

Giant Cell Tumor of the Lateral Malleolus Treated by Tumor Excision and Reconstruction using A 180° Rotated Proximal Fibular Autograft – A Rare Case Report

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Learning Point of the Article:

Giant cell tumors of the lateral malleolus are rare, and wide excision with 180° rotated proximal fibular autograft reconstruction can preserve ankle stability and function.

Abstract

Introduction: Giant cell tumor (GCT) of bone was first described by Sir Astley Cooper in 1818. It is one of the most frequently encountered benign bone tumors in orthopedic practice and is characterized by a significant risk of local recurrence following surgical treatment. GCT involving the distal fibula, particularly the lateral malleolus, is extremely rare, accounting for <1% of all cases. Various treatment modalities have been described for lateral malleolus GCT, including tumor excision, ankle arthrodesis, reconstruction with ipsilateral proximal fibular graft, and autograft or allograft reconstruction. This report presents the management of a Campanacci Grade II GCT of the lateral malleolus involving the epiphysis and metaphysis, with compression of the lateral collateral ligament complex, peroneal muscles and tendons, and the talus. The patient was successfully treated with tumor excision, reconstruction using an ipsilateral proximal fibular graft, and ankle joint reconstruction. This technique preserved ankle stability while maintaining joint mobility.

Case Report: A 26-year-old male presented with a 6-month history of swelling and pain over the lateral aspect of the ankle. Radiological evaluation and histopathological examination were performed to establish the diagnosis and plan treatment. The patient underwent complete surgical excision of the tumor followed by reconstruction using an ipsilateral proximal fibular graft. Histopathological analysis confirmed the diagnosis of a Grade I GCT without evidence of malignant transformation.

Conclusion: Due to the rarity of distal fibular GCT, the optimal surgical approach and its impact on ankle stability remain subjects of debate. The reconstruction technique described in this case provides a viable option for managing such uncommon lesions, offering effective tumor control, preservation of ankle stability, and maintenance of functional joint movement. This method may serve as a valuable reference for future reconstruction procedures in similar rare clinical scenarios.

Keywords: Giant cell tumor, lateral malleolus, surgical excision.

Introduction

Giant cell tumor (GCT) of bone is a benign but locally aggressive neoplasm and is among the most frequently encountered benign bone tumors in orthopedic practice. The most commonly affected anatomical sites, in descending order of frequency,

include the distal femur, proximal tibia, distal radius, and proximal humerus. Involvement of the small bones of the hand and foot is relatively rare, with reported incidences of approximately 2.4% in the hand and 1.2–1.8% in the foot [1]. The occurrence of GCT in the distal fibula is exceptionally

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Figure 1: Clinical image.

uncommon, constituting <1% of all reported cases.

Several surgical options have been proposed for the management of GCT of the lateral malleolus, ranging from extended intralesional curettage with adjuvant therapies to en bloc resection of the distal fibula followed by ankle reconstruction. Reconstructive techniques described in the literature include inter tibio-fibular or tibiotalar arthrodesis, 180° rotation of the proximal fibula [3-8], cortical or strut graft reconstruction of the remaining fibula, fibular allograft reconstruction, repair of the lateral ligamentous complex of the ankle, and utilization of the distal peroneal tendons to re-establish ankle stability.

Case Report

A 26-year-old male patient presented with pain in the left ankle



Figure 3: Magnetic resonance imaging images.



Figure 2: Pre-operative X-rays.

region and difficulty in walking for a period of 6 months. On examination, a vertically ovoid swelling was present on the lateral aspect of the ankle with restriction of ankle movement. Radiograph of the left ankle showed an eccentric, expansile lytic lesion with a soap-bubble appearance, 6.5 cm in size at the epiphyseo-metaphyseal part of the distal fibula. Magnetic resonance imaging showed that the lesion was compressing the peroneal muscles and tendons and the talar bone (Fig. 1, 2, 3).

Operative steps

Treatment options were clearly discussed with the patient, and the patient wanted an ankle reconstruction. At his request, surgery was planned to reconstruct the ankle joint using an ipsilateral proximal fibula graft. A direct lateral incision was made over the distal half of the fibula to access the tumor. The



Figure 4: Resection of the tumor.



Figure 5: Harvesting proximal fibula graft.

superficial peroneal nerve's cutaneous branch was identified and preserved. After exposing the tumor, we performed a wide surgical resection of the tumor up to 7.5 cm from the lateral malleolus tip, which was sent for biopsy. To reconstruct the ankle, an ipsilateral proximal fibular graft of adequate length was harvested after safeguarding the common peroneal nerve, as shown in Fig. 4, 5, 6.

The proximal fibula graft was then prepared and approximated to the proximal part of the distal fibula and temporarily fixed with K-wires. An adequate length reconstruction plate was then used to fix the graft. The fibular collateral ligament and the syndesmotric ligaments were repaired, and a syndesmotric screw was also kept as shown in the post-operative X-ray (Fig. 7).

The ankle was immobilized in an above-knee plaster of Paris slab and bandage for 6 weeks. After that the slab was removed, and non-weight-bearing exercises were advised for another 6



Figure 6: Reconstructing the ankle joint.

weeks. Radiological and Clinical follow-up was carried out regularly (Fig. 9 and 10)..

Discussion

GCT of the lateral malleolus is an uncommon clinical entity [9], and the management of aggressive lesions at this location remains particularly challenging. Owing to its rarity, there are no established treatment guidelines, and the available literature is limited to isolated case reports and small case series. The distal 10 cm of the fibula plays a vital role in maintaining the stability of the ankle mortise. Therefore, reconstruction of the distal fourth of the fibula following tumor excision is essential to preserve ankle stability. Lesions occurring in this region require



Figure 7: Immediate post-operative X-ray.

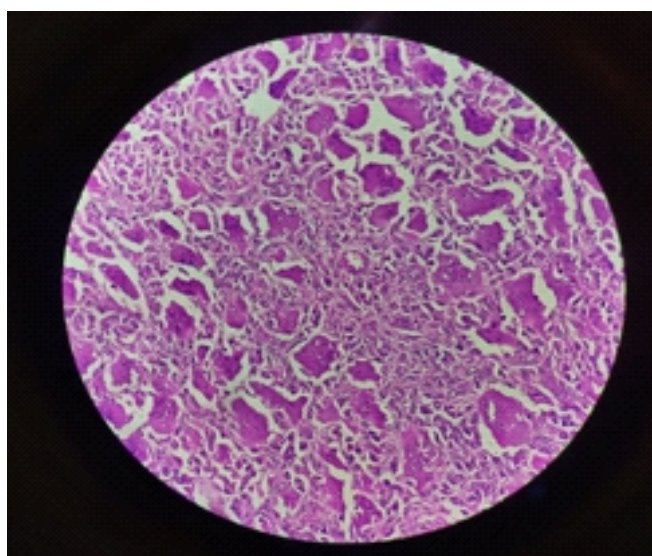


Figure 8: Histopathological slides.



Figure 9: Follow up X-ray.

meticulous planning, especially in young and active individuals, to maintain ankle function and prevent long-term disability.

Furthermore, deformities involving the ankle can significantly impair gait and functional mobility, adversely affecting a patient's daily activities, social interactions, and occupational performance. Patients with GCT of the lateral malleolus commonly present with pain, swelling, and restricted ankle movements. Previous studies have demonstrated that ankle stability depends not only on the integrity of the distal fibula but also on the preservation of its ligamentous attachments. During weight-bearing, the fibula contributes to deepening the ankle mortise and transmits approximately 7.1% of the body's weight. Complete excision of the distal fibula without appropriate reconstruction may result in valgus instability of the ankle and subsequent degenerative arthritic changes [5].

Capanna et al. [2] described six different methods of fibular excision and reconstruction based on the location of the distal fibular lesion. These techniques include reconstruction using a proximally harvested fibula rotated through 180°, cortical grafting, and augmentation of ankle stability with the peroneal tendons [10]. Additional reconstructive options aimed at preserving ankle joint congruity include the use of tricortical iliac crest grafts and fibular allografts stabilized with dynamic compression plates. Although each technique offers distinct advantages, they are also associated with specific limitations. Moreover, harvesting the proximal fibula carries the potential risk of injury to the common peroneal nerve and the lateral collateral ligament complex.

Leibner et al. [10] proposed seven principles for distal fibular reconstruction, emphasizing preservation of the native fibula whenever oncologically feasible. In the present case, the patient



Figure 10: Clinical images.

had a Grade II lesion and expressed a strong desire to retain normal ankle function. Consequently, our treatment strategy focused on complete tumor excision while restoring the integrity of the ankle mortise. Resection of the fibula at a level 6–8 cm proximal to the distal tip can disrupt the syndesmotic ligaments and interosseous membrane, thereby increasing inversion and rotational stresses across the ankle joint. Clinically, this may manifest as deep muscular pain, weakness, and difficulty with running and other strenuous activities. Therefore, reconstruction and stabilization of the syndesmosis are recommended. In our patient, the tumor was excised completely, followed by reconstruction using a 180° rotated proximal fibular graft, syndesmotic repair, and fixation with a reconstruction plate.

Conclusion

GCTs of the lateral malleolus are extremely rare and pose challenges in their management. Thus, we recommend that all aggressive and large GCTs of the lateral malleolus must be excised adequately, and the bony defect should be reconstructed using autogenous bone graft with internal fixation. It is mandatory to preserve the ankle mortise during reconstructive surgery to achieve a good functional outcome.

Clinical Message

Giant cell tumor of the lateral malleolus poses a challenge in management; therefore, proper excision and reconstruction of the ankle mortise are essential for a good functional outcome.

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

Conflict of interest: Nil **Source of support:** None

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