

10 Years Follow up of Chondroblastoma Treated with Intralesional Curettage: A Retrospective Study

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Research article

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Abstract

Introduction: Chondroblastoma is a rare benign tumor mainly occurred in epiphyses and apophyses of long bones, and usually affects the young people. The primary treatment for chondroblastoma is intralesional curettage. The aim of this study was to evaluate the clinical and radiologic results of patients suffering chondroblastoma treated with intralesional curettage, electrocauterization of the cavity and bone grafting.

Patients and Methods: From January 2000 to January 2010, 15 patients with chondroblastoma were treated with intralesional curettage and electrocauterization of the cavity, among which 14 patients received bone grafting. After operation, patients were immobilized with splint for 4 weeks and followed up for at least 10 years. The recurrence was examined by clinical manifestation and X ray. The clinical outcome included complications and the Musculoskeletal Tumor Society Score (MSTS).

Results: Totally, 15 patients with chondroblastoma were enrolled in our study, including 9 males and 6 females, with a mean age of 13 years old (range from 8 to 21 years). The most common chief complaint were pain and limited joint motion, others including local swelling and increased skin temperature. The mean duration of symptom was 5 months (range from 2-14 months). Tumors mostly affected the proximal humerus (7/15), distal femur (4/15), proximal femur (1/15), proximal tibia (2/15) and femoral head (1/15). Eight patients were undiagnosed or misdiagnosed before operation, only 7 patients with a consideration of chondroblastoma. With a mean follow up of 12 years (range from 10-16 years), two patients had complications of upper limb shortening and 1 patient suffered re-operation due to tumor recurrence. The mean postoperative MSTS score was 28.1 (range, 24 to 30) points, which was significantly higher than the preoperative score of 17.6 (range, 12 to 21) points.

Conclusion: Thorough curettage with electrocauterization and bone grafting has a good functional outcome in the treatment of chondroblastoma, but still has a low risk of recurrence and complications.

Level of Evidence: Level IV, retrospective case series.

Introduction

Chondroblastoma is a rare benign aggressive tumor mainly occurred in epiphyses and apophyses of long bones. It accounts approximately for 1% of primary bone tumors, and usually affects the young people[1]. The proximal humerus, proximal tibia and distal femur are the most common sites involved. The clinical manifestations of the disease are not typical. Pain is the most common presentation and even sometimes may be the only presentation. Other atypical symptoms include local swelling, limited motion of the adjacent joint, and joint effusion[2, 3].

The primary treatment for chondroblastoma is intralesional curettage with or without bone-grafting[4], and some authors preferred chemical or physical adjuvants inactivation to decrease tumor recurrence[5]. The local recurrence rates were obviously different in the literature, which could be as high as 30%[6, 7].

The aim of this study was to retrospectively evaluate the clinical and imaging outcome of patients suffered chondroblastoma from January 2000 to January 2010 in our center. The details of the patients' general data and clinical results are presented here.

Patients And Methods

This study was approved by the Institutional Review Board of West China Hospital, Sichuan, China. Written informed consent was obtained from the patients for the publication of this report and any accompanying images.

All 15 patients received open surgery for removal of lesions, electrocauterization of the cavity and definite pathological diagnoses. Autogenous iliac bone grafting were performed in 14 patients, among which 2 cases were autogenous bone grafting with artificial bone due to the large defect. Surgery was performed under general anesthesia by a senior orthopedic surgeon who was well trained. Postoperatively, the extremity was placed in a well-padded splint for 4 weeks with no weight bearing. All patients were followed up at least for 10 years, with a mean follow up of 12 years (range from 10–16 years). Patients were followed up every two months throughout the first one year, then every six months in the second year. After the second year, patients were followed up every 2 years. Local recurrences were examined by clinical manifestation and X ray. The clinical outcome included complications, limb length and Musculoskeletal Tumor Society Score (MSTS) .

Result

Totally 15 patients (9 male and 6 female) were enrolled in our study, with a mean age of 13 years old (range from 8 to 21 years). The major clinical manifestations included 15 cases of a constant pain, 5 cases of local swelling, 7 cases of limited movement of adjacent joints and 1 case of increased skin temperature. The mean duration of symptom was 5 months (range from 2–14 months).

Only 7 patients were considered a possibility of chondroblastoma preoperative. Eight patients were undiagnosed or misdiagnosed before operation, including 1 case of bone cyst, 1 case of bone tuberculosis, 1 case of osteofibrous dysplasia, and 5 cases of undiagnosed bone tumors.

In this group of patients, chondroblastoma mainly affected the humerus (Fig. 1) and femur in a single site. There was 1 patient with 2 lesions involved the proximal tibia and distal femur of the left side who was considered a possibility of osteofibrous dysplasia preoperatively (Fig. 2). The lesions located in proximal humerus, distal femur, proximal femur, proximal tibia and femoral head were 7, 4, 1, 2 and 1, respectively.

Among these 15 patients, 11 patients had persistent epiphysis, among which 3 patients with lesions extended through the epiphyseal plate and 8 patients with lesions located inside the epiphysis. Focal articular surface destruction of the femoral head was involved in 1 patient (Fig. 3).

Postoperatively, one patient developed a surgical wound infection with a delay of incision healing after treatment with antibiotics and subcutaneous drainage. During the follow up, two patients had complications of limb shortening that were all within 2 cm and occurred on upper limb.

During follow up, all patients had a good clinical outcome, with a postoperative MSTTS score of 28.1 (range, 24 to 30) points, which was significantly higher than the preoperative score of 17.6 (range, 12 to 21) points. While 1 patient developed local recurrence in the proximal humerus 9 months after the initial treatment of intralesional curettage, electrocauterization of the cavity and autogenous iliac bone graft. This patient received a re-operation of extended lesion curettage with bone cement filling and no recurrence was observed. Lung metastasis was not observed in this group of patients.

Discussion

Chondroblastoma is a rare benign bone tumor that typically arise during the teenage years with a very wide range of age [2, 8]. It usually affects the epiphyses or apophyses of long bones such as humerus, femur and tibia. Less common location affected by chondroblastoma including patella, calcaneus, acetabulum and even spine, also had been reported in literature [9–11]. It seems that chondroblastoma occurs more frequently in males than in females, in a ratio of 2.3 to 1 [2, 12]. In this group of patients, the mean age of onset was 13 years old with a male to female ratio of 1.5:1, and also the proximal humerus was the mostly involved location, which all coincided with most previous studies.

The clinical manifestation of chondroblastoma is not typical and it is difficult to make an accurate clinical diagnosis before the final pathological result [4, 13]. All these 15 patients had chief complaint of a mild to moderate pain. Seven patients had limited joint motion, among which 5 were caused by pain and 2 were caused by the local joint swelling. However, these two common symptoms were not specific for the diagnosis of the disease, because most bone tumors could present in the same way. The typical imaging findings included a round-like focus located in epiphysis with a clear boundary, and a significantly higher-intensity signal on T2-weighted MRI [14]. These characteristic imaging features and lesion locations were very helpful for the preoperative diagnosis. However, there were still 8 patients undiagnosed or misdiagnosed, only 7 patients with a consideration of chondroblastoma preoperatively in this group of patients.

Surgical removal of the lesion and bone grafting in a large defect is the standard treatment for chondroblastoma [1, 15]. For completely curettage of tumor and avoid recurrence, most authors advised adjuvant physical or chemical inactivation methods, including high-speed burr, electrocauterization, phenol, cryotherapy and ethanol [5, 16]. High-speed burr, phenol and ethanol were more widely reported in the previous studies. However, there is still no study on the comparison of the different adjuvant options, and point out the optimal choice. Moreover, these adjuvant therapies may cause an extensive tissue damage while killing tumor cells, and should be used carefully, especially for tumors involving the epiphyseal plate.

Due to the typical chondroblastoma location in epiphyses, there was always a concern about the physal plate injury of patients with persistent epiphysis, which might cause growth disturbance. While, it seems that a completely extended lesions curettage is more important than protection of the epiphyseal plate to avoid local recurrence[17]. Mashhour and Abdel Rahman[18] preferred aggressive surgical treatment at the time of the first surgery to prevent recurrence, because re-operation after recurrence might cause more damage on growth plate. In this group of patients, complications of upper limb shortening occurred on 2 patients, who both had persistent epiphysis with lesions extended through the epiphyseal plate. Because the shorting were within 2 cm and occurred on humerus, there were no obvious effect on function and appearance. However, varus or valgus deformity of knee joint and lower limb shorting deformity still had been reported in some previous studies[19], which might influence the functional outcome and need a further treatment.

Cortical defect and fracture had been reported before when chondroblastoma affected the articular surface, and there might be a complication of arthritis in long term follow up[20]. In this study, focal articular surface destruction of the femoral head was involved in 1 patient who received an operation of intralesional curettage and electrocauterization through the hip joint approach, without bone grafting or cementing. This patient gained a normal hip function, with no tumour recurrence, no femoral head necrosis or arthritis observed during 10 years follow up(Fig. 3). Treatment of femoral head chondroblastoma can be extremely challenging. Surgical approaches include direct hip joint approach and indirect way from the lateral femur to femur head via a subtrochanteric drill hole. Laitinen MK[2] also preferred the direct hip joint approach to treat femur head lesion without grafting. In their study, results of femoral head chondroblastoma treated in a direct hip joint approach were better with no local recurrence or femoral head collapse occurred, when compared to the indirect surgical approach.

The prognosis of chondroblastoma generally is good, while it is still an aggressive tumor, with risk of local recurrence and extremely rare metastasis[21]. Location, age and persist epiphysis once were considered a possible risk factor for recurrence, while most authors thought inadequate curettage was the most significant risk factor associated with local recurrence[4]. In our study, all patients gained good functional outcome with a mean postoperative MSTTS score of 28.1 points at 10 years follow up. The overall recurrence rate was 6.7% (1/15), which was within the wide range of recurrence rate reported in the literature[4, 6, 7].

The limitations of our study were that it was a retrospective study in a single center, and it was in a small sample size with no control. There still need more further studies of large sample, multi-centre clinical trials, especially in the adjuvant treatment and risk factors of local recurrence.

Conclusions

Thorough intralesional curettage with electrocauterization of the cavity and bone grafting is an effective treatment for chondroblastoma. Although most patients will gain good clinical outcome, there are still a few patients at risk of recurrence and complications.

Abbreviations

MSTS

Musculoskeletal Tumor Society Score;

CT

computed tomography;

MRI

magnetic resonance imaging

Declarations

Ethics approval

This retrospective study involving human participants was in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards, and was approved by the Institutional Review Board of West China Hospital, Sichuan, China.

Consent to participate

Written informed consent was obtained from all individual participants included in the study.

Consent for publication

Written informed consent for publication was obtained from all adult participants and parents of all pediatric participants.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Authors' contributions

LY wrote the first draft of the manuscript, completed the analysis and interpretation of data for the work; PYY, DXW, XDY and LL completed the patients' follow up and data collection. XYT performed the clinical

practice and final approval of the version to be published. All authors reviewed the manuscript for important intellectual content and approved the final version to be published.

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Figures

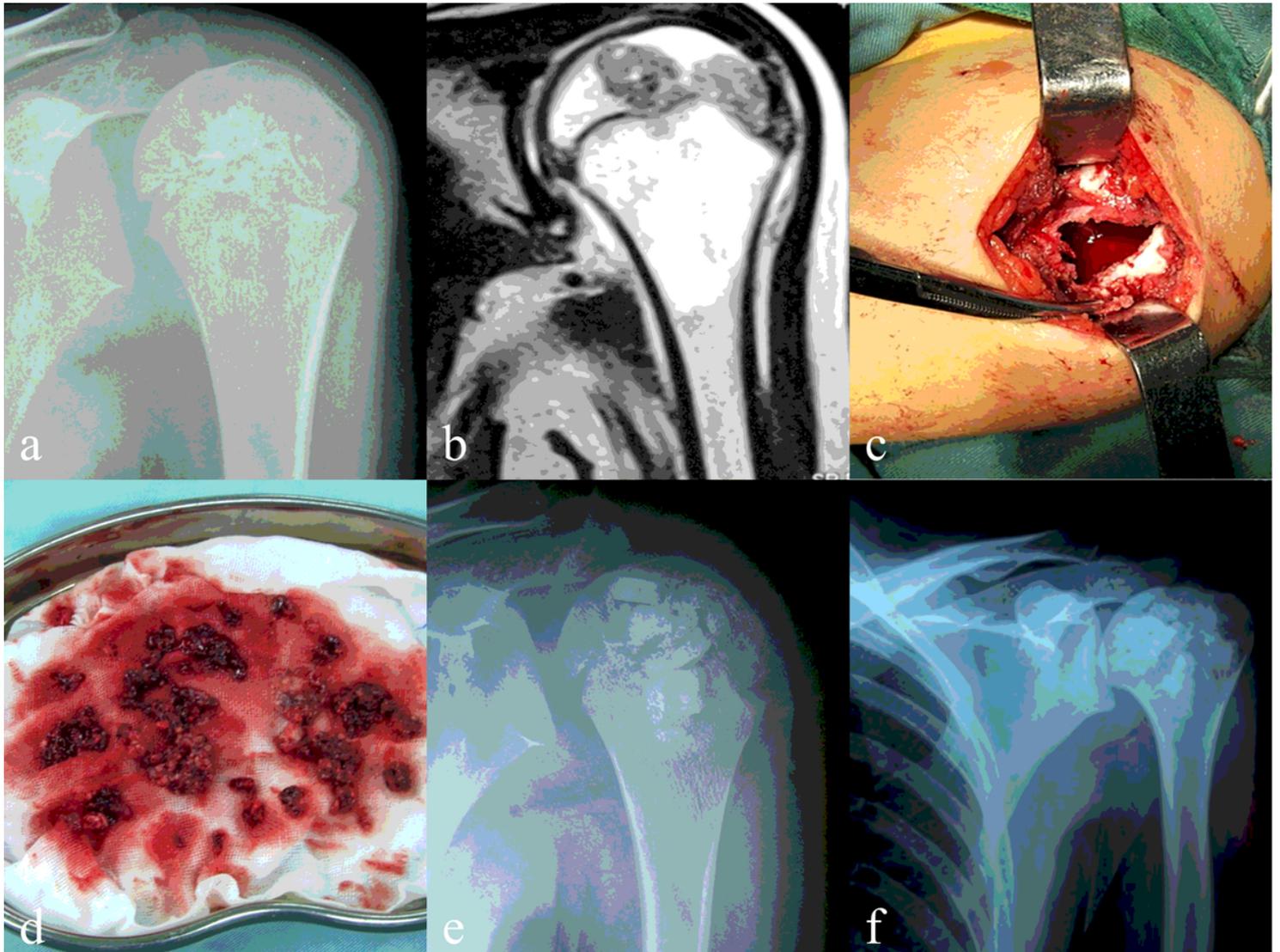


Figure 1

An 11 years old boy with chondroblastoma involved the proximal humerus of the left side, and treated with intralesional curettage, electrocauterization of the cavity and bone grafting. a,b Radiographs showing the lesions on X ray film and CT scan.c Intraoperative photo after curettage. d Histological appearance of the tumor. e Postoperative radiograph showing the lesions after curettage and grafting. f Radiograph at 10 years follow up. CT: computed tomography.

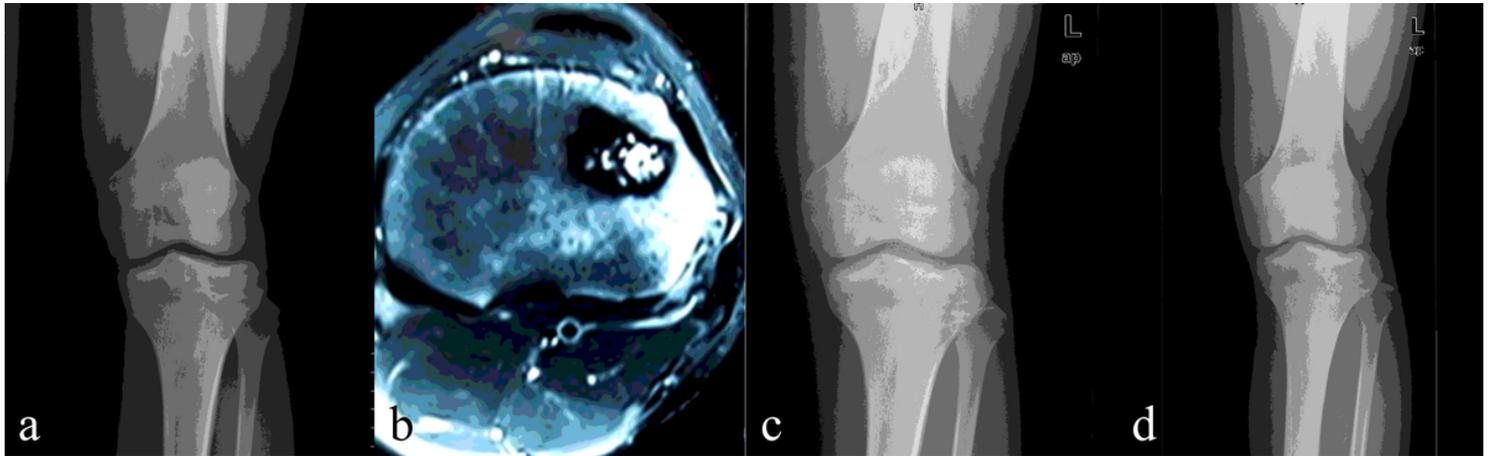


Figure 2

A 16 years old male patient with 2 lesions involved the proximal tibia and distal femur of the left side who was considered a possibility of osteofibrous dysplasia preoperatively. Operation of intralesional curettage, electrocauterization of the cavity and autogenous iliac bone grafting was only performed on the tibia due to a persistent pain of lower knee. a Anteroposterior view showing the lesions on X ray. b MRI of the lesions. c Postoperative radiograph showing the lesions after curettage and grafting. d Radiograph at 10 years follow up. MRI: magnetic resonance imaging.

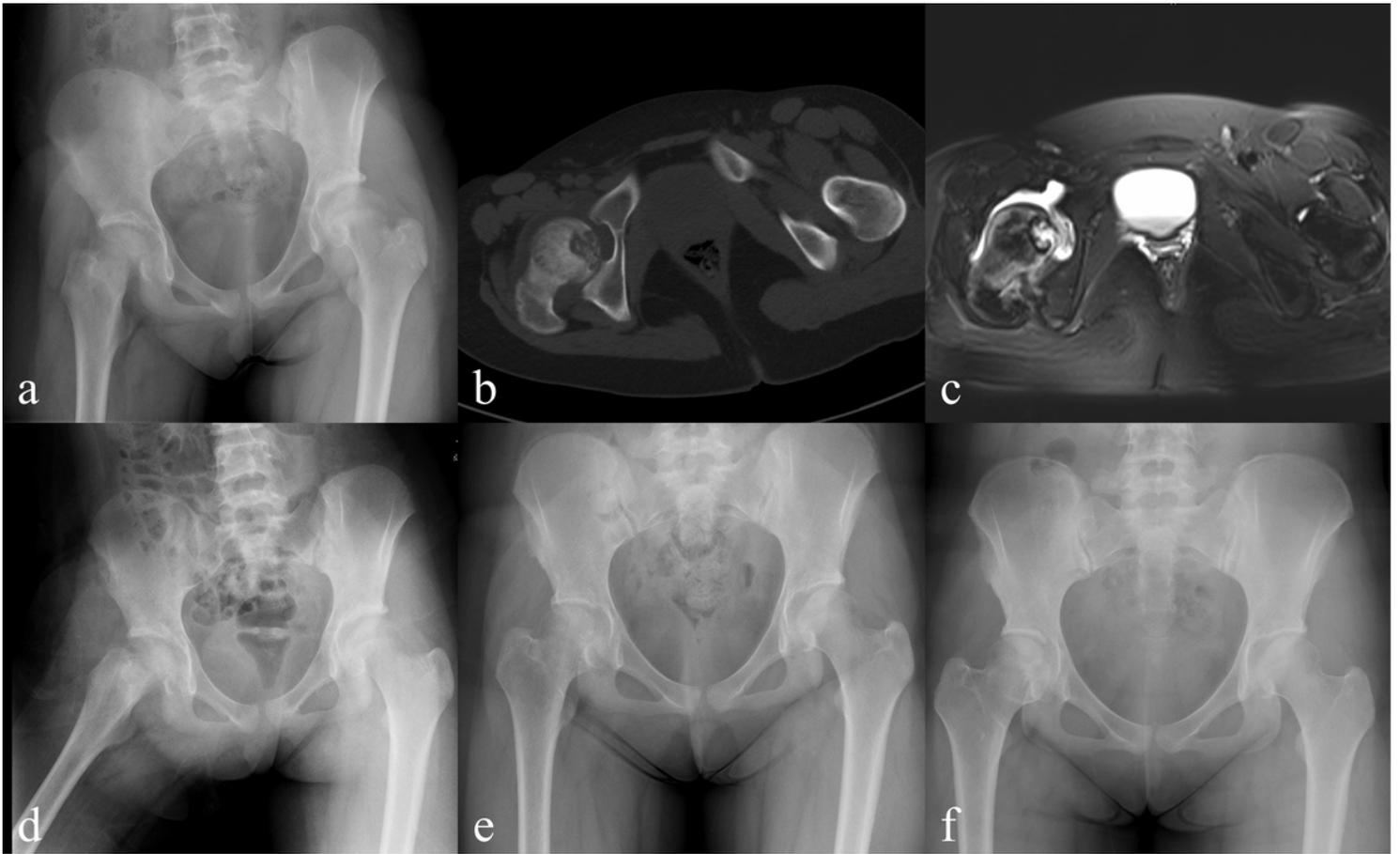


Figure 3

A 12 years old girl with chondroblastoma involved the femur head of the right side, who treated with intralesional curettage, electrocauterization of the cavity and no grafting. a Radiograph of the lesion on right femur head. b CT scan of the lesion. c MRI of the lesion. d Postoperative radiograph showing the lesion after curettage. e,f Radiographs at 5 years and 10 years of follow up. CT: computed tomography; MRI: magnetic resonance imaging.