

## Case Report

# Acupuncture Induced Bilateral Pneumothorax in Children

TK *Tsui*, CH *Li*, KH *Poon*, DSY *Lam*

**Abstract** Acupuncture is one of the prevalent complementary and alternative medicines nowadays. Its use is gaining popularity in paediatric patients. The procedure is generally safe but serious adverse events do occur. We are reporting two paediatric cases of bilateral pneumothorax after acupuncture therapy so as to arouse the awareness of clinicians and acupuncturists to the potential life-threatening complication.

**Key words** Acupuncture; Children; Pneumothorax

### Introduction

Acupuncture was originated in China two thousand years ago and it was believed to be effective and complementary in many diseases treatment.<sup>1</sup> Through applying needles with different depth at specific points of the body, the "flow of energy" inside the body is created to cure diseases and relief pain.<sup>2</sup> Its application is gaining popularity, even in paediatric patients. It is believed to be safe and most complications are minor provided that it is performed under hands of properly trained acupuncturists and with adequate aseptic techniques. However, serious, life-threatening situation (e.g. tension pneumothorax, cerebral haemorrhage) or even death can occur as a result of the procedure.<sup>3-5</sup> There were case reports about iatrogenic pneumothorax arising from acupuncture in adults but it was rarely reported in

children.<sup>6-8</sup> We present two paediatric cases with bilateral pneumothorax related to acupuncture therapy in Hong Kong.

### Case 1

A 17-year-old girl with good past health consulted a Chinese herbalist for neck pain in 5/2011. She received acupuncture over bilateral trapezium regions for neck pain at 10 am in the morning. She attended tutorial class afterwards and experienced chest pain with progressive shortness of breath 2 hours later. She attended the emergency department around 2.5 hours after procedure. Her height was at 75th centile and body mass index (BMI) was 16.8 kg/m<sup>2</sup>. There was no feature suggestive of Marfan syndrome. She was mildly tachypnoeic (respiratory rate = 24/min, heart rate = 63/min, blood pressure = 98/60 mmHg) with pulse oximetry of 98% in air. Auscultation showed reduced air entry and hyper-resonance on percussion over both chest. Chest radiograph revealed bilateral pneumothorax of ~30% on each side (Figure 1).<sup>9</sup> She was hospitalised with bilateral chest drains inserted. There was good resolution of bilateral pneumothorax. The left and right chest drains were removed on day 4 and day 5 respectively. Subsequent follow-up visit and radiographs revealed complete resolution of the pneumothorax and the child recovered without long-term consequence. Her neck pain was followed up by orthopaedics surgeon.

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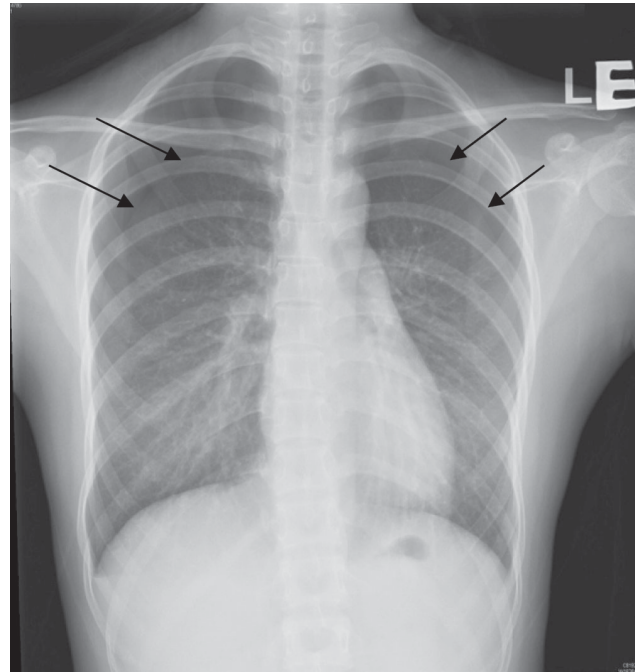
## Case 2

A 16-year-old previously healthy boy consulted acupuncturist because of sprained neck with neck pain for 1 month in 7/2010. Three acupuncture needles were applied on both upper thoracic paraspinous regions. He experienced chest discomfort and exertional shortness of breath around 2 hours after the procedure. He did not seek any medical advice at that time as he thought these might be the normal response after the therapy. However, the pain and discomfort were progressive and affected his sleep. He finally attended the emergency department on the next day (~22 hours after the procedure). His height was at 75th centile and BMI was 20.5 kg/m<sup>2</sup>. There was no feature suggestive of Marfan syndrome. He was not tachypnoeic at rest (respiratory rate = 20/min, heart rate = 72/min, blood pressure = 115/62 mmHg) and the pulse oximetry was 100% in air. Auscultation showed reduced air entry and hyper-resonance on percussion over right chest. Chest radiograph showed right pneumothorax of 38% (Figure 2)<sup>9</sup> and left apical pneumothorax. Chest tapping was performed over the right chest with 715 ml air aspirated. Serial chest radiographs showed gradual resolution of bilateral pneumothoraxes. No further chest drainage was needed. He was discharged on Day 6 of admission. His neck condition was assessed by orthopaedics surgeon and found mild thoraco-lumbar scoliosis with compensated cervical spine scoliosis. Follow-up and physiotherapy were arranged for him.

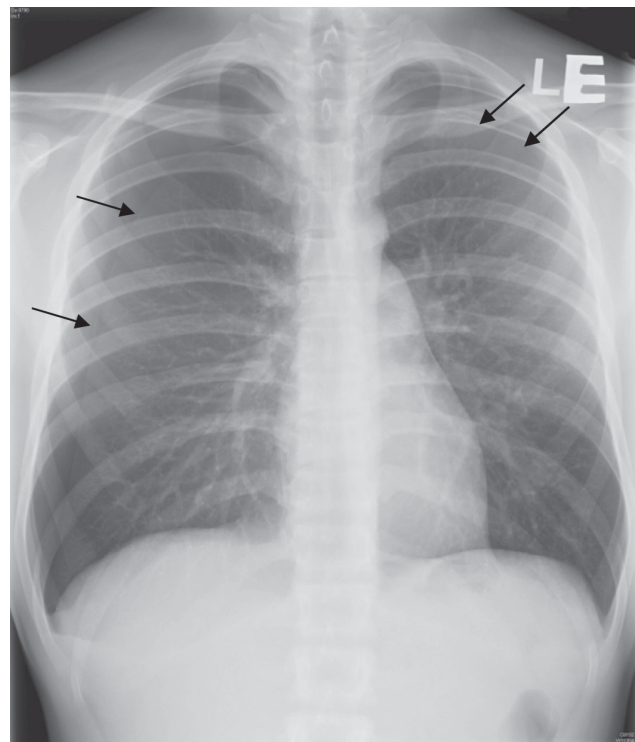
## Discussion

Acupuncture is considered to be one of the most popular complementary and alternative medicines advocated by many registered medical professionals.<sup>1</sup> Traditional acupuncture is performed by applying fine needles (usually 22-26 gauges) at a depth of 1-2 cm to stimulate the anatomical points of the body in order to generate a "flow of energy".<sup>2</sup> Its effectiveness was studied in many medical conditions like chronic pain (e.g. musculoskeletal pain, cancer related pain), nausea and vomiting, headache, allergic rhinitis.<sup>1</sup> Analgesic effect of acupuncture attributed to neurotransmitters, e.g. endorphin, was most widely mentioned in literature. However, the whole mechanism of action may be complex acting both locally and centrally.<sup>1,2</sup>

Acupuncture is considered safe but can lead to complications of different extents. Local complications



**Figure 1** Chest X-ray demonstrated bilateral pneumothorax of case 1 on admission.



**Figure 2** Chest X-ray demonstrated bilateral pneumothorax of case 2. Right side was more severe than the left.

include insertion sites pain, bleeding, contact dermatitis, infection and paraesthesia. More serious complications include transmission of infectious disease (e.g. hepatitis, HIV), needle fragments inside body, organ injury, pneumothorax, pneumomediastinum, cardiac tamponade and osteomyelitis.<sup>3,4</sup> Zhang et al conducted a systemic review of the Chinese literatures in 2010.<sup>3</sup> A total of 115 articles were included in the review and 479 cases of adverse events after acupuncture were reported. Fourteen patients died. The authors concluded that the most frequent adverse events were pneumothorax, fainting, subarachnoid haemorrhage and infection. The most serious consequences were cardiovascular injuries, subarachnoid haemorrhage (SAH), pneumothorax and cerebral haemorrhage. Adams et al reported similar finding in a systemic review on the safety of paediatric acupuncture.<sup>5</sup> Thirty-seven studies included with twenty-five serious adverse events identified. These included thumb deformity, infection, cardiac rupture, pneumothorax, nerve impairment, SAH, intestinal obstruction, etc. The type of complications would be dependent on the sites, the depth of insertion and the types of needle used. The experience of the acupuncturists and the proper aseptic techniques also contributed to the risk of complications.<sup>8</sup>

This complication was reported overseas. Wright et al reported a case of bilateral tension pneumothorax in 1991.<sup>6</sup> A 31-year-old woman developed bilateral tension pneumothorax immediately after acupuncture for asthma. She experienced persistent severe pleuritic chest pain during needles insertion. She went to emergency department 3 hours later after procedure. Iwadata et al reported an autopsy case report of bilateral tension pneumothorax in 2003.<sup>7</sup> A 72-year-old lady received acupuncture for neck pain. She developed sudden onset of chest pain and breathlessness around 30 minutes after procedure and died 90 minutes after the onset of symptoms.

The mechanism of acupuncture-associated pneumothorax is related to penetrating trauma to the chest wall, injuring the pleural surfaces. Air can enter the pleural space through the leak in either the visceral or parietal pleura. It may arise and is dependent on the sites of insertion, the depth and the types of needle used. Our two patients were previously healthy, without underlying lung disease such as bullae or previous pneumothorax history. Both of them had no clinical sign of Marfan syndrome, which was known to be associated with spontaneous pneumothorax. They suffered from bilateral pneumothoraxes after receiving acupuncture at the upper thoracic regions. The temporal relationship of the symptoms

onset made it attributable to the acupuncture. Unfortunately, we were unable to trace the information on the acupuncture needle size and the depth of needle inserted as well as the qualification of the two Acupuncturists. In Hong Kong, the practice of acupuncture is regulated by the Chinese Medicine Ordinance (Cap. 549).<sup>10</sup> The Chinese medicine practitioner should obtain the appropriate qualification as approved by the Chinese Medicine Council of Hong Kong. However, the ordinance is quite brief to regulate this area of practice and the procedure of the acupuncture therapy is not specified. It is highly recommended to have proper discussion and formal consents from the patients before the procedure.

Patients with pneumothorax usually present with sudden onset of dyspnoea and pleuritic chest pain. The severity of symptoms is related to the volume of air in the pleural space. Management strategies of pneumothorax depend on the size of air leak and symptoms of patient.<sup>9</sup> Observation alone will be considered if pneumothorax is small (intrapleural distance at the level of hilum  $\leq 2$  cm) and patient is asymptomatic. If the size is large or patient is symptomatic (e.g. breathlessness, hypoxia), needle aspiration will be considered. Chest drain will be needed if aspiration alone failed. The occurrence of sudden increase in breathlessness may herald the development of tension pneumothorax, which may lead to further hypoxia, haemodynamic compromise or even cardiac arrest. Our patients with bilateral pneumothorax were managed accordingly. One patient had bilateral chest drains inserted and another patient had chest tapping done. Fortunately, both patients had uneventful full recovery.

## Conclusion

We reported two previously healthy adolescents who suffered from bilateral pneumothorax as a result of having acupuncture at the upper thoracic regions. The temporal relationship of the symptoms onset made it attributable to the acupuncture. All patients should be counselled by the acupuncturists on the potential adverse effects and offered informed consent before the procedure. All acupuncturists and clinicians should be aware of this potential life threatening adverse effect of the procedure and adopt a low threshold for suspicion. Acupuncturists should also note possible higher risk of pneumothorax given the relative small muscle bulk and thin chest wall in children and adolescents. Needle insertion on both sides of the chest may

pose serious risk, including death should large pneumothorax occurs simultaneously. More detail and specific regulation of local acupuncture practice by government is warranted to uphold standard of care.

### Declaration of Interest

None

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