Case Report

POSI
IJPO

Asymmetrical Bilateral Tibial Dysplasia in a Pediatric Patient: A Rare and Complex Presentation

Tariq Altaf Mir[1], Haseeb Gani[1]

Abstract

Bilateral tibial dysplasia is a very rare condition and has only been reported infrequently. We report a rare case of idiopathic bilateral tibial dysplasia in a 15-month-old child with asymmetric presentation. We managed the two sides differently and achieved a satisfactory union. Bilateral tibial dysplasia can be very challenging to manage, and the two sides may not behave similarly. Anterolateral bowing without fracture can have a better prognosis for union.

Keywords: Congenital pseudoarthrosis of the tibia, Tibial dysplasia, Congenital pseudoarthrosis of tibia.

Dr. Tariq Altaf Mir

Dr. Haseeb Gani

Introduction

Congenital tibial dysplasia or congenital pseudoarthrosis of the tibia (CPT) is a rare diagnosis and one of the most challenging conditions to manage in pediatric orthopedics. Almost all cases of tibial dysplasia are unilateral, whereas bilateral cases are sporadic. Treatment can involve multiple procedures to achieve union, and even once achieved, the union may not be permanent, necessitating long-term follow-up.

Case Report

A 15-month-old male child was brought in with bilateral lower limb deformity. The child was born at full term, through normal vaginal delivery as the firstborn to non-consanguineous parents. Soon after birth, parents noticed the deformity. The child had no motor milestone developmental delay. There was no family history of neurofibromatosis. The deformity was slowly progressive. At walking age of 12 months, the child had a trivial fall and had difficulty putting weight on the left lower limb. Since then, the child has been non-weight-bearing and has been referred to our center. On general examination, the child had no facial dysmorphism, no neurocutaneous marks of neurofibromatosis, no kyphoscoliosis, and no other deformities elsewhere. Local examination of the lower limbs revealed bilateral anterolateral bowing of the tibia. No abnormal mobility was noted at the deformity site. No distal neurovascular deficits were seen.

Plain radiographs confirmed findings with only anterolateral bowing of the tibia on the right side and bowing with pseudoarthrosis on the left side (Fig. 1). The child was taken for bilateral lower limb surgery in the same sitting. We started with the left side. The hamartoma was thoroughly debrided, and the excised specimen was sent for histopathology. Choi's 4-in-1 osteosynthesis was attempted. The tibia was stabilized with a retrograde intramedullary Rush nail spanning the ankle, and a few K-wires were used to hold the tibia and fibula cross-union site, using an ipsilateral fibula graft for cross-union. Bone morphogenetic protein (BMP) could not be used in our case due to availability issues. The right side was managed by deformity correction of the tibia and retrograde Rush nail insertion (Fig. 2). Histopathology was consistent with lipofibromatosis. Postoperatively, the child was put in an above-knee cast for 2

Address of Correspondence
Dr. Tariq Altaf Mir,
Department of Paediatric Orthopaedics Unit, Paras Health, Durganag, Dalgate, Srinagar, Jammu and Kashmir, India.
E-mail: mirtariqaltaf@gmail.com

[1]Department of Paediatric Orthopaedics Unit, Paras Health, Srinagar, Jammu and Kashmir, India.

DOI- https://doi.org/10.13107/ijpo.2026.v12.i02.278
www.ijpoonline.com

Submitted: 03/02/2026; Reviewed: 01/03/2026; Accepted: 16/05/2026; Published: 10/08/2026

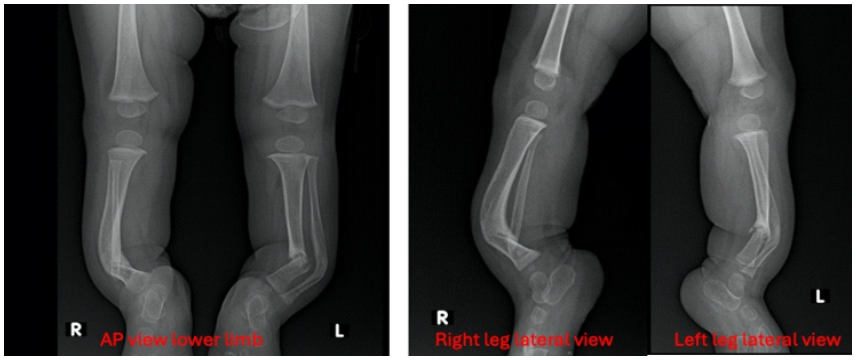

Figure 1: Anteroposterior and lateral radiographic views of lower limbs showing bilateral anterolateral bowing of the tibia with established pseudoarthrosis on the left side. Note can be made of fibula pseudoarthrosis on the right side.

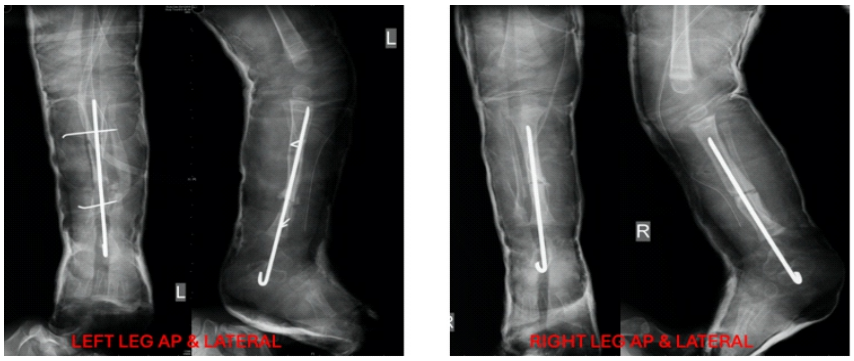

Figure 2: Post-operative plain anteroposterior and lateral radiographs of lower limbs.

months. Plaster was removed, and a customized clamshell orthosis was given on both sides. The child was allowed weight bearing as tolerated with the brace. At 1-year follow-up, the left side tibia pseudoarthrosis failed to unite (Fig. 3), and open grafting of the pseudoarthrosis site using ipsilateral iliac crest cancellous graft was performed. Union was achieved, and the child was followed up on regularly. Three cycles of pamidronate injection were given to strengthen the bone. The right tibia Rush nail was removed later. The left-sided Rush nail was kept in situ and is now planned for exchange with an antegrade Rush nail. At the recent follow-up, the child is 8 years old without any residual deformity in the legs (Fig. 4) and is walking using a clamshell orthosis. He can go to school and manage his routine activities of daily living. His recent radiographs show satisfactory healing on both sides (Fig. 5).

Discussion

CPT or, more accurately, tibial dysplasia is an uncommon orthopedic disorder, with an estimated incidence ranging from 1 in 140,000 to 1 in 250,000 live births [1]. CPT is most frequently associated with neurofibromatosis type 1 (NF1), reported in approximately 50–90% of cases [2]. Less commonly, CPT has also been linked to conditions such as fibrous dysplasia and osteofibrous dysplasia [3].

The pre-fracture condition, often referred to as anterolateral bowing of the tibia, is associated with a high risk of fracture due to the inherent structural abnormalities. Following a fracture, there is a significant likelihood of non-union resulting from a combination of an unfavorable biomechanical environment and compromised bone biology. Even when a union is achieved, it is frequently complicated by issues such as refracture, angular deformity, limb-length discrepancy, joint stiffness, chronic pain, and functional impairment.

Anterolateral bowing of the tibia is typically evident at birth, presenting as a lateral apex along the leg, often accompanied by an inverted or medially displaced foot relative to the lower leg. In cases with a neonatal fracture, abnormal movement at the pseudarthrosis site may be observed. These deformities are almost always unilateral, with noticeable limb shortening and angulation when compared to the opposite leg. Bilateral cases are extremely rare, and only a few cases have been reported [4]. The natural course of anterolateral bowing is typically poor. Spontaneous healing after a fracture is uncommon, particularly when the fracture occurs before the child begins to walk. In cases of

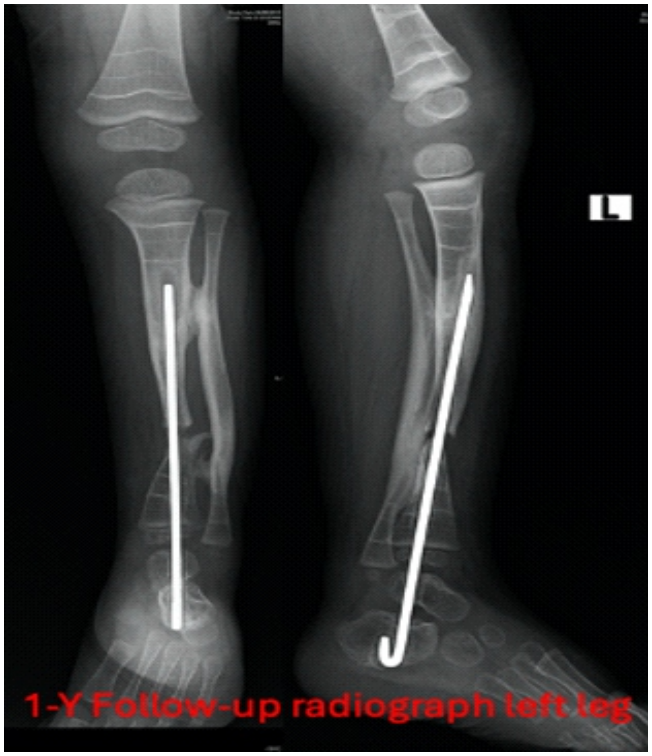

Figure 3: 1-year follow-up plain anteroposterior and lateral radiograph of left lower limb showing non-union at the tibial pseudoarthrosis site with successful cross-union between tibia and fibula, both proximal and distal.

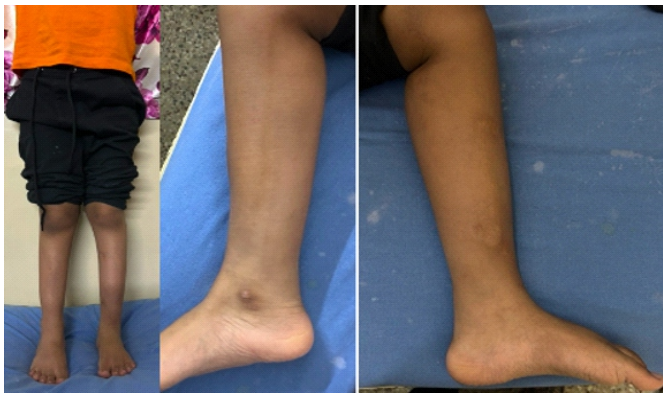

Figure 4: Clinical picture of lower limbs at recent follow-up. No deformity can be seen.

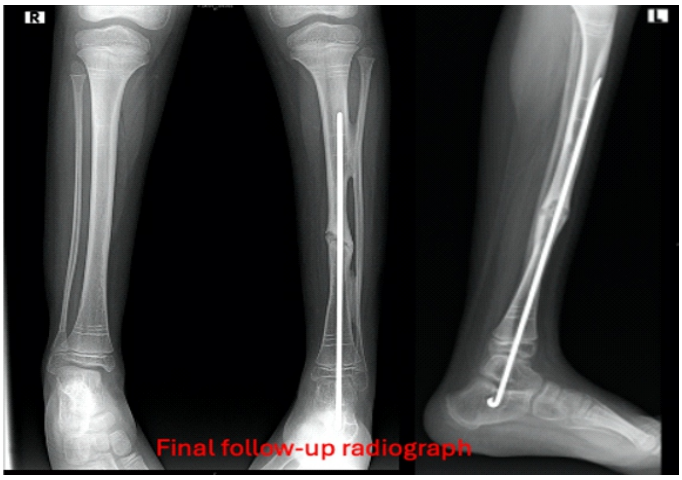

Figure 5: Recent follow-up radiographs of lower limbs with complete healing on the right side. The left side is healed with a retrograde Rush nail in situ, which is short. Note is made of horizontal sclerotic metaphyseal lines corresponding to pamidronate infusions received by the patient.

tibial dysplasia without a fracture, strategies to reduce or delay the risk of fracture include the use of clamshell orthoses, bypass grafting, and growth modulation [5].

The primary goals in treating a dysplastic tibia with pseudoarthrosis are to achieve lasting bone union, maintain proper alignment, and preserve lower limb function. Clinical experience highlights two key principles for successful management: (i) Sustained alignment of the leg is essential, and (ii) permanent intramedullary fixation is recommended to maintain this alignment or to serve as internal support for a united tibia. Three primary surgical approaches are commonly employed to achieve bone union:

1. Resection of the pseudoarthrosis, followed by bone grafting and intramedullary fixation
2. Resection of the pseudoarthrosis combined with circular external fixation
3. Vascularized fibular grafting.

Bilateral tibial dysplasia or CPT cases reported earlier had an association with NF1. Our case is unique in that no neurofibromatosis was detected (idiopathic tibial dysplasia), and the presentation was asymmetrical, with bowing only on the right side and bowing with frank pseudoarthrosis on the left side. There were no union problems on the right side, whereas the left side underwent revision surgery to achieve union. Our report has a few limitations. Follow-up was inadequate, as in CPT, the quality of the union is often dubious, with a high risk of refracture. In addition, BMP, which has been studied well for its role in the union, could not be used in our case due to cost and availability issues.

Conclusion

This case highlights the unusual presentation of bilateral tibial dysplasia with asymmetric clinical progression, where one limb demonstrated progressive bowing while the contralateral side developed pseudoarthrosis. The divergent natural history in the same patient underscores the heterogeneous behavior of tibial dysplasia, even under similar genetic and environmental influences. It emphasizes the importance of individualized monitoring and management strategies for each limb rather than assuming a uniform disease course. This case adds to the limited literature on asymmetric manifestations in bilateral involvement and reinforces the need for long-term follow-up in such patients.

References

1. Hefti F, Bollini G, Dungl P, Fixsen J, Grill F, Ippolito E, et al. Congenital pseudarthrosis of the tibia: History, etiology, classification, and epidemiologic data. J Pediatr Orthop B 2000;9:11-5.

2. Kesireddy N, Kheireldin RK, Lu A, Cooper J, Liu J, Ebraheim NA. Current treatment of congenital pseudarthrosis of the tibia: A systematic review and meta-analysis. J Pediatr Orthop B 2018;27:541-50.

3. Herring JA, editor. Disorders of the leg. In: Tachdjian's Pediatric Orthopaedics. 5th ed. Amsterdam, The Netherlands: Elsevier; 2013. p. 713-58.

4. Chand S, Afaque SF, Singh RK. Bilateral congenital pseudoarthrosis of the tibia: A case report and literature review. J Clin Orthop Trauma 2024;58:102769.

5. Laine JC, Novotny SA, Weber EW, Georgiadis AG, Dahl MT. Distal tibial guided growth for anterolateral bowing of the tibia: Fracture may be prevented. J Bone J Surg Am 2020;102:2077-86.

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

How to Cite this Article

Mir TA, Gani H | Asymmetrical Bilateral Tibial Dysplasia in a Pediatric Patient: A Rare and Complex Presentation | International Journal of Paediatric Orthopaedics | May-August 2026; 12(2): 36-39.