

Interventions Oncology Case Report

Radiofrequency ablation treatment of periacetabular chondrosarcoma: A case report

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ABSTRACT

Needle biopsy of an incidental periacetabular bone lesion in an 18-year-old female showed a low-grade cartilaginous tumor. Based on the imaging and pelvic location, the tumor was considered a Grade I chondrosarcoma. Due to the young age, incidental discovery, and low metastatic potential, radiofrequency ablation (RFA) was recommended in favor over traditional wide *en bloc* resection. The patient has been radiographically and clinically stable for 2 years. RFA has not been previously reported for low-grade chondrosarcoma. Its use should be done only with careful consideration and diligent follow-up in this setting.

Keywords: Radiofrequency Ablation, Enchondroma, Chondrosarcoma, Pelvis, Bone

INTRODUCTION

Radiofrequency ablation (RFA) in orthopedics is most frequently used for the treatment of benign tumors such as osteoid osteomas or metastatic bone disease (MBD).^[1,2] However, RFA has not previously been reported for chondrosarcoma treatment. In the case of pelvic chondrosarcoma, conventional oncology treatment has been complete wide resection. The potential morbidity of wide resection, particularly in the periacetabular region, is substantial.^[3,4]

We describe a case of periacetabular chondrosarcoma treated with RFA. Despite the established efficacy of this technique in other orthopedic bone tumors, to the best of our knowledge, this is the first reported case.^[5]

CASE REPORT

An 18-year-old Caucasian female presented with gastrointestinal symptoms, leading to computed tomography (CT) examination. Although the gastrointestinal upset resolved, a left periacetabular bone lesion was noted as an incidental finding. The XR showed a very faint radiolucency in the left posterior acetabulum [Figure 1a]. The CT showed a predominantly radiolucent 1.5 × 2.1 cm lesion with punctate central mineralization, slight cortical expansion, and endosteal scalloping in the same location [Figure 1b]. Initially, the patient reported no pain associated with the lesion. Physical examination of both hips was normal.

An magnetic resonance imaging (MRI) showed a discrete predominantly peripherally enhancing 1.9 × 2.0 × 2.5 cm left periacetabular lesion [Figure 2]. A subsequent CT-guided needle biopsy

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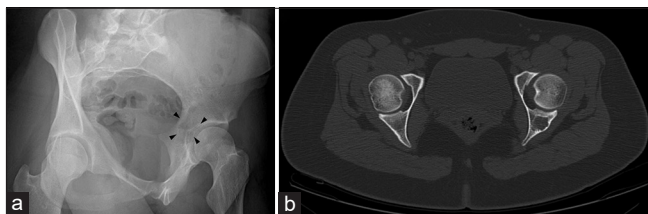


Figure 1: An 18-year-old female with low-grade chondrosarcoma discovered incidentally on computed tomography during evaluation of unrelated gastrointestinal symptoms. (a) XR of the left posterior oblique pelvis shows radiolucency along the posterior margin of the acetabulum. (arrowheads) (b) Pelvic CT shows lytic lesion with endosteal scalloping of the acetabulum, respectively.



Figure 2: 1.5 T magnetic resonance imaging of coronal, sagittal, and axial (T1 and STIR) sections of posterior column of the left posterior acetabulum before radiofrequency ablation treatment showing a predominantly peripherally enhancing intramedullary lesion.

revealed a low-grade cartilaginous neoplasm. Histology showed fragments of hyaline cartilage with focally increased cellularity and mild focal cytologic atypia. Slight myxoid changes were also seen. No mitotic activity, necrosis, or marrow permeation were observed [Figure 3]. Pre-operative grading is subjected to a certain degree of sampling error such that the biopsy may not accurately represent the true grade of the tumor. However, given the pelvic location and radiographic findings, the neoplasm was felt to be consistent with low-grade chondrosarcoma. During early follow-up, the patient reported 10/10 shooting pain along the posterior aspect of the ipsilateral thigh radiating below the knee that worsened at night and awakened her from sleep, but this was felt to be unrelated to the tumor. The patient was presented the option of resection of the tumor accompanied by osteoarticular partial acetabular reconstruction or RFA. The latter option was recommended after consultation with an outside orthopedic oncologist due to

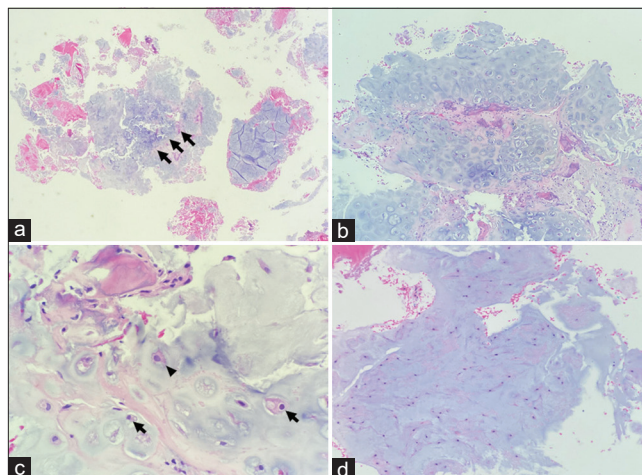


Figure 3: Image-guided needle biopsy of cartilage tumor in the posterior left acetabulum, stained with hematoxylin and eosin. (a) $\times 2$: Fragments of bone, hyaline cartilage, and small foci of myxoid changes. The hyaline cartilage displays focally moderate cellularity (arrows). (b) $\times 4$: Higher power view of the area of moderate cellularity in the hyaline cartilage: The neoplastic cells reside in the lacunar spaces. (c) $\times 50$: The hyaline cartilage exhibits mild focal cytologic atypia. The majority of chondrocytes have small, round, dark nuclei, and lack nucleoli (arrows). A few cells show atypia, with fine chromatin and small nucleoli (arrowhead). (d) $\times 20$: Higher power view of myxoid cartilage. The chondrocytes in this area are spindle-shaped and reside in the basophilic extracellular matrix, not in lacunar spaces.

the patient's young age and minimal symptoms. Ultimately, the patient opted for RFA.

The specific approach and ablation tract were planned in collaboration between the orthopedic oncologist and the interventional radiologist. An ilioinguinal approach for acetabular tumor resections was suggested by the orthopedic oncologist. Under general anesthesia, interventional radiology performed two sessions of RFA treatment at 100°C for approximately 3 min each session. The patient tolerated the procedure well with an uncomplicated overnight stay. She was discharged the following day with no weight-bearing limitations and activity as tolerated. During the first 6 weeks postoperatively, the patient complained of the left gluteal pain for which she is given appropriate pain medication. Some of her pain was alleviated by a GT bursal injection. By 6-week post-procedure, she rated pain as a 4/10. Early post-RFA MRI showed only perilesional edema felt likely due to post-treatment changes [Figure 4a]. At 6-, 15-, and 32-month post-procedure, MRI showed no progression in size of the lesion and gradual resolution of early perilesional edema [Figure 4b]. The patient's symptoms have remained stable. The relationship of her variable symptoms to the underlying tumor remains questionable. She was able to resume all normal activities. The patient is aware that her case would be submitted for publication and has provided consent.

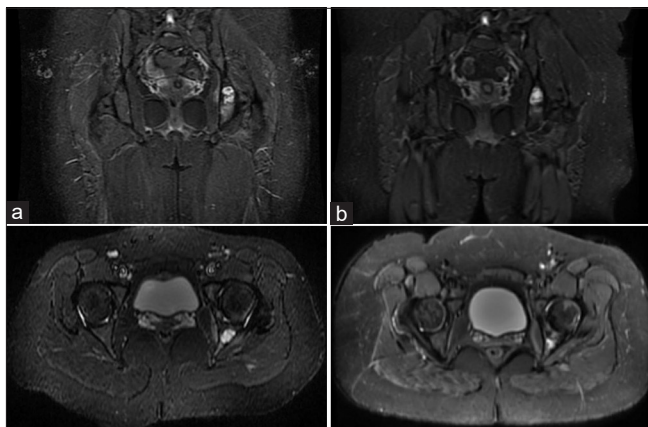


Figure 4: 1.5 T and 3.0 T magnetic resonance imaging (MRI) of coronal and axial (STIR) sections of posterior column of the left posterior acetabulum post-radiofrequency ablation (RFA) treatment showing no lesional progression. (a) 1.5 T MRI of coronal and axial (STIR) sections of early post-operative RFA period (1 month) showing some perioperative edema and residual size of the lesion. (b) 3.0 T MRI of coronal and axial (STIR) sections of late post-RFA period (32 months) showing resolution of early perilesional edema and absence of progression of the size of the lesion.

DISCUSSION

Low-grade periacetabular chondrosarcoma is typically treated with wide *en bloc* resection given the propensity for low-grade cartilage lesions of the pelvis to behave in a more aggressive fashion. However, these procedures carry considerable potential morbidity with a high rate of complication with local recurrence rates even after wide resection.^[3] Conversely, preservation of the periacetabular area has shown to better conserve function.^[6] In the present case, with the understanding that the tumor was low grade and the goal of preserving function, the offer of RFA was made after outside consultation at another institution's orthopedic oncology unit. At 3-year post-RFA, the patient has no evidence of lesional progression and has resumed normal function with minor activity-related unrelated pain. The patient's pain was initially unresponsive to conservative management, suggestive of a chronic lower back pain. However, the improvement since RFA treatment indicates that at least part of the pain may have been related to the tumor and thus relieved by ablation. We will continue to follow the patient with annual MRIs to monitor for tumor progression, reoccurrence, and metastatic disease. To the best of our knowledge, this is the first report of RFA used to treat chondrosarcoma. It may be considered an alternative treatment for very small low-grade chondrosarcomas when the risks of wide resection are high and expected functional outcome may be poor.

Conventionally, RFA has been utilized to treat osteoid osteomas and MBD. The use of RFA in osteoid osteomas has shown success rates up to 94% with minimal

complications.^[1] In cases of MBD, patients undergoing RFA have seen significant reductions in pain and narcotic use with improvements in ADLs.^[2] Success with RFA has also been reported in the treatment of chondrosarcoma, enchondroma, giant cell tumor, and bone hemangioma.^[5]

Anecdotal reports on RFA treatment for enchondroma are directly relevant to our case since there is much controversy regarding the distinction between enchondromas and Grade I chondrosarcomas.^[7,8] It is essential to note that low-grade cartilage tumors of the pelvis are generally considered to be chondrosarcomas rather than enchondromas.^[7] In a prior report of RFA treatment for enchondroma, two lesions located in the anterior cortex of the middle left tibial diaphysis and anterior cortex of the intertrochanteric region of the left femur in pediatric patients were treated for presumed osteoid osteoma but the final pathology showed enchondromas – only one was successful, the other later required open surgical resection.^[9]

In our case of this periacetabular Grade 1 chondrosarcoma, preservation of function and quality of life was considered imperative, and the small size of the tumor was ideal for RFA therapy. To the best of our knowledge, this is the first instance of low-grade chondrosarcoma successfully treated with RFA therapy.^[10] By utilizing RFA for this low-grade periacetabular chondrosarcoma, we were able to avoid complications of major pelvic resection while maintaining oncological control. In the future, RFA therapy should be considered for similar small, low-grade bone cancers, although close follow-up of all cases is advised, and the technique should be used only with caution.

CONCLUSION

In cases of low-grade periacetabular chondrosarcoma, the use of radiofrequency ablation may be considered in specific cases in order to preserve maximal function and quality of life.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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