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Preoperative histological evaluation of chondrosarcoma biopsy specimens: radiological features and their correlations with pathological data

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Purpose: Chondrosarcoma represents a heterogeneous group of tumors, ranging from indolent low-grade lesions (grade 1) to aggressive high-grade neoplasms (grade 2 and 3). Some authors have recently advocated the adequacy of intralesional surgery for grade 1 chondrosarcoma. However, accurate diagnosis and effective treatment of these tumors remain challenging. This study was performed to compare the histological findings after wide resection with preoperative radiographic findings and to evaluate the reliability of preoperative grading of biopsy specimens.

Materials and Methods: We retrospectively reviewed the medical records of 15 patients diagnosed with central chondrosarcoma that underwent wide resection and histologically evaluated sections of resected specimens at our institution from 1996 to 2014. The tumors were located in the femur ($n = 5$), humerus ($n = 3$), rib ($n = 3$), scapula ($n = 2$), tibia ($n = 1$), and phalange ($n = 1$). In these cases, we reviewed the method used for biopsy, radiographic findings of the biopsy site, and both pre- and postoperative histological grading, and compared the histological findings after wide resection with the preoperative radiographic findings.

Results: The methods used for preoperative histological grading were needle biopsy in six patients and excisional biopsy in nine patients. On radiographic findings, the biopsy site revealed endosteal scalloping and cortical penetration with little calcification (group A) in nine cases or soft-tissue mass formation (group B) in six cases. Low signal intensity on T1-weighted images, high signal intensity on T2-weighted images, and poor enhancement on gadolinium-enhanced T1-weighted images were seen in all patients. Preoperative histological grading was benign in one patient, 1 in eight patients, and 2 in six patients. However, five of eight patients evaluated as grade 1 before surgery were changed to grade 2 on postoperative grading. Among these five cases, three were in group A and two were in group B, and two of the five patients were diagnosed by needle biopsy. Grade 2 area was seen at the biopsy site in four of five cases on postoperative histological examination.

Discussion: On postoperative histological evaluation, it was thought that the part of soft tissue mass formation, with absence of calcification or endosteal scalloping on radiographic findings would be appropriate as the biopsy site. The reason for the failure to determine the correct histological grade may have been because chondrosarcoma has various histological grades within the same tumor, and the biopsy specimens were small. Therefore, it is important to combine radiographic interpretation with histological findings.