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Case Report Open Access

A Case of Occipito-Thoracic Fusion for Skull Base and Cervical Multiple Myeloma

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Abstract

Multiple myeloma is a systemic malignancy that causes bone destruction due to bone marrow infiltration. Treatment options for myeloma of the spine include radiation therapy and surgery. The case of a 59-year-old woman with multiple myeloma is reported. She was Stage 3B according to the Durie-Salmon staging system and responded to high-dose chemotherapy and peripheral blood stem cell transplantation and achieved complete remission. However, her skull base and cervical bones showed marked osteolysis which required external fixation and bed rest. Surgery with occipito-thoracic (OT) fusion was performed, which yielded neurological improvement and could walk completely on her own 2 months after surgery. She had no recurrence over a 5-year follow-up period. Surgical stabilization allowed this multiple myeloma patient to remain ambulatory.

Keywords: Multiple myeloma; Skull base; Osteolysis; Occipito-thoracic fusion; Instrumentation

Introduction

Multiple myeloma is a systemic malignancy that causes bone destruction due to bone marrow infiltration [1]. Bone dissolution caused by myeloma often results in pain, compression fractures, spinal instability, or spinal cord compression [2,3]. Treatment options for myeloma of the spine include radiation therapy and surgery.

The case of a 59-year-old woman with cervical multiple myeloma with occipito-thoracic fusion (OT) fusion, which yielded neurological improvement and no deterioration and no recurrence during a 5-year follow-up period, is reported. Surgical stabilization allowed this multiple myeloma patient to remain ambulatory.

Case Presentation

A 59-year-old woman who had gradually developed back pain was found to have a lumbar compression fracture by her primary care doctor. Chest X-rays showed right lung mass lesions. The computed tomography (CT)-guided biopsy of the lung lesions and immunoelectrophoresis in another hospital indicated multiple myeloma. Cervical and lumbar spinal bones showed multiple osteolytic lesions. Serum beta-2 microglobulin was 10.8 mg/L. She was Stage 3B according to the Durie-Salmon staging system and responded to high-dose chemotherapy and peripheral blood stem cell transplantation, and she achieved complete remission. Radiation therapy (2×10 Gy) was performed for the cervical osteolytic lesions. Her skull base and cervical bones showed marked osteolysis which resulted in her being bedridden.

On referral to our hospital, her neurological examination showed bilateral numbness of her hands and feet and no motor weakness. She also had neck pain when she tried to raise her head. Therefore she wore a Philadelphia collar. Her Karnofsky Performance Scale Index was 40% 12. Cervical CT revealed that the occipital condyle, clivus, and C1-3 appeared as radiolucent lesions with a thin cortex (Figure 1A-1D). Small radiolucent lesions were also seen in the C4-6 vertebral bones (Figure 1C and 1D). Cervical MRI showed no cord compression (Figure 2A and 2B). There were no pathological fractures.

Surgical procedure and pathological findings

Under general anesthesia, the patient was placed in the prone position. The head was fixed with a Mayfield head clamp. A midline incision was extended downward through the ligamentum nuchae from the external occipital protuberance to T4. Subperiosteal exposure of the posterior spinal elements was performed. The muscle dissection was continued laterally to expose the entire facet joint. The external occipital protuberance, laminae, and lateral mass from C1 to T2 were exposed. The spinous process of C2 was removed. The occipital bones and the laminae of C1-2 were decorticated with a high-speed drill. The cervical facets were also decorticated. The screws for the occipital bones were placed on the middle and outside of the external occipital protuberance. The lateral mass screws were placed in bilateral C4/6 and left C5. Pedicle screws were also inserted for bilateral C7. The lamina hooks of bilateral T2 were clamped. The rod was fastened from the occipital bone to the thoracic lamina. The iliac bone was grafted on the C1/2 laminae and around the cervical facets.

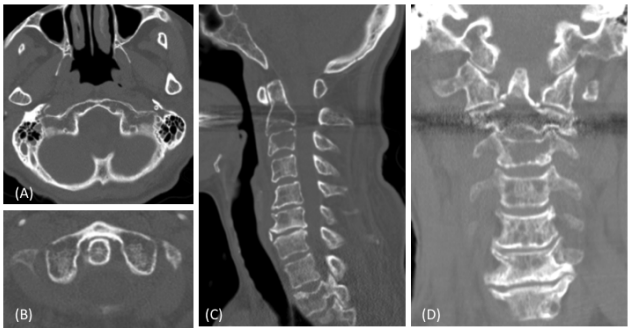

Figure 1: Preoperative occipitocervical CT shows that the occipital condyle, clivus, and C1-3 appear as radiolucent lesions.Small radiolucent lesionsare also seen in the C4-6 vertebral bones. Axial images at the skull base (A), and C1 level (B). Sagittal (C) and coronal images (D).

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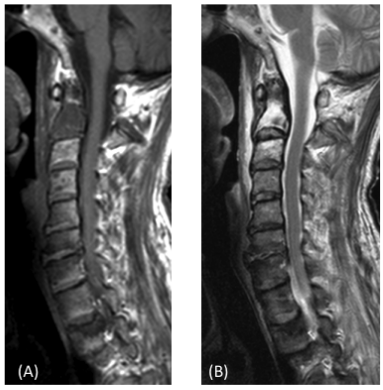

Figure 2: Preoperative cervical MRI shows the C2-3 lesions and no cord compression. Sagittal images on(A) T1WI, (B) T2WI. The C2-3 vertebral lesions clearly show a changed signal.

Figure 3: Postoperative cervical roentgenograms show no atlantoaxial and subaxial instability and ossification of the occipito-thoracic fusion 5 years after surgery (A,B).

Postoperative course

The patient continued to wear a Philadelphia collar for 2 months and was able to walk completely on her own 2 months after surgery. Postoperative CT revealed ossification of the OC fusion 1 year after surgery. She had no recurrence of myeloma and can enjoy jogging 5 years after surgery (Figure 3). Postoperatively, her Karnofsky Performance Scale Index was 100%.

Discussion

The prognosis for patients with multiple myeloma has improved significantly owing to advances in systemic therapy. Overall survival rates of >5 years can be achieved [4,5]. External beam radiation therapy has been used successfully to treat patients with normal alignment or minimal subluxation. Posterior stabilization provides pain relief and neurologic preservation or recovery without the need for anterior decompression [6]. The postoperative complication rate for bone disease is low in multiple myeloma patients [7]. The aim of surgery is, therefore, to improve quality of life during the short subsequent survival period [8-10]. Another aim of surgical treatment is to provide rigid fixation so that patients do not require prolonged external support [11-13].

In this case, the patient was responsive to chemotherapy and achieved complete remission. However, she had multiple occipitocervical osteolytic lesions and was bedridden. She underwent OT fusion, which yielded neurological improvement and no deterioration and no recurrence during a 5-year follow-up period.

Malignant lesions in the skull base and upper cervical spine often involve the lateral masses, vertebral bodies, and the dens, and they cause pathological fracture and subluxation giving rise to intense suboccipital neck pain. An aggressive approach using posterior stabilization of the skull base and upper cervical region can improve quality of life by relieving pain and preventing neurological complications.

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