

## Case Report

# Vascularized Articular Transfer of the Second Metatarsal in the Management of Giant Cell Tumor of Second Metacarpal: A Case Report

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## Abstract

Giant Cell Tumors (GCT) is benign tumors with potential for aggressive behavior and capacity to metastasize. Although rarely lethal, benign bone tumors may be associated with a substantial disturbance of the local bony architecture that can be particularly troublesome in peri-articular locations. This paper presents the medium-term follow-up after 48 months, of giant cell tumor of the entire second metacarpal treated by “en bloc” resection and in a second time, reconstruction with vascularized toe joint transfer in a musician.

**Keywords:** Giant cell tumors; Microsurgery; Toe-to-hand transfer; Vascularized bone graft

## Introduction

Benign aggressive osteolytic lesions of the metacarpals such as Giant Cell Tumors (GCT) of bone are uncommon. The management of these lesions can be problematic with unacceptably high rates of recurrence with conventional management by curettage alone or by curettage and bone grafting [1].

The commitments of metacarpal phalangeal joint worse this condition, making more difficult the options for a reasonable treatment, as it is considered the key joint for finger function, contributing 77% to the total arc of finger flexion [2,3] and its loss causes a significant disability of the finger.

Articular prosthetic replacement after marginal resection of tumors may not be feasible as this requires good supportive bone stock and also it may give poor long-term results [3-5].

Non-vascularized joint transfers have the drawbacks of undergoing articular cartilage lysis and ischaemic necrosis of the subchondral bone, leading to collapse of the joint architecture and distortion of joint surfaces, followed by early degenerative arthritis [6-9]. Vascularized toe joint transfers, by preserving the blood supply of the joint, avoid these changes. They also provide the option of harvesting the overlying skin with the toe joint to cover any defects

of the integument. Such islands of skin also allow assessment of the vascularity of the underlying joint [10].

## Case Presentation

This case report was approved by the Hospital Ethics Committee, and the patient signed an informed consent form.

A 27-year-old man was referred to us presenting a mass on dorsal aspect of the right (dominant) hand, with 6-month evolution. He was submitted an open bone biopsy elsewhere with diagnostic of an aggressive giant bone tumor of the second metacarpal. On examination, there was a surgical scar on dorsal aspect and a tender, bony hard swelling of the second metacarpal. Movements of the metacarpophalangeal joint were restricted but not painful. X-rays revealed an expansile lesion of the entire second metacarpal (Figure 1).

The surgical treatment was divided in two stages; first, the entire metacarpal was resected, and a customized polyethylene spacer (made at surgery time) was placed on metacarpal space. Only the Extensor Index Proprius (EIP) was left in place (Figure 2). After 12 months the second vascularized metatarsophalangeal joint was transferred to reconstruct the metacarpophalangeal joint (Figure 3).

At follow-up of 48 months, the patient had painless, stable joint with range of motion of 700 and return to his previous work as a professional clarinetist. The X-rays showed an intact articular space, indicating preservation of the articular cartilage, with no evidence of articular degeneration; tumor recurrence and without complain on donor site (Figure 3).

Giant Cell Tumor of Bone (GCTB) is a rare, benign, and locally aggressive tumor, constituting 4%-5% of all primary bone tumors and 18%-20% of benign bone tumors [11,12].

Hand involvement in GCTB is rare (2% - 5%) [13]. The metaphyseal region of the metacarpals and phalanges is the origin site for most of these tumors. Compared with giant cell tumors at more proximal locations, in hand they are diagnosed at advanced stages with significant bony destruction and diaphyseal extension. Joint involvement is not uncommon and complicates the treatment.

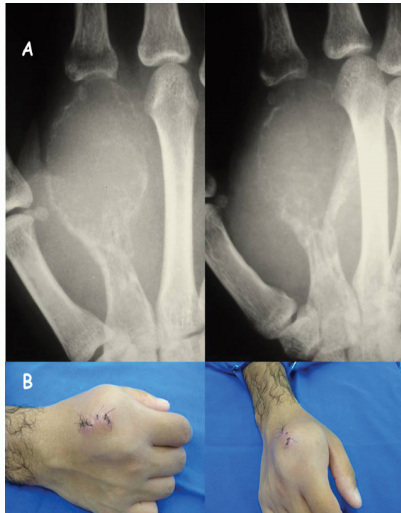
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**Figure 1:** (a) Radiographic, (b) Clinical aspect.



**Figure 2:** (a) Oncological Tumor resection, (b) Customized Spacer in Place.



**Figure 3:** (a) Clinical aspect, (b) Radiographic appearance, (c) donor site.

The primary goal of treatment in malignant and some aggressive benign tumors of the hand is the eradication of the disease [14]. Concerns of reconstruction and function must be given secondary consideration. Simple curettage and bone grafting may result in an increased rate of recurrence [15,16].

Although Campanacci et al. [17] showed zero recurrence of giant

cell bone tumor after wide and radical procedures, Athanasian et al. [13] showed one third of recurrence in wide excision plus amputation and ray resection in hand GTBC, with primary recurrence in 7 months (range, 3 to 11 months) of mean interval. These results encourage us to perform the joint transfer despite the technical complexity and donor-site morbidity. An “en bloc” resection of the entire metacarpal and all intrinsic muscles macroscopically compromised was carried out. A customized polyethylene spacer (made at surgery time) was placed on metacarpal space until the risks of recurrence were minimized. After one year, the patient returned with broken intramedullary kirschner wire, probably because of the movement allowed by antebrachial splint at metacarpophalangeal joint, no signs of recurrence was seen in hand roentgenograms or hand MRI.

The joint vascularity was based on the first metatarsal artery and the drainage by saphenous vein. The entire metatarsal with metatarsal phalangeal joint and the base of the proximal phalange of the second toe were transferred. Vascular anastomosis was performed laterally to the radial artery and terminally to the cephalic vein on anatomical Snuff Box. Bony fixation was by mini micro screws and plates.

As the main action of the MTP joint in the foot is hyperextension, a technique in which the joint is turned 180° around its longitudinal axis was performed, achieving maximum flexion and using the flexor groove of the metatarsal head as extensor apparatus for the remaining Extensor Index Proprius (EIP).

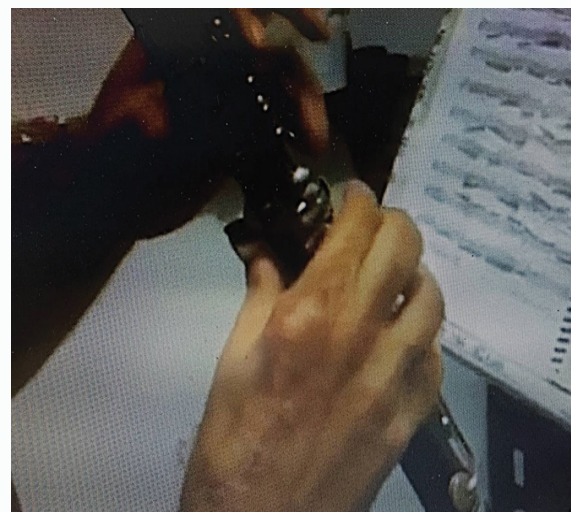
At 2 years after surgery, the metacarpophalangeal joint was stable and had 75° of flexion and no lack of extension (Figure 3). Good lateral mobility was seen. Radiographs revealed no arthritic change and maintenance of joint space. The patient was pleased with the functional results and appearance and had returned to work as a Professional Clarinetist (Figure 4).

### Ethical Approval Declaration

Ethical approval to report this case was obtained from “Faculdade de Medicina da Universidade de São Paulo” (Approval Number 4.226.469)\*.

### Informed Consent Declaration

Written informed consent was obtained from the patient for their anonymized information to be published in this article; also the patient authorized the use of photographs.



**Figure 4:** Playing Clarinet.

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