

**CASE REPORT**

Auricular Acupuncture Analgesia in Thoracic Trauma: A Case Report

Georgios S. Papadopoulos, Petros Tzimas,
Antonia Liarmakopoulou, Anastasios M. Petrou*

Department of Anesthesiology and Postoperative Intensive Care, Faculty of Medicine, School of Health Sciences, University of Ioannina, P.O. Box 1186, 45110, Ioannina, Greece

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Abstract

We report a case of thoracic trauma (rib fractures with pneumothorax and pulmonary contusions) with severe chest pain leading to ineffective ventilation and oxygenation. The patient presented to our emergency department. The patient had chronic obstructive pulmonary disease and was completely unable to take deep breaths and clear secretions from his bronchial tree. After obtaining informed consent, we applied auricular acupuncture to ameliorate pain and hopefully improve his functional ability to cough and breathe deeply. Within a few minutes, his pain scores diminished considerably, and his ventilation and oxygenation indices improved to safe limits. Auricular acupuncture analgesia lasted for several hours. Parallel to pain reduction, hemodynamic disturbances and anxiety significantly resolved. A second treatment nearly a day later resulted in almost complete resolution of pain that lasted at least 5 days and permitted adequate ventilation, restored oxygenation, and some degree of mobilization (although restricted due to a compression fracture of a lumbar vertebra). Nonopioid and opioid analgesics were sparsely used in low doses during the entire hospitalization period. Hemodynamic alterations and anxiety also decreased, and the patient was soon ready to be discharged.

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* Corresponding author. Faculty of Medicine, School of Health Sciences, University of Ioannina, P.O. Box 1186, 45110, Ioannina, Greece.
E-mail: apetrou@cc.uoi.gr (A.M. Petrou).

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1. Introduction

Thoracic trauma with rib fractures is associated with increased morbidity and mortality [1,2]. Respiratory system complications arise from inefficient ventilation resulting from the restricted mobility of the rib cage (due to pain) and possible instability produced by the rib fractures [3]. Variable analgesia regimens, including nonsteroidal anti-inflammatory medications, epidural analgesia, intravenous opioids, patient-controlled analgesia, and intercostal or paravertebral nerve blocks, are applied and validated in patients with rib fractures [4–10].

Data in the literature depict significant effectiveness of nonpharmaceutical treatments. Some report short-term pain relief with acupuncture in 50% to 80% of cases, but large, well-designed studies are needed to accurately assess its contribution to pain management [11].

2. Case Report

A 60-year-old man was transferred from a primary care hospital to our emergency department following a car accident. At presentation, he was fully alert (Glasgow Coma Scale, 15/15) but anxious and speaking with difficulty at a low volume. He had obvious difficulty breathing, and he reported intractable pain at the front and right lateral area of the chest and in the lumbar region. At the primary care hospital, a chest tube had been inserted at the right hemithorax to evacuate a right pneumothorax. There was extended bruising of the right inguinal region and an open laceration on the anterior abdominal wall. His visual analog pain scale (VAS) score was 10 and his breathing pattern was primarily abdominal. His pulse oxygen saturation (SpO₂) was 82% despite breathing oxygen at 5 L/min via a face mask. Blood gas analysis revealed increased carbon dioxide tension (PaCO₂, 48 mm Hg) and severe hypoxia (PaO₂, 54 mm Hg). His arterial blood pressure was elevated (179/95 mm Hg by noninvasive measurement) and his heart rate (HR) was 115 beats/min (bpm). His past medical history revealed another incident of spontaneous pneumothorax and chronic obstructive pulmonary disease as a result of heavy smoking.

Skull computed tomography (CT) revealed a fracture containing air bubbles at the internal rim of the ocular cavity and opacification of the ethmoid turbinates. Chest CT revealed right pneumothorax with a drain tube ending in the middle lobe, pulmonary contusion with atelectasis of the posterior segments of the right upper and lower lobes, subcutaneous emphysema, emphysematous dysplasia of the right middle lobe, and multiple, small, bilateral air cysts in the remaining pulmonary parenchyma. It also showed retrosternum hematoma with a few air bubbles, fracture of the right lateral edge and the main body of the sternum, bilateral fractures at the anterior cartilages of the lower ribs, precipitation fracture of the second lumbar vertebra, and a small subcapsular hematoma in the liver. Prior to CT examination, an initial dose of 25 mg of meperidine was administered.

After our primary evaluation, the attending anesthetist obtained informed consent and applied auricular acupuncture with 0.15 mm × 15 mm needles at the

cingulate gyrus, 26a (thalamus), Omega 2, Point 0, and Shen Men instead of instituting an opioid-based analgesia scheme (Fig. 1) [12,13].

Within a few minutes, the patient reported complete regression of chest pain. His anxiety resolved quickly, he was keeping his eyes open, and his voice became clear and stable. His breathing regained a thoracic pattern with normal expansion at a respiratory rate of 20 breaths/min. His pulse oximetry rose to 92%, and after stimulation to breathe deeply, his oxygen saturation rose to 97%. Blood gas analysis revealed a significant drop in PaCO₂, to 38 mm Hg.

The patient was transferred to an advanced care unit in a significantly improved condition and free of pain. During the next few hours, his SpO₂ fluctuated around 94% (89–97%). The patient deteriorated 22 hours later with rapidly increasing pain, gradually returning to VAS 10, preventing him from effective coughing and expectoration. He succumbed to an abdominal pattern of breathing, his SpO₂ fell to 79%, respiratory rate rose to 36 breaths/min, HR rose to 121 bpm, arterial pressure became 189/99 mm Hg and his blood gas analysis showed PaO₂ was 51 mm Hg and PaCO₂ was 45 mm Hg.

The patient, an anesthetist himself and in severe respiratory distress, stressfully requested that the intensivists proceed with mechanical ventilation. A 50-mg dose of tramadol failed to reduce the pain, and the attending anesthetist proposed and applied a second round of auricular acupuncture using the same scheme, adding points Pulmo I and II (Fig. 1).

The intervention proved successful again within a few minutes, and the patient's pain was rated around VAS 3. The patient was able to take deep breaths and cough effectively. His SpO₂ returned to 97% to 100%, HR fell to 90 bpm and arterial gases renormalized. This intervention had

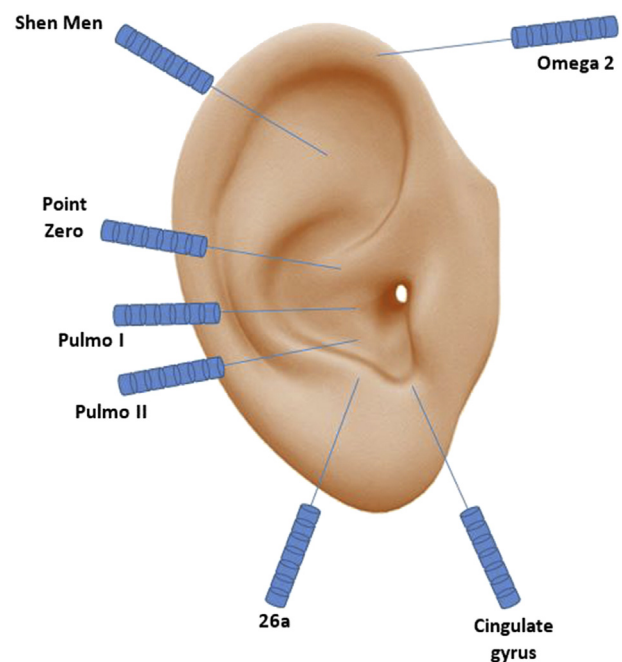


Figure 1 Initial and supplemental auricular acupuncture points used.

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