

Ilizarov technique for correcting Blount's disease

Abstract

Blount's disease, also known as tibia vara, is a growth disorder that affects the lower leg, leading to a bowing of the shinbone (tibia). The Ilizarov method can be employed as a specialized treatment approach for correcting deformities associated with Blount's disease.

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Introduction

Erlacher first description of tibia vara and internal tibial torsion (1922). Blount (1937) described tibia Vara as "an osteochondrosis similar to coxa plana and Madelung's deformity but located at the medial side of the proximal tibial epiphysis."

Blount's disease is a complex orthopedic condition, predominantly seen in children, causing a distinctive varus alignment in the lower extremities.¹ This gives rise to a multiplanar limb deformity, committing of varus angulation, anterior bowing (procurvatum), and internal rotation of the tibia. This combined multiplanar type of deformity requires a comprehensive understanding for effective diagnosis and treatment planning in the pediatric population. The Ilizarov method, renowned for its efficacy in addressing complex orthopedic conditions, offers a comprehensive approach to the treatment of Blount's disease.

Materials and methods

From 2000 to 2023 we have treated 96 patients with Blount's Disease. 56 males and 40 females, mean age was 7 years, were treated by Ilizarov. The typical duration of treatment averaged six months, with a variability ranging from four to twelve months. Patient selection based on diagnosis of Blount's disease, preoperative assessment including clinical and radiographic evaluation, surgical planning tailored to individual cases, Ilizarov frame application under fluoroscopic guidance, percutaneous wire and pin insertion, gradual correction through distraction osteogenesis, and postoperative care including regular monitoring and physical therapy.

Clinical features

The exact cause of Blount's disease is not fully understood, and it is likely to be multifactorial, involving a combination of genetic, mechanical, and environmental factors. Some potential factors that may contribute to the development of Blount's disease include:

Early walking and overweight in infantile

Children with infantile Blount's disease often begin walking early, typically before 12 months old. The combination of early walking, and

being overweight contributes to an increased stress on the developing leg bones, potentially playing an okay role in the development of the condition!

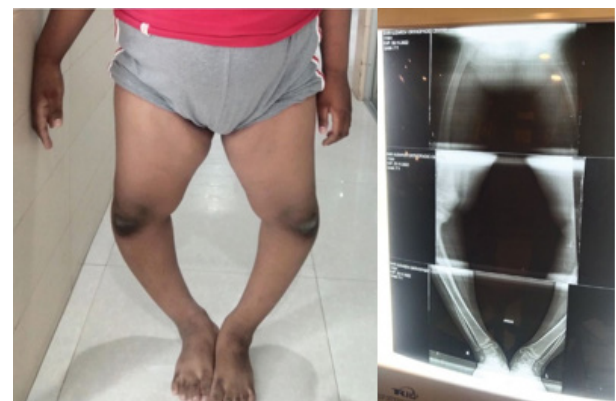
Weight-related factors

Adolescent Blount's disease may be associated with factors which include rapid weight gain in adolescents, and also obesity. This additional, often, places increased stress on the growing; particularly, around the knee joint. This could potentially leading to the characteristic varus deformity seen in Blount's disease! In some cases, the condition could have been preventable with proper weight management.

Genetic component

The condition tends to run in families, suggesting a hereditary predisposition. While, like the actual genetic factors involved are not fully understood, the familial clustering of cases highlights the influence of genetics in some instances.

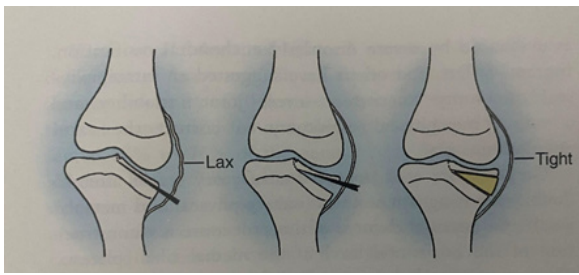
Clinical features



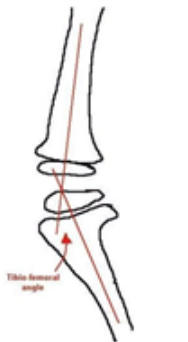
Similar to physiologic genu varum

Obese

Often lateral thrust on walking



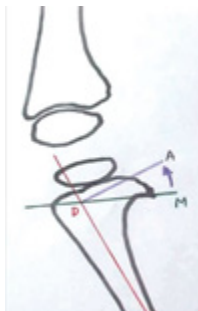
Hemicondylar osteotomy.



Tibiofemoral angle



Metaphysis Diaphysial angle (Levin and Drennen)



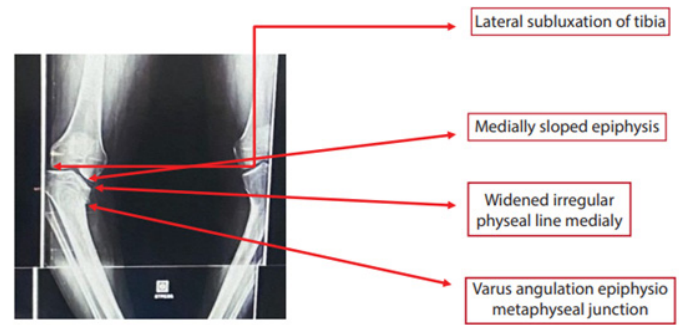
MDA Angle



MDA < 11: normal physiologic bowing

MDA 11-15: equivocal

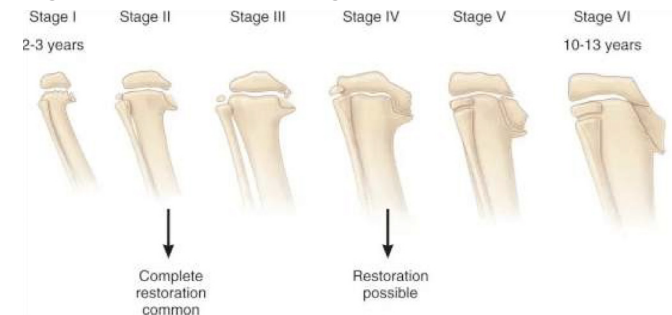
MDA > 15: Blount's



Classification

The Langenskiold classification helps orthopedic surgeons determine the appropriate treatment approach based on the severity of the disease.

Stages of Blount's disease: Langenskiold



Stage I and II

- i. More than 3 yrs.
- ii. Metaphyseal corrective osteotomy and fixation Either acute or gradual correction
- iii. External fixation
- iv. Over correction 5-6 degree valgus

Stage III

- i. Corrective osteotomy metaphyseal alone
- ii. Delay in surgery higher chances of recurrence

Stage IV and V

- i. More serious
- ii. Physal arrest already occurred [not seen radiologically]
- iii. Two deformities- metaphyseal and epiphyseal
- iv. Treatment must be individually

Stage VI

- i. Medial bony bridge and epiphyseal closure
- ii. Deformity is progressive as long as the growth continues
- iii. Two deformities- intraarticular & extra articular

Results

Blount's disease can be corrected simultaneously by Ilizarov fixation with minimum complications. There were no recurrent deformities in our cases. The deformity correction was achieved with a proper alignment in all the cases.

Discussion

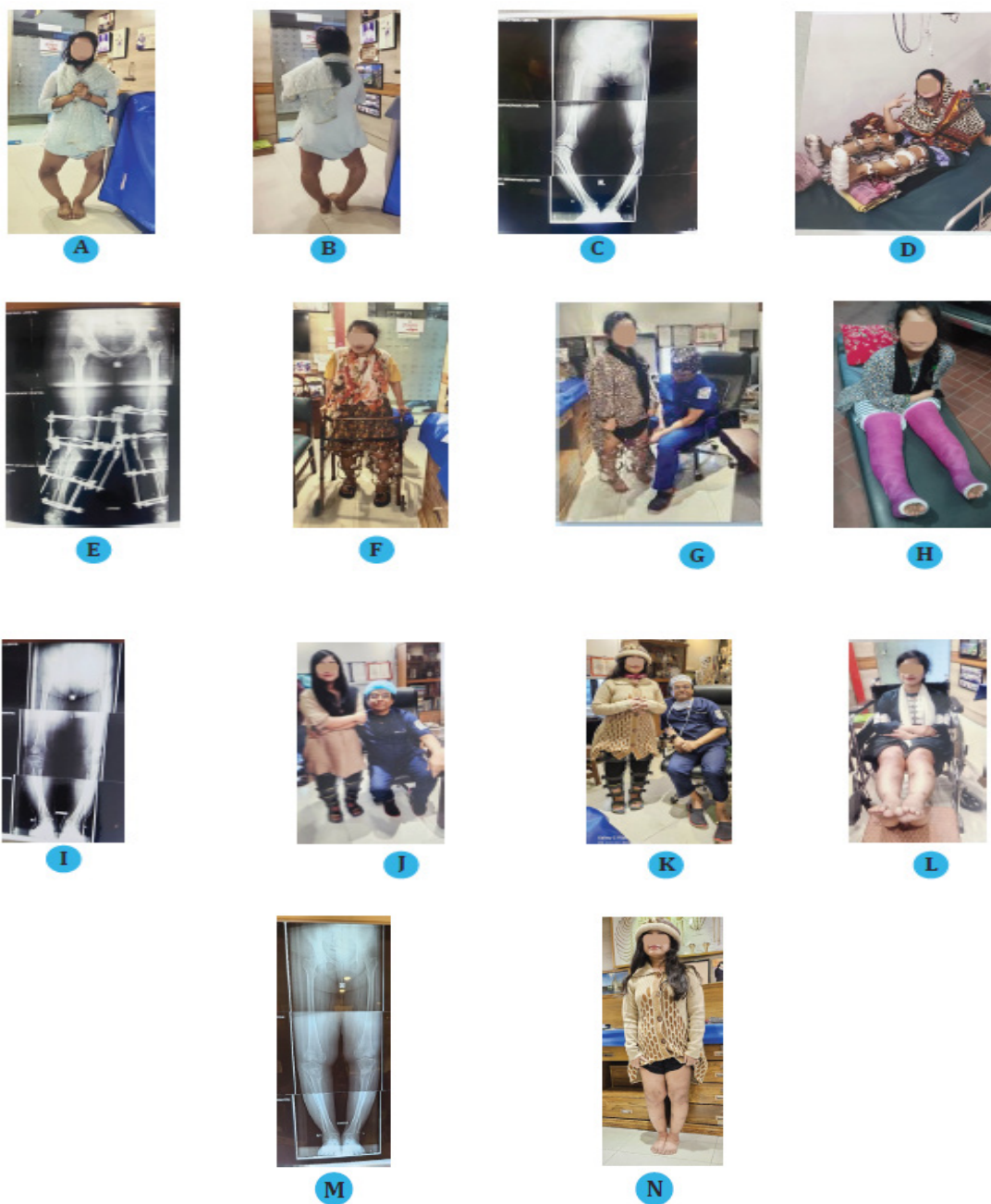
Ilizarov methodology and the apparatus goes hand in hand when it comes to correcting Blount's disease. Pre-operatively, a detailed general, systemic and radiological examination is important. The Ilizarov technique has emerged as an effective method for correcting the complex deformities associated with Blount's disease.²⁻⁴ The aim of the study was to increase the overall quality of life of the patient. By employing external fixation devices and gradual bone manipulation,

the Ilizarov technique offers precise correction while minimizing soft tissue trauma and preserving neurovascular structures.⁵ This approach is particularly beneficial in pediatric patients, where skeletal immaturity necessitates interventions that can accommodate ongoing growth. This requires a very thorough and methodical patient follow-up throughout the entire duration of treatment. Concurrently, exercise, physical therapy should be carried out consistently so as to minimize the extent of any complications.



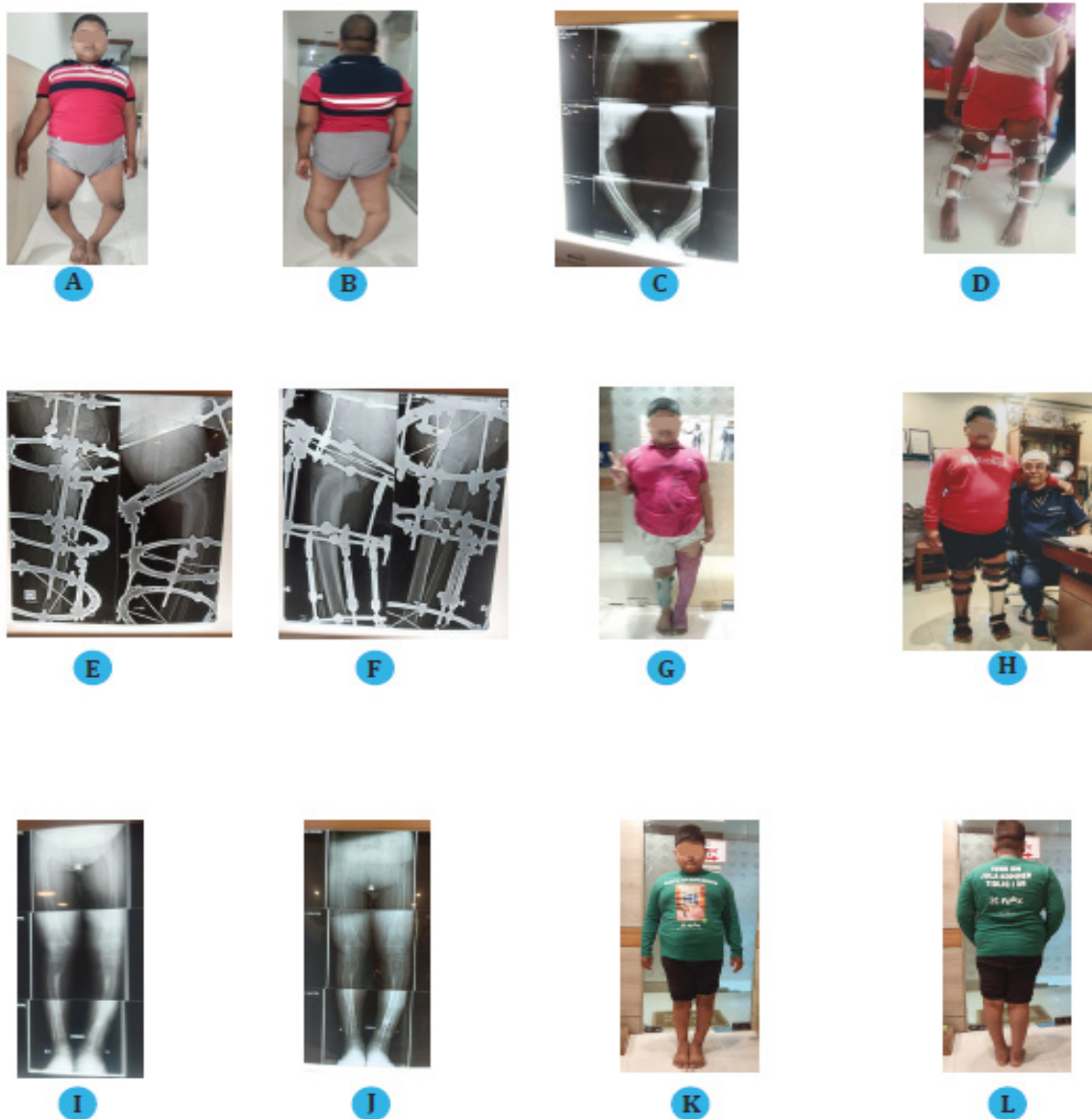
Case I

- a) 2 years old girl with Blount's disease
- b) Radiographic view showing, left sided severe Blount disease (type 2)
- c) Patient with Ilizarov apparatus
- d) Correction of deformity by hinge application
- e) Patient is comfortable with Ilizarov ring
- f) Radiographic view after 3 weeks with full consolidation
- g) Smiling patient with Ilizarov apparatus
- h) Radiographic view after 1 month
- i) After 2 months followed-up, plaster immobilization
- j) Radiographic view after removal of plaster immobilization, after 1 month
- k) Final radiograph after 3 months. Full correction is achieved
- l) m) Patient after 3 months (Front & back view).



Case 2

- a,b) Sequelae of Blount's disease with bowing of tibia with genu Varum– 24 years old girl (Font and back view)
- c) X-ray showing Blount's disease with bowing of tibia with genu Varum
- d) Patient with Ilizarov apparatus
- e) Radiographic view showing patient with Ilizarov apparatus
- f) Patient with Ilizarov apparatus with full weight bearing
- g) The doctor is examining the patient's Ilizarov apparatus
- h) After removal of Ilizarov apparatus, plaster immobilization
- i) After 6 months followed-up
- j,k) Patient with brace for support
- l) After removable of plaster
- m) Stress x-ray showing full correction
- n) Full correction achieved after 9 months treatment



Case 3

- a, b) 7 years old boy, Blount's disease with Bilateral Bow legs (Front and back view)
- c) X-ray showing Blount's disease with Bilateral Bow legs with both metaphyseal and epiphyseal
- d) Patient with Ilizarov apparatus with full weight bearing
- e, f) Radiographic view after 2 weeks
- g) After removal of Ilizarov apparatus, plaster immobilization
- h) Patient with brace for support
- i) After 8 months treatment
- j) Stress x-ray showing full correction After 11 months treatment
- k, l) Full correction achieved after 11 months treatment (Front and back view)

Conclusion

In conclusion, the Ilizarov technique stands as a very valuable and an effective approach for correcting Blount's disease. This method, involving external fixation and gradual correction, has demonstrated successful outcomes in addressing the deformities that are associated

with the condition. The ability to customize the correction process through controlled adjustments using the external fixator contributes to its great versatility. Moreover, the deliberate strategy of overcorrection, often by 5-6 degrees in valgus; helps mitigate the risk of relapse, during the healing period. With an average treatment duration of six months, ranging from 4 to 12 months, the Ilizarov

technique offers a very comprehensive solution that not only corrects the immediate deformity, but also allows for careful monitoring; and adjustments, ultimately leading to improved long-term results, in the management of Blount's disease.^{6,7}

Acknowledgments

None.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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