] João Nelson Teixeira,[2] Juliana Louro Cruz,[3] José Eduardo Oliveira[4]

[1]Organizing Commission of the Post-Graduation Courses on Medical Acupuncture of the Medical Sciences Faculty of the New University of Lisbon (FCM-UNL) and the Health Sciences School of the University of Minho, Braga (ECS-UM), Braga, Portugal
[2]Private practice physician, Braga, Portugal
[3]Anesthesiology Department, Hospital de Braga, Braga, Portugal
[4]Intensive Care Department, Hospital de Braga, Braga, Portugal

Correspondence to Dr António Paulo Martins da Encarnação, Organizing Commission of the Post-Graduation Courses on Medical Acupuncture of the Medical Sciences Faculty of the New University of Lisbon (FCM-UNL) and the Health Sciences School of the University of Minho, Braga (ECS-UM), Rua do

Carvalhal, 25, Braga, Dume 4700-051, Portugal; antoniopauloencarnacao@yahoo.co.uk

Acknowledgements The authors thank Dr Mike Cummings for comments on image editing and the early draft of the paper.

Contributors All authors contributed to writing of the initial and final drafts and image selection and editing.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; internally peer reviewed.

To cite Martins da Encarnação AP, Teixeira J N, Cruz J L, *et al*. *Acupunct Med* Published Online First: [*please include* Day Month Year] doi:10.1136/acupmed-2014-010642

Received 12 August 2014
Accepted 21 August 2014

REFERENCES

1 Melchart D, Weidenhammer W, Streng A, *et al*. Prospective investigation of adverse effects of acupuncture in 97733 patients. *Arch Intern Med* 2004;164:104–5.
2 Peuker E, Cummings M. Anatomy for the acupuncturist—facts and fiction 2: the chest, abdomen, and back. *Acupunct Med* 2003;21:72–9.
3 Encarnação A. Hand held electroacupuncture devices—potential for teaching in functional muscular neuroanatomy and musculo-skeletal diagnosis. *Acupunct Relat Ther* 2014;2:29–33.
4 Peuker ET, White A, Ernst E, *et al*. Traumatic complications of acupuncture—therapists need to know human anatomy. *Arch Fam Med* 1999;8:553–8.
5 Choi W-I. Pneumothorax. *Tuberc Respir Dis* 2014;76:99–104.

Pneumothorax sustained during acupuncture training: a case report

António Paulo Martins da Encarnação, João Nelson Teixeira, Juliana Louro Cruz, et al.

Acupunct Med published online September 4, 2014
doi: 10.1136/acupmed-2014-010642