

Recurrent primary lumbar vertebra chondrosarcoma: Marginal resection and Iodine-125 seed therapy

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ABSTRACT

Chondrosarcomas are uncommon in the spinal column. En bloc excisions with wide margins are of critical importance but not always feasible in spine. We report the outcome in a case of recurrent lumbar vertebral chondrosarcoma treated with marginal resection and iodine-125 seeds placed in the resected tumor bed.

Key words: Chondrosarcoma, lumbar vertebra, iodine-125, marginal resection

INTRODUCTION

Chondrosarcomas are rare in the spine. The incidence of spinal chondrosarcomas is estimated to be 2-12% of all primary spinal bone tumors. Almost 90% of spinal chondrosarcomas are classified as low grade (Enneking Stage I).¹ Chondrosarcomas show a high propensity to recur locally after resection. As chondrosarcomas tend to be non responsive to conventional adjuvant therapies, surgical management is critical to treatment. However, en bloc excision is not always feasible because of the proximity to vital neurovascular structures. Although lesions cannot be excised in an ideal en-block manner for giant recurrent chondrosarcomas, lesions should be completely resected with tumor free margins. Recently, radiotherapy has been proved to be effective in chondrosarcomas, particularly for those which are incompletely excised.² One study used interstitial Iodine-125 seeds to prevent any recurrence from chondrosarcoma in thoracic segments for more than 18 months of followup.³ Iodine-125 seeds have a long half life and low energy with

excellent stability, the doses to the surrounding normal tissues decrease very rapidly with distance and are easily confined within the tumor target. Therefore, radioactive iodine-125 seed implantation is another choice for treatment of malignant tumors, which is applied for its curative effect and few complications. To prevent tumor recurrence, we seeded iodine-125 in the bed of the resected tumor.

CASE REPORT

A 54 year old male presented with progressive back pain and lumbar swelling that had gradually increased in size over 3 years. He had undergone an operation for chondrosarcoma in the left transverse process of the third lumbar vertebra 4 years ago in another hospital. Two years prior to admission, he began to have pain in his left leg that radiated from the back and had left paraparesis. Physical examination revealed an 18-cm hard, immobile, round, nontender mass in the posterolateral left flank. Neurological examination showed atrophy of the left quadriceps and hypoesthesia in the left anterolateral thigh.

Plain radiographs of the LS spine showed inconspicuous calcified points involving the left side of the L3 vertebrae. Computed tomography (CT) showed a mass at L1-5 level, 15 cm in diameter, originating from the left transverse process of L3 [Figure 1a and b]. Lumbar spine magnetic resonance imaging (MRI) demonstrated a large mass lesion, compressing the left nerve root, close to the aorta at the L1-2 levels [Figure 1c]. The lesion was completely resected anteroposteriorly, in a piece meal fashion until tumor free margins were obtained. The L3 left remnant transverse process and part of the normal articular process and lamina were removed. The nerve root was free of compression. According to the preoperative plan to which the patient and his family agreed, radioactive Iodine-125 particles with

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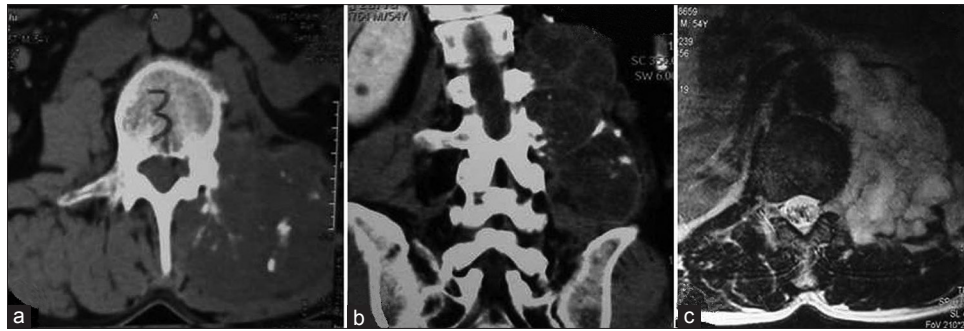


Figure 1: (a and b) CT axial and coronal images showing a destructive, large lesion in the left transverse process in L3 vertebra (c) Axial T2w MRI shows the lesion close to the aorta at L1-2 level

diameters of 0.8 mm, lengths of 4.5 mm and titanium alloy shells were put in gelatin sponges, then they were placed in the bed of the excised lesion. Neurological deficits gradually improved. The pathology specimen was compatible with conventional low-grade chondrosarcoma [Figure 2].

Two years since the operation, the patient remained asymptomatic. Recently obtained X-ray, CT, and MRI show no sign of tumor recurrence [Figure 3].

DISCUSSION

Spinal chondrosarcomas are uncommon disorders, characterized by malignant cartilage forming cells. They most commonly arise in the thoracic and cervical region and are rare in lumbar vertebra.⁴ Lesions may involve any part of the body or posterior elements of the vertebra, but tend to involve the posterior elements more frequently.⁴

Surgery is critical in treating spinal chondrosarcomas and should aim at preserving or even improving function, relieving pain and controlling local tumor recurrence, promising a prolonged survival. However, surgical treatment of spinal chondrosarcoma is particularly difficult as most tumors adhere to nerve roots and the great vessels. When all locations are considered, survival from chondrosarcoma is relatively high, at 87% after 5 years, but is considerably lower for pelvic, sacral and spinal locations, varying between 25% and 54%.⁵ En bloc resection with wide disease free margins provides the best results in local chondrosarcoma control, with reported rates of recurrence as low as 3-8%.⁶ However, Boriani *et al.* reported five patients with spinal chondrosarcomas who were treated with a new piecemeal excision followed by a second recurrence. Of these, four (80%) were within 6 months.⁷

Although Rao *et al.* reported a large series of sarcomas of the mobile spine, their results failed to show a statistically significant benefit in survival or local recurrence rates for

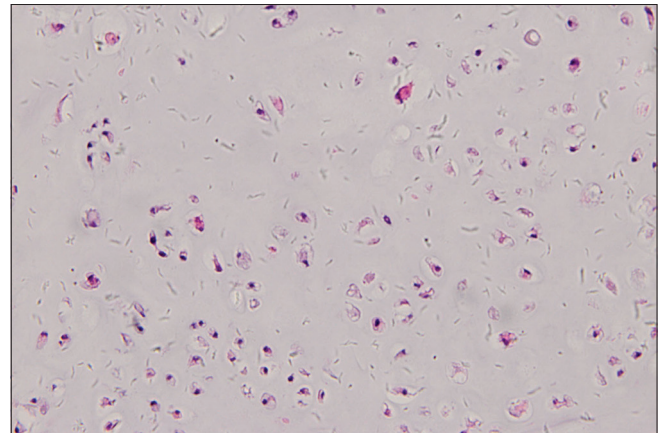


Figure 2: Microscopic finding showing low grade conventional chondrosarcoma. (hematoxylin and eosin stain, $\times 200$)

en bloc versus intralesional resections, for either metastatic or primary sarcomas of the spine.⁸ Hirsh suggested that repeated surgical excision of local recurrences can be beneficial and prolong survival.⁹

Complications of en bloc excision can be serious and mainly comprise wound problems, excessive blood loss and implant failure.¹⁰ In our case, the lesion was still limited to the transverse process. To avoid large surgical trauma and postoperative complications, we aimed to preserve the normal motion segments of the vertebral body. The lesion was completely resected, in a multi-cut fashion, leaving the nerve root free of compression.

Chondrosarcoma has been long considered to be relatively unresponsive to radiotherapy and chemotherapy. Although complete resection remains the primary treatment, addition of radiotherapy appears to provide excellent and durable local control in those who would be at high risk of local failure if treated with surgery alone. The 10-year overall survival rates of up to 86% have been reported.²

Iodine-125 has a half-life of 59.4 days; it emits gamma radiation with medium energy of 29 keV, with a radiation

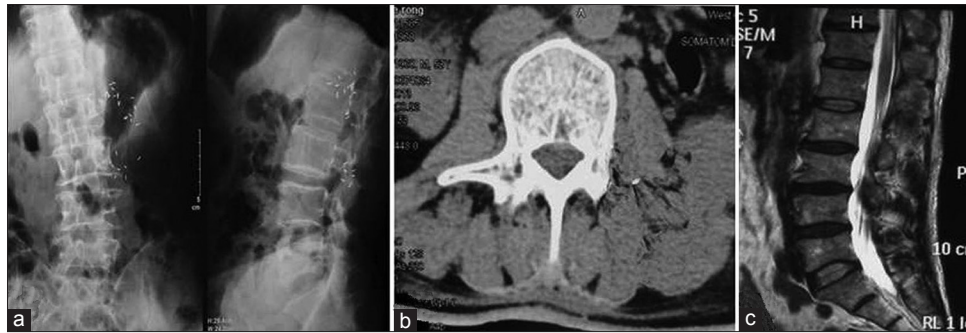


Figure 3: (a) X-ray lumbosacral spine anteroposterior and lateral views showing Iodine-125 seeds in place at the tumor resection site 2 years after surgery. (b and c) Axial CT and sagittal T2W MRI showing no signs of recurrence 2 years following surgery

radius of roughly 2 cm. Damage to the normal tissue is small.¹¹ Compared with external beam radiation therapy, iodine-125 seed implant brachytherapy provides higher doses to the target mass, spares distant normal tissues, and works for a longer time in the tumor locale. In this case, the tumor's large size and tissue adhesion called for a piece-meal resection by which contamination was inevitable. Iodine-125 seeds were permanently placed in the tumor resection bed to prevent recurrence to some extent.

Rogers *et al.* reported a series of 24 patients with malignant tumors resulting in spinal cord compression who were treated with surgery and Iodine-125 brachytherapy. Permanent Iodine-125 seeds in absorbable sutures were placed with open exposure after resection. The 2- and 3-year actuarial local control rates were 87.4% and 72.9%, respectively.¹² Zhu *et al.* reported a series of 19 patients with recurrent head and neck carcinomas (one was chondrosarcoma) who underwent Iodine-125 seed implantation under ultrasound or CT guidance. The 1-, 2-, and 3-year local controls were 73.3%, 27.5%, and 27.5%, respectively.¹³

Trombetta *et al.* reported resection and Iodine-125 interstitial lung brachytherapy in approximation to the aorta in 29 patients, who were implanted with Iodine-125 impregnated Vicryl mesh that contacted >50% with the aorta. One of the 29 patients suffered a fatal hemorrhage from suspected great vessel rupture.¹⁴ In our case, Iodine-125 was seeded around the abdominal aorta, but did not directly come in contact with the artery.

Hamilton *et al.* reported that interstitial Iodine-125 seeds were placed in the resected chondrosarcoma tumor bed to prevent recurrence from microcellular disease in thoracic segments for more than 18 months of followup.³ They applied multiple layers of gold foil around the thecal sac and nerve root sleeves to produce an enveloping radiation shield after resecting a recurrent tumor. In our case, as the resection range did not involve the spinal canal, implanted particles did not directly come in contact with the nerve root and

doses of radioactive Iodine-125 to the surrounding normal tissues decrease very rapidly with distance, irradiation risk to the spinal cord should be very slight.

This case illustrates a method of treating giant recurrent spinal chondrosarcomas limited to a part of the vertebrae. The lesion was completely resected while retaining most of the vertebra and motion segment, and relieving the patient's nerve compression symptoms and pain. Iodine-125 seeds placed in the bed of a resected chondrosarcoma to prevent recurrence appears an effective method of treatment for such lesions.

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