

Unilateral facet fixation as a salvage procedure: Report of two cases with cervical primary bone tumors with extensive bone destruction

ABSTRACT

We describe cases of two patients with primary cervical bone tumors that resulted in extensive destruction of bones of the region. In the first patient, the tumor and its growth resulted in the destruction of C3–C5 vertebral bodies and the unilateral destruction of facets and pedicles. In the second case, there was focal destruction of the body and odontoid process and unilateral pedicle and facet of C2. Tumor resection and spinal stabilization were the aims of the surgery. In both cases, unilateral fixation of facets was done. In the first patient, multi-segmental transarticular fixation by Camille's technique was done, and in the second patient, unilateral lateral mass plate and screw fixation was done by the Goel technique. Solid bone fusion of spinal segments was observed at more than a 2-year follow-up in both cases. Based on this experience, it appears that unilateral facet fixation can provide firm stability and can be used when other more frequently and popularly used techniques are either not available or possible.

Keywords: Bone tumors, camille's technique, goel technique

INTRODUCTION

Primary cervical benign bone tumors are generally diagnosed when they have become large and are often associated with extensive bone destruction. Radical tumor resection and stabilization of the involved spinal segments are the aims of surgery. Bone destruction or erosion can make spinal stabilization a formidable surgical procedure. Under the circumstance, we identified unilateral facet fixation on the un-involved side as a simple, safe, strong, and quick option. Long-term follow-ups in 2 cases of aneurysmal bone cyst and simple bone cyst involving the cervical spine treated by radical tumor resection and unilateral facet fixation are reported. Our literature survey did not identify any report advocating such unilateral spinal facet fixation.

CASE REPORTS

Case 1

A 7-year-old female child presented with a progressively growing lump in the neck, severe neck pain and torticollis

for 5 months, and recent onset paraesthesia in the right hand and weakness of grip. Investigations revealed a

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large tumor and related destruction of C3, C4, and C5 vertebral bodies and unilateral destruction of facets and pedicles [Figure 1]. In addition to attempted radical tumor resection, transarticular Camille's fixation of the C2–3, C3–4, C4–5, and C5–6 levels was done on the contralateral normal and tumor-free side.^[1,2] Titanium self-tapping screws measuring 2.6 mm in diameter and 14 mm in length were used. Spinous processes were cut at their base and were used as bone grafts. Bone graft was placed over the appropriately prepared exposed part of the bones of posterior spinal elements. The patient was relieved of symptoms after surgery. Histology of the tumor revealed

it to be an aneurysmal bone cyst. After about 6 months of surgery, the patient underwent another attempt at radical surgery for the growth of the residual tumor. The previously done fixation was not manipulated. At a follow-up after 2 years, the patient is asymptomatic. The spinal column was stable, and solid unilateral bone fusion of the facets was observed [Figure 1]. There was marginal growth of the residual tumor.

Case 2

An 11-year-old male child presented with severe neck pain, tingling, and numbness in both lower and right upper limbs

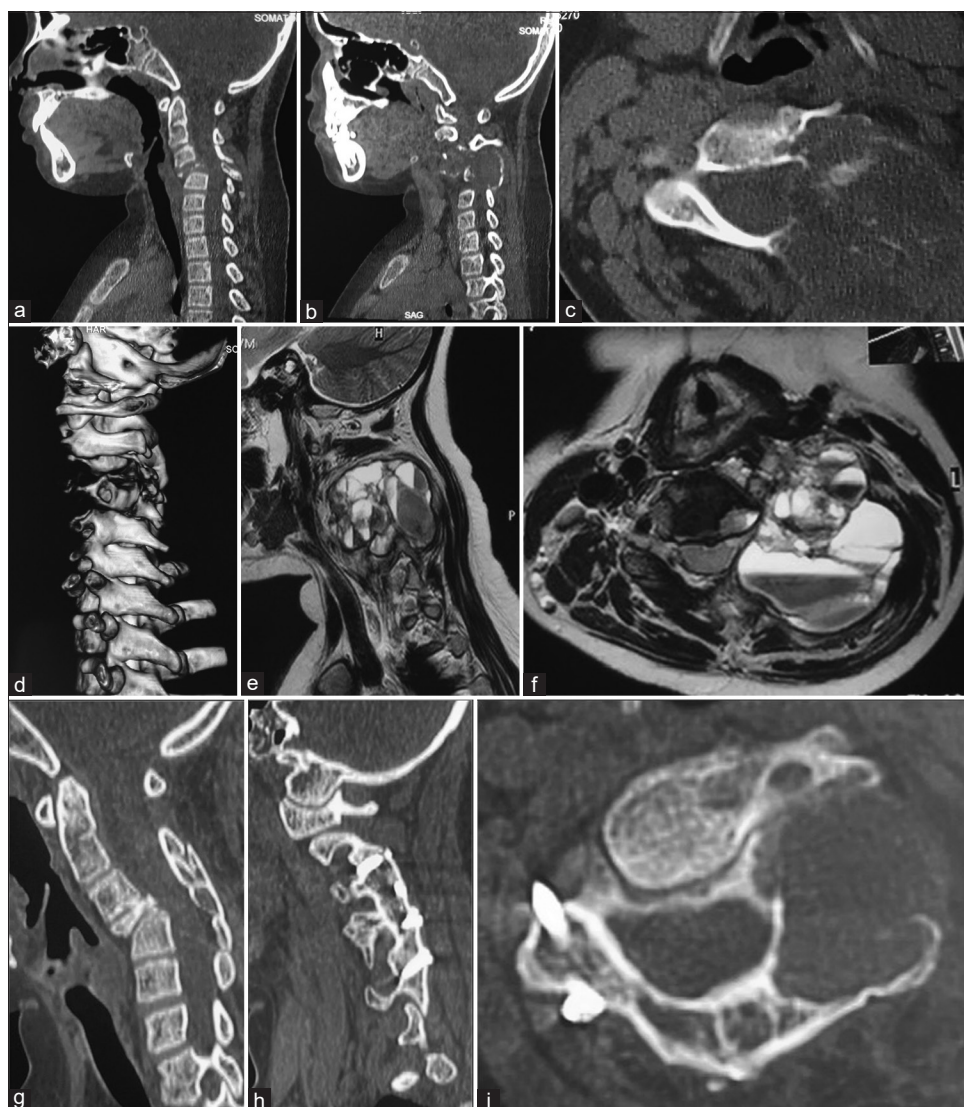


Figure 1: Images of a 7-year-old female child. (a) Sagittal CT scan of the cervical spine showing the destruction of the C4 vertebral body and listhesis of C3 over the C4 vertebra, (b) Sagittal cut of CT scan through the facets showing the expansile and lytic tumor involving and destroying the left side C3, C4, and C5 facets and pedicles, (c) Axial image (at C3 spinal level) showing the tumor and destruction of the lamina, pedicle, transverse process and part of the vertebral body, (d) 3D reconstructed image of CT scan showing the unilateral destruction of the C3–C5 facets, (e) T2-weighted sagittal MRI image showing the expansile lesion with multiple cysts, each having fluid-fluid levels, (f) T2 weighted axial image showing the tumor, (g) Sagittal CT scan after 24 months of surgery showing bone fusion of posterior elements of C2–C6 spinal segments, (h) Sagittal CT scans with the cuts passing through the facets showing C2-6 facet fusion, (i) Axial CT scan showing the tumor in the paraspinous region. Transarticular screw can be seen. CT - Computed tomography, MRI - Magnetic resonance imaging

for 3 months. His neurological examination was normal. Computed tomography (CT) of the craniovertebral junction showed a lytic lesion in the body of C2 extending into the right C2 pedicle with odontoid fracture and atlantoaxial instability [Figure 2]. Magnetic resonance imaging (MRI) showed the lesion to be hyperintense on T2-weighted images with enhancement on contrast administration [Figure 2]. The cyst within the lesion had a fluid level. The patient was operated and a radical resection of the lesion was performed. Goel's C1 lateral mass and C2 pedicle screw fixation were performed on the contralateral normal side.^[3,4] Bone graft was harvested from the iliac crest and packed

into the left atlantoaxial facetal articulation and placed over the posterior elements of the exposed atlas and axis after appropriately decorticating the host bone. Bone graft was additionally inserted in the cavity that resulted after the tumor was excised and the C1 pedicle had to be resected to expose the tumor. The patient improved in his symptoms of tingling numbness after surgery. He was also relieved of his neck pain. Postoperative investigations showed a good fixation and a radical excision of the tumor. Histology of the lesion showed that the lesion was a "simple bone cyst." At a follow-up of 3½ years, the patient is asymptomatic. Follow-up MRI, 36 months after surgery, showed no growth

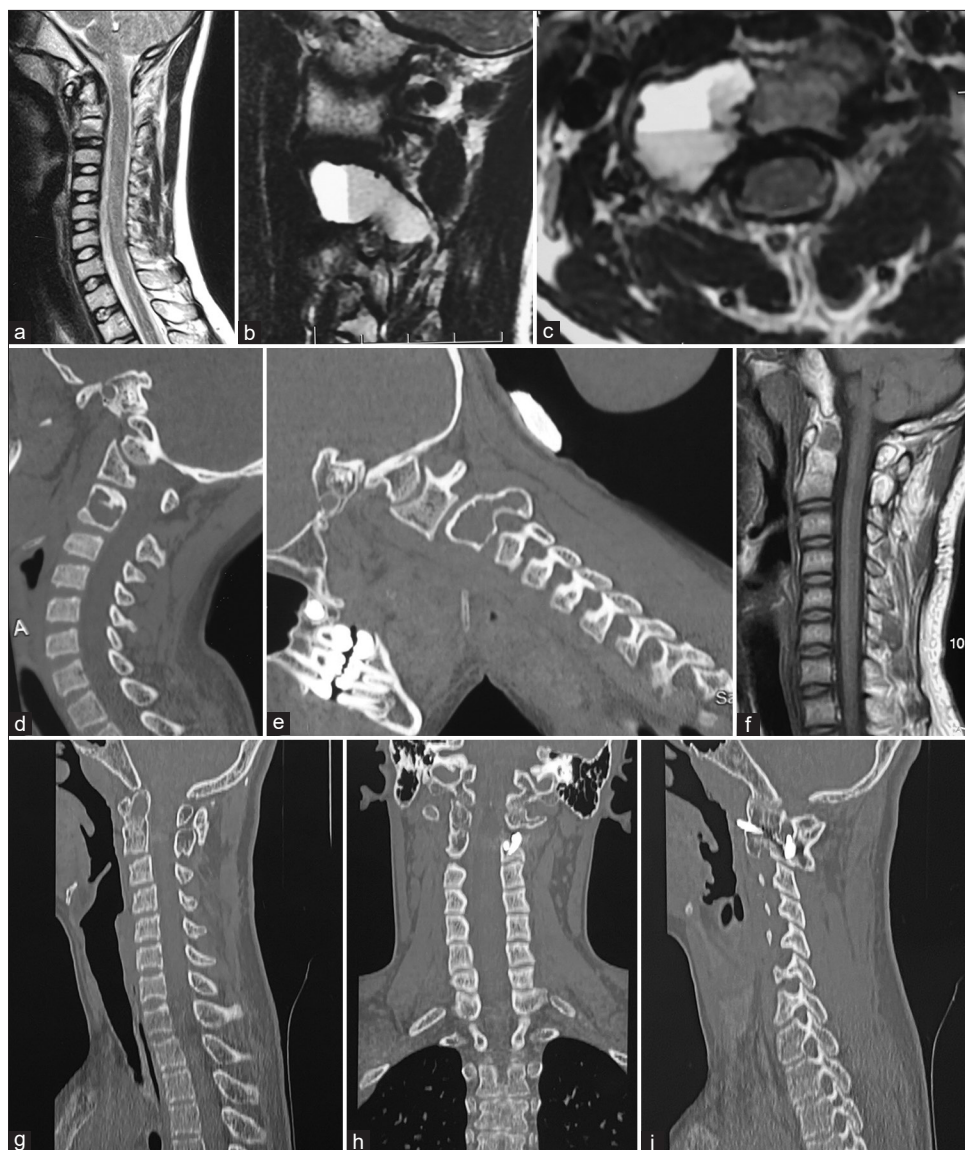


Figure 2: Images of an 11-year-old male child. (a) T2 weighted sagittal MRI image showing a lesion in the body of C2 with associated odontoid fracture and atlantoaxial instability, (b) Sagittal image of MRI through the facets showing a lesion involving the pedicles and facets of C2. Fluid level within the cyst content of the tumor is seen, (c) Axial image of MRI showing the lesion with multiple fluid-fluid levels, (d) Sagittal image of CT scan showing the lytic lesion involving the C2 body and facet on one side, (e) Sagittal cut of CT scan through the facets showing the lytic lesion involving the region of C2 body-facet, (f) Delayed Postoperative MRI image showing excision of the tumor with the healing of the odontoid fracture and craniovertebral re-alignment, (g) Sagittal cut of CT through the healed odontoid fracture with good bone fusion, (h) Coronal image of CT showing the unilateral fixation, (i) Sagittal image of CT with cuts passing through the facets showing the implant and bone fusion. CT - Computed tomography, MRI - Magnetic resonance imaging

in the residual tumor. CT showed satisfactory atlantoaxial fusion [Figure 2].

DISCUSSION

Primary bone tumors include giant cell tumors, aneurysmal bone cysts, eosinophilic granulomas, simple bone cysts, and osteomas. Aneurysmal bone cysts are histologically benign primary bone lesions that often behave aggressively and cause extensive bone destruction. High tumor vascularity and extensive bone destruction related to the locally aggressive character of aneurysmal bone cysts make surgery for tumor resection and spinal stabilization a therapeutic challenge.^[5,6] Apart from radical tumor resection, stabilization of the spinal segments forms the key surgical issue. Simple or solitary bone lesions are rare tumors and generally present in young adults and are infrequently seen in children.^[7] They usually present as incidental lesions but often present with the sole symptom of local pain. A simple bone cyst presenting as an odontoid fracture has never been reported before.

With our more than 30-year experience with lateral mass fixation for atlantoaxial instability and approximately 10-year experience with Camille's technique of fixation for subaxial cervical spine for a variety of indications, we identify unilateral facet fixation as a strong and viable therapeutic option as a salvage fixation method in the desperate clinical situation as was encountered in the presented cases.

Transarticular fixation of the virgin subaxial facets and lateral mass plate and screw fixation of the atlantoaxial articulation presented a safe, quick, and strong fixation. Using Camille's technique, we recently presented our experience with 2422 screws in 321 patients at cervical levels.^[8] During the average follow-up of 33 months, there was no clinical or radiological evidence of screw back out or failure and successful bone fusion was obtained at each treated level.^[8] The firm and strong physical nature of the facets that comprises primarily of cortical bone, provides a strong and reliable ground for screw purchase and stable fixation. Our studies have identified that the bones of the facets are stronger than any other bone component of the vertebral segment and provide a strong ground for the purchase of screws, stabilization of the region, and an opportunity for bone fusion.^[9,10]

CONCLUSIONS

Unilateral facet fixation can be a viable option for spinal stabilization when other techniques of stabilization are not available for any reason.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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