



## Intralesional curettage, with phenol and cement as adjuvants, for low-grade intramedullary chondrosarcoma of the long bones

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The authors conducted a retrospective study on 23 patients (12 females and 11 males) with low-grade intramedullary chondrosarcoma of a long bone, treated with intralesional curettage, phenolization and cementation. The use of phenol was supported by an *in vitro* study, the use of bone cement by clinical studies. A consensus has been growing that this type of tumours should be treated less aggressively. The average age of the patients was 44.5 years (range : 29 to 71). The mean follow-up period was 6.2 years (range : 2.5 to 11 years). After 6 months the average Musculoskeletal Tumor Society (MSTS) score was 76.8% of 30, the best possible score (range : 61% to 87%). After 12 months this score increased to 89.8% (range : 63% to 100%). Complications were : one recurrence (4.3%), treated with a tumour prosthesis, and 3 fractures (13%). The authors strongly support this new technique, all the more as it still allows for a more radical approach, if necessary. They stress the importance of a strict follow-up by a multi-disciplinary team, in order to treat local recurrences and (rarely) metastases.

**Keywords :** low-grade chondrosarcoma ; curettage ; cement ; phenol.

### INTRODUCTION

Chondrosarcoma is a malignant tumour of cartilage-producing cells. This tumour of adulthood and old age includes a heterogeneous group of lesions with diverse morphologic features, clinical behaviour and radiologic findings (5). Pain is

commonly the only presentation in these patients. Grade I chondrosarcoma is the most differentiated type, and grade III the least differentiated (15).

The distinction between grade I chondrosarcoma and benign chondroma is difficult and not only based on histological findings but also on clinical and radiographic features (10,12). Multi-spot biopsy is mandatory, during a separate operative session, before deciding to perform intralesional curettage, in order to be sure that the lesion is a grade I in all its extension.

Low-grade chondrosarcoma is resistant to chemotherapy and radiotherapy ; its treatment is primarily surgical (11). Different treatment strategies are reported in the literature, with variable outcomes. They range from intralesional curettage, with or without adjuvant therapy, to wide excision.

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They remain controversial, although a multidisciplinary approach has optimized the management of these patients.

The authors present their experience with intralesional curettage, followed by phenol 80% and polymethylmethacrylate (PMMA) as adjuvants. Phenol has a local necrotizing effect to a depth of 1 to 2 mm, which allows to eradicate the possibly remaining tumour cells (4). Moreover, its cytotoxic effect on chondrosarcoma-derived cells has been demonstrated *in vitro* (18). Acrylic cement increases the necrotizing action of phenol through its exothermic effect, and it provides immediate stability.

### MATERIALS AND METHODS

Between 1997 and 2008, 23 consecutive patients (12 females and 11 males) with low-grade intramedullary chondrosarcoma of a long bone underwent intralesional curettage with phenol and cement as adjuvants. Sixteen lesions were situated in the femur (5 proximally, and 11 distally), 5 in the tibia (3 proximally, and 2 distally), one in the humerus, and one in the fibula. The patients' mean age was 44.5 years (range : 29 to 71). The mean follow-up period was 6.2 years (range : 2.5 to 11 years).

Medical history, technical reports and therapy were reviewed. Only patients with a diagnosis of low-grade chondrosarcoma, treated surgically at our institution, and with a minimum follow-up of two years, were included. The diagnosis of low-grade chondrosarcoma was based on clinical, radiological and histological findings. Most patients had pain, the intensity of which increased with daily activities. Preoperative imaging included plain

radiographs, a technetium (TC<sup>99</sup>) bone scan, MRI scan of the infected bone and CT and MRI imaging of the chest. The final diagnosis was based on multi-spot biopsy, during a separate operative session.

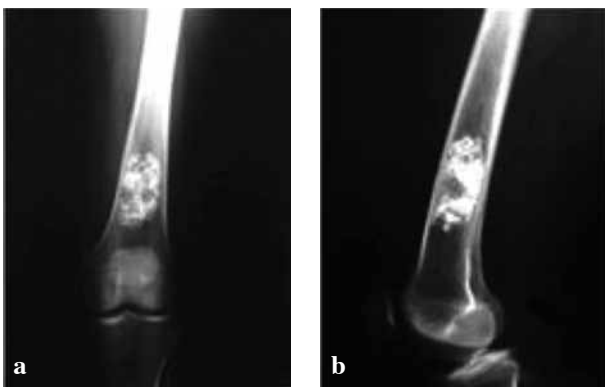
The approach was intralesional curettage through a cortical window, followed by phenolization with gauze soaked in 80% phenol. The marrow cavity was filled with bone cement (case 1) (Fig. 1, 2), except in two cases where allogeneic bone chips were used.

Patients were re-evaluated at one month, 2 months, 4 months, 6 months, every 6 months during the first three years, and annually thereafter. Physical examination and radiographic control took place at every visit. CT-scans or MRI were ordered annually or according to the clinical findings.

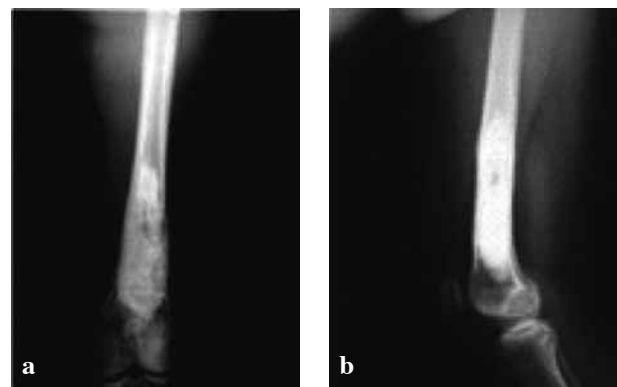
The Musculoskeletal Tumor Society (MSTS) score was used to evaluate the clinical outcome (6). This system assigns numerical values (0-5) to each of 6 categories. These 6 categories are, in the lower limb : pain, function, emotional acceptance, ambulatory support, walking ability, and gait. In the upper limb : pain, function, emotional acceptance, hand positioning, dexterity, and lifting ability. The authors expressed their results as a percentage of the maximum score : 30.

### RESULTS

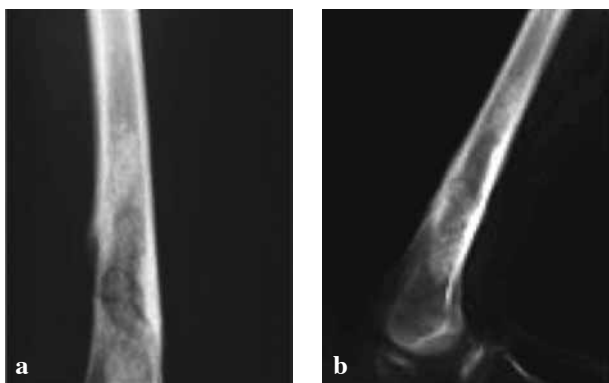
Twenty-three patients underwent a surgical intervention on the lower limb. Weight bearing was not allowed for +/- 31.8 days (range :18 to 95 days). Only one out of 23 patients (4.3 %) developed a local recurrence (case 2) (Fig. 3 & 4). He was 55 years old when a so-called grade I chondro-



**Fig. 1.** — Case 1. — AP and lateral view of a low-grade chondrosarcoma.



**Fig. 2.** — Case 1. AP and lateral view after curettage, phenolization and cementation. No signs of recurrence, two years later.



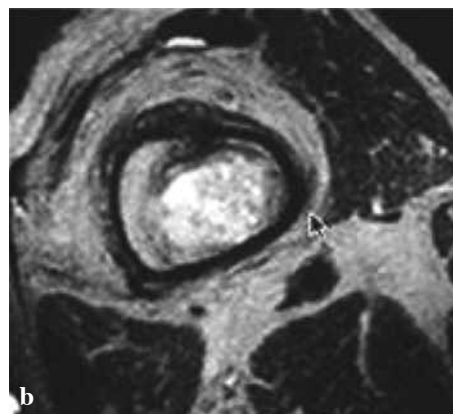
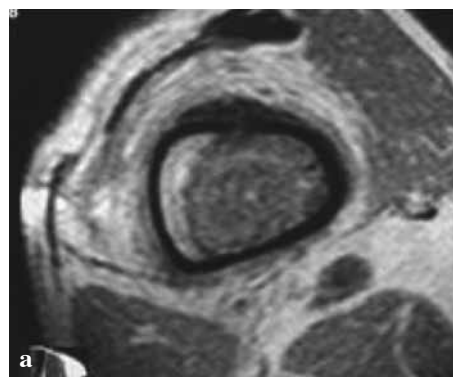
**Fig. 3.** — Case 2. AP and lateral view showing recurrence after curettage and phenolization of an apparently low grade chondrosarcoma, *without* cementation. A tumour prosthesis was inserted.

sarcoma in his right distal femur was curetted and phenolized, without reconstruction with bone cement. A single sample was sent to the pathologist, rather than several ones. This was probably at the origin of the wrong diagnosis. Twenty-seven months later the patient complained of sharp pain, while MRI showed a recurrence. This time the histological findings were indicative of a grade II lesion. Wide resection and reconstruction with a tumour prosthesis were now performed. The patient remained in good health up to now. All the other patients were treated according to the protocol, and no recurrences were noted. Two patients sustained a femoral fracture, and one a tibial fracture. All three fractures healed with plaster cast immobilisation. Metastases were not seen.

The average MSTS score was 76.8% (range : 61% to 87%) after 6 months, and 89.8% (range : 63% to 100%) after 12 months. The 3 patients with a fracture scored less well. All patients were able to perform activities of daily living.

### DISCUSSION

Treatment of low-grade chondrosarcoma of the long bones is controversial. There is no consensus on whether intralesional curettage or wide resection is the best alternative. Aarons *et al* (1) claim that the conservative approach leads to better function and fewer complications than segmental resection and reconstruction. Gelderblom *et al* (8) advocate



**Fig. 4.** — Case 2. MRI, T1 and T2 weighted axial views, showing recurrence of an apparently low-grade chondrosarcoma. A tumour prosthesis was inserted.

extensive intralesional curettage followed by local adjuvant treatment and bone grafting. Curettage with adjuvant cryosurgery has been proposed with good results (13,16). Intralesional curettage and cementation without phenol has been used by other authors, with excellent oncological and functional results (3,9). Our data confirm these results. On the other hand, wide resection is often associated with a high complication and morbidity rate, an important social cost and a poor functional outcome because of articular contiguity. This procedure with its adverse effects is acceptable when treating high grade sarcomas but is not ideal for the treatment of slowly growing lesions with low metastatic risk (2).

As far as the recurrence rate is concerned : the Münster group (17) reports a higher risk of local recurrence after curettage and cementation for stage IA tumours of the long bones, but less than in the pelvis and the axial skeleton. Chondrosarcomas in

the non-appendicular skeleton always have a worse prognosis in terms of recurrences and metastasis (14). In contrast with high-grade chondrosarcoma, for which wide resection is always indicated, the potential for local recurrence and metastasizing is extremely low in low-grade chondrosarcoma (15).

The authors strongly defend the conservative approach. It is not a “way of no return”: if a recurrence occurs, a more radical treatment is still possible. A multidisciplinary approach is essential (12,18).

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