

Free Osteoarticular Metatarsal Transfer for Giant Cell Tumor of Metacarpal—a Surgical Technique

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Background

Giant cell tumor is a relatively uncommon tumor of bones accounting for 5% of all the primary bone tumors. In the small bones of hands it occurs even more rarely. Only 2–5% of all the giant cell tumors have been reported to affect the hand and metacarpal involvement is much less common than a phalangeal one [1–4]. The tumor occurring at this site commonly presents at an advanced stage and is associated with more bony destruction thereby complicating treatment [5–8]. Also these are associated with higher rate of recurrence [2]. The various treatment modalities described are curettage with or without bone grafting, en bloc resection and reconstruction and ray amputations [2]. We here describe a case of successful transplantation of 4th metatarsal along with its osteo-articular ligamentous complex to replace the 5th metacarpal bone which was the site of tumor. This enabled us to preserve the full function of the metacarpophalangeal joint by a relatively simple technique.

Case Presentation

A 25 year old female patient presented to us with a 8-month history of pain and progressive swelling of the right little finger metacarpal. She did not sustain any kind of trauma or suffer any febrile illness during this period. The patient was in good general condition with normal systemic examination. Local examination revealed a fusiform, non tender swelling in the area of 5th metacarpal (Fig. 1). The overlying skin was free without any sign of inflammation. Movements of the adjoining joint were full in range and were painless. A radiograph of the hand showed an expansile, lytic lesion in the diaphyseal region with paper thin cortex of right 5th metacarpal extending up to the subchondral bone. **There was breach in the ulnar side of cortex.** (Figure 2). A radiograph survey of the skeleton showed no other lesions. Provisional diagnosis of giant cell tumour was made and diagnosis confirmed with core biopsy.

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Surgical Technique

En bloc resection of tumor was done by dorsal approach (Fig. 3a). Whole of the capsule and collateral ligaments of metacarpo-phalangeal joint were preserved while excising the tumor (Fig. 3b). Disarticulation was done at the level of carpo-metacarpal joint. 4th metatarsal was harvested from the foot along with capsule and collateral ligaments of its metatarso-phalangeal joint. Metatarsal was osteotomised proximally at a level, according to the pre-operative planned length, desired at the recipient site. The capsule and ligaments of the transferred metatarsal were sutured to the corresponding capsule and ligaments at the recipient site, to reconstruct metacarpo-phalangeal joint (Fig. 3c, d).

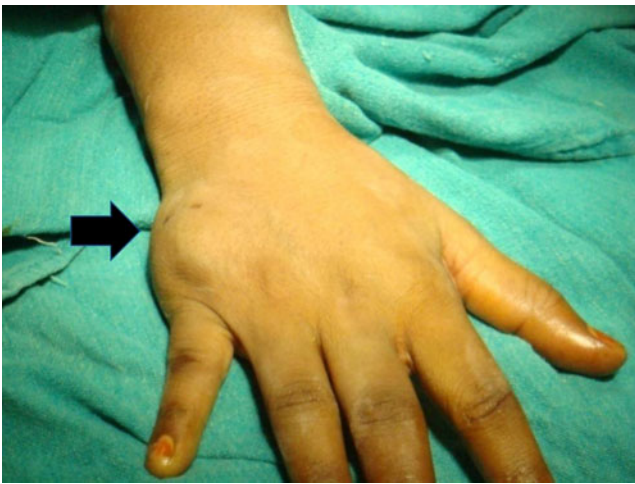


Fig. 1 Pre-op photograph of hand showing swelling in the region of 5th metacarpal

Transferred metatarsal was fused proximally with hamate with the help of multiple Kirschner-wires without any bone grafting. Double breasting of the transferred metatarsal capsule was done providing adequate stability at metacarpo-phalangeal joint. This fixation was supplemented with below elbow volar slab. In the foot region, metatarsal was reconstructed by using free fibular graft. Sutures were removed after 10 days at both the sites and early range of motion was started. **K-wires used to achieve**



Fig. 2 Antero-posterior view of hand showing an expansile, lytic lesion in the diaphyseal region with paper thin cortex of right 5th metacarpal extending up to the subchondral bone

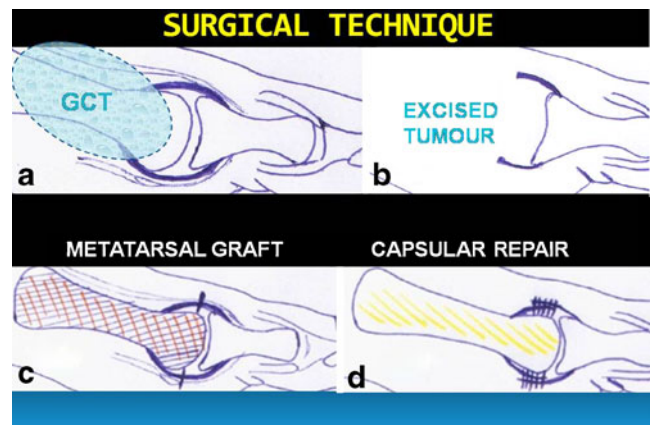


Fig. 3 **a** Diagrammatic representation of tumor. **b** En bloc resection of tumor and preservation of the capsule of MP joint. **c** Resection of metatarsal along with its capsule. **d** Double breasting of donor and recipient capsulo-ligamentous complex to reconstruct MP joint

fusion at carpometacarpal joint were not removed. Subsequent repeated radiological examination showed no reduction of joint space and no arthritic changes. Clinical examination revealed progressive improvement in function. Also, no change in the density of transplanted metatarsal was noted (Fig. 4). After 2 year of follow-up, range of motion was nearly normal and painless with terminal restriction of flexion at the metacarpo-phalangeal joint (Fig. 5) with no functional disability and Thorough assessment of hand revealed 10° flexion lag with good



Fig. 4 Follow up radiograph showing preserved joint space and structure of transferred metatarsal

Fig. 5 Hand function at 2 year follow up



grip strength. ROM of MP joint was 0–80° (active) and she was able to perform cylindrical, spherical & hook grasp with ease & strength. Patient was able to perform translation movement both finger to palm & palm to finger and was able to shift objects in the operated hand. No evidence of local as well as distant metastasis was there.

Discussion

Giant cell tumor (GCT) of bone is a relatively rare, benign but locally aggressive osteolytic skeletal neoplasm of young adults. The bones of hand and wrist area are even more rarely affected. GCT of hand bones most commonly occurs in a central location which differs from the usual eccentric location seen in GCTs at other sites. Also, they are generally diagnosed at an advanced stage with extensive bony destruction. Accurate diagnosis requires a thorough clinical evaluation, imaging studies and histopathological assessment. Conservative treatment by digit-sparing surgery is associated with high recurrence rates.

The various treatment modalities described are curettage with or without bone grafting, en bloc resection and reconstruction and ray amputation. The recurrence rate with simple curettage is 50% (Jacobs and Clemency, 1985), with excision with curettage 7% (Sung et al, 1982) and with wide or radical resection 0% (Campanacci et al, 1987).

Vascularised joint transfer for the management of recurrent GCT has also been described, though is a technically challenging procedure [9].

It is assumed that the reconstruction of metacarpophalangeal joint provides stability and so no transfixing wires are required. The synovial membrane of the proximal phalanx provides nutrition to the cartilage of the transferred metatarsal head and ensures its survival. Osteoarticular ligamentous complex of metatarsal transfer is a technically simpler procedure, which an average orthopedic surgeon can perform.

Conclusion

Transfer of Osteoarticular ligamentous complex of metatarsal for reconstruction of metacarpal defects is a technically simpler procedure and gives cosmetically and functionally good results.

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Consent Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Competing Interest The authors declare that they have no competing interests.

Author Contribution LM was a major contributor in writing the manuscript while GSC was a major contributor in writing and in editing the manuscript, as well. PY and VKG analyzed and interpreted the patient data. All authors have read and approved the final manuscript.

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