

# Guided Growth – When? How?

## Different options: plates, screws, staples, drilling

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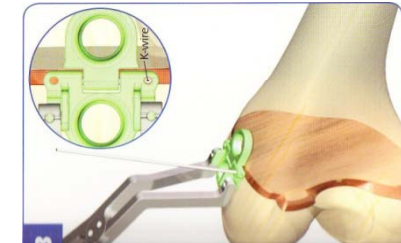
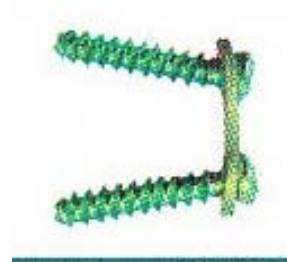
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Disclosure: NO Conflict of Interest

# Different options for guided growth

JPO 2007.  
Guided Growth for Angular Correction  
*A Preliminary Series Using a Tension Band Plate*  
Peter M. Stevens, MD

- Plates



Hinge plate

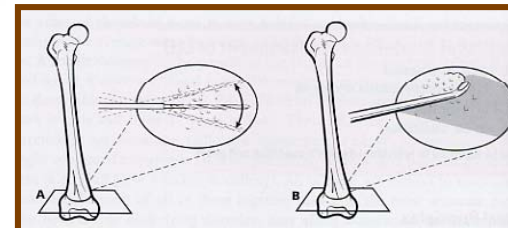
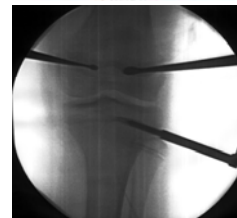
- Screws



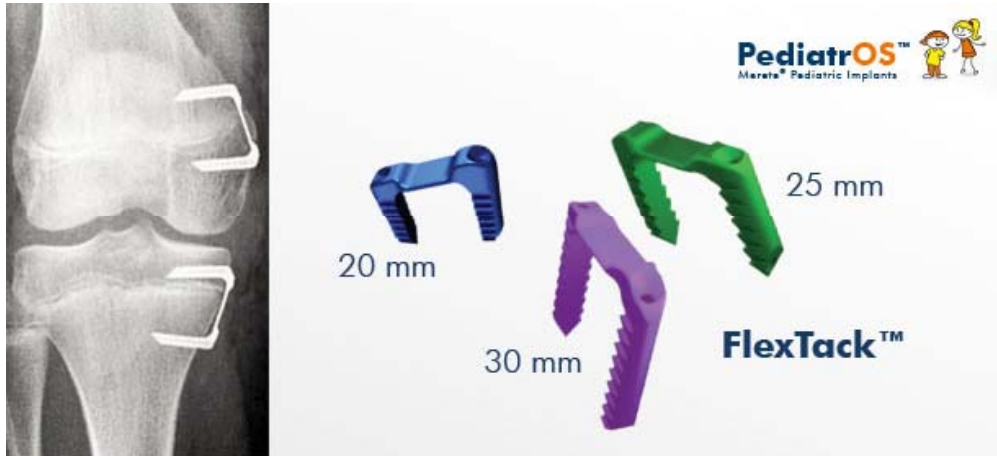
- Staples



- drilling



# Other guided growth devices



„The FlexTack™“ is the optimal implementation of the „Tension - Band“ for growth guidance.

(Prof. Dr. Robert Rödl, Pediatric Orthopedics, University Clinic Münster)



Peanut® Growth Control Plating System

Surgical Technique

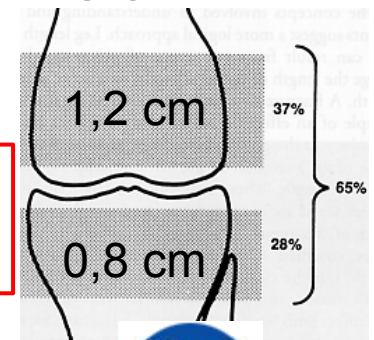
An Innovative Approach To Hemi-Epiphysiodesis

# Standard methods of epiphyseodesis

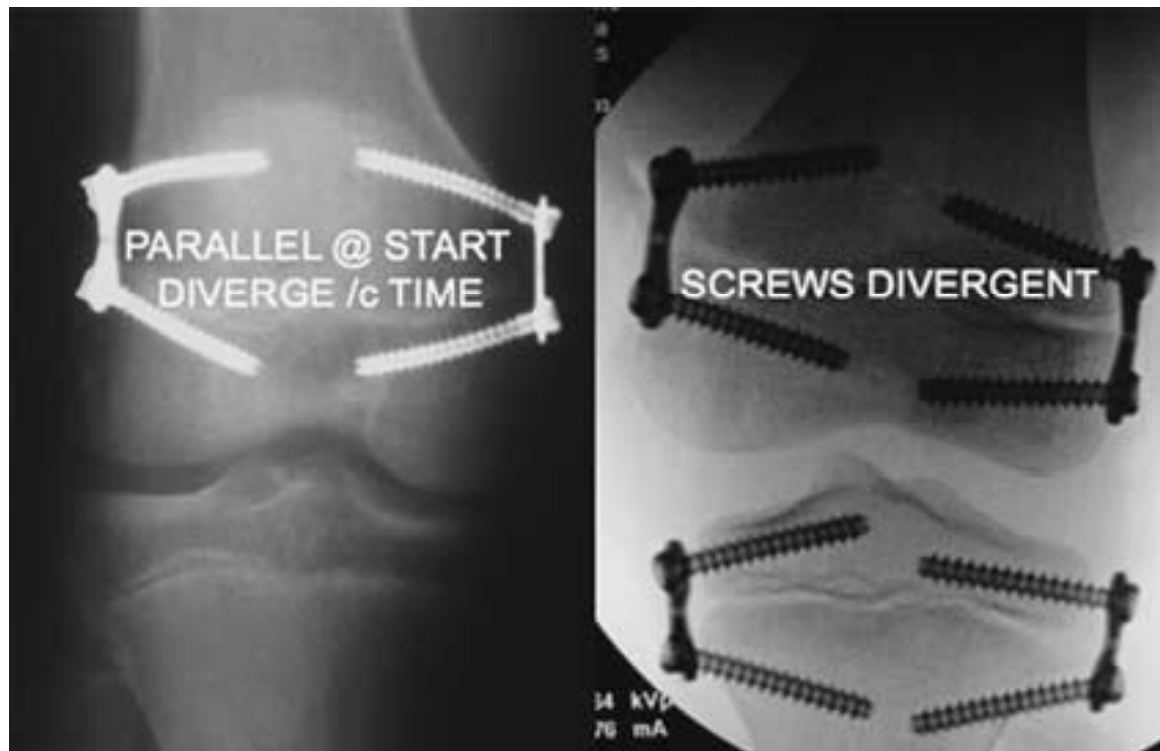
- Ablative – percutaneous drilling (Phemister, 1933.)
- Compressive - Blount staples (1949.)
  - Transphyseal screws (Metaizeau 1990s)

Goal is to achieve immediate and often permanent growth arrest without lag period.

Prerequisites: - precise determination of skeletal age of the patient  
- estimation of final discrepancy at maturity

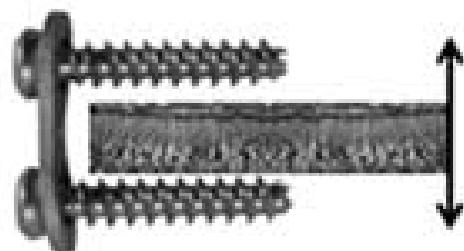


# Guided growth with a pair of 2-hole tension band plates is to produce growth deceleration

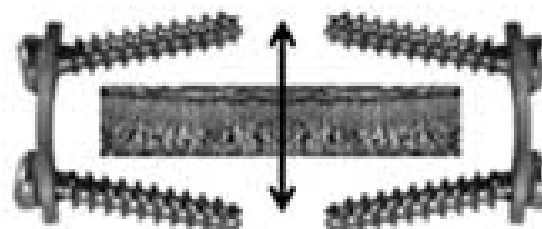


## TECHNIQUE VARIATION (same implant)

ANGLE



LENGTH



SCREWS +/- PARALLEL

TENSION BAND

NO LAG  $\updownarrow$

NO TIME LIMIT

SCREWS DIVERGENT




PASSIVE COMPRESSION

LAG EFFECT (3-6 mos.)

< 2 YEARS / REPRIEVE



# Comparison of different GG implants

		Extra-physeal	Flexible	Ease of removal
staples		0	X	X
screws		X	X	0
“8” plates		0	0	0

# Comparison studies

- Cannulated guided growth construct and solid screw system – experimental study.
  - Stitgen A. et al. J Pediatr Orthop **2012**;32(2):206-9.
- Significant increase in strength of the solid screw.
- Two methods of implant placement – a prospective clinical study.
  - Masquijo JJ. et al. J Pediatr Orthop **2015**;35(3):e20-5.
- Modified technique (Paley) reduce operative time, incision size and radiation exposure.



# Comparison studies – screw length and screw divergence

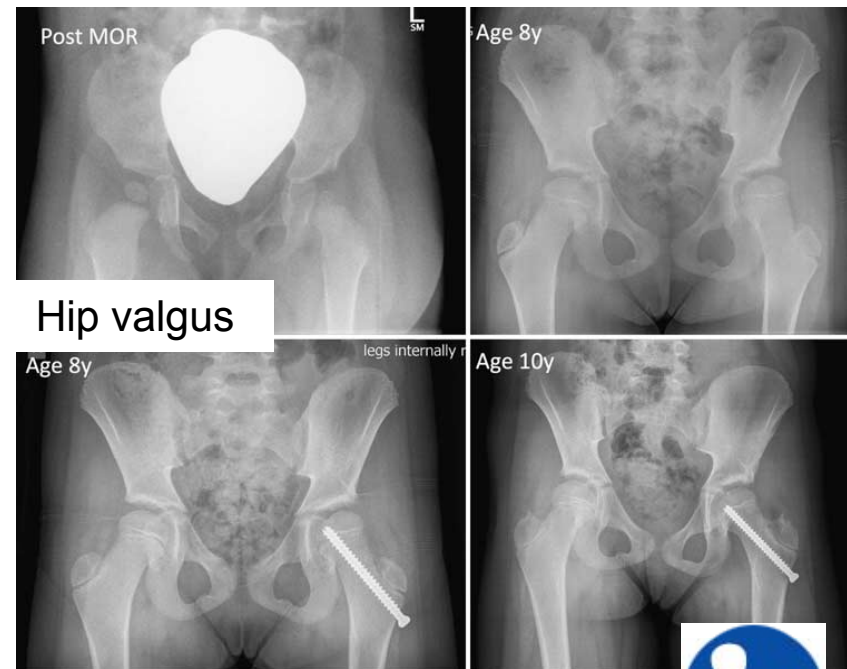
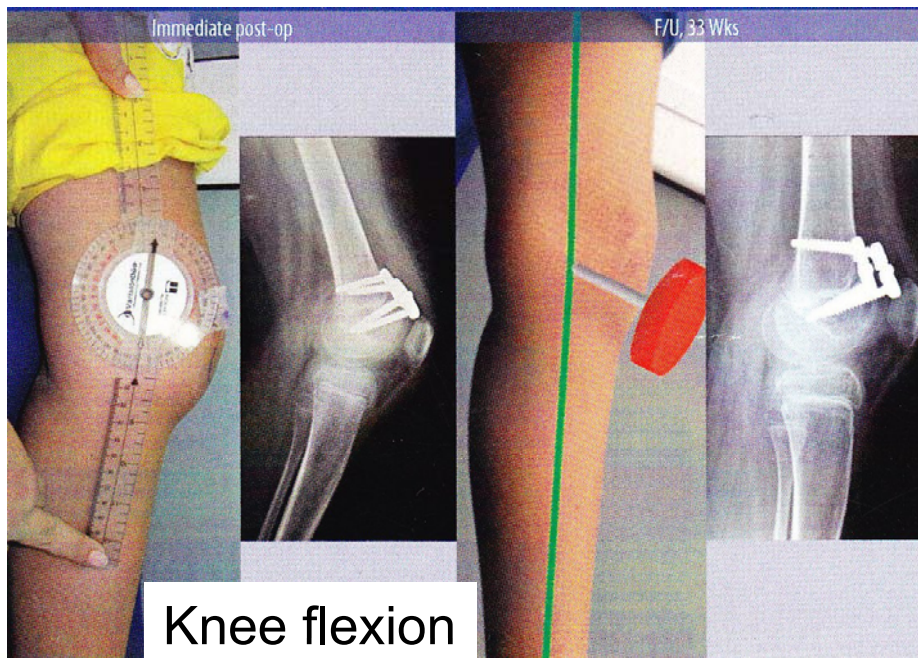
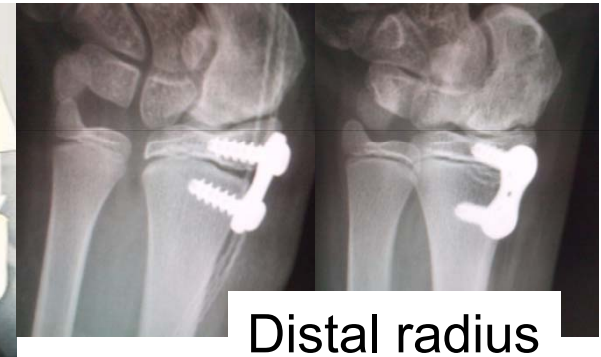
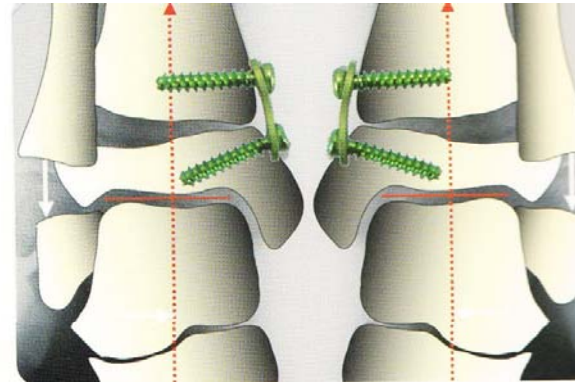
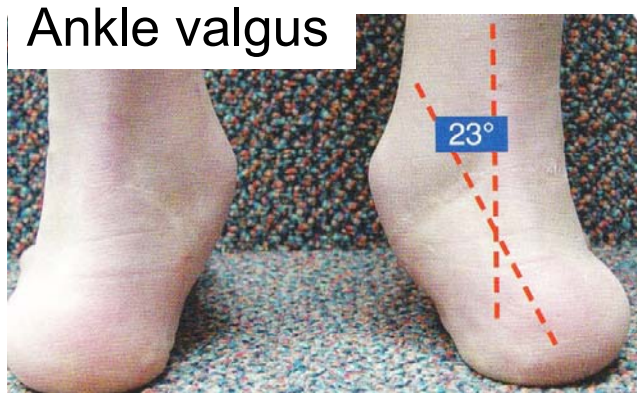
- Does screw length matters in guided growth method? Experimental prospective study in rabbits. Raluy-Collado D. et al. Arch Orthop Traum Surg **2012**;132:1711-5.
- Length of screw has no role in the 8-plate function.
- Change in screw divergence influence anatomic knee alignment in coronal plane.
  - Sweeney KR. et al. J Pediatr Orthop **2017**;37:e261-4.

# Guided growth – when?

- In children with more than 2 years
- More than 6 months before end of skeletal growth.
- Idiopathic frontal plane angulation - Normal physis.
- Pathologic physis: tibia vara, skeletal dysplasia, multiple hereditary exostoses



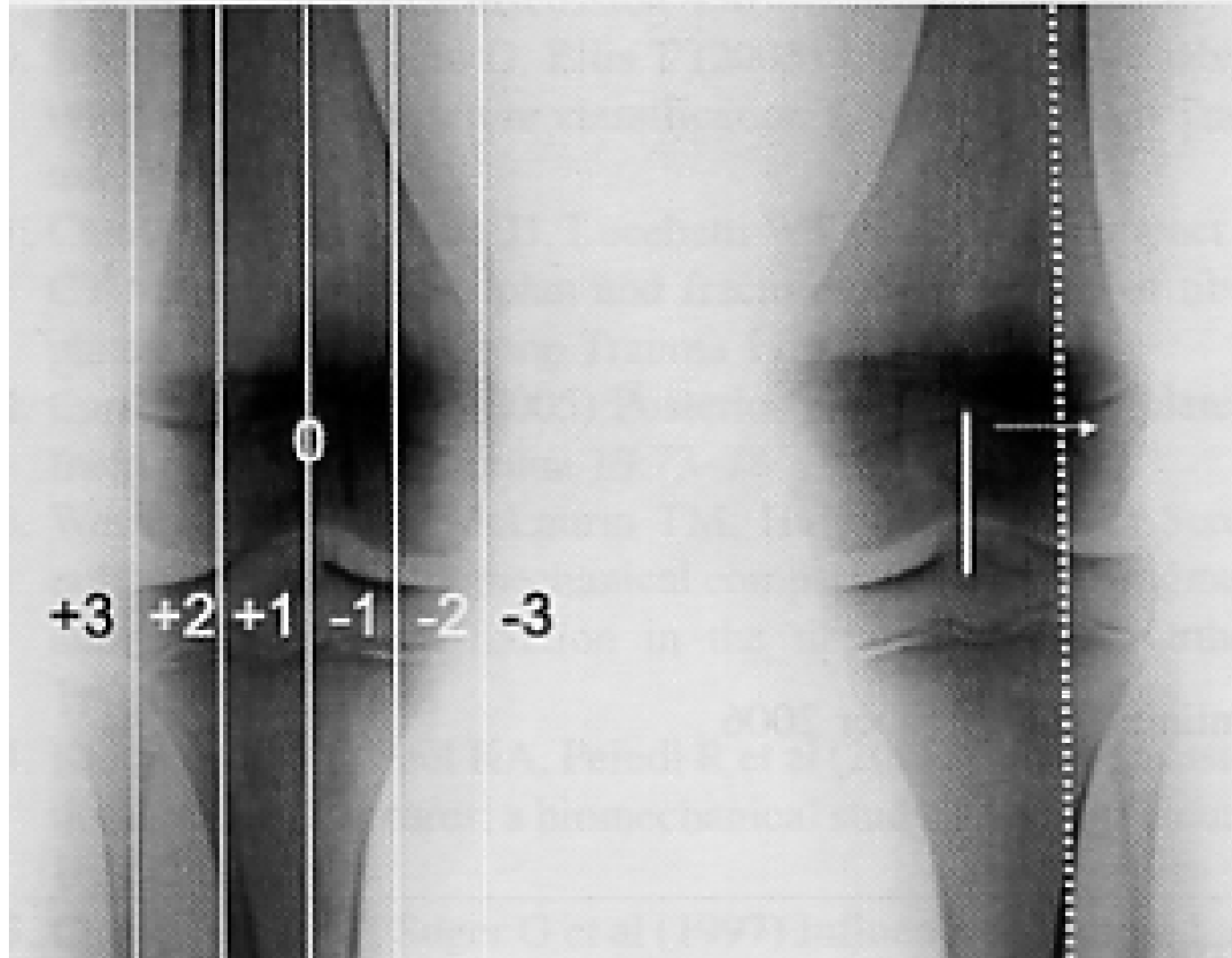
# Guided growth - various locations



# MECHANICAL AXIS - ZONE

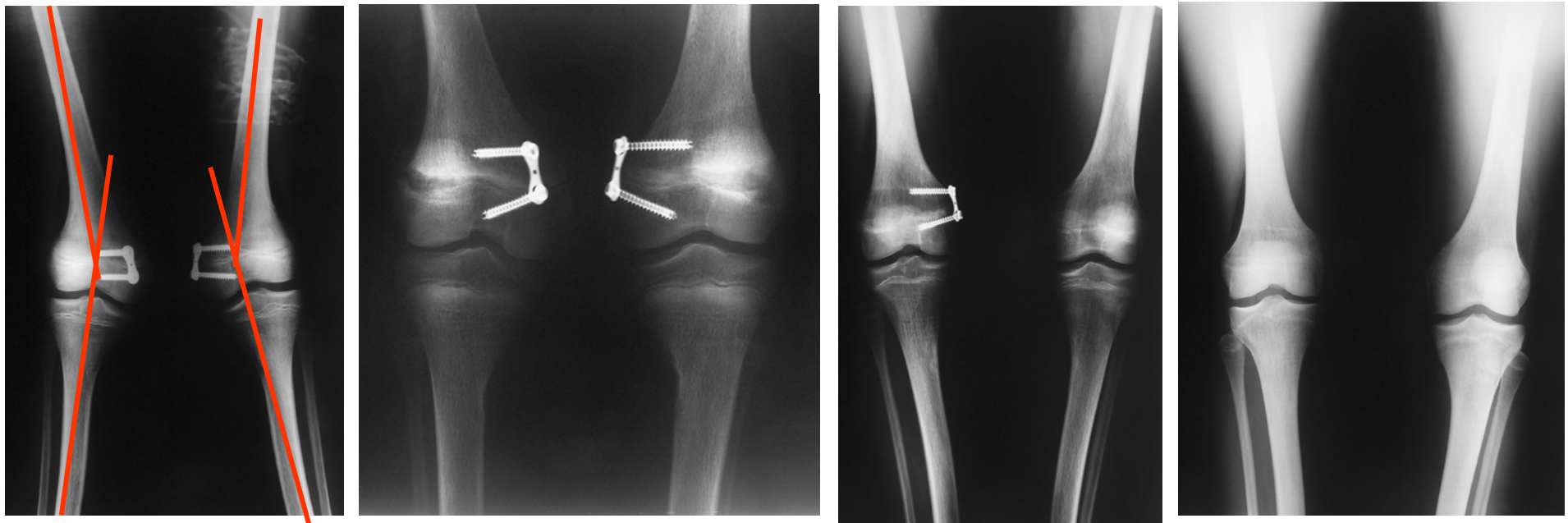
valgus

varus





# Renal osteodystrophy – valgus knee deformity



K. P. ♀, 12 y.

1 year post-op.

3 y.

Final result

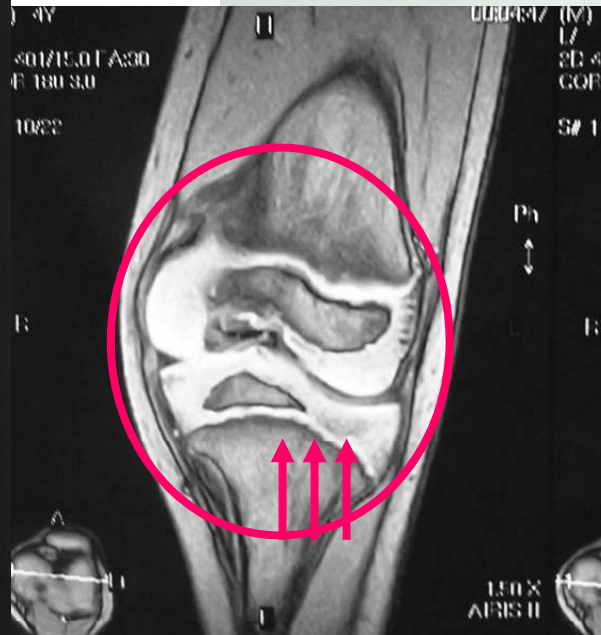
Gigante C, Borgo A, Corradin M.

J Child Orthop **2017**;11:79-84. - seven patients report

# Indications for guided growth

- Multiple hereditary exostoses
  - Kang S, Kim JY, Park S-S. J Pediatr Orthop **2017**;37(4):265-71.
- Focal Fibrocartilaginous dysplasia
  - Welborn MC, Stevens P. J Pediatr Orthop **2017**;37(3):e183-7.
- Anterolateral bowing of the tibia
  - Kennedy J, O'Toole P, Backer JF, Moore D. J Pediatr Orthop **2017**;37(5):e326-8.

# Ellis-van Creveld syndrom (Chondro-ectodermal dysplasia)







M.B. ♂ 6 y. Dg. Ellis-VanCreveld sy.

ORIGINAL ARTICLE

J Pediatr Orthop 2014.

Correction of Lower Extremity Angular Deformities in Skeletal Dysplasia With Hemiepiphysiodesis: A Preliminary Report

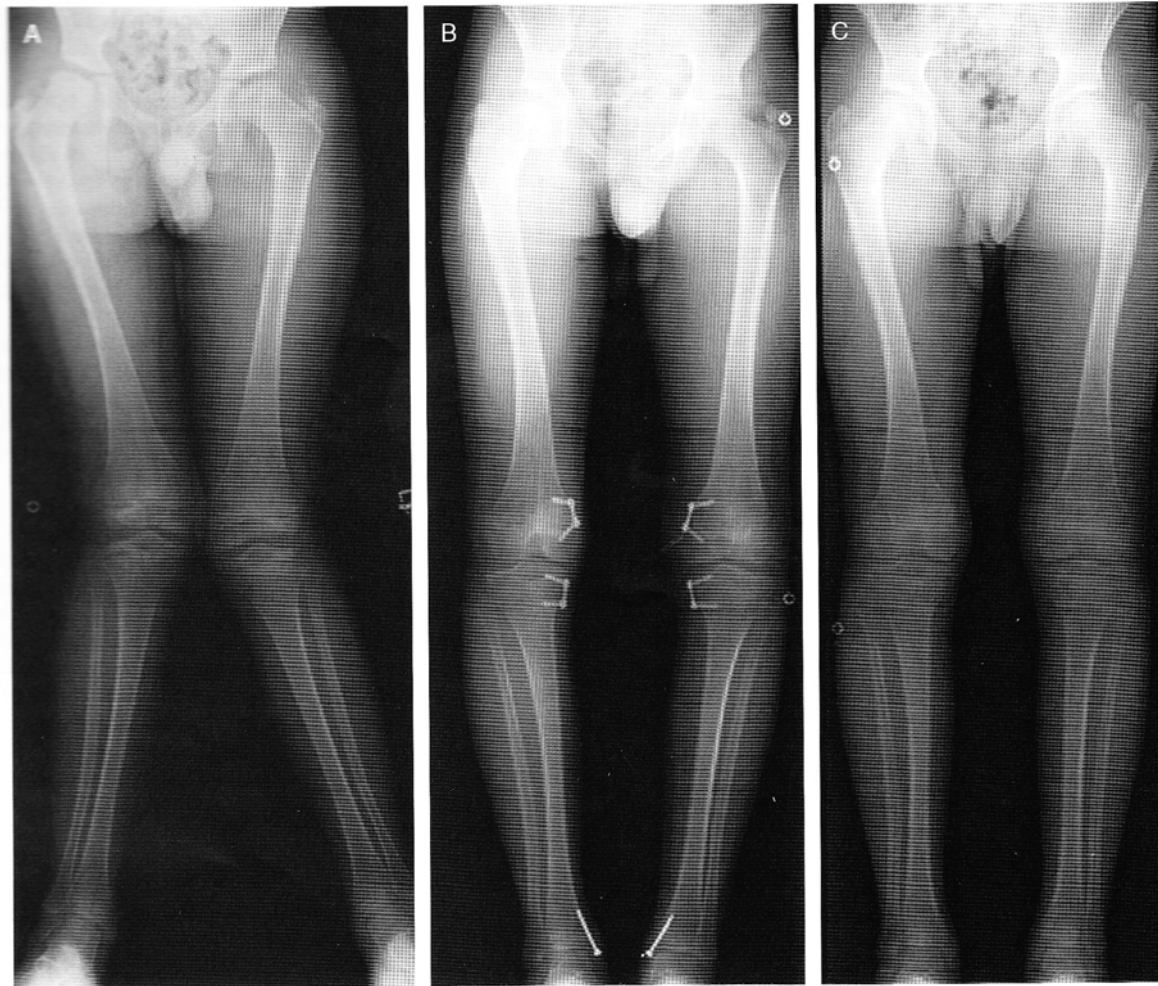
*Guney Yilmaz, MD,\* Murat Oto, MD,\* Ahmed M. Thabet, MD,† Kenneth J. Rogers, PhD, ATC,\* Darko Anticevic, MD, PhD,‡ Mihir M. Thacker, MD,\* and William G. Mackenzie, MD\**



# Correction of Lower Extremity Angular Deformities in Skeletal Dysplasia With Hemiepiphysiodesis: A Preliminary Report

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*J Pediatr Orthop* • Volume 34, Number 3, April/May 2014



Correction is slower.

Treatment should start earlier.



European Paediatric Orthopaedic Society

FIGURE 4. Twelve-year-old with multiple epiphyseal dysplasia. Preoperative (A) and 13 months postoperative (B) radiographs. Intentional overcorrection to varus before plate removal was achieved. Correction of mechanical axis and ankle valgus obtained at 17 months (C).



Zagreb, Children's Hospital

# Take home messages

- Selection of implant depends on the goal of treatment: permanent growth arrest or temporary deceleration of growth.
- Factors that significantly influence amount of correction were: Age at plate implantation, etiology and gender.
- Patients with non-idiopathic deformity should be treated earlier and monitoring (follow-up) should be closer.



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**EPOS 37<sup>th</sup> Annual Meeting**  
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