Four-Level Vertebrectomy for En Bloc Resection of a Cervical Chordoma

Salah G. Aoun[1], Mahmoud Elguindy[1], Umaru Barrie[1], Tarek Y. El Ahmadieh[1], Aaron Plitt[1], Jessica R. Moreno[1], John M. Truelson[2], Carlos A. Bagley[1]

BACKGROUND: **Chordomas are locally aggressive tumors that can involve multiple levels of the spine and are difficult to resect. We present our technique for 4-level en bloc cervical spondylectomy for a locally aggressive chordoma.**

CASE DESCRIPTION: **A 37-year-old woman presented with a 6-month history of dysphagia and a large indurated cervical mass. Imaging showed an enhancing lesion involving C3-6. Needle biopsy confirmed the diagnosis of chordoma. En bloc resection was chosen to maximize her chances of disease-free survival. A 360° approach was deemed necessary. We posteriorly disconnected the vertebral bodies and skeletonized the bilateral vertebral arteries and nerve roots. The interspinous and yellow ligaments and the spinous processes were spared to maintain a solid posterior tension band, as previously described approaches that had sacrificed these elements had a high rate of instrumentation failure. After posterior instrumentation, a wide anterior approach enabled us to resect the tumor attached to the vertebral bodies of C3-6 as 1 specimen. A 4-level corpectomy cage and plate were used for anterior instrumentation. The patient tolerated the surgery well. She needed a temporary gastrostomy, and she had a right C5 palsy that progressively recovered. Follow-up imaging showed no tumor recurrence and good bony fusion.**

CONCLUSIONS: **En bloc resection as part of a multidisciplinary team approach remains the mainstay of spinal chordoma treatment. Modern instrumentation and careful dissection can provide good results even in locally advanced cases.**

INTRODUCTION

Chordomas are rare, slow-growing malignant primary bone neoplasms that can affect the clivus, sacrum, and spinal column.[1-3] They have an incidence of <0.1 per 100,000 per year, with approximately 25 cases diagnosed in the United States annually, and tend to predominantly affect older men.[4,5] It is estimated that only 6% of chordomas primarily affect the cervical spine.[6-8] Cervical tumors can insidiously grow in size before becoming symptomatic and slowly encase the hollow viscera of the neck and vessels and nerves. Presentation is usually benign, with slowly progressive dysphagia or dysphonia, and lesions are locally advanced by the time a diagnosis is made.[6,7,9-11] Despite significant breakthroughs in chemotherapy and radiation, marginal surgical resection remains the mainstay of treatment.[12]

We present the case of a 37-year-old woman with a locally advanced cervical spine chordoma that required a 4-level cervical vertebrectomy for en bloc resection followed by a 360° fusion of the cervical spine. To our knowledge, this is the longest en bloc vertebrectomy segment for tumor resection published to date. We also describe sparing of the posterior tension band over a long spondylectomy segment to optimize the stability of the fusion construct, as prior attempts at this type of surgery have shown a high rate of structural failure and the need for multiple reoperations. This case highlights the need for a multidisciplinary approach when addressing this complex and difficult disease. Given the retrospective nature of our data collection and the fact that this is a single case report, informed patient consent before publication was waived in accordance with our institutional review board.

CASE DESCRIPTION

Clinical Presentation

A 37-year-old woman presented to our clinic with a 6-month history of progressive hoarseness and dysphagia to solids. She

Key words
- Cervical spine tumor
- Chordoma
- En bloc resection
- Posterior tension band
- Spine reconstruction
- Spondylectomy
- Technique

Abbreviations and Acronyms
CT: Computed tomography
MRI: Magnetic resonance imaging

From the Departments of [1]Neurological Surgery and [2]Otolaryngology, University of Texas Southwestern Medical Center, Dallas, Texas, USA

To whom correspondence should be addressed: Salah G. Aoun, M.D. [E-mail: salahaoun@hotmail.com]

Citation: World Neurosurg. (2018) 118:316-323.
https://doi.org/10.1016/j.wneu.2018.07.153

*Journal homepage: **www.WORLDNEUROSURGERY.org***

*Available online: **www.sciencedirect.com***

Figure 1. Sagittal computed tomography scan of the cervical spine showing erosion of the C4 vertebral body.

was otherwise neurologically intact and without signs of neuropathy or radiculopathy. Her symptoms persisted, and a computed tomography (CT) scan of the cervical spine was obtained (Figure 1). The scan showed erosion of the C4 vertebral body. Magnetic resonance imaging (MRI) (Figure 2) showed a large contrast-enhancing mass rooted on cervical vertebral bodies C3-6 and displacing the trachea and the esophagus anteriorly. The tumor also appeared to be compressing the right vertebral artery at the level of C5 and the right C5 nerve root. CT angiography did not show any vascular occlusion or stenosis. A comprehensive metastatic work-up was negative. According to the tumor classification of Weinstein, Boriani, and Biagini, the tumor involved quadrants 4–9 with extraosseous soft tissue involvement (4–9A) at C4 and C5 and quadrants 5–8 at C3 and C6 with extraosseous soft tissue involvement (5–8A).[13] A CT-guided needle biopsy of the lesion confirmed the diagnosis of chordoma. The sample cells were brachyury positive and S100 negative.

Surgical Resection

Posterior Approach. Given the nature of the tumor, an en bloc resection was planned, as successful use of this method has been previously described.[12] The patient was taken to the operating room and was positioned prone. A midline incision was made to expose the cervical C2 level to the thoracic T2 level. The purpose of the posterior approach was to

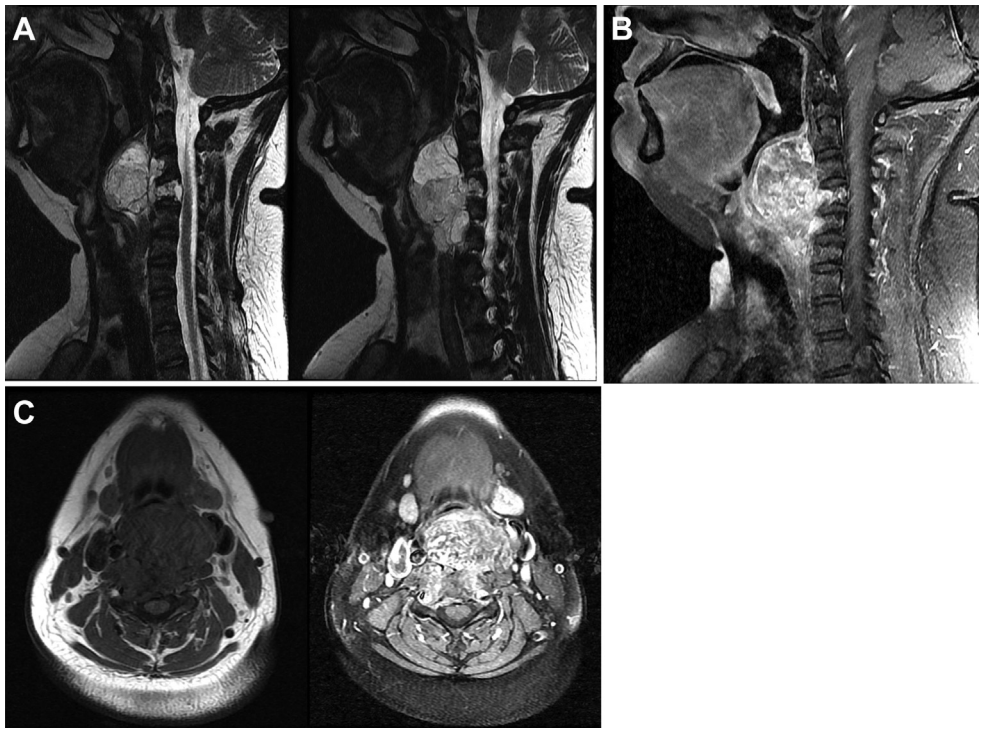

Figure 2. (**A**) Sagittal T2 magnetic resonance imaging sequence of the cervical spine displaying tumor invasion. (**B**) Sagittal T1 post–gadolinium injection magnetic resonance imaging sequence of the cervical spine. (**C**) Axial T1 pre– and post–gadolinium injection magnetic resonance imaging sequences of the cervical spine passing through the C4 vertebral body.