International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Growth-Preserving Stabilization in Recurrent Pathological Tibial Fractures Due to Non-Ossifying Fibroma: A Paediatric Case Report

Dr. Aadil Cyclewala[1], Dr. Ashay Gandhi[2], Dr. Yash Chordiya[3], Dr. Girish Gadekar[4]

[1]Resident in Orthopaedics, Department of Orthopaedics, MGM Medical College and Hospital, Aurangabad, India
Corresponding Author Email: *adnancyclewala[at]gmail.com*

[2]Resident in Orthopaedics, Department of Orthopaedics, MGM Medical College and Hospital, Aurangabad, India
Email: *ashaygandhi2000 [at]gmail.com*

[3]Resident in Orthopaedics, Department of Orthopaedics, MGM Medical College and Hospital, Aurangabad, India
Email: *yashchordiya[at]gmail.com*

[4]Professor and Head of Department, Department of Orthopaedics, MGM Medical College and Hospital, Aurangabad, India
Email: *girish4444[at]gmail.com*

Abstract: ***Background**: Non-ossifying fibroma (NOF) is the most common benign fibrous bone lesion in children and is usually asymptomatic; however, lesions in weight-bearing bones may predispose to pathological fractures. We describe a 6-year-old girl who had two prior unicortical pathological fractures at the same location within a year, both of which were treated conservatively, and who now presented with a pathological midshaft tibial fracture after little trauma. Through a lytic lesion consistent with NOF, imaging showed a bicortical fracture. In light of skeletal immaturity, surgical treatment comprised corticotomy with lesion excision, partial fibulectomy to aid in alignment, and growth-preserving intramedullary telescopic fixation of the tibia. Radiographs taken after surgery revealed good alignment and steady healing. Fracture union was attained at the three-month follow-up, with knee range of motion restricted to 90 degrees and no problems or recurrence due to the implant. The significance of final surgical stabilization in recurring pathological fractures caused by NOF is demonstrated by this instance.***

Keywords: Non-ossifying fibroma; Pathological fracture; Telescopic nail; Paediatric tibial fracture; Fibular strut graft; Intramedullary fixation

1. Introduction

Non-ossifying fibroma (NOF) is the most common benign fibrous bone lesion of childhood and represents a developmental cortical defect rather than a true neoplasm.[1-4] It is characterized by replacement of normal bone with fibrous tissue and typically involves the metaphysis of long bones, particularly the distal femur and proximal tibia.[1,2,5] The most prevalent age range for NOF is 5 to 15 years old. It often has no symptoms and resolves on its own when the skeleton matures. Larger lesions affecting weight-bearing bones, however, may cause substantial cortical weakness, increasing the risk of pathological fractures and functional disability.[3,4,6].[2,5,7] NOF has distinctive benign radiographic characteristics, such as an eccentric, well-defined lytic lesion with sclerotic edges, which helps in diagnosis.[1,2,4] Recurrent pathological fractures are an uncommon and clinically important presentation that necessitates surgical stabilization, even if the majority of patients are treated conservatively. For skeletally immature individuals, restoring structural integrity, preventing recurrence, and ensuring the best possible functional results all depend on early detection and proper care.

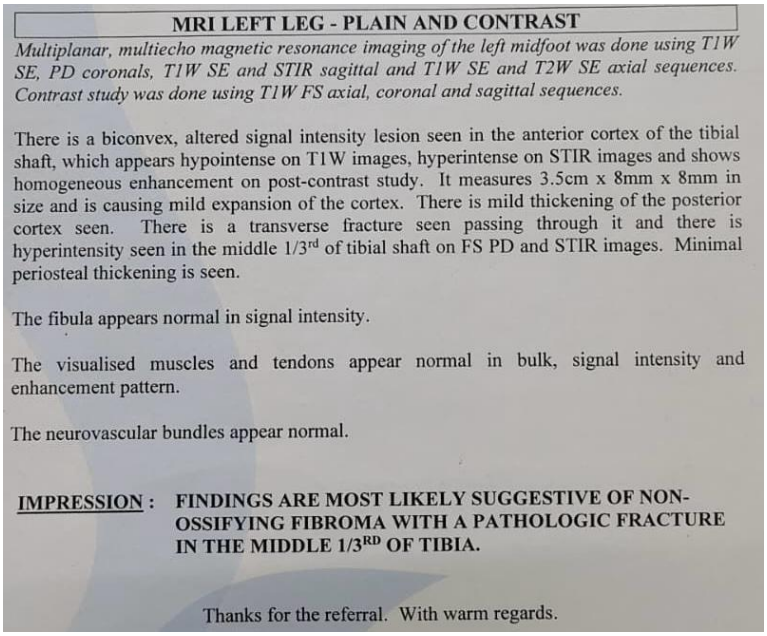
Figure 1: Non ossifying fibroma

2. Case Presentation

A 6-year-old female presented to the OPD with pain, swelling, and inability to bear weight on the left leg following trivial trauma. A similar incident happened when the child was two years old. A radiological examination revealed a midshaft tibia fracture, which was treated conservatively with splint immobilization (above knee slab followed by casting), resulting in union after six weeks. After little stress, a fracture happened at the same location one year later at the age of three. At that time, radiographs showed an eccentric lytic lesion. An MRI examination showed a well-defined, eccentric, bubble-like lesion that appeared hypointense on T1 and hyperintense on T2/STIR sequences. This was consistent with NOF of the midshaft of the tibia and was treated conservatively for six weeks because it was a unicortical fracture.

Figure 2: 2 years of age (1st episode)

Figure 3: 3 years of age(2nd episode)



MRI LEFT LEG - PLAIN AND CONTRAST

Multiplanar, multiecho magnetic resonance imaging of the left midfoot was done using T1W SE, PD coronals, T1W SE and STIR sagittal and T1W SE and T2W SE axial sequences. Contrast study was done using T1W FS axial, coronal and sagittal sequences.

There is a biconvex, altered signal intensity lesion seen in the anterior cortex of the tibial shaft, which appears hypointense on T1W images, hyperintense on STIR images and shows homogeneous enhancement on post-contrast study. It measures 3.5cm x 8mm x 8mm in size and is causing mild expansion of the cortex. There is mild thickening of the posterior cortex seen. There is a transverse fracture seen passing through it and there is hyperintensity seen in the middle 1/3rd of tibial shaft on FS PD and STIR images. Minimal periosteal thickening is seen.

The fibula appears normal in signal intensity.

The visualised muscles and tendons appear normal in bulk, signal intensity and enhancement pattern.

The neurovascular bundles appear normal.

IMPRESSION : FINDINGS ARE MOST LIKELY SUGGESTIVE OF NON-OSSIFYING FIBROMA WITH A PATHOLOGIC FRACTURE IN THE MIDDLE 1/3RD OF TIBIA.

Thanks for the referral. With warm regards.

Figure 4: MRI films and report

On current presentation, following trivial trauma 7 days prior to presentation, clinical examination revealed localized swelling, tenderness, and crepitus over the midshaft tibia. The results of the neurovascular evaluation were normal. A bicortical displaced midshaft tibia fracture through the NOF was seen on radiographs. Upon admission, laboratory tests were performed to rule out infection, metabolic bone disease, and cancer. The results indicated normal hemoglobin, ESR, CRP, calcium, phosphate, alkaline phosphatase, and LDH.

Figure 5: Current radiograph (3rd episode)

Due to recurrent fractures and structural instability and deformity, surgical intervention was performed with the procedure of Corticotomy and curettage of the lesion, followed by stabilization using intramedullary telescopic tibial nailing, fibular osteotomy and fibular strut grafting were performed to enhance stability and promote healing and alignment.

Figure 6: immediate post op Xray

Figure 7: Corticotomy

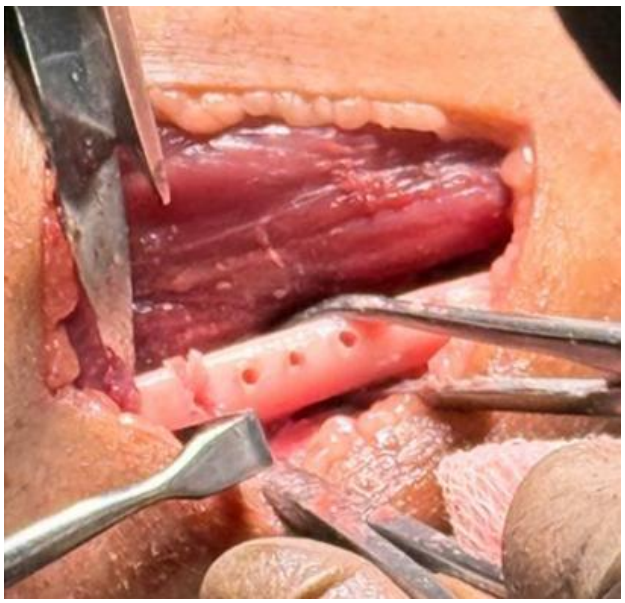


Figure 8: Fibular osteotomy with strut preparation

Figure 9: Telescopic Nail system (male and female nails)

An above-knee slab was provided for extra support after immediate postoperative imaging verified adequate fixation. Fourteen days following the operation, the patient was contacted for suture removal because there were no indications of infection or implant issues. At follow-up intervals of six weeks, serial x-rays revealed sufficient callus development; at three months, full fracture union with graft integration was noted with no lesion recurrence. There was no discomfort at the fracture site and knee flexion could now reach 90° with a slight terminal flexion limitation.

Figure 10: 1.5 months post op

Figure 11: 3 months post op

3. Discussion

Recurrent pathological fractures indicate significant structural compromise and require definitive surgical stabilization to restore biomechanical integrity and prevent further morbidity. In our instance, despite conservative treatment, recurrent unicortical fractures developed into bicortical fractures, indicating insufficient intrinsic stability of the afflicted tibial section. Recurrent bicortical fractures in a skeletally immature kid with diaphyseal non-ossifying fibroma are an uncommon and difficult clinical presentation. Lesion corticotomy and excision, partial fibulectomy to aid in realignment, and growth-preserving intramedullary fixation—which offered instant mechanical stability and encouraged fracture healing—were among the surgical treatments. Because it provides load-sharing stability, preserves alignment, and permits continuing skeletal development while avoiding soft tissue injury, intramedullary fixation is especially beneficial for young patients.[5] Growth-preserving intramedullary stabilization after lesion excision offers better biomechanical support in structurally compromised bone than elastic stable intramedullary nailing (ESIN) alone by addressing both the pathological defect and the mechanical instability, lowering the risk of recurrent fracture. In paediatric tibial pathological fractures caused by non-ossifying fibroma, similar instances described by Easwar et al. and Jain et al. showed positive results after lesion curettage and internal fixation.[8,9] However, in order to stop such occurrences, recurring fracture patterns—like the one we saw—require stronger stability. In order to restore structural integrity and prevent deformity, Campbell's Operative Orthopaedics recommends intramedullary fixation as a surgical option in situations of repeated fractures or substantial cortical involvement.[5] In order to reduce growing fracture risk and functional impairment, surgical stabilization in structurally deficient weight-bearing bones is also supported by radiological research by Greenspan and Resnick.[1,2] The efficacy of combined lesion excision and growth-friendly intramedullary stabilization was validated at the three-month follow-up by good fracture union, preserved alignment, and lack of recurrence. The most important therapeutic lesson is that in order to end the cycle of structural failure and guarantee long-lasting functional recovery, repeated pathological fractures in juvenile NOF should motivate early definitive surgical stabilization. Recurrent diaphyseal non-ossifying fibroma necessitating growth-preserving telescopic stabilization has, as far as we are aware, seldom been documented in the literature.

4. Management and Outcome

Initial management of pathological fractures secondary to non-ossifying fibroma may be conservative in stable unicortical fractures in very young children. To address mechanical instability, however, recurring or bicortical involvement necessitates a final surgical correction. In this instance, growth-preserving intramedullary telescopic fixation was combined with lesion removal. Anatomical realignment was made easier by partial fibulectomy, and bone grafting was applied selectively according to the extent of the remaining defect. Stabilization allowed for ongoing skeletal development while maintaining physeal integrity and restoring structural continuity. Radiographs taken after surgery verified that the reduction was adequate and the alignment was preserved. At three months, full fracture union was attained without implant-related problems or radiological recurrence, and serial follow-up showed increasing callus development. Clinically, the patient recovered functionally and was able to walk steadily while maintaining limb alignment. In a patient with skeletal immaturity, our method preserved development potential while offering long-lasting stability and preventing more fracture events.

5. Recent Advances

Recent developments in paediatric intramedullary fixation have improved clinical results and implant life by refining telescopic nail technology. In juvenile long bone disease, a multicenter prospective research showed that contemporary telescoping intramedullary nails significantly improved function and had high union rates.[10] Sustained alignment and low revision rates in paediatric tibial abnormalities and fractures treated with telescopic systems are further supported by long-term follow-up studies.[11] Additionally, expandable intramedullary fixation devices have demonstrated enhanced functional recovery and dependable radiological union in skeletally immature individuals, supporting their utility in growth-preserving stability.[12] In comparison to previous designs, biomechanical analyses of more recent telescopic structures show improved axial and rotational stability, lower implant-related problems, and better load-sharing mechanics. Furthermore, hybrid constructions and dual intramedullary fixation techniques have been shown to be successful ways to improve stability in juvenile bone that is structurally impaired, especially when bone fragility or recurrent fractures are present.[14] In line with modern paediatricorthopedic concepts of stability, low invasiveness, and preservation of skeletal growth, these developments encourage the use of growth-accommodating intramedullary fixation in recurring pathological fractures.

6. Conclusion

Recurrent pathological fractures due to non-ossifying fibroma represent a clinically significant indicator of structural compromise requiring definitive surgical management. Our example demonstrates how careful lesion excision in conjunction with growth-friendly intramedullary stabilization guarantees consistent fracture union, maintains limb alignment, and stops recurrence while protecting physeal integrity. Stable biomechanical restoration may be accomplished without sacrificing future development because to developing advancements in telescopic and elastic fixation methods. For skeletally immature individuals, early diagnosis and prompt, well-planned treatments are essential for maximizing functional recovery and long-term results.

Source of Support: Nil

Conflict of Interest: Nonedeclared

References

[1] Greenspan A. Orthopedic Imaging: A Practical Approach. 6th ed. Philadelphia: Wolters Kluwer; 2015. p. 365–369.
[2] Resnick D, Kransdorf MJ. Bone and Joint Imaging. 3rd ed. Philadelphia: Elsevier Saunders; 2005. p. 1242–1246.
[3] Dorfman HD, Czerniak B. Bone Tumors. St. Louis: Mosby; 1998. p. 468–476.
[4] Khurana JS, Abdul-Karim FW, Bovée JVMG. WHO Classification of Tumours of Soft Tissue and Bone. 5th ed. Lyon: International Agency for Research on Cancer (IARC); 2020. p. 475–477.
[5] Canale ST, Beaty JH. Campbell's Operative Orthopaedics. 14th ed. Philadelphia: Elsevier; 2021. p. 915–918.
[6] Kumar V, Abbas AK, Aster JC. Robbins and Cotran Pathologic Basis of Disease. 10th ed. Philadelphia: Elsevier; 2020. p. 1177–1179.
[7] Ritschl P, Karnel F, Hajek P. Fibrous metaphyseal defects—determination of their origin and natural history using a radiomorphological study. Skeletal Radiol. 1988;17(1):8–15.
[8] Easwar TR, et al. Non-ossifying fibroma presenting with pathological fracture: a case report. Journal of Orthopaedic Case Reports. 2015;5(4):25–28.
[9] Jain M, et al. Surgical management of pathological fracture through non-ossifying fibroma of tibia in paediatric patient. International Journal of Orthopaedics Sciences. 2019;5(2):102–105.
[10] Zhang Y, Liu X, Wang T, et al. Clinical and functional outcomes of telescoping intramedullary nails in paediatric long bone pathology: a multicenter prospective study. Front Surg. 2025;12:1454192.
[11] Li H, Chen Z, Huang Y, et al. Long-term outcomes of telescopic intramedullary nailing in paediatric tibial deformities and fractures. BMC MusculoskeletDisord. 2025;26:8790.
[12] Kumar R, Singh P, Sharma A, et al. Expandable intramedullary fixation in skeletally immature patients: functional and radiological outcomes. J Pediatr Orthop B. 2024;33(6):512–519.
[13] Patel A, Brown M, Clarke S, et al. Biomechanical assessment of modern telescopic intramedullary nail constructs in paediatric long bones. Appl Sci. 2021;11(12):5422.
[14] Rossi F, Moretti B, Coluccia D, et al. Dual intramedullary fixation strategies in paediatric bone fragility: clinical outcomes and mechanical stability. Injury. 2025;56(3):238–245.