

# Core Needle Biopsy of Periacetabular Chondrosarcoma Often Results in Under-Grading but Does Not Change Management by Experienced Orthopaedic Oncologists

Hayden Elizabeth Harvard, Megan Badejo, Nicole Lillian Levine, Nicole Cantor, William Curtis Eward, Julia Dawn Visgauss, Brian E Brigman

## INTRODUCTION:

Chondrosarcoma is a malignant hyaline cartilage neoplasm most commonly diagnosed in adults older than 50 years of age and typically affecting the long bones and pelvis. It represents the most common primary bone tumor affecting the periacetabular region, followed by osteosarcoma and Ewing’s sarcoma. Periacetabular tumors are unique in that curative treatment with wide resection is associated with significant patient morbidity. It is also challenging to attain an open biopsy of pelvic chondrosarcoma. Percutaneous biopsy is a more favorable procedure, however limited by its diagnostic capacity and uncertainty around tumor grade or subtype. As a result, a multidisciplinary team is required to evaluate the presentation, imaging, histopathology, and the biopsy to make treatment decisions. This differs from other primary bone tumors which are definitively diagnosed and graded before treatment. While radical resection of these lesions is the curative treatment, there are chondrosarcomas (dedifferentiated and mesenchymal chondrosarcoma) that can be responsive to neoadjuvant chemotherapy. However, with the narrow samples percutaneous biopsies provide, some tumors could be missing treatment opportunities outside of radical resection that are not as morbid. This situation begs the question of what the concordance is on tumor diagnosis based on the preoperative percutaneous biopsy versus the sample after radical resection. To address this, the authors performed a retrospective review of patients with periacetabular cartilaginous tumors at a single institution. The authors aimed to determine whether any changes in diagnosis or grading following resection and complete histopathologic review of the entire lesion would have resulted in any deviations from the executed surgical plan and highlight the presence of overaggressive treatment measures. To the author’s best knowledge, this represents the first retrospective review focusing on accuracy of different biopsy methods for cartilaginous tumors about the periacetabular region.

**METHODS:** This is a retrospective review of patients with periacetabular cartilaginous tumors who were treated between the years 2000 and 2022 at a single institution. All patients included in the analysis underwent surgical resection. The preoperative biopsy and post-surgical resection histological grades were compared. Concordance and treatment implications were evaluated.

**RESULTS:** Of the 23 preoperative biopsies performed, there were 19 Image Guided Core Needle Biopsies (IGCNB), three Fine Needle Aspirations (FNA), and one open biopsy. There was concordance between preoperative and surgical resection histological grade in only 10 cases using all methods of biopsy (IGCNB, FNA, and open biopsy), giving a (10/23) 43.5% accuracy rate. When considering biopsy techniques individually there was an accuracy rate of 7/19 (36.8%) for IGCNB, 2/3 (66.7%) for FNA, and 1/1 (100%) for open biopsy. In total there were 13 cases of discrepancy between preoperative biopsy and surgical resection regarding histological grade. In 12 cases of discrepancy, surgical resection histology revealed a higher grade than that of preoperative biopsy histology. In one case of discrepancy, preoperative IGCNB biopsy histology revealed a high-grade chondrosarcoma while the surgical resection histology revealed an intermediate-grade. There were no situations in which the plan made based on a preoperative biopsy resulted in an inappropriate treatment decision, even when there was not concordance between preoperative diagnosis and diagnosis after definitive resection.

**DISCUSSION AND CONCLUSION:** Significant discrepancy in grading was observed with preoperative IGCNB and FNA of periacetabular cartilaginous lesions. However, while 12 out of the 13 discordant cases (92.3%) underestimated the true grade of the tumor, there was no impact on treatment decision making.

Table 1. Concordance of histological grading between pre-operative biopsy and surgical resection pathology.

	Total Number	Concordant	Discrepant
All Methods (IGCNB, FNA, Open)	23	43.5% (10/23)	56.5% (13/23)
IGCNB	19	36.8% (7/19)	63.2% (12/19)
FNA	3	66.7% (2/3)	33.3% (1/3)
Open Biopsy	1	100% (1/1)	0% (0/0)

Table 1. Concordance of histological grading between pre-operative biopsy and surgical resection pathology.

	Total Number	Concordant	Discrepant
All Methods (IGCNB, FNA, Open)	23	43.5% (10/23)	56.5% (13/23)
IGCNB	19	36.8% (7/19)	63.2% (12/19)
FNA	3	66.7% (2/3)	33.3% (1/3)
Open Biopsy	1	100% (1/1)	0% (0/0)

Table 2. Summary of all 23 periacetabular chondrosarcomas.

Patient	Sex	Age	Location of tumor	Biopsy method	Biopsy grade	Revised grade	Management strategy	Final diagnosis
1	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
2	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
3	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
4	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
5	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
6	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
7	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
8	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
9	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
10	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
11	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
12	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
13	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
14	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
15	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
16	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
17	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
18	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
19	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
20	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
21	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
22	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma
23	M	51	Acetabulum	IGCNB	Low grade	Intermediate grade	IGCNB	Chondrosarcoma