

# OBESITY and TIBIA VARA

by Mark T. Dahl, M.D.

Tibia vara, commonly referred to as Blount's disease, is an abnormality of the growth of the inner tibia just below the knee. In 60 percent of cases, the condition affects both legs. Some describe the physical features of Blount's as genu varus or "bowlegs." There are, however, characteristics that differentiate Blount's from the physiologic bowleg.

The two forms of Blount's are: *infantile*, with onset between 1 and 3 years of age, and *adolescent*, with onset between 8 and 13 years of age. Generally, the younger children are when diagnosed, the more severe the condition because of a longer remaining growth period. Untreated Blount's can result in severe orthopaedic issues — including early arthritis — for years to come. Also, when the condition is treated early, the outcome is more likely to be successful.

## Infantile Blount's

Infantile Blount's is a progressive disease, and the main period of progression of the varus deformity is in the first few years of life. The deformity may undergo spontaneous regression in mild cases, but this is rare.

Children with Blount's are often obese, have short stature and walk earlier than their peers. The condition affects

children of all cultural backgrounds, but is more prevalent in African-American children, who — presumably because of earlier ambulation and increased weight — apply abnormal forces across their physis (growth plate). The asymmetric growth results in malalignment. There is no evidence that infection, trauma, or blood deficiencies are contributing factors to infantile Blount's; however, they can mimic the condition.

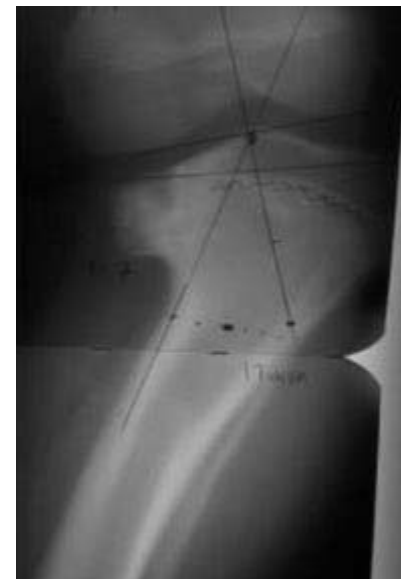
## Diagnosing Infantile Blount's

Obesity is frequently a factor when patients present with infantile Blount's. On physical examination, bowing just below the knee is revealed. A bony, non-tender bulge on the medial aspect of the tibial metaphysis may be palpable. With the knee flexed 10 to 15 degrees, there may be instability of the tibia on the femur. The child walks with the knee flexed.

Clinically, it's difficult to differentiate early infantile Blount's from the physiologic bowleg. Until there are definite X-ray changes in the physis, the physician can't be certain whether the patient has Blount's. By repeated clinical and radiographic examinations, however, the diagnosis can be made.

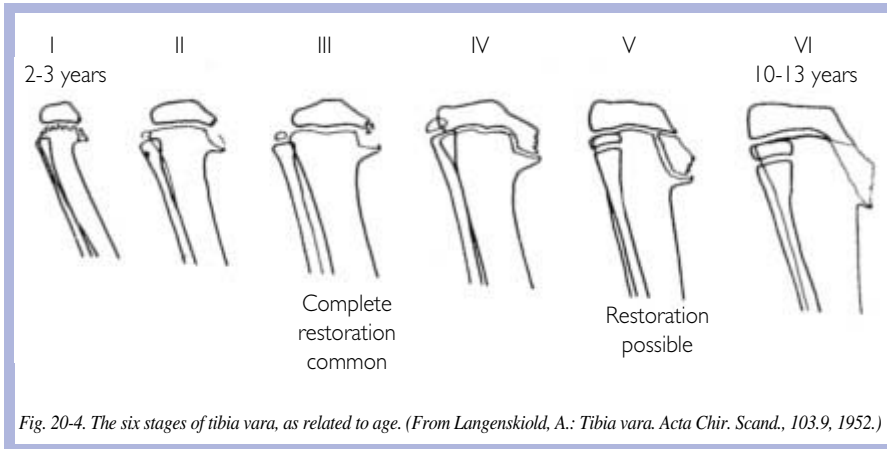
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**Figure 1** These illustrations are of a 7-year-old female with severe infantile Blount's. The patient was treated with an osteotomy at 3 years of age, and because of continued obesity issues, had a recurrence of the condition. She was treated with a second osteotomy at age 7.



## Figure 2 X-ray Stages of Blount's.

This illustrates X-ray appearances of the upper tibia at six stages of Blount's.



## Prevention

Although surgical intervention is usually successful in treating infantile Blount's, weight control is essential to controlling recurrences. Physicians may want to recommend weight-management options for patients who present with obesity — or potential weight issues.

## Adolescent Blount's

When tibia vara occurs in older children, it is generally referred to as adolescent Blount's.

The adolescent type, which occurs during the adolescent growth spurt, is commonly seen in obese African-American males. Adolescent Blount's is usually unilateral, and most patients present with knee pain. The radiographic appearance is quite different than the infantile type. There is no steplike deformity of the proximal tibial epiphyseal plate, and the ossified portion of the epiphysis appears to be relatively normal. The overall appearance is of a prematurely closing medial physis.

## Diagnosing Adolescent Blount's

The etiology of adolescent Blount's is suspected to be mechanical in nature. Obesity and residual physiologic bowleg contribute to mechanical and histopathologic changes in the medial tibial growth plate. Typical radiographic findings include narrowing of the medial aspect of the tibial epiphysis with the physis irregularly thickened.

## Treatment

Surgical treatment of choice is an osteotomy performed high on the tibia with or without a fibular osteotomy. Internal fixation (screws and plates) or external fixation can be used.

## Prevention

As with infantile Blount's, weight control is important in preventing recurrence. Physicians may want to recommend weight-management options for patients who present with obesity issues.

Usually, by age 2, physiologic bowlegs will have shown spontaneous improvement, while the deformity in Blount's disease will have increased and radiographic changes in the proximal tibia will be well-developed. There are six radiographic stages, related to age and severity of the condition, that occur. These range from stage 1, in which irregularity of the proximal medial tibial metaphysis is noted, to stage 6 in which branches of the medial aspect of the physis have ossified. Some characteristic features of the intermediate stages are widening and irregularity of the medial aspect of the physis (see figure 2).

## Treatment for Infantile Blount's

Left untreated, infantile Blount's usually progresses and can lead to severe changes, including knee instability and early arthritis. When Blount's is untreated, the medial portion of the growth plate at the proximal tibia produces bone, causing asymmetrical growth at the knee and progressive bowlegs.

The treatment for infantile Blount's usually involves some form of osteotomy. However, in mild cases noted early in life (stage 1 or 2 in a 2- to 3-year-old), observation with the possible use of a corrective orthosis may be considered. Progression to advanced stages (stage 3 or 4) is an indication for osteotomy. An osteotomy performed before age 8 on a patient with stage 4 — or less — Blount's is usually sufficient to correct the deformity. The younger the patient, however, the greater the likelihood of recurrence.

Corrective orthotics may be used in patients older than 3 who have stage 1 or 2 Blount's disease, but results are variable. Patients who have persistent varus deformity without evidence of improvement after one year of orthosis use, presenting with stage 3 involvement, are treated with a proximal tibial corrective osteotomy.

Patients who present with advanced involvement (stage 5 or 6) have a complex proximal tibial varus deformity. This deformity may best be corrected with gradual realignment osteotomy, using an external fixator to support the bone while healing. The goal of these procedures is a proper relationship to the mechanical axis of the limb and restoration of a more normal configuration of the articular surface of the proximal tibia (see figure 3).

## CASE STUDY

**Figure 3**

Photos A and B

These x-rays and photos are of a 10-year-old male with adolescent Blount's. A 3 centimeter leg-length difference, in addition to the varus deformity, is evident.

Photo C

Shows the Ilizarov external fixator in place while lengthening and straightening the tibia.

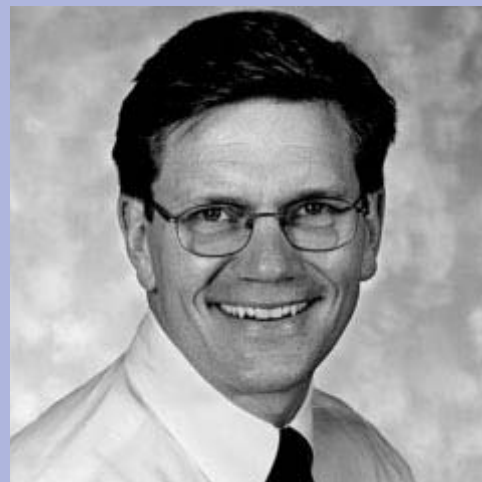
Photo D

Shows equal leg lengths and corrected deformity.



# Author's Profile

**Mark T. Dahl, M.D.**



Mark T. Dahl, M.D., specializes in adult and pediatric limb reconstruction surgery. He graduated from Mayo Medical School and completed his residency in orthopaedic surgery at the University of Minnesota in Minneapolis. He began working at Gillette Children's Specialty Healthcare in 1989. He also is medical director of the Minnesota Limb Length Center.

Dahl's ongoing education has included specialized training on the application of the Ilizarov procedure (for limb lengthening) in Russia, where the technique originated. He also completed advanced fellowship study at the University of Verona, and in Lecco, Italy.

He is certified by the American Board of Orthopaedics. His professional associations include the American Academy of Orthopaedic Surgeons, Minnesota Orthopaedic Society, Pediatric Orthopaedic Society of North America, and Association for the Study and Application of the Methods of Ilizarov — North America. For further information, contact Dahl at 651-229-3991 or 612-672-2911.

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Please send your questions or comments to:

*A Pediatric Perspective*  
Marketing Communications  
200 East University Avenue  
St. Paul, MN 55101  
651-229-1744

Editor-in-Chief.....Steven Koop, M.D.  
Editor.....Beverly Smith-Patterson  
Designer.....Kim Goodness  
Photographer.....Anna Bittner

12-02SEXTON7600GG



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*Specialty Healthcare*

200 East University Avenue  
St. Paul, Minnesota 55101  
651-291-2848  
TDD 651-229-3928  
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## Gillette Welcomes New Orthodontist



Gillette welcomes Cheryl Cermin, D.D.S., an orthodontist who specializes in orthodontic care for patients who undergo plastic and reconstructive surgery. Cermin joins the Minnesota Center for Craniofacial Surgery at Gillette.

In her practice, Cermin uses a revolutionary orthopaedic appliance, called an obturator, for children who have cleft lip and palate. The obturator, used before initial lip surgery is performed, helps pull the cleft areas together, improving the ability of newborns to suck and swallow.

Cermin holds bachelor of science and doctor of dental surgery degrees from the University of Minnesota. She completed a general practice residency at Brigham and Women's Hospital at Harvard School of Dentistry in Boston and an advanced graduate residency in orthodontics at the Goldman School of Dentistry at Boston University. Her fellowship in surgical orthodontics was completed at the University of Texas Southwestern Medical School in Dallas.

Cermin is an assistant clinical professor at Baylor College of Dentistry and in the division of oral and maxillofacial surgery and the department of plastic and reconstructive surgery at the University of Texas Southwestern Medical School.

She is a member of the American Dental Association, the American Association of Orthodontics, and the American Cleft Palate Association.

## Referral Information

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