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Retrospective evaluation of cartilage tumors of long bones under clinico-radiological surveillance

Background: Incidentally diagnosed cartilage lesion (enchondroma) potentially can turn into secondary central chondrosarcoma although the risk is largely unknown[1]. Universal consensus on management of these cartilage tumors is lacking.

Purpose: To find out whether clinical and radiological surveillance of cartilage tumors with low biological activity is necessary and if so, at what intervals.

Methods: A cross-sectional study was undertaken at our tertiary referral bone and soft tissue tumor unit. A list of all cartilage tumors was obtained from our tumor database. Those patients with lesions in long bones proven/ considered to be intramedullary cartilage neoplasms based on clinical and radiological picture and kept under surveillance because they gave no/ minimal symptoms were included. Patients with cartilage tumors of flat bones, vertebrae, hands and feet, alternative cartilage neoplasms, skeletally immature patients and those with incomplete data and syndromic association were excluded. Radiological images were reviewed to measure the size of the lesion and to record their radiological charecteristics. The total increase in size in subsequent scans is measured as the sum of difference in size in all three planes (supero-inferior, medio-lateral and antero-posterior planes) in the subsequent scan as compared to the first scan.

Results: After applying the inclusion and exclusion criteria, 126 lesions qualified for inclusion. The most common bone to be involved was femur followed by humerus, tibia and fibula in order. Histological report was available in 24 lesions of which two were grade 1 chondrosarcomas, 7 were atypical enchondromas and 15 were enchondromas. Both the chondrosarcoma patients were operated during arthroplasty of adjacent joint. When compared to MRI, radiographs were not good at delineating the lesion size and 25 lesions were not apparent on radiographs at all.

A total of 423 scans in 126 patients were reviewed of which 98 patients had more than one MRI/ CT. Estimation for measurement error of lesion size was performed and it was found that our measurement error varied from -2 mm to + 2 mm in any single plane. The growth pattern of lesions were studied and it was found that all lesions which did not increase by 6mm in total size at 3 years did not grow much in subsequent scans while a majority of the alternative group continued to grow. One patient got operated for increase in lesion size of 11mm on follow-up imaging at 6 months that turned out to be atypical enchondroma. None of the other patients had operative intervention for increase in size.

All patients with radiological follow-up of more than 3 years (45 patients) were identified and divided into two groups- those with total increase in size of more than 6mm were termed 'Active' group (11 patients) while the rest were termed 'Sluggish' group (34 patients). Both the groups had similar length of follow-up and demographic characteristics. Out of the radiological characteristics, only calcification in CT was found to be significantly different between the two groups while lesion size, scalloping in CT and intensity of uptake in bone scan were insignificant. Majority of lesions in 'Active' group had calcification of less than half the lesion size while those in 'Sluggish' group were commonly heavily calcified.

Conclusion: MRI is the imaging modality of choice for surveillance as radiographs are unreliable. At the time of diagnosis, CT scan can help in identifying lesions with growth potential as lesions with little calcification in CT tend to be 'active'. First follow-up MRI is indicated at one year or earlier depending upon the clinical picture. If the total growth is > 6 mm, then the lesion shall be intervened as the growth rate is very high. The second follow-up MRI can be performed at 3 years. If the lesion did not demonstrate a total growth of 6 mm, then further radiological surveillance interval can be lengthened. Those lesions that demonstrated 'active' growth at 3 years can be either followed-up or intervened depending upon the clinical situation. Scalloping in CT may not be an indicator of aggressiveness of lesion. If patient needs arthroplasty, either extra medullary alignment

should be used or the lesion should be excised or adequately curetted to avoid apprehension if the final histological report revealed a grade 1 chondrosarcoma.

Reference:

1. Fletcher, C.D.M., Bridge, J.A., Hogendoorn, P.C.W., Mertens, F. (Eds.) (2013). WHO Classification of Tumors of Soft Tissues and Bone. 265-266.