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Outcome of intralesional curettage for low-grade chondrosarcoma of long bones

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Abstract

Background: Different treatment strategies for low-grade chondrosarcomas are reported in the literature with variable outcomes. The aim of this study was to assess the oncological and functional outcomes associated with intralesional curettage and cementation of the lesion as a treatment strategy.

Patients and methods: We performed a retrospective review of 39 consecutive patients with intramedullary low-grade chondrosarcoma of long bones treated by intralesional curettage and cementation at our institution between 1999 and 2005.

Results: There were 10 males and 29 females with a mean age of 55.5 years (32–82), and a mean follow-up of 5.1 years (3–8.7). Local recurrence occurred in two patients (5%) within the first two years following index surgery. Both were treated by re-curettage and cementation of the resultant defects. A second local recurrence developed a year later in one of these two patients, for which a further curettage followed by local liquid nitrogen treatment was performed. Overall, there were no cases of post-operative complications or metastases. The patients were assessed using the Musculoskeletal Tumour Society scoring system (MSTS) to determine limb function. The average score achieved was 94% (79–100%).

Conclusion: Intralesional curettage is an effective treatment strategy for low-grade intramedullary chondrosarcoma of long bones, with excellent oncological and functional results. Careful case selection with stringent clinical and radiographic follow-up is recommended.

Keywords: Chondrosarcoma; Intralesional curettage; Polymethylmethacrylate cement – PMMA; Musculoskeletal Tumour Society Score – MSTS; Local recurrence

Introduction

Chondrosarcoma is the second most commonly occurring primary malignant bone tumour, with a peak incidence between the fourth and seventh decades of life.[1–5] These tumours were first described as a separate entity by Phemister in 1930.[6] In adults, the pelvis, ribs, shoulder girdle, femur, and humerus are mainly affected, while in children, facial bones and the knee region are the main sites.[7] The majority of lesions arise centrally in normal bone, uncommonly in pre-existing benign cartilaginous tumours (secondary chondrosarcoma), and rarely in synovial chondromatosis or 'de novo' in the synovium.[1,8,9] They have a variable and often unpredictable outcome, ranging from slowly growing indolent lesions, to highly aggressive invasive sarcomas.[10] Authors link the prognosis to tumour size, anatomical location, and most importantly, histological grade.[10,11] Five to 10 year survival rates for patients with low-grade tumours range from 85% to 100%, and from 20% to 40% for high-grade tumours.[10–17] The treatment of chondrosarcoma is primarily surgical because of its resistance to chemotherapy and irradiation,[1,16,18,19] and while there is a universal acceptance that high-grade lesions in the appendicular skeleton are best treated by wide surgical

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resection, the diagnosis and management of low-grade lesions remains a controversial issue.[19] Firstly, distinguishing intramedullary low-grade chondrosarcoma from enchondroma is difficult, particularly on needle core biopsy because of potential sampling issues.[20] Secondly, there is currently no consensus with respect to the optimal surgical treatment for these cases. Different methods reported in the literature include wide excision, marginal excision, and intralesional curettage. Some authors advocate wide excision, necessitating substantial reconstructive surgery, often requiring massive endoprostheses or allografts.[21,22] In contrast, many others believe that less extensive surgery is indicated for less aggressive lesions.[5,13,19,23–25] This would minimises the need for complex limb reconstruction and results in a good functional outcome. In this paper, we examine the oncological and functional outcomes of intralesional curettage and cementation as a treatment strategy.

Patients and methods

Between 1999 and 2005, 39 consecutive patients with histologically verified low-grade intramedullary chondrosarcoma of long bones underwent intralesional curettage and cementation of their lesion at our institution. These patients were identified using our department's histopathology database and then were retrospectively reviewed. The inclusion criteria included a definitive histological diagnosis of grade 0.5 or 1 chondrosarcoma, intramedullary lesions arising in long bones, and a minimum follow-up of three years. We excluded patients with lesions breaching the bone cortex and/or associated with a soft tissue mass, as these were treated by wide excision. However, the longitudinal length of the lesion alone did not influence our decision to perform intralesional curettage. We obtained clinical data from the case notes, hospital databases, imaging studies, clinic reviews and patient questionnaires. There were 10 males and 29 females with a mean age of 55.5 years (range 32–82). The mean overall follow-up was 5.1 years (range 3–8.7). Patients were referred to our regional tumour centre and managed by a multidisciplinary team. All patients had persistent pain as one of the presenting features. Pre-operative imaging included plain radiographs, technetium (TC99) bone scans, chest CT and MRI. Imaging studies were evaluated by experienced musculoskeletal consultant radiologists for the presence of malignant features including significant endosteal scalloping (greater than two thirds of cortical thickness), sclerotic rim, reactive thickening of the cortex with bone expansion, cortical destruction, soft tissue extension and periosteal reaction.[26–28] All 39 patients had one or more of these features, and therefore, needle and/or open biopsies were obtained in all cases. The diagnosis of low-grade chondrosarcoma was reached combining radiological, histological and clinical findings. The patients included in this study underwent intralesional curettage of their lesion through a cortical window, followed by washout with saline pulsatile lavage then adjuvant treatment with bone cement. The resultant intraosseous defects were reconstructed with polymethylmethacrylate (PMMA) bone cement, as this provides immediate stability, avoids the morbidity of autogenous bone graft, and aids the post-operative radiographic evaluation for signs of local recurrence.[24] Eighteen lesions occurred in the femur, 14 in the humerus, 6 in the tibia, and 1 in the radius. Patients were followed up at regular intervals of 3 months in the first year post-operatively, and every 6 months between 1 and 3 years, and on an annual basis thereafter. Plain radiographs were obtained at each visit of the operated site and the chest to identify local recurrence and/or metastases. Clinical outcome assessment was performed using the Musculoskeletal Tumour Society (MSTS) scoring system for the upper and lower limbs.[29] This system assigns numerical values (0–5) for each of the following six categories. In the upper limb: pain, function, emotional acceptance, hand positioning, dexterity, and lifting ability. In the lower limb: pain, function, emotional acceptance, ambulatory support, walking ability, and gait. A numerical score and a percentage rating are calculated to allow for comparison of results.

Histological grade

Histology slides were examined for grade by experienced musculoskeletal consultant histopathologists. The histological grading system used at our Institution is a modified variant of the system first described by Jaffe in 1958.[30] Characteristics of the cells and intercellular background, degree of pleomorphism and mitotic activity, changes in the matrix (from hyaline to myxoid), and the pattern of infiltration of normal trabecular bone are all carefully analysed. A grade of 0.5, 1, 2, 3 is assigned on the basis of the above criteria. Grade 0.5 in our system refers to a lesion that other authors have designated as a 'CLUMP' (Cartilagenous Lesions of Unknown Malignant Potential) or 'atypical' enchondroma.[16,31] Such lesions demonstrate increased cellularity, mild nuclear atypia typified as open nuclei but without prominent nucleoli, and binucleate cells. The presence of permeation of host lamellar bone by tumour, as described by Mirra et al.,[32] renders the lesion a grade 1. Mitoses are absent in both grade 0.5 and 1, but present in grades 2 and 3 (Fig. 1a,b,c). In addition to showing histological borderline features of malignancy, grade 0.5 lesions also demonstrate atypical radiological characteristics[30–32] and a progressive biological behaviour. In this series, there were 19 patients with grade 0.5 tumours, and 20 with grade 1 lesions.

Results

Oncological outcome

One patient died at 3.5 years post-operatively of an unrelated cause (myocardial infarction). She had had a grade