

Limb Salvage for Massive Recurrent Distal Femoral Giant Cell Tumour Using Megaprosthesis Reconstruction in a Resource-Limited Setting: A Case Report

Alexander Western^{1*}, Derrick Lousaing^{1*}, Shane Lee Loy^{1*}

¹Fracture and Orthopaedic Clinic Limited, Port of Spain, Trinidad and Tobago.

*Corresponding Authors: Dr. Derrick Lousaing, Dr. Derrick Lousaing, Dr. Shane Lee Loy, Fracture and Orthopaedic Clinic Limited, Port of Spain, Trinidad and Tobago and Dr. Shane Lee Loy, Fracture and Orthopaedic Clinic Limited, Port of Spain, Trinidad and Tobago.

<https://doi.org/10.58624/SVOAOR.2026.06.029>

Received: August 26, 2026

Published: October 05, 2026

Citation: Western A, Lousaing D, Lee Loy S. Limb Salvage for Massive Recurrent Distal Femoral Giant Cell Tumour Using Megaprosthesis Reconstruction in a Resource-Limited Setting: A Case Report. *SVOA Orthopaedics* 2026, 6:5, 219-225. doi: 10.58624/SVOAOR.2026.06.029

Abstract

Giant cell tumour of bone is a locally aggressive neoplasm with a recognised risk of local recurrence. A 52-year-old female was referred to Fracture and Orthopaedic Clinic Limited with recurrent distal femoral giant cell tumour after two prior surgical procedures in the public health system. The patient reported first noticing pain and a mass around the distal femur in April 2024 and subsequently underwent two prior operations before referral, including tumour removal with bone cement placement followed by plate fixation after postoperative complications. Imaging demonstrated severe recurrent distal femoral destruction with extra-osseous extension. She underwent wide en bloc resection, removal of previous fixation and distal femoral endoprosthesis reconstruction with a rotating-hinge knee mechanism. Amended external pathology supported recurrent giant cell tumour of bone, with H3F3A G34W positivity and no overt malignant features. At six-month follow-up, knee range of motion was 0-90 degrees and the Musculoskeletal Tumor Society (MSTS) lower-limb score was 28/30 (93.3%).

Keywords: *giant cell tumour of bone; distal femur; recurrence; limb salvage; megaprosthesis; resource-limited setting*

Introduction

Giant cell tumour of bone most commonly affects skeletally mature adults and often occurs around the knee. Although usually histologically benign, it may behave aggressively, causing cortical destruction, soft tissue extension and local recurrence [2,3]. Recurrent distal femoral disease is particularly challenging because oncological clearance must be balanced against preservation of limb length, alignment and knee function.

Megaprosthesis reconstruction has expanded limb-salvage options after oncological resection around the knee [4,5]. In this report, a resource-limited environment refers not only to financial constraint, but to a regional surgical setting in which orthopaedic oncology infrastructure, custom implant availability, modular backup components, specialist revision inventory, and immediate technical support are limited. In such circumstances, there may be no practical fallback position once definitive surgery begins. The resection level, implant selection, equipment availability, contingency planning, and intraoperative execution must therefore be planned meticulously and carried out precisely [1].

Case Presentation

A 52-year-old female was referred with recurrent giant cell tumour involving the distal femur. She first noticed pain and a mass around the distal femur in April 2024 and initially sought care through the public health system. She reported undergoing two prior operations before referral. The first involved tumour removal and bone cement placement. A subsequent procedure involved plate fixation following postoperative complications after the initial operation. Detailed operative records from the index procedures were not available for review; however, radiographs demonstrated retained distal femoral plate fixation consistent with prior surgical management. She was later referred to Fracture and Orthopaedic Clinic Limited following progressive recurrence after prior treatment.

The patient developed progressive symptoms involving the affected knee. Imaging demonstrated progressive osteolytic destruction, marked distal femoral expansion, loss of normal condylar architecture and extra-osseous soft tissue extension.

Investigations

Serial radiographs demonstrated recurrent distal femoral disease around retained plate fixation, with progressive cortical destruction and expansion of the distal femur. Lateral radiographs showed a large extra-osseous component and severe distortion of the distal femoral anatomy.

Computed tomography of the thighs demonstrated a recurrent mass measuring approximately 8.0 x 9.3 x 11.0 cm. The lesion was associated with complete erosion of the medial femoral condyle, partial erosion of the lateral femoral condyle, endosteal scalloping and periosteal reaction. The mass displaced the femoral artery and vein posteriorly, with a preserved fat plane. CT chest, abdomen and pelvis showed no definite distant metastatic disease; a small indeterminate pulmonary nodule was noted on subsequent documentation but no definite metastasis was identified. Three-dimensional volume-rendered CT reconstructions additionally demonstrated the marked osseous deformity and destructive change of the right distal femur in relation to the remaining skeleton.

Surgical Management

Limb salvage surgery was undertaken following review of the clinical and radiological findings. An extensile anterior approach was performed through the previous incision. The previous distal femoral plate was removed. Extra-tumoral medial and lateral planes were developed, and posterior dissection was carried towards the gastrocnemius insertion.

The tumour-bearing distal femur was resected en bloc. The distal resection included the articular structures required for oncological clearance, including the collateral ligaments, menisci and cruciate ligaments. Reconstruction was performed using a distal femoral megaprosthesis with rotating-hinge knee articulation. The proximal tibia was prepared and the tibial component implanted. Patellar resurfacing was performed using a 28-mm patellar button. Intraoperative assessment confirmed satisfactory alignment and stability without rotational instability.

Histopathological Findings

Gross examination demonstrated a distal femoral specimen measuring 15.2 x 11.2 x 6.9 cm with a mass measuring 7.8 x 5.5 x 12.5 cm. Initial microscopic examination showed a tumour composed of numerous osteoclast-like giant cells and mononuclear cells, with areas of necrosis, haemorrhage and woven bone associated with tumour. The tumour involved bone and replaced marrow spaces. Circumferential and longitudinal soft tissue margins were clear, with tumour more than 10 mm from the proximal soft tissue margin and 3 mm from the distal soft tissue margin.

Following external referral, the amended pathology report described a giant cell-rich neoplasm compatible with recurrent giant cell tumour of bone. Associated haemorrhage, fibrosis, focal necrosis and osteoid formation were identified. H3F3A G34W immunohistochemistry was uniformly positive in the mononuclear tumour cells, supporting the diagnosis. p63 was focally positive and SATB2 showed variable/focal positivity. No overt cytological malignant features or atypical mitotic activity were identified.

Postoperative Course and Follow-up

Postoperative radiographs demonstrated satisfactory positioning of the distal femoral endoprosthesis and rotating-hinge knee reconstruction, with restoration of limb alignment. Serial follow-up radiographs demonstrated maintained alignment without early implant loosening, periprosthetic fracture or radiographic evidence of local recurrence. At six-month follow-up, knee range of motion was 0-90 degrees. The patient achieved a Musculoskeletal Tumor Society (MSTS) lower-limb functional score of 28/30, equivalent to 93.3%. She scored 5/5 for pain, function, emotional acceptance, supports and walking ability, and 3/5 for gait.



Figure 1. Preoperative AP radiograph demonstrating recurrent distal femoral giant cell tumour with retained lateral distal femoral plate fixation and extensive osteolytic destruction.



Figure 2. Preoperative lateral radiograph demonstrating distal femoral expansion, cortical destruction and extra-osseous soft tissue extension.



Figure 3. Later preoperative lateral radiograph demonstrating progression of the recurrent lesion with severe distal femoral destruction before definitive resection.



Figure 4. Long-leg standing radiograph demonstrating recurrent distal femoral disease with retained fixation and preservation of the proximal femoral shaft.



Figure 5. Three-dimensional volume-rendered CT reconstruction from staging imaging, demonstrating marked deformity and destructive change of the right distal femur with retained fixation.



Figure 6. Alternate three-dimensional volume-rendered CT view demonstrating the extent of right distal femoral osseous destruction and deformity before definitive limb-salvage surgery.



Figure 7. Resected distal femoral tumour specimen following en bloc excision.

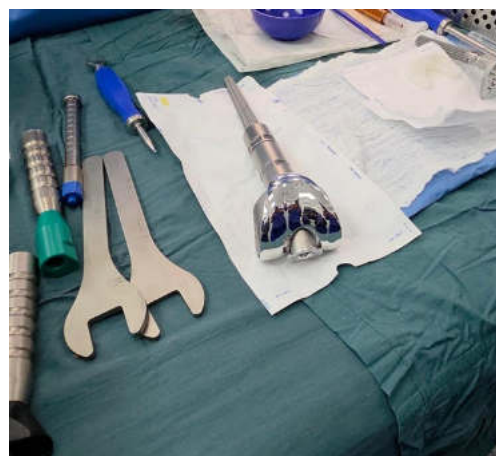


Figure 8. Distal femoral megaprosthesis and instrumentation prior to implantation.

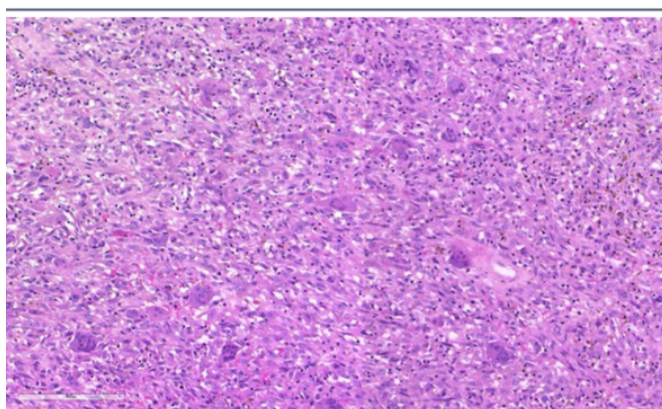


Figure 9. Histopathology photomicrograph from the resection specimen demonstrating a giant-cell-rich tumour with numerous osteoclast-like giant cells in a mononuclear stromal background.



Figure 10. Immediate postoperative AP radiograph following distal femoral resection and megaprosthesis rotating-hinge knee reconstruction.



Figure 11. Immediate postoperative lateral radiograph demonstrating the distal femoral endoprosthesis, rotating-hinge articulation and patellar resurfacing.

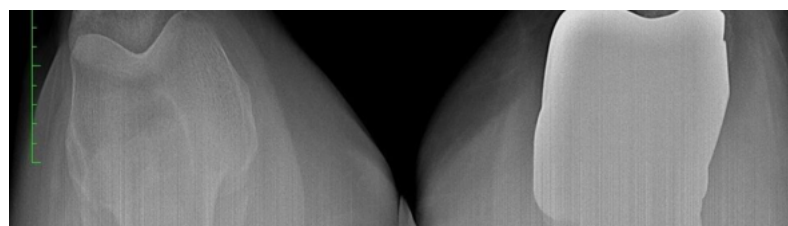


Figure 12. Postoperative axial (sunrise/skyline) patellofemoral radiograph demonstrating patellofemoral joint alignment and patellar resurfacing following distal femoral endoprosthesis reconstruction.



Figure 13. Follow-up AP radiograph demonstrating maintained alignment and stable implant position.



Figure 14. Follow-up lateral radiograph demonstrating maintained implant position without early mechanical complication.

Discussion

This case illustrates the reconstructive challenge of massive local recurrence of giant cell tumour involving the distal femur. By the time of referral, the lesion had caused extensive condylar destruction and extra-osseous extension, making joint-preserving treatment unsuitable. Wide resection with distal femoral replacement provided a limb-salvage option capable of restoring alignment and immediate structural stability [4,5].

This case is particularly relevant in a regional resource-limited environment. The patient was initially managed in the public health system and was referred following recurrent disease after two prior procedures. Distal femoral endoprosthesis reconstruction is not routinely performed in the region. Limited access to alternative implant sizes, replacement components, specialist revision inventory, and immediate technical support means that there may be no reliable fallback position if the reconstruction cannot be completed as planned. For this reason, successful limb salvage in this setting depends on meticulous preoperative planning, careful coordination of implants and equipment, and execution of the operative plan to the letter [1].

Histopathology was essential because the differential diagnosis of a giant cell-rich tumour includes giant cell tumour with aneurysmal bone cyst-like change and, less commonly, sarcoma rich in osteoclast-like giant cells. External osteoarticular pathology review and H3F3A G34W immunohistochemistry supported the diagnosis of recurrent giant cell tumour of bone and found no overt malignant transformation [6,7].

The main limitations are the absence of detailed operative records from the index procedures and the relatively short duration of follow-up. Although the six-month clinical and radiographic outcome is encouraging, longer surveillance is required to assess durable function, implant survival and late recurrence.

Conclusion

Massive recurrent giant cell tumour of the distal femur can cause severe periarticular destruction and loss of normal knee anatomy. This case demonstrates that wide resection and distal femoral endoprosthetic reconstruction can achieve limb salvage and early implant stability in a regional setting where such reconstruction is not routinely performed.

Learning Points

- Giant cell tumour of bone may recur with aggressive local destruction despite previous treatment.
- Massive distal femoral recurrence may preclude joint-preserving surgery.
- Distal femoral endoprosthetic reconstruction can provide limb salvage after wide tumour resection.
- External osteoarticular pathology review and H3F3A G34W immunohistochemistry are valuable for confirming recurrent giant cell tumour of bone.
- In a resource-limited environment, the absence of a reliable fallback position makes meticulous planning, implant preparation, and precise execution essential.

Ethics and Institutional Permission

Fracture and Orthopaedic Clinic Limited, a private clinical centre, granted institutional permission to access and use the patient's anonymised clinical records and imaging for preparation of this case report. Written informed consent was obtained from the patient for publication of the anonymised case and accompanying clinical and radiological images.

Author Contributions

All authors contributed substantially to the conception and preparation of the case report, interpretation of the clinical and pathological findings, critical revision of the manuscript, and approval of the final version. All authors agree to be accountable for the work.

Acknowledgements

The authors acknowledge Fracture and Orthopaedic Clinic Limited for granting institutional permission to access anonymised clinical records and imaging for this work.

Conflict of Interest

The authors declare no conflicts of interest.

Funding

No funding was received for this work.

References

1. Augustus M, Ali A, Beharry A, Armorer D, Lousaing D. Management of a Giant Cell tumors with megaprosthesis in a resource-limited setting. *Indian J Orthop Surg.* 2024;10(2):189-194.
2. Campanacci M, Baldini N, Boriani S, Sudanese A. Giant-cell tumor of bone. *J Bone Joint Surg Am.* 1987;69(1):106-114.
3. Mavrogenis AF, Igoumenou VG, Megaloikonomos PD, Panagopoulos GN, Papagelopoulos PJ, Soucacos PN. Giant cell tumor of bone revisited. *SICOT J.* 2017;3:54.
4. Natarajan MV, Prabhakar R, Mohamed SM, Shashidhar R. Management of juxta articular giant cell tumors around the knee by custom mega prosthetic arthroplasty. *Indian J Orthop.* 2007;41(2):134-138.
5. Gkavardina A, Tsagozis P. The use of megaprotheses for reconstruction of large skeletal defects in the extremities: a critical review. *Open Orthop J.* 2014;8:384-389.
6. Amary F, Berisha F, Ye H, Gupta M, Gutteridge A, Baumhoer D, et al. H3F3A (Histone 3.3) G34W immunohistochemistry: a reliable marker defining benign and malignant giant cell tumor of bone. *Am J Surg Pathol.* 2017;41(8):1059-1068.
7. Yamamoto H, Iwasaki T, Yamada Y, Matsumoto Y, Otsuka H, Yoshimoto M, et al. Diagnostic utility of histone H3.3 G34W, G34R, and G34V mutant-specific antibodies for giant cell tumors of bone. *Hum Pathol.* 2018;73:41-50.

Copyright: © 2026 All rights reserved by Western A, Lousaing D and Lee Loy S. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.