

Pain

Bilateral high-level percutaneous cervical cordotomy in cancer pain due to lung cancer: a case report

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Received 25 March 2006; accepted 11 July 2006

Abstract

Background: Computed tomography-guided high-level percutaneous cordotomy has been used unilaterally or bilaterally for the treatment of localized intractable pain in malignancies.

Case Description: A 57-year-old man was admitted to the hospital with the complaint of intractable pain involving the left side of the chest, axillary region, and shoulder. He was operated for small cell lung cancer on the left side in December 2003 and received radiotherapy and chemotherapy. His neurological examination was normal. Magnetic resonance imaging of the thorax revealed contrast-enhancing lesions on the left side extending to mediastinum and pleura. His pain was relieved completely after the first cordotomy procedure, and he was discharged from the hospital on the second postoperative day. The patient was readmitted to the hospital with the complaint of severe unilateral chest pain like the initial pain on the right side 4 days after cordotomy. The CT-guided bilateral high-level percutaneous cordotomy was performed with a 15-day interval.

Conclusion: The CT-guided bilateral high-level percutaneous cordotomy can be used in the treatment of intractable upper trunk pain in patients with cancer without pulmonary dysfunction.

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Keywords:

Cancer pain; Percutaneous cordotomy; Computerized tomography-guided; Bilateral

1. Introduction

Cordotomy is a procedure used to destroy the lateral spinothalamic tract in patients with cancer pain [3,20]. Mullan et al [12] developed the percutaneous technique in 1963, and later in 1965, Rosomoff et al [14] used RF current to produce a lesion. Computed tomography-guided PCC, which was described by Kanpolat et al [6,7], is applied safely, effectively, and selectively. Percutaneous cervical cordotomy is the most useful procedure for patients with unilateral intractable pain due to cancer. Today, morbidity and mortality rate associated with the procedure has decreased dramatically. The CT-guided bilateral selective PCC offers the advantages of higher segmental selectivity and controlled ablation of neural structures at the higher cervical level under direct visualization and may prove to be

the treatment of choice for patients suffering from bilateral cancer pain.

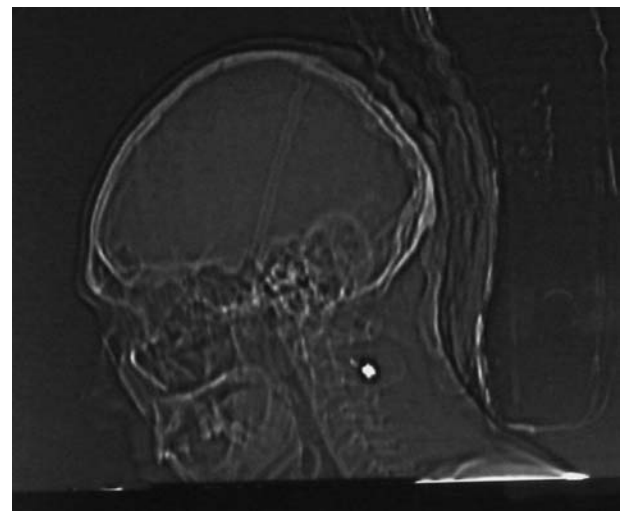


Fig. 1. Placement of the needle at the C1-2 level was visualized in the lateral scanogram.

Abbreviations: CT, Computed tomography; ICU, Intensive care unit; PCC, Percutaneous cervical cordotomy; RF, Radiofrequency; VAS, visual analogue scale.

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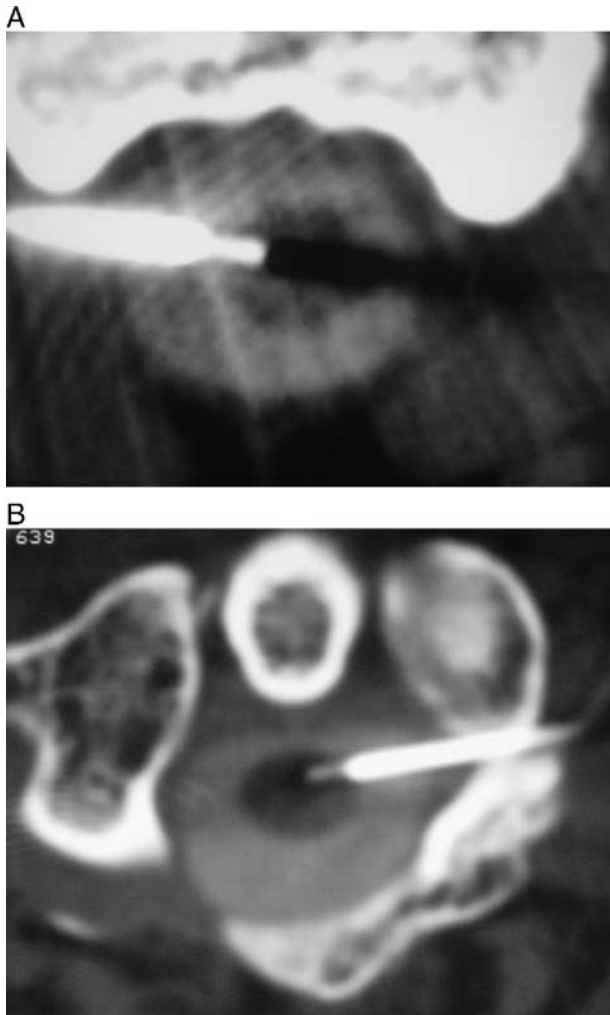


Fig. 2. Computerized tomography scans showing the needle and electrode in their final positions located in the right (A) and left (B) side of the cervical spinal cord.

Here, we report a patient presenting with bilateral upper trunk pain from lung cancer treated by bilateral high-level PCC.

2. Case report

A 57-year-old man was admitted to our hospital complaining of unilateral upper body pain on the left side during the last month. His pain involved the left side of the chest, axillary region, and shoulder and was not adequately treated with medical and other less invasive methods. He was operated on in December 2003 because of small cell lung cancer on the left side and underwent radiotherapy and chemotherapy. His neurological examination was normal. Magnetic resonance imaging of the thorax revealed contrast-enhancing lesion in the left chest extending to mediastinum and pleura. High-level PCC was planned on the right side.

The procedure was performed using the method described by Kanpolat et al [6–8]. The contrast agent that consisted of 7 mL of iohexol (Omnipaque, 350 mg/mL) was adminis-

trated by lumbar puncture 30 minutes preoperatively. Then, the patient was placed on the CT table in the supine position with the upper cervical spine held horizontally. The procedure was performed while the patient was awake and under sedation (midazolam, 0.05–0.1 mg/kg) and analgesia (fentanyl, 1 μ g/kg). After injection of the local anesthetic agent, cordotomy needle (Radionics, Inc, Burlington, Mass) was inserted inferiorly to the tip of the mastoid process on the right side in a vertical plane perpendicular to the axis of the spinal cord. Positioning of the needle at the C1–2 level was visualized in the lateral scanogram (Fig. 1). Then, the tip of the needle was manipulated toward the anterior aspect of the spinal cord with the help of axial CT sections using 1-mm slice thickness.

The needle was in the ideal position if it was nearly perpendicular to the spinal cord. After achieving the ideal position of the needle tip, the straight electrode (0.27-mm diameter and 2-mm open-tip electrode; Radionics, Inc) was inserted (Fig. 2A and B). Impedance measurements were made to identify whether the active electrode tip was in the cerebrospinal fluid ($<400 \Omega$), in contact with the spinal cord, or inside the spinal cord ($>1000 \Omega$). The electrode tip was stimulated with currents of 2 and 100 Hz (RF generator, Radionics, Inc). After achieving the localization of upper trunk in spinothalamic tract, the test lesion was applied at the tip of the electrode by using temperature of 65°C within 60 seconds. The final lesion was made at 75°C for 60 seconds. The patient reported analgesia between the left C4 and T11 dermatomas and was discharged from the hospital on the second postoperative day (Fig. 3).

The patient was readmitted to the hospital complaining of severe intractable unilateral chest pain on the right side 4 days after PCC. Bilateral PCC was planned, and the procedure and the probable complications were discussed with the relatives of the patient. Then, CT-guided PCC was performed on the left side. Two RF lesions were applied at a

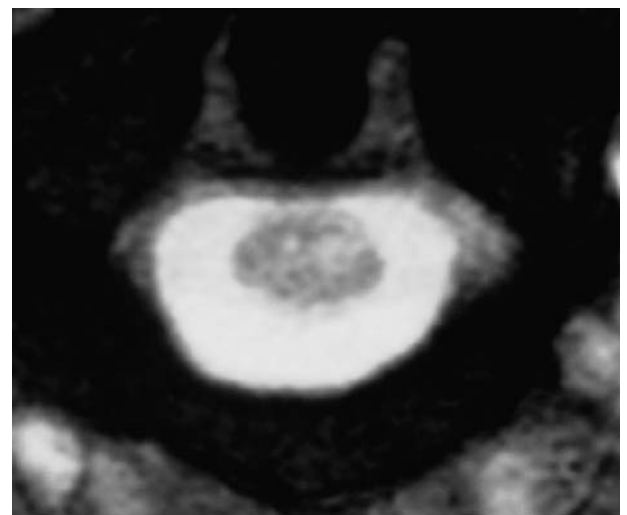


Fig. 3. The appearance of the lesions 24 hours after second cordotomy procedure on magnetic resonance imaging.

tip of temperature at 65°C and 75°C within 60 seconds, respectively. Analgesia was obtained (VAS = 0) on the right side between the C5 and L1 dermatomas.

The patient was observed in the ICU for 24 hours. Blood pressure and respiratory functions were monitored carefully during his stay in the ICU. Pain medication was reduced gradually and stopped within 1 week. The patient was discharged on the second postoperative day. On the control examinations, the patient experienced no pain a week, a month, and 3 months later.

3. Discussion

Cordotomy is the preferred method if the surgeon is certain that the patient's intractable pain is transmitted in the lateral spinothalamic tract. The best candidates for cordotomy are patients with unilateral somatic cancer pain and compression of the plexus, roots, or nerves [19]. Unilateral upper body pain (secondary to lung carcinoma, mesothelioma, or Pancoast tumors) and bilateral somatic intractable pain in the lower body and extremities can be controlled by CT-guided unilateral or bilateral selective cordotomy [7,8].

Percutaneous cordotomy is highly effective in controlling local intractable pain due to malignancy. In this group of patients, most do not need to contact the hospital and the medical staff after the pain ablation. As these patients are usually under continuous medical supervision for the final months or years of their lives, this is a great contribution to the well-being and psychology of the patient with cancer.

With the ablation of pain patients can return to work or their daily activities. The fibers transmitting pain from the lower part of the trunk and lower extremities are located in the posterolateral part of the lateral spinothalamic tract, which is farther from the ventrolateral reticulospinal tract than from its anteromedial part [2,4,20]. For this reason, bilateral destruction of the pain fibers from the lower trunk and extremities at the upper cervical level seems to be safer than destruction of the fibers from the upper trunk and upper extremities [13,16]. Kanpolat et al. advise bilateral cordotomy only for cases with bilateral abdominal, pelvic, or lower extremity pain [10].

In cervical cordotomies, it has already been mentioned that respiratory dysfunction is the principal complication, and it can be fatal [2,4,15]. The risk is higher in patients with preexisting functional respiratory disorders. Cordotomy is contraindicated in patients with severe pulmonary dysfunction, those who are unable to stay in a supine position for 30 to 40 minutes, and those whose partial oxygen saturation is less than 70% [13]. In our patient, unilateral cordotomy was initially planned on the right side. However, he complained of the same intractable pain on the right side 4 days after first PCC. Almost normal respiratory functional tests and tolerability of the patient encouraged us to perform the second cordotomy procedure. Then, bilateral PCCs were applied after 15 days interval.

Bilateral cordotomy procedures are associated with a higher rate of complications than unilateral procedures [1,5,11,12,16-18]. Most complications after bilateral cordotomy are due to bilateral lesioning of the anteromedial portion of spinal cord. Complications of conventional cordotomy included ipsilateral motor weakness (5%-10%), ataxia (8%-34%), bladder dysfunction (1.5%-17%), post-cordotomy dysesthesia (2-5%), hypotension (4%), and respiratory problems (4%) [9].

Sleep-induced apnea is the most dangerous complication after bilateral cordotomy, and this complication affects the mortality rates after the procedure [3]. Rosomoff [16] reported respiratory problems in 4%, and mortality due to sleep-induced apnea in 2% of their cases. On the other hand, the mortality rate is much higher in the series reported by Ischia [5] and Sindou and Daher [18], which was 11% and 50%, respectively. However, the conventional cordotomy technique (x-ray) was used in all of these series with remarkable mortality rates and respiratory problems. Kanpolat et al [8] reported a series that underwent CT-guided bilateral cordotomy for lower trunk and extremities without mortality and respiratory problems. We did not observe any respiratory complications after bilateral PCC. We think that bilateral PCC may be performed even for the cases with pain located in the upper trunk and upper extremities using CT-guided technique because this technique is much more selective and associated with lower morbidity.

In conclusion, CT-guided high-level selective PCC is an effective neurosurgical procedure for the treatment of unilateral or bilateral intractable cancer pain. The best results are obtained in properly selected patients using the appropriate technique.

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