Long-Term Outcome of Custom-Made Megaprosthetic reconstruction in Recurrent Distal Femoral Giant Cell Tumours: A Case Series

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Abstract

Giant cell tumours (GCT)s which are benign do exhibits local aggressive behaviour and has propensity for recurrence specially when managed with intralesional curettage. Recurrent lesions, specially in weight bearing regions pose a reconstructive challenge. Mega prosthetic reconstruction following wide excision offers limb salvage with early mobilisation but long-term follow-ups and outcomes are reported rarely.

This case includes five patients with recurrent Campanacci grade 3 distal femoral GCTs treated between 2008 and 2013 after prior intralesional curettage with cementing elsewhere All were managed with wide excision and reconstruction with custom-made megaprosthesis from Eagle Osteon Technologies.

The mean follow was 15 years (range 11.5 to 17.8 years), with excellent Musculoskeletal Tumor Society scores (MSTS) at 10-year follow-up averaging 26.25 (87.5%; range 24-29). No aseptic loosening occurred; one patient developed infection requiring knee arthrodesis, and another had late recurrence at 12 years post-reconstruction. This case series aims to showcase the need of long-term follow-ups and not neglecting patients treated with megaprostheses for recurrent GCT even beyond 10 years of follow-up.

Keywords: Giant Cell Tumour, Distal Femur, Megaprosthesis, Tumour Recurrence, Long-Term Follow-Up

Introduction

Giant cell tumours (GCT) are benign but locally aggressive bone tumour that commonly affect the epiphyseal and metaphyseal region of long bones, especially the distal femur [1, 2]. Being benign, GCTs have high tendency to recur locally in many cases but rarely metastasise to the lungs [3, 4]. GCT management particularly at weight bearing areas comes with challenges. Initial treatment often involves intralesional curettage, sometimes combined with bone grafting or cementing [2, 3]. However, this procedure is associated with substantially higher recurrence rates, historically ranging from 40% to 60% prior to contemporary adjuvant therapies [2, 3]. Upon recurrence, particularly following initial intralesional curettage, more radical surgical procedures are generally warranted to secure effective local tumour control [2, 3, 5].

For significant bone defects following extensive resection of recurrent giant cell tumours, reconstruction with a custom-made megaprosthesis has shown to be favourable option for limb salvage with good functional outcomes and long-term stability [2, 6]. Megaprostheses do carry potential challenges despite providing joint stability and early rehabilitation such as implant loosening and infection [1, 7]. Therefore, long-term follow-up is warranted to evaluate the efficacy, functional outcomes, and to assess potential complications associated with megaprostheses in patients with recurrent distal femoral GCTs along with evaluation of incidence of recurrence even after reconstruction using megaprosthesis. Hence, this case series aims at investigating the long term outcome in cases of recurrent GCT cases managed with megaprostheses which were initially managed with intralesional curettage with cementing.

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Materials and methodology

This is a case series of five patients (four males and one female) who presented with recurrent GCT of distal femur since 2008 till 2013 with mean age group of 30.8 years ranging from 25 years and 35 years. Radiological assessment was done using X-ray of knee including distal femur in anteroposterior and lateral views, CT and MRI of local site were taken for all 5 patients along with chest x-ray. Tumour was staged using Campanacci et al's staging system [8]. Recurrence was confirmed with biopsy showing all the cases were benign GCTs with no malignant changes.

The mean follow-up period was 15 years (range 11.5 -17.8 years). Post operatively serial radiographs of local site and chest x-ray were done at 3rd month, 6th month, 12th month and thereafter annually. Functional outcome was assessed at 10-year follow-up using Musculoskeletal Tumor Society (MSTS) scoring system.

A distal femur GCT recurrence that was treated with resection and megaprosthesis is shown in Figure 1.

Result

There were four males and one female patients. The mean age group was 30.8 years (25-35) came with recurrence of GCT of distal femur which were initially treated with intralesional curettage with cementing in primary setting done elsewhere.

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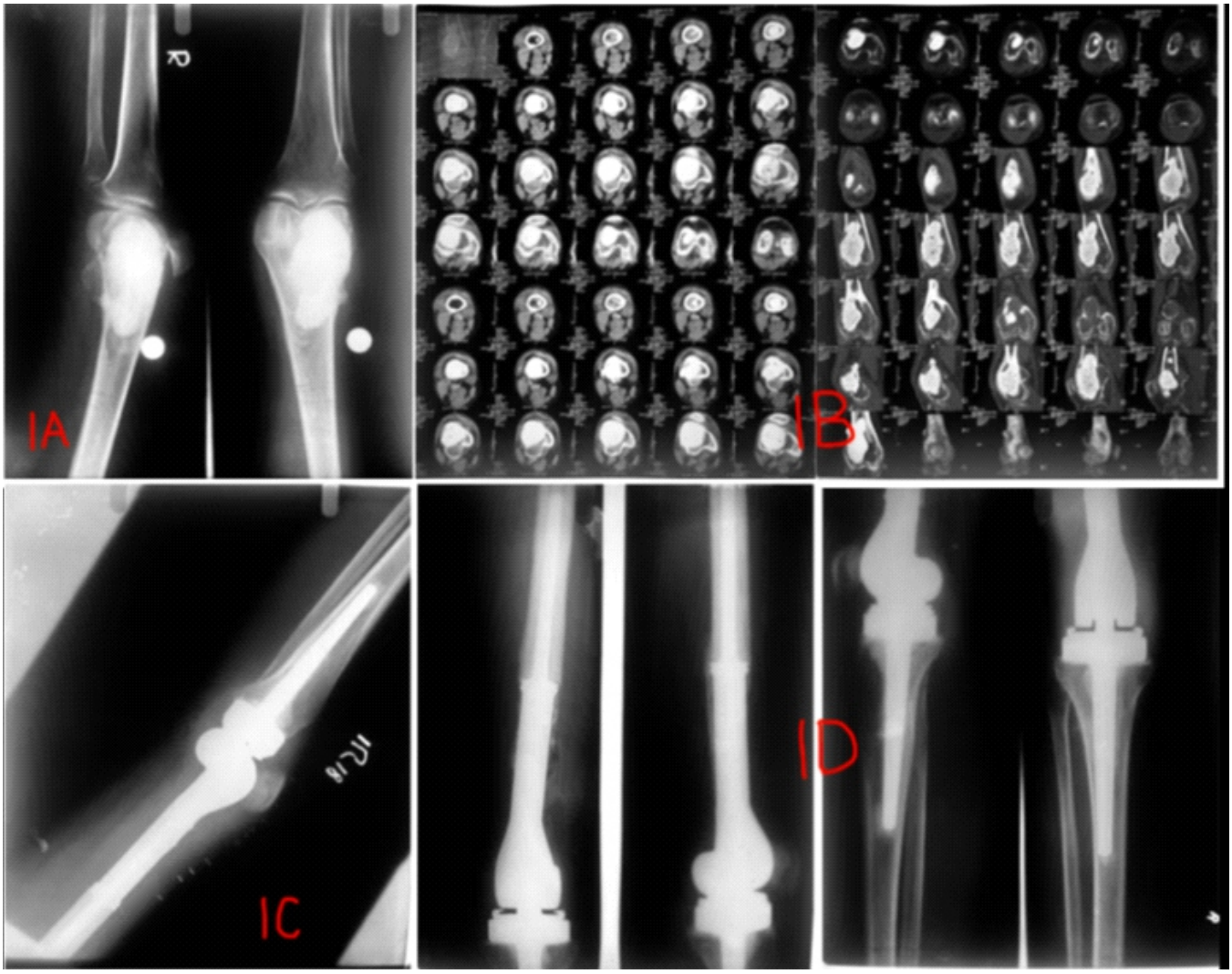

Figure 1: A male patient of age 35 years with distal femur recurrent GCT, which was treated with resection and megaprosthesis: (A) Radiograph showing extended curettage and bone cementing; (B) MRI of right distal femur; (C) Postoperative radiographs showing megaprosthesis; (D) Follow up X-ray at 10 years

These recurrences were graded as per Campanacci et al.'s radiological grading- all five cases were grade III (extension into the soft tissues). All the cases were managed with wide excision and reconstruction using custom-made megaprosthesis from eagle osteon technologies.

Functional Outcome

The functional status was using MSTS scoring system at ten year follow-up. The mean MSTS score of 26.25 (87.5%) (Range: 24-29) indicating excellent functional outcomes.

Complications

There was one case of deep infection necessitating knee arthrodesis, hence was excluded from MSTS scoring system whereas rest four showed no sign of infection or implant loosening. Out of four one had recurrence at twelfth year follow-up which had undergone amputation.

Discussion

GCTs which are benign do exhibits local aggressive behaviour and has propensity for recurrence which necessitates careful long term follow-up and careful long-term management strategies. This biological behaviour presents significant challenges in managing lesions especially at weight bearing areas where extensive resection can cause significant bone deficit requiring complex reconstructive approaches [3].

Recurrence rates have reduced from 40 to 60% to less than 25% with intralesional curettage with adjuvant therapy particularly for Campanacci Grade II lesions, but if they recur these cases do need wider resection with reconstruction using megaprosthesis to achieve good functional outcome, and also to prevent further recurrence specially in Campanacci III recurrent tumors which are even more aggressive requiring aggressive treatment strategies as depicted in this case series [2, 9].

In our case series, one patient developed deep infection necessitating knee arthrodesis, whereas other four did not show any evidence of aseptic loosening at a mean follow-up of 15 years. As per published literature, aseptic loosening of distal femoral megaprostheses vary widely, ranging from 5% to 17% [10]. While recently, a cohort study reported mean time of aseptic loosening to be 2.9 years (range 7

months to 8 years) with an overall revision rate of 48.5% [11]. Long-term studies have also indicated the importance of long term follow-ups as prosthesis survival free from aseptic loosening is generally more than 90% at 5 years which declines to 85% at 10 years, and may further decline approximately to 45% by 15 years [12].

Functional outcomes in our case series were excellent, with a mean MSTS score of 26.25 (87.5%) at tenth year. These results are consistent with the published literature which reports MSTS score of 71% at 10-year follow-up [13]. The use of custom implants allows early mobilisation, limb salvage, and restoration of joint stability, contributing to favourable long-term function. Interestingly, there was recurrence in one patient at twelfth year of follow-up for which above knee amputation was done. This is a new finding showing late recurrence following wide excision and megaprosthetic reconstruction of distal femoral GCTs which has been rarely reported in existing literature.

Conclusion

High grade recurrent GCT of the distal femur are challenging and necessitating aggressive treatment strategies in order to prevent futher recurrence. Wide excision followed by reconstruction using custom-made megaprostheses offers excellent long-term functional outcomes. In our series, implant survival was excellent with no cases of aseptic loosening at a mean follow-up of fifteen years. However, the occurrence of late local recurrence at twelve years highlights the possibility of late recurrence even after megaprosthetic reconstruction. This underscores the importance of long-term follow-ups even beyond ten years in patients treated with megaprostheses for recurrent distal femur GCTs.

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Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

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