ANTERIOR MEDIAL AND POSTERIOR MEDIAL DEFORMITY OF THE TIBIA

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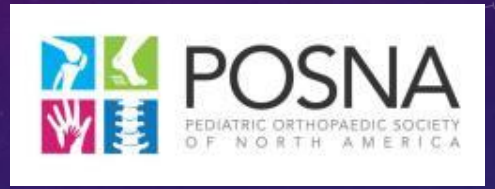
DISCLOSURES



- POSNA President and BOD member
- AAP Immediate Past Chair and Section on Orthopaedics Executive Committee
- K2M Consultant
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- Project Perfect World Board of Directors.
- Miracle Feet Medical Advisory Board.

LEARNING OBJECTIVES TIBIA BOWING

- Examine patient with open mind
- What is the direction of the bowing?
- Detect other associated abnormalities
- Understand the difference in the natural history of anterior lateral, anterior medial and posterior medial bow.

Modern Medicine

TYPES OF BOWING YOU WILL SEE

Direction of Bowing	Clinical Conditions	Features
Lateral upper tibia. Classic bow legs	Blount disease	May be unilateral, often bilateral Can be Juvenile or Adolescent
Anterior lateral bowing	Congenital pseudarthrosis tibia	50% of the time patient may have NF1. Surgical treatment for pseudarthrosis
Posterior bowing. May be iatrogenic if excessive stretching.	Arthrogryposis, Escobar syndrome	May see posterior bow with excessive stretching in therapy.
Anterior medial or anterior bowing	Fibula hemimelia	May have dimple. Femur and foot are frequently involved. Despite treatment may still have shortening and anterior medial bow. When severe do well with amputation.
Posterior medial bowing	Isolated deformity. Foot and femur typically normal	Corrects mostly in the first year then less so. May have up to 5-7 cm shortening and need treatment

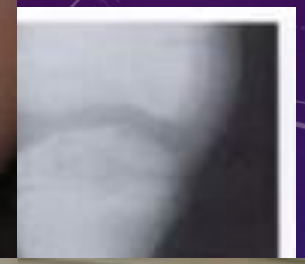
BLOUNT'S DISEASE- CLASSIC BOW LEGS

ANTERIOR LATERAL BOW

- Classic for congenital pseudarthrosis tibia
- Diagnose by physical exam.

ANTERIOR LATERAL BOW

- Classic for congenital pseudarthrosis tibia
- Diagnose by physical exam
- NF1- skin can tell us a lot



SELF ASSESSMENT QUESTION

- 4 month old B popliteal pterygium syndrome 100 deg KFD. Future Rx?
- 1. Serial weekly casting.
- 2. PT dynamic splinting.
- 3. Releases, skin Z-plasty, excise bands, posterior knee capsular release.
- 4. femoral shortening ostetomies with extensive soft tissue releases.
- Gradual correction with external fixators, no releases.

SELF ASSESSMENT QUESTION

- 4. femoral shortening osteotomies with extensive soft tissue releases.
- >60 degree deformity is difficult to correct.
- Can see ischium to calcaneus band
- Sciatic nerve near band
- Can get iatrogenic tibia deformity-recurvatum with posterior bow if excessive physical therapy.
- 20-40 deg-hamstring lengthening and splinting.
- >40 deg- femoral shortening or fixator with soft tissue releases and postoperative splinting.

FIBULA HEMIMELIA

- Most common longitudinal deficiency of the long bones
- 1 per 50,000-135,000 live births
- No genetic transmission
- Spectrum from mild fibula shortening to complete absence with tibia shortening
- 75% have anomalies in the femur and knee laxity
- Foot deformity: valgus, absent lateral rays, coalitions (tarsal 50%, also ray)
- Variable anterior (valgus) tibia bow (±dimple)
- Ankle needs reconstruction before any attempt at lengthening

ANTERIOR MEDIAL BOW

- 3 year old boy with fibula hemimelia
- Notice dimple over the tibia and 3 toe foot

- 5 main problems with the limb
  - Limb length discrepancy
  - Foot and ankle deformities and deficiencies
  - Tibia deformity
  - Genu valgum
  - Knee instability
    - Paley 2016


PLEASE RETURN
THIS RADIOGRAPH TO THE
PERMANENT RECORD
L

INDICATIONS FOR TREATMENT IN FIBULAR DEFICIENCY

- Parent education and contact with other families.
- Limb preservation and correction:
  - 4 or more rays in foot
  - < 8 cm predicted LLD
  - Stable, mobile ankle, plantigrade foot
  - Access to multidiscipline team.
- Amputation
  - >25 cm LLD at maturity
  - Poor foot and ankle

- Herring JA, Birch JG. Child with Limb Deficiency, Shriners Symposium 1997

FIBULAR HEMIMELIA, CLASSIC OUTCOMES

- Children with lengthening did well, but children with amputation and prosthesis at 1.2 years of age did even better.
    - McCarthy 2000
- Patients with Syme amputation at average 15 mo were more active than those using extension prosthesis. Did not need the kyphus corrected.
    - Eastwood D 2017
- Much enthusiasm now for foot reconstruction then lengthening
    - Paley 2016, Hefny 2017

SELF ASSESSMENT EXAMINATION

- Newborn images. What is best course of action?
- 1 genetic testing
- 2 stretching exercises performed by the parents
- 3 series of corrective plaster casts
- 4 long leg orthosis to control the foot and leg
- 5 surgical lengthening of the anterior tibial tendon and a short leg cast.

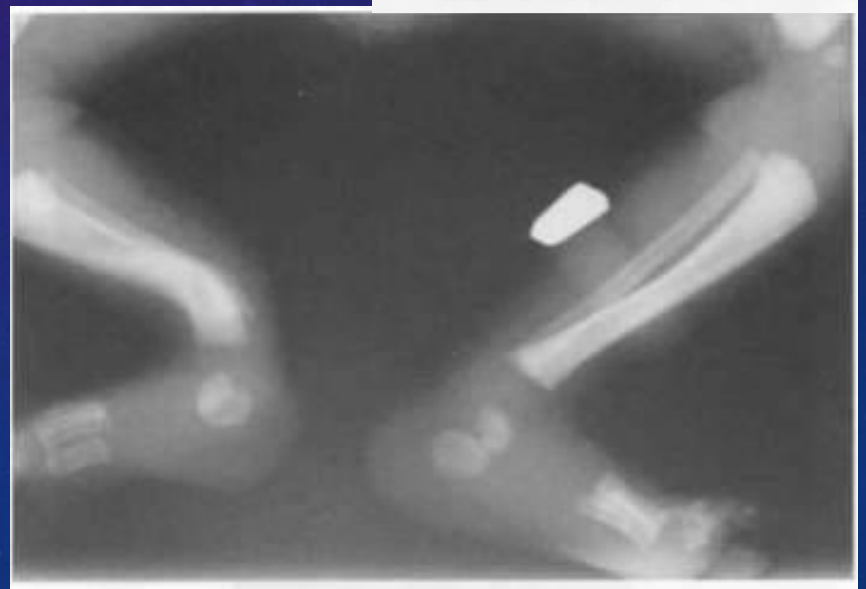


Figure 11b: Item 26

SELF ASSESSMENT EXAMINATION

- Answer: 2 stretching exercises performed by the parents

- Posteromedial bowing of the tibia and calcaneal valgus. Both thought caused by positioning. Long term problem is LLD.
  - Hofmann A, Wenger DR. JBJS 1981.

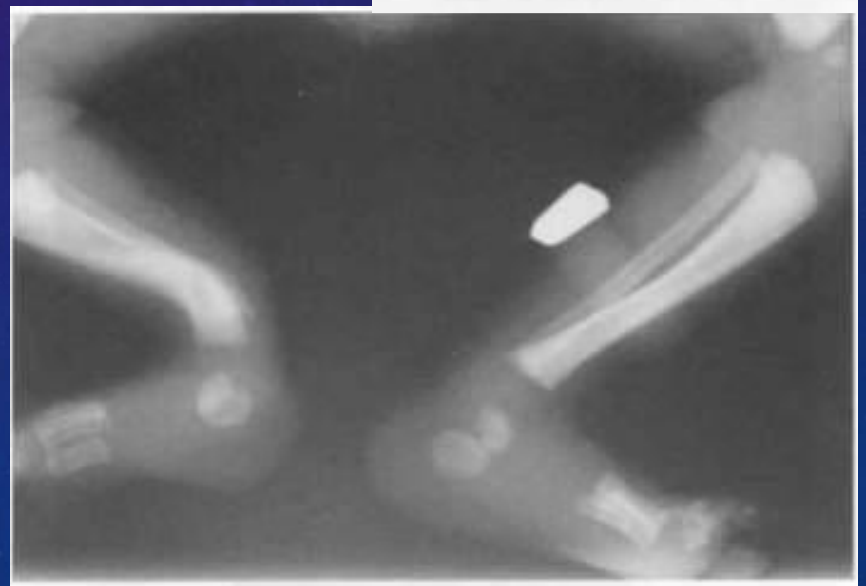


Figure 11b: Item 26

POSTERIOR MEDIAL BOW

- Confused with calcaneous valgus foot
- Corrects rapidly during first year then up to 4 years.
- Have greater shortening with worse deformity.
  - Pappas AM 1984
- Corrects more through the physis than the diaphysis
- May have 5 -7 cm or more limb length discrepancy at maturity
  - Shah HH 2009

POSTERIOR MEDIAL BOW

- Follow until maturity.
- Compared to conservative treated, surgical treated had more complications, but corrected the LLD
- Recommended corrective osteotomy and lengthening near end of growth.
  - Johari A

SUMMARY OF TIBIA BOWING

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REFERENCES

- Calder P (Eastwood D) A comparison of functional outcome between amputation and extension prosthesis in treatment of congenital absence of the fibula with severe limb deformity. J Child Orthop 2017 Aug 1:11(4):318-325.
- Hefney H et al. Ankle reconstruction in fibular hemimelia:New Approach. HSS J. 2017 Jul;13(2):178-185.
- Johari AN. Congenital posterior medial bowing of the tibia and fibula. Is early surgery worthwhile. JPO B Nov 2010;19(6):479-486.
- McCarthy JJ. Comparison of outcome measurements after amputations and lengthening. JBJS Dec 2000;82A(12):1732-5
- Pappas AM. Congenital posterior medial bowing of the tibia and fibula. JPO A 1984 Sep:4(5):525-531
- Paley D. Current Concepts Review. Surgical reconstruction for fibular hemimelia. J Child Ortho 2016;10:557-583
- Shah HH, Joseph B. Posteriormedial bowing of the tibia: a retrospective analysis of growth abnormalities in the leg. JPO B 2009 May;18(3):120-128.