Function after Wrist Arthrodesis with Non-Vascularized Fibular Graft in Distal Radius Giant Cell Tumor: Case Series

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ABSTRACT

Giant cell tumor (GCT) of bone, the most common benign locally aggressive bone tumor, accounts for 4% to 5% of all primary bone neoplasms and 20% of benign bone tumors. The distal radius is the third commonest site of involvement in about 10% of GCT cases. Due to the high recurrence rate after curettage of the more progressed lesions, most surgeons prefer en bloc resection followed by reconstruction. **Cases:** Three distal radius GCT Campanacci III cases underwent en bloc resection and wrist arthrodesis with non-vascularized fibular graft. The mean follow-up period was nine months (6-12 months). Patients were evaluated with the Disabilities of the Arm, Shoulder, and Hand (DASH) Score. **Results:** Union had been achieved in 2 patients, and implant removal was done. One patient needs cancellous bone grafting after implant removal—no sign of recurrence after one year. DASH score showed moderate disability. **Conclusion:** Autogenous non-vascularized fibular graft reconstruction can be considered a reasonable option after en bloc resection of distal radius GCT.

Keywords : Giant Cell Tumor, non-vascularized bone graft

ABSTRAK

Giant Cell Tumor (GCT) adalah tumor tulang jinak yang paling sering dijumpai, bersifat agresif secara lokal, merupakan 4-5% dari seluruh neoplasma tulang primer dan 20% dari seluruh tumor tulang jinak. Radius distal merupakan lokasi GCT terbanyak ketiga, mencakup 10% kasus GCT. Mengingat tingginya rekurensi setelah prosedur kuretase, lebih disukai reseksi *en bloc* diikuti rekonstruksi. **Kasus:** Tiga pasien GCT pada radius distal (Campanacci III) menjalani reseksi *en bloc* disertai *arthrodesis* pergelangan tangan. *Follow-up* rata-rata selama 9 bulan (*range* 6-12 bulan). Pasien dinilai menggunakan skor *Disabilities of the Arm, Shoulder, and Hand* (DASH). **Hasil:** *Union* tulang tercapai pada 2 pasien, dan implan telah dicabut. Satu pasien membutuhkan *graft* dari tulanag *cancellous* setelah pencabutan implan. Tidak didapatkan rekurensi pada periode *follow-up* satu tahun. Skor DASH menunjukkan disabilitas sedang pada ketiga pasien. **Simpulan:** Prosedur rekonstruksi menggunakan *non-vascularized fibular graft* baik dilakukan setelah reseksi *en bloc* pada pasien GCT radius distal. **Heru Rahmadhany. Fungsi Pergelangan Tangan setelah Arthrodesis Teknik *Non-Vascularized Fibular Graft* pada *Giant Cell Tumor* Radius Distal: Kasus Serial.**

Kata kunci: *Giant cell* tumor, *non-vascularized bone graft*

Introduction

Giant cell tumor (GCT) is a benign, locally aggressive bone neoplasm composed of sheets of neoplastic, ovoid, mononuclear cells interspersed with uniformly distributed large osteoclast-like giant cells. GCTs comprise about 4-5% of all primary bone tumors and 20% of benign bone lesions. The peak incidence is between 20 to 45 years of age.[1] Seventy percent of cases of GCT fall in this age group.[2] It is rarely found in age less than ten years. GCT commonly affects the ends of long bones. The distal femur, proximal tibia, distal radius, and proximal humerus are the commonly affected sites in the appendicular skeleton. At the same time, the sacrum is the widely affected site in the axial skeleton.[1] Rarely, GCTs are multicentric or found primarily as lesions arising in the soft tissues.

Distal radius plays a significant role in the radio-carpal articulation and hence in the function of the hand. It is always challenging to reconstruct the defect after the excision of distal radius tumors. The complex anatomy and the need for acceptable functional outcomes with good disease clearance create a dilemma in treating GCTs in the lower end of the radius. Various treatment modalities are advocated in the literature, including:

1. Extended curettage,[3] with or without reconstruction using autogenic/allogenic bone grafts or polymethyl-methacrylate.[4,5]
2. Resection and reconstruction with a vascularized or non-vascularized proximal fibula (fibular head arthroplasty).[6]
3. Resection with partial wrist arthrodesis (radio-scaphoid-lunate arthrodesis) using a strut bone graft.[7]
4. Resection and complete wrist arthrodesis using an intervening strut bone graft.[8]
5. This paper reports 3 GCT cases in the distal radius treated with en bloc resection followed by wrist arthrodesis and application of non-vascularized fibular graft.

Cases

Three patients with GCT of the distal radius Campanacci III underwent en bloc resection and reconstruction with non-vascularized

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Figure 1. Case 1 : Female, 29 years old.
(A) Mass on the right distal radius;
(B) Radiographs shows geographic lytic lesion with sharp zone of transition.

Figure 2. Case 2: Female, 47 years old.
(A) Large shiny mass on the right distal radius;
(B) Radiographs shows lytic lesion with marked bone destruction.

fibular graft and wrist arthrodesis. The mean follow-up period was nine months (range, 6-12 months). Bone tumor resection was done until 2 cm to the normal bone. The shaft of the fibula was taken and fixated with a reconstruction plate to the 2nd metacarpal. Wrist extension in 200 - 400 position. The patient was then followed and evaluated with the Disabilities of the Arm, Shoulder, and Hand (DASH) score.

Discussion

Three patients had good conditions. Union had been achieved in 2 patients, and implant removal was done. One patient needs cancellous bone grafting after the removal of the implant. One patient needs a flap. No sign of recurrence after 1 year of follow-up. All patients have limited wrist motion and forearm supination—no injuries in the donor site. DASH score showed moderate disability in all three patients.

Conclusion

Autogenous non-vascularized fibular graft reconstruction can be considered a reasonable option after en bloc resection of GCT in the distal radius.

REFERENCES

1. Fletcher CD, Unni KK, Mertens F. Pathology and genetics of tumors of soft tissue and bone. I.A.R.C. Press: Lyon; 2002. World Health Organization - Classification of Tumors; pp. 309–12.
2. Dorfmann HB, Czerniak B. Bone tumors- Giant cell lesions. Mosby Inc: pp. 559–606.
3. Khan MT, Gray JM, Carter SR, Grimer RJ, Tillman RM. Management of the giant-cell tumours of the distal radius. Ann R Coll Surg Engl. 2004;86:18–24.
4. Blackley HR, Wunder JS, Davis AM, White LM, Kandel R, Bell RS. Treatment of giant-cell tumors of long bones with curettage and bone-grafting. J Bone Joint Surg Am. 1999;81:811–20.
5. Cheng CY, Shih HN, Hsu KY, Hsu RW. Treatment of giant cell tumor of the distal radius. Clin Orthop Relat Res. 2001;383:221–8
6. Aithal VK, Bhaskaranand K. Reconstruction of the distal radius by fibula following excision of giant cell tumor. Int Orthop. 2003;27:110–3
7. Bickert B, Heitmann Ch, Germann G. Fibulo-scapho-lunate arthrodesis as a motion-preserving procedure after tumour resection of the distal radius. J Hand Surg Br. 2002;27:573–6.
8. Muramatsu K, Ihara K, Azuma E, Orui R, Goto Y, Shigetomi M, et al. Free vascularized fibula grafting for reconstruction of the wrist following wide tumor excision. Microsurgery. 2005;25:101–6.