
CASE REPORT

Fluoroscopic-guided Biopsy for Pathological Fracture of C2: Transoral Approach

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ABSTRACT

Biopsy of the cervical spine poses special problems because of the proximity to many vital organs with the potential for bleeding and damage to nerves and spinal structures. Although the transoral approach to the atlanto-axial region is generally an open surgical procedure, for patients for whom diagnosis is required before treatment, a needle biopsy can be done. This report is of a patient for whom the transoral approach was used to perform fluoroscopic-guided biopsy for pathological fracture of C2.

Key Words: Biopsy, needle; Spine

INTRODUCTION

Despite advanced diagnostic methods, biopsy is usually necessary to help decide on the appropriate treatment for an isolated lesion of the spine. Closed percutaneous biopsy appears to be adequate for histological diagnosis and is safer and cheaper than surgical biopsy. The most common approach to biopsy of the thoracic or lumbar spine is usually posterolateral, under fluoroscopic or computed tomography (CT) guidance.¹ Biopsy of the cervical spine under fluoroscopic guidance remains a relatively dangerous procedure because of the proximity to vital structures such as the spinal cord and the vertebral and carotid arteries. Percutaneous biopsy of C1 or C2 lesions can be performed under CT guidance from the lateral, posterolateral, or anterior approach, in which the needle is advanced between the pharynx and carotid artery.² The transoral surgical approach for operating on the cervical spine is well established and cases of transoral vertebroplasty of C2 have been reported.^{3,4} Transoral fluoroscopic-guided biopsy of C2 is technically feasible and this approach avoids potential damage to the neurovascular structures.

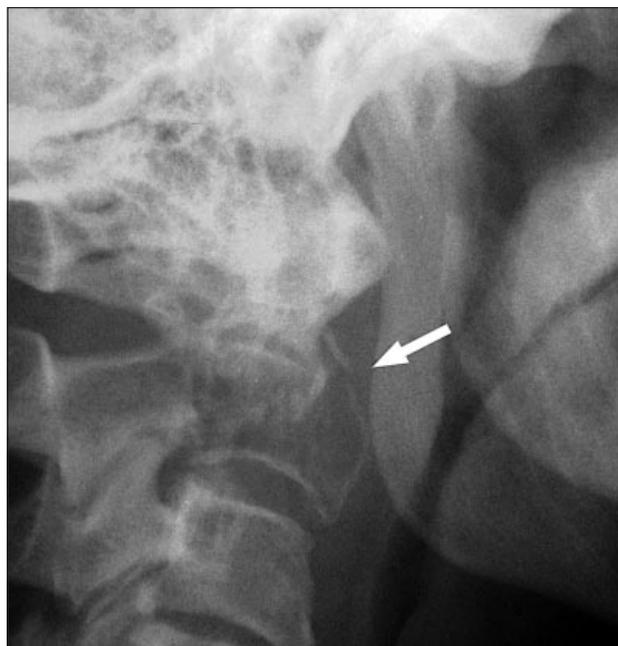


Figure 1. Lateral X-ray of the cervical spine showing an osteolytic lesion in the C2 vertebral body. Cortical break (arrow) at the anterior cortex is suggestive of pathological fracture.

CASE REPORT

A 58-year-old man presented in 2006 with upper cervical spine pain after he fell from the bed. He had no focal neurological symptoms and X-ray showed a lytic lesion in C2 complicated with pathological fracture (Figure 1). CT scan showed an extensive osteolytic lesion of the C2 vertebral body and dens with extension to the lateral masses (Figure 2).

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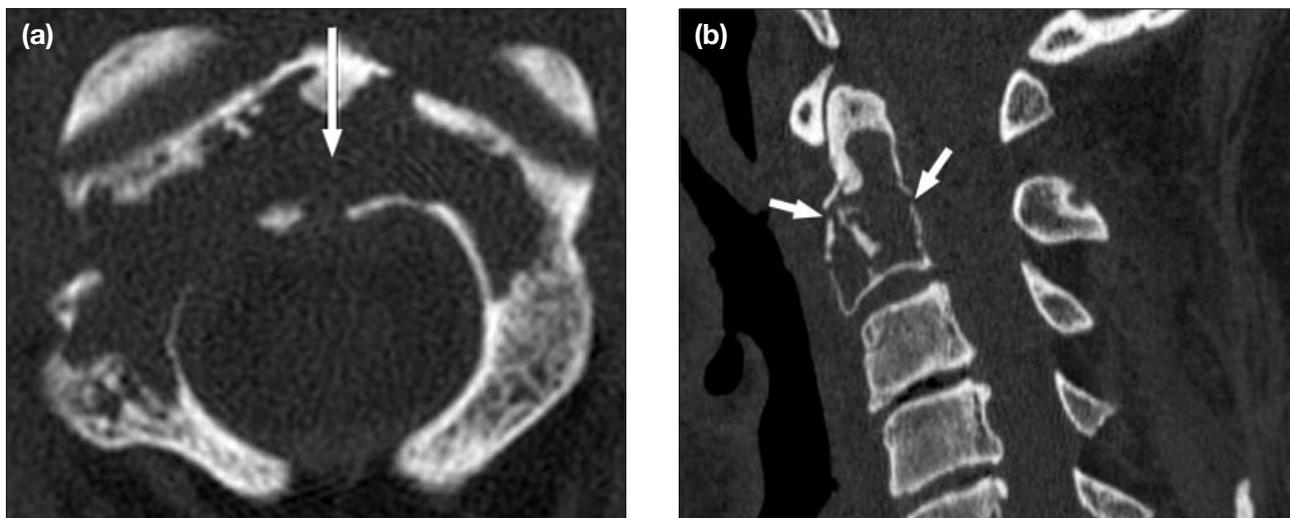


Figure 2. (a) Axial; and (b) reformatted sagittal images of C2 showing an osteolytic lesion involving the C2 vertebral body, with extension to the lateral masses and odontoid process. The pathological fracture is best seen as a cortical break (arrows) in the sagittal image.

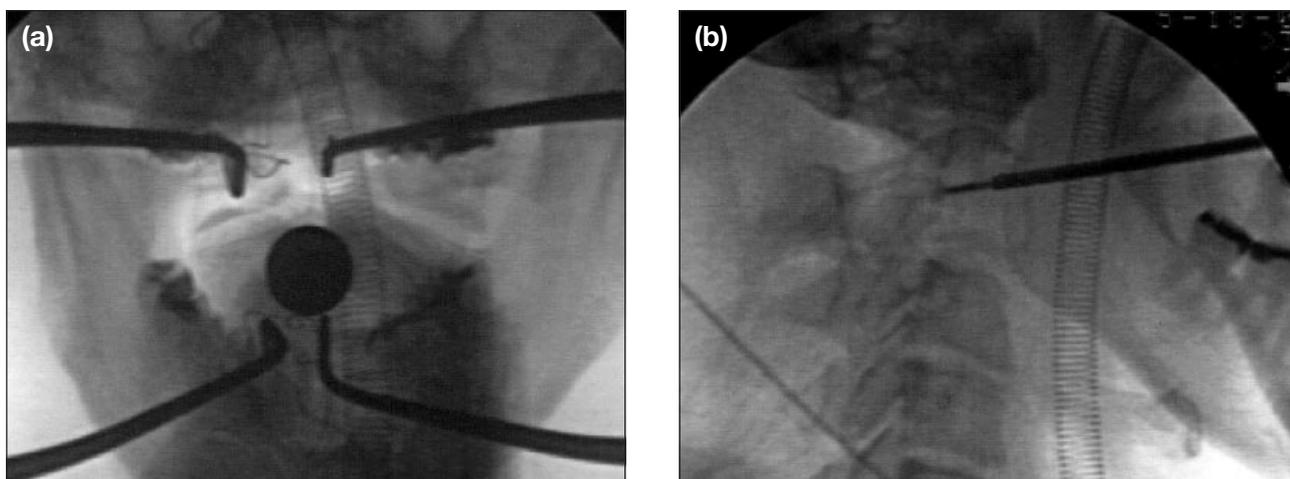


Figure 3. (a) Frontal and (b) lateral X-ray revealing transoral placement of the skin perforator and biopsy needle into the lytic lesion of C2.

General anaesthesia was administered, with placement of an endotracheal tube. A self-retaining pharyngeal retractor was used for tongue depression and displacement of the endotracheal tube from the sterile field. The oral cavity and posterior oropharynx were cleansed with 0.05% chlorhexidine solution to sterilise the operation field.

With biplane fluoroscopy, the osteolytic C2 lesion was seen in the anteroposterior and lateral planes. A small incision was made and a 4.5-cm 12-G skin perforator was placed through the posterior oropharyngeal wall under fluoroscopic guidance (Figure 3a). This was followed by a 14-cm 12-G needle-guide cannula with a 17-cm 14-G stylet, which was advanced through the C2 cortex into the osteolytic lesion under fluoroscopic guidance. After satisfactory positioning, the stylet was removed. A 14-G Ackermann biopsy needle (Cook Inc;

Bloomington, USA) and a 14-G Trucut biopsy needle (Promex Technologies; Franklin, USA) were advanced through the needle-guide cannula into the lytic lesion (Figure 3b) and multiple biopsies were taken. No complications resulted from the procedure. Histopathological and cytological analysis of the biopsy specimens yielded a diagnosis of plasmacytoma.

DISCUSSION

Percutaneous biopsy of the spine using radiographic or fluoroscopic guidance is a well-established procedure, especially for lumbar lesions. Due to the risks of bleeding in the close confines of the neck and the close proximity to major nerves and vessels, percutaneous biopsy of the upper cervical spine is usually avoided.²

A paravertebral approach for biopsy of the upper cervical spine is associated with risk because vascular, neural,

and pharyngeal structures block access to the vertebral body. This approach requires navigation of the needle around the vagus, spinal accessory, lingual, hypoglossal, marginal, and laryngeal nerves, and the internal jugular vein and the vertebral and carotid arteries.⁵

Sonographically guided fine-needle aspiration biopsy of C2 has been described using the anterolateral approach. However, this approach is limited to patients with destructive or lytic bony lesions with a break in the overlying cortex, and lesions with extraosseous soft tissue extension. Among 12 patients undergoing ultrasound-guided fine-needle aspiration biopsy of the cervical spine described by Gupta et al, there was only 1 patient with a C2 lesion, and the biopsy material obtained was inadequate for diagnosis.⁶

Tampieri et al suggested the anterolateral approach for lesions between C2 and C7 in their series of 9 cervical spine biopsies done under fluoroscopic guidance; a positive result was obtained in 89% of the patients.⁷ However, there were only 2 patients undergoing C2 biopsies in this series and the only negative result was for a patient with a C2 lesion, yielding a positive result rate of 50% among the patients with C2 lesions.

In the series of 103 patients undergoing CT-guided biopsy performed by Kornblum et al, cervical spine lesions had the lowest diagnostic accuracy at 25%, while lesions at the thoracic, lumbar, and sacral levels had diagnostic accuracy rates ranging from 71% to 92%.⁸

Successful biopsy of the C2 vertebral body using the transoral stereotactic approach has been performed by Patil.⁹ This researcher used a 16-G unbevelled needle with a cutting-edged tip, together with a sharp stylet. Biopsy material was obtained through negative suction created by a 12-mL syringe.

Transoral needle biopsy should be a safe procedure as the only structure that needs to be transversed is the posterior pharyngeal wall. The posterior pharyngeal wall

consists of 2 layers and 2 interspaces: the mucosa and prevertebral fascia, and the retropharyngeal space and prevertebral space, respectively. Anatomically, only a thin layer of pharyngeal constrictor muscles, pharyngobasilar fascia, and anterior longitudinal ligament separate the posterior oropharyngeal mucosa from the upper cervical spine.

The transoral approach allows precise placement of the needle into the C2 vertebral body in a controlled and direct fashion using biplane fluoroscopy, which minimises needle excursion. This effectively eliminates the risk of neurovascular complications, and the risk of infection is low as there is only minimal disruption of the posterior oropharyngeal tissues by the needle.

This experience demonstrates that a transoral approach under fluoroscopic control for C2 biopsy is safe and effective, and not technically difficult.

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