Recurrence in giant cell tumour of bone: imaging features and risk factors

Tumore osseo a cellule giganti recidivante: caratteristiche radiologiche e fattori di rischio

Cheng-Sheng Wang • Jiang-Hua Lou • Jin-Sheng Liao • Xiao-Yi Ding • Lian-Jun Du • Yong Lu • Ling Yan • Ke-Min Chen

Department of Radiology, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, No. 197, Ruijin 2nd Road, Shanghai 200025, China
Correspondence to: Xiao-Yi Ding, Tel.: +86-18918967155, Fax: +86-21-64150737, e-mail: dxyjr@hotmail.com

Abstract
Purpose. This study was done to investigate X-ray, computed tomography (CT) and magnetic resonance (MR) imaging features of recurrence in giant cell tumour of bone (GCTB) and to evaluate risk factors.

Materials and methods. Medical records and imaging data were reviewed for 55 cases of recurrent GCTB. All images were reviewed retrospectively and independently by two radiologists experienced in skeletal musculature. The common radiological findings; factors related to tumour recurrence such as gender, age, location; pathological fracture, Campanacci grading and surgical procedure were analysed by nonparametric test (Mann–Whitney U test for two independent samples test and Kruskal–Wallis H test for multiple independent samples test). p values <0.05 were considered to indicate a statistically significant difference.

Results. The imaging features of recurrent GCTB were as follows: osteolytic destruction or bone resorption of graft bone or around the polymethylmethacrylate (PMMA), soft tissue mass formation and expansile change. Tumour parenchyma showed markedly heterogeneous enhancement, except for necrotic cystic cavities, on contrast-enhanced MR images. Wide resection had a smaller (p=0.031) risk of local recurrence than did intralesional curettage. There was no statistical significance in gender, age, location, pathological fracture and Campanacci staging (p>0.05).

Conclusions. The risk of recurrence in GCTB was influenced by the type of surgery and adjuvants. Bone recurrence in giant cell tumour of bone: imaging features and risk factors

Tumore osseo a cellule giganti recidivante: caratteristiche radiologiche e fattori di rischio

Cheng-Sheng Wang • Jiang-Hua Lou • Jin-Sheng Liao • Xiao-Yi Ding • Lian-Jun Du • Yong Lu • Ling Yan • Ke-Min Chen

Department of Radiology, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, No. 197, Ruijin 2nd Road, Shanghai 200025, China
Correspondence to: Xiao-Yi Ding, Tel.: +86-18918967155, Fax: +86-21-64150737, e-mail: dxyjr@hotmail.com

Received: 29 October 2011 / Accepted: 15 December 2011 / Published online: 9 August 2012
© Springer-Verlag 2012

Riassunto
Obiettivo. Questo studio è stato condotto per valutare le caratteristiche radiografiche, di tomografia computerizzata (TC) e di risonanza magnetica (RM) della recidiva del tumore osseo a cellule giganti (GCTB) e valutarne i fattori di rischio.

Materiali e metodi. Sono state riesaminate le cartelle cliniche e le indagini radiologiche di 55 casi di GCTB recidivante. Tutte le immagini sono state valutate retrospective e indipendentemente da due radiologi esperti in radiologia muscolo-scheletrica. I rilievi radiologici ed i fattori correlati alla recidiva tumorale come sesso, età, sede, presenza di frattura patologica, classificazione di Campanacci e procedura chirurgica sono stato analizzate mediante test non parametrici (test U di Mann-Whitney U e test H di Kruskal-Wallis). Valori di p<0,05 sono stati considerati statisticamente significativi.

Risultati. Le principali caratteristiche radiologiche del GCTB recidivante sono risultate essere: distruzione osteolitica, riassorbimento dell’innesto osseo o in adicenca al polimetilmetacrilato (PMMA), insorgenza di massa nei tessuti molli e comparsa di formazione expansiva. All’indagine RM il tessuto tumorale ha mostrato enhancement marcatamente eterogeneo, ad eccezione per le cavità cistiche necrotiche. Le resezioni radicali hanno avuto un minor rischio (p=0.031) di recidiva locale rispetto al curettage intralesionale. Non si è evidenziata differenza statisticamente significativa per quanto concerne sesso, età, sede, presenza di frattura...
resorption, soft tissue mass formation and aggravated expansile change are reliable signs of recurrence on imaging.

Keywords Bone neoplasms - Giant cell tumours - Recurrence - Computed tomography - X-rays - Magnetic resonance imaging

Introduction

Giant cell tumour of bone (GCTB) is a benign but locally aggressive neoplasm accounting for approximately 5% of all primary bone tumours [1, 2]. Some GCTB have the characteristics of postoperative local recurrence and pulmonary metastasis, although their histopathology is benign [3–6]. The reported local recurrence rate is 2.5–45%, and most are cases of postoperative recurrence within 24 months [4, 7, 8]. These characteristics are frequently ignored and underestimated in clinical practice. Many studies show that tumour size, location, X-ray grading, pathological fracture and histological grading have no impact on tumour recurrence, invasiveness and distant metastases [9]. Tumour recurrence is closely related to the therapeutic regimen, with recurrence rate being high after curettage and low after resection [3, 9]. The recurrence rate after wide resection is 3–12%, and intralesional curettage shows an overall recurrence rate of 16–18% [8, 10].

Radiological monitoring can be used for early detection of recurrence [3–5, 11]. Balke et al. recommend that MR imaging be performed if the patient presents with newly occurring pain or swelling or the standard X-rays shows any suspicious findings [7]. In this study, we retrospectively analysed radiographic, CT and MR imaging features and clinical data of 55 postoperatively recurrent histologically confirmed GCTB. The purpose was to investigate X-ray, CT and MR imaging features of recurrence in GCTB and evaluate the risk factors.

Materials and methods

Patients

Between June 1990 and September 2011, 316 patients with a histologically proven diagnosis of GCTB were treated surgically at our institution. The patients were retrospectively identified from the hospital database, and their radiological images were reviewed to identify those with recurrence in GCTB. There were 159 men and 157 women, with a mean age at operation of 36.8 (14–75) years. The vast majority of tumours were located in the metaepiphyseal region of the long bones. Sixty-eight primary GCTB were located in the distal femur, followed by proximal tibia (n=57), mobile spine (n=24), sacrum (n=23), distal radius (n=21) and other locations (n=123) (Table 1).

Routine postoperative follow-up examinations were performed at 1, 3 and/or 6 months and thereafter every 6 months for 3 years. After that, no further follow-up examination was routinely scheduled. Patients who did not experience recurrence were censored at the time of the last follow-up, and mean follow-up was 51 (3–180) months. Routine follow-up included clinical examination and conventional radiography of the operative site. CT and MR imaging were used for further investigation when radiography demonstrated a suspected relapse (such as graft or bone resorption, expansile change and local soft tissue swelling/mass formation, etc.) or when clinical symptoms and signs suggested recurrence despite negative radiography. In addition, a plain radiograph or CT of the chest was performed to rule out metastasis at presentation.

Fifty-five patients had recurrence after the initial treatment. The overall recurrence rate was 17.4% (55/316). The mean interval between surgery and recurrence was 22 (range, 3–174) months, of which 65.5% (36/55) occurred within in 3–24 months. The main symptoms of recurrence were local mass and mild pain and/or limitation of activity, of which 24 cases had localised swelling and pain as the initial symptoms. Four patients with lesions located in the mobile spine or sacrum had different degrees of nerve compression symptoms (lower-extremity weakness and numbness, urinary and faecal incontinence, etc.). The remaining 27 cases had no obvious clinical pain or dysfunction. The lesions were graded according to the Campanacci staging system [12]: 11 cases were classified as grade 1, 39 as grade 2 and five as grade 3.

In 55 recurrent cases, four showed malignant transforma-