

# Low Profile Ilizarov Frame in Correction of Varus Deformity in Patients With Adolescent Blount's Disease

Thesis

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## *List of abbreviations*

|              |                                     |
|--------------|-------------------------------------|
| <b>ACL</b>   | <b>anterior cruciate ligament.</b>  |
| <b>AP</b>    | anteroposterior.                    |
| <b>CORA</b>  | centre of rotation of angulation .  |
| <b>EFT</b>   | external fixation time.             |
| <b>FDO</b>   | focal dome osteotomy.               |
| <b>FshA</b>  | femoral shaft axis.                 |
| <b>JLCA</b>  | joint line convergence angle.       |
| <b>LAT</b>   | lateral.                            |
| <b>LCL</b>   | lateral collateral ligament.        |
| <b>LDFA</b>  | lateral distal femoral angle.       |
| <b>LDTA</b>  | lateral distal tibial angle.        |
| <b>LLD</b>   | limb length discrepancy.            |
| <b>LOTV</b>  | late onset tibia vara.              |
| <b>MAD</b>   | mechanical axis deviation.          |
| <b>MAF</b>   | mechanical axis of the femur.       |
| <b>MA-LE</b> | mechanical axis of lower extremity. |
| <b>MAT</b>   | mechanical axis of the tibia.       |
| <b>MCL</b>   | medial collateral ligament.         |
| <b>MPTA</b>  | medial proximal tibial angle.       |
| <b>PCL</b>   | posterior cruciate ligament.        |
| <b>PPTA</b>  | posterior proximal tibial angle.    |

|             |                         |
|-------------|-------------------------|
| <b>S</b>    | Significant.            |
| <b>SD</b>   | standard deviation.     |
| <b>SCO</b>  | straight cut osteotomy. |
| <b>TFA</b>  | thigh foot angle.       |
| <b>TSF</b>  | Taylor spatial frame.   |
| <b>TshA</b> | tibial shaft axis.      |
| <b>TTT</b>  | total treatment time.   |

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## ***ABSTRACT***

**Introduction:** Adolescent Blount disease or late onset tibia vara constitutes the most common cause of pathologic genu varum in late childhood and adolescence. It is a developmental condition characterized by disordered endochondral ossification of the posteromedial part of the proximal tibial physis resulting in multiplanar deformities of the lower limb

**Aim of the work:** The aim of this study was to evaluate the results of acute correction of Adolescent Blount disease by using low profile Ilizarov frame.

**Patients and Methods: Equipment used** It is a prospective study for 10 patients who had adolescent Blount disease treated by acute correction using low profile Ilizarov frame. We looked principally into the following variables to evaluate the results of the treatment: Deformity correction (expressed as mechanical axis restoration), the average normal values were used as a reference (medial proximal tibial angle, 85–90; posterior proximal tibial angle, 77–84; thigh–foot angle, +10 external rotation)

**Keywords:** Blount disease , Low profile Ilizarov , acute correction

### *Introduction*

Adolescent Blount disease or lateonset tibia vara constitutes the most common cause of pathologic genuvarum in late childhood and adolescence. It is a developmental condition characterized by disordered endochondral ossification of the posteromedial part of the proximal tibial physis resulting in multiplanar deformities of the lower limb<sup>(1)</sup>.

In 1922, Erlacher<sup>(2)</sup> is credited with the first description of progressive tibial varus deformity in otherwise healthy children.

In 1937, Blount<sup>(3)</sup> reviewed previous reports adding his own cases. He was the first to identify two forms of this disorder; infantile and adolescent (late onset) and coined the term “osteochondrosis deformans tibiae”. However, the condition also referred to as “tibia vara” in the literature, is often referred to as Blount disease.

Langenskiöld<sup>(4)</sup> made significant early contributions to the identification and management of infantile Blount disease in 1964. He described a prognostic radiographic classification system.

Although Blount coined the term tibia vara implying a solely frontal plane deformity, subsequent authors noted that multiplanar deformities are commonly seen with this condition. Secondary to the asymmetrical growth with relative inhibition of the posteromedial portion of the proximal tibial growth plate, a three dimensional deformity of the tibia with varus, procurvatum (apex anterior), and internal rotation develops, along with possible limb shortening in unilateral cases<sup>(5,6)</sup>.

This entity can lead to a progressive deformity with gait deviations, limb length discrepancy, and premature arthritis of the knee<sup>(7,8)</sup>.

Two clinically distinct forms of Blount disease; early onset (infantile) and late onset have been described, with the classifications based on whether the limb deformity develops before or after the age of four years<sup>(3,4,9)</sup>.

Thompson and Carter<sup>(9)</sup> further classified late onset Blount disease as a juvenile type (onset at the age of four to ten years) and an adolescent type (onset after the age of ten years).

Bilateral involvement is common, particularly with an early onset presentation<sup>(6)</sup>. Although there are clinical and radiographic differences between early and late onset Blount disease, there are several similarities, including a predisposition for obese black children. Also, there are comparable histologic findings at the proximal tibial growth plate<sup>(9-11)</sup>.

The prevalence of adolescent Blount disease may be as high as 2.5% in the population at greatest risk, obese black males<sup>(12,13)</sup>. Incidence may furthermore be escalating because of the increasing prevalence of morbid obesity in western society<sup>(14)</sup>. Male:female ratio of 4:1 and over 90% of patients obese and black<sup>(15-16)</sup>.

It is postulated that the medial femoral physis also suffers growth inhibition due to the high loads through the medial knee joint particularly in older obese patients with a fat thigh gait<sup>(17)</sup>.

Several treatment modalities were described for these cases as proximal tibial osteotomy, growth modulation, and medial plateau elevation that are either carried out as an isolated procedure or in combination with other osteotomies<sup>(18-20)</sup>.

Proximal tibial osteotomy is still the standard surgical management for late onset cases where the researchers observed that the proximal tibial physis typically grow symmetrically following this osteotomy<sup>(21,22, 26)</sup>. Methods of fixation of the osteotomy have changed, from plaster alone to include limited internal fixation with Steinmann pins, stable internal fixation with compression plates or external fixation.

Due to the difficulties associated with obesity in late onset Blount disease, external fixators have become a popular fixation method, including monolateral and circular fixators. The deformity correction using external fixation can be done either acutely or gradually<sup>(23,24,25)</sup>. While the gradual correction strategy using distraction osteogenesis has its crucial indication in certain situations like addressing severe deformity or a coincident significant anatomical limb length discrepancy, as it requires a high degree of patient compliance and still has its recorded complications<sup>(27,28)</sup>. Conversely, patients should be more compliant to an acute correction strategy and requires less regular follow up visits, but it needs proper case selection.

