Journal of Bone Oncology 9 (2017) 10–14

Contents lists available at ScienceDirect

Journal of Bone Oncology

journal homepage: www.elsevier.com/locate/jbo

Research Paper

Soft tissue recurrence of giant cell tumor of the bone: Prevalence and radiographic features

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ARTICLE INFO

Keywords:
Giant cell tumor of bone
Recurrence
Prevalence
Radiographic features

ABSTRACT

Aim: Recurrence of giant cell tumor of bone (GCTB) in the soft tissue is rarely seen in the clinical practice. This study aims to determine the prevalence of soft tissue recurrence of GCTB, and to characterize its radiographic features.

Methods: A total of 291 patients treated by intralesional curettage for histologically diagnosed GCTB were reviewed. 6 patients were identified to have the recurrence of GCTB in the soft tissue, all of whom had undergone marginal resection of the lesion. Based on the x-ray, CT and MRI imaging, the radiographic features of soft tissue recurrence were classified into 3 types. Type I was defined as soft tissue recurrence with peripheral ossification, type II was defined as soft tissue recurrence with central ossification, and type III was defined as pure soft tissue recurrence without ossification. Demographic data including period of recurrence and follow-up duration after the second surgery were recorded for these 6 patients. Musculoskeletal Tumor Society (MSTS) scoring system was used to evaluate functional outcomes.

Results: The overall recurrence rate was 2.1% (6/291). The mean interval between initial surgery and recurrence was 11.3 ± 4.1 months (range, 5–17). The recurrence lesions were located in the thigh of 2 patients, in the forearm of 2 patients and in the leg of the other 2 patients. According to the classification system mentioned above, 2 patients were classified with type I, 1 as type II and 3 as type III. After the marginal excision surgery, all patients were consistently followed up for a mean period of 13.4 ± 5.3 months (range, 6–19), with no recurrence observed at the final visit. All the patients were satisfied with the surgical outcome. According to the MSTS scale, the mean postoperative functional score was 28.0 ± 1.2 (range, 26–29).

Conclusions: The classification of soft tissue recurrence of GCTB may be helpful for the surgeon to select the appropriate imaging procedure to detect the recurrence. In addition, the marginal resection can produce a favorable outcome for the patients.

1. Introduction

Giant cell tumor of bone (GCTB) is a neoplasm typically occurring in the epiphyses of long bones and representing approximately 5% of all bone tumors [1]. Despite its benign histopathology nature, GCTB was reported to have a high rate of local recurrence as well as occasional pulmonary metastases, thereby implicating the aggressiveness of the tumor [2–4]. For most cases, the postoperative recurrence could be observed within 24 months after the surgery. Depending on the type of surgical procedure and local presentation of the tumor, the recurrence rate of GCTB could range from 2.5% to 45% [5,6]. Patients treated with intralesional curettage were reported to have higher recurrence rate than those undergoing wide resection of the tumor [7,8].

Compared with local recurrence in bone, recurrence in the soft tissue is more rarely seen in clinical practice. It has been documented that the soft tissue recurrence of GCTB most frequently arises in the area adjacent to curettage site, probably due to the contamination during surgical removal of the tumor [9–12]. For an early detection of the recurrence, Balke et al. [5] suggested MR imaging be performed in case of any suspicious findings. To date, there were a limited number of literatures that described the presentation of soft tissue recurrence [13–15]. A peripheral rim of ossification surrounding the mass was reported as an indicator of soft tissue recurrence of GCTB [13,15]. Nevertheless, some studies have shown a low detection rate of the

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http://dx.doi.org/10.1016/j.jbo.2017.09.002
Received 26 March 2017; Received in revised form 15 September 2017; Accepted 18 September 2017
Available online 20 September 2017

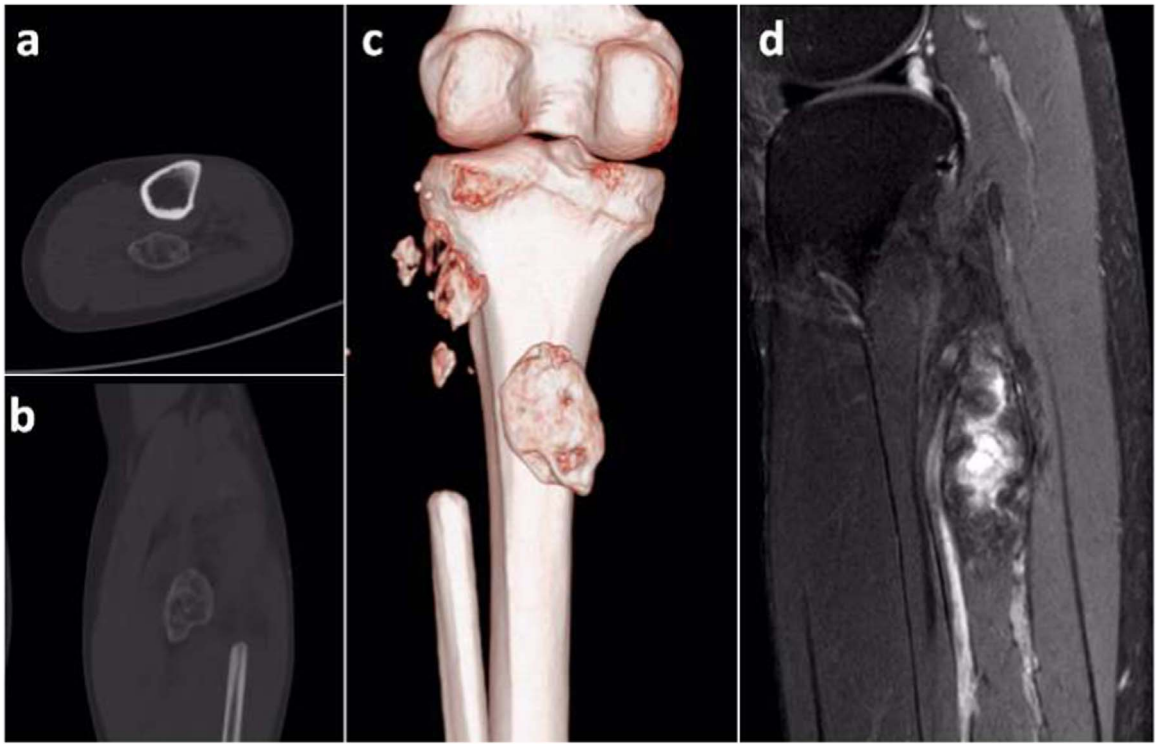

Fig. 1. A 44-year-old female patient with giant cell tumor in the proximal left fibula. (a–c) CT scan of the left leg at the 17th month after surgery showed soft tissue nodular lesions with eggshell-like peripheral hyperdense rim. (d) On the cross-sectional fat-suppressed T2-weighted MR image, soft tissue masses revealed inhomogeneous high signal intensity.

ossification on the plain radiography [14,16]. Obviously, radiographic characteristics of soft tissue recurrence of GCTB have not been well recognized in previous studies, and a good understanding of them would facilitate accurate diagnosis and appropriate treatment.

In the present study, we retrospectively reviewed a cohort of GCTB patients treated with intralesional curettage in our center. Radiographic data and clinical outcome of the patients with soft tissue recurrence of GCTB were analyzed. The purpose of our study was to determine the prevalence of soft tissue recurrence of GCTB and to characterize its radiographic features.

2. Methods

2.1. Patients

Between January 2002 and December 2014, a total of 291 patients with histologically diagnosed benign GCTB were treated by intralesional curettage at our department. All the patients had a minimum follow-up of 2 years with complete radiographic data. Radiological images and clinical data were retrospectively reviewed and the baseline characteristics were recorded for each patient, including gender, age, location of the tumor, tumor grade and tumor size that was measured as the greatest dimension in centimeters from x-ray films. Specifically, tumor grade was classified as grades I, II, and III according to the Campanacci method as previously reported [17].

6 patients were identified to have the recurrence of GCTB in the soft tissue, all of whom had undergone marginal resection of the lesion. Demographic data including period of recurrence and follow-up duration after the second surgery were recorded for these 6 patients. Under the approval of the local Institutional Review Board, all the patients signed the informed consent for participation in the current study.

2.2. Classification of radiographic features

Based on the x-ray, CT and MRI imaging, the radiographic features of soft tissue recurrence were classified into 3 types. Type I was defined as soft tissue recurrence with peripheral ossification (Fig. 1). Type II was defined as soft tissue recurrence with central ossification (Fig. 2).

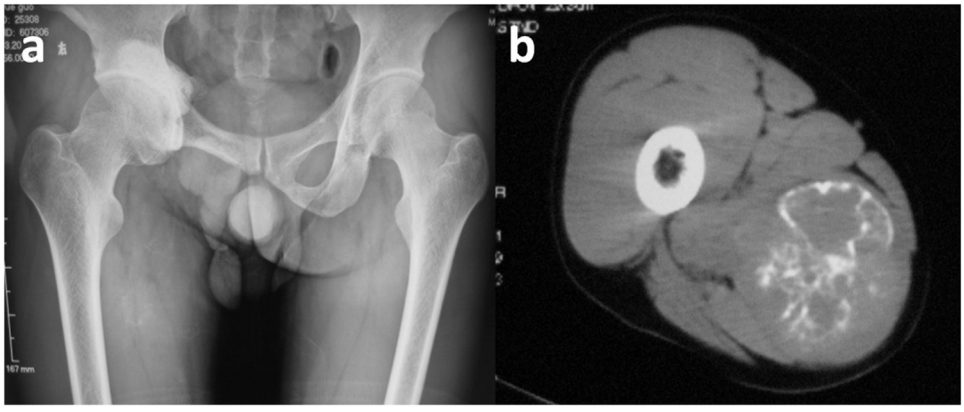

Fig. 2. A 37-year-old male patient with giant cell tumor in the right ischium. (a–b) A centrally located ossification could be observed on both plain radiography and CT scan at the 9th month after surgery.