

Een kind is geen miniatuur volwassene

A child is not a miniature adult

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**Nederlandse Vereniging
voor Kinderfysiotherapie**

Aangesloten bij KNGF



de Meierij
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A child is not a miniature adult

Topics:

- ▶ Growth, epiphysial plates and knee injury
- ▶ Pediatric Physical Therapy

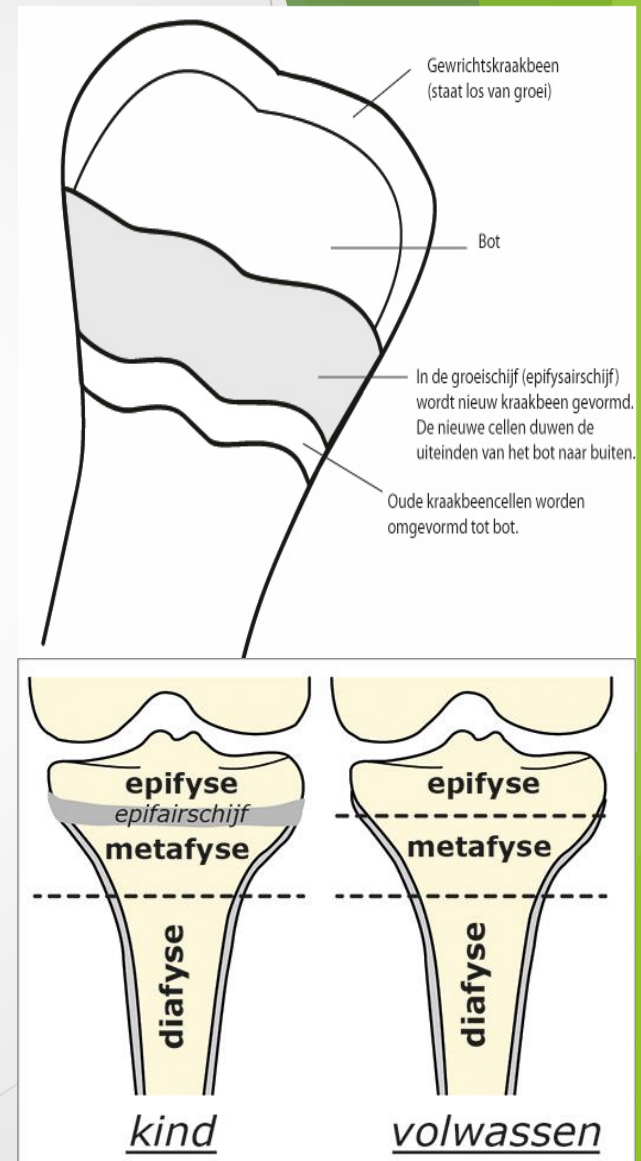
Ofcourse today is about ACL-leasions, but what is specific in children?

Prevalence ACL-rupture

- ▶ Less than 5% of all ACL-patients are children, most of them older than 9 years old
- ▶ Up to the age of 13 → boys = girls
- ▶ Over the age of 13 → 2 times more boys
- ▶ Mostly sports trauma, other causes are a fall or traffic accident
- ▶ Under the age of 13 → ACL rupture are rare, often damage to other structures like meniscus >60% → Why?

The Epiphysial Plate

- ▶ Children and adolescents are growing due to epiphysial plates
- ▶ Cartilage-like growthcentre between epifysis and metafysis
- ▶ Girls → closing when 12,5 years of age
- ▶ Boys → closing when 14,5 years of age



The Epiphysial Plate

- ▶ Ligaments en tendoninsertions are **stronger** than epiphysial plates.

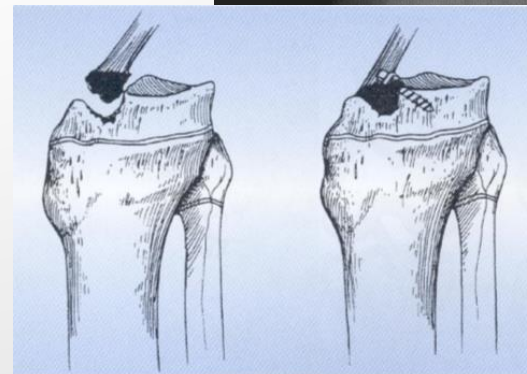
Result: Change of epiphysial fracture

- ▶ Epifyse of distal part of the femur and proximal part of the tibia are at risk in ACL rupture
- ▶ Distal Femur = 35-40% of total leg length!
- ▶ Poximal Tibia = 25-28% of total leg length!



Eminentia Fracture or ACL rupture?

- ▶ After MRI or Rontgen → ACL or EF
- ▶ EF: Avulsion fracture of the ACL → mainly at young age
- ▶ Typically after a fall on the knee



Treatment

Treatmentgoal: A functional knee with good stability for an active lifestyle for the length of life

- ▶ Conservative treatment or reconstruction?
- ▶ Depending on → *open* or *closed* epiphysial plate
- ▶ Depending on → Eminentia fracture or ACL rupture?

Treatment: Eminentia fracture

- ▶ Repositioned eminentia after extension → **conservative treatment** with cast and extended knee (6 wks).
- ▶ Not-repositioned eminentia after extension → **surgery** to reposition eminentia AND cast (6 wks).
- ▶ After both → Pediatric Physical Therapy

Treatment: ACL rupture

Closed epiphysial plate

- ▶ Size of the rupture
 - ▶ <50% rupture: conservative treatment
 - ▶ 3-4 months PT
 - ▶ Adjustments in physical activities
 - ▶ Increased risk of secondary meniscus or cartilage injury
 - ▶ >50% rupture: reconstruction
 - ▶ 12-18 months PT

Treatment: ACL rupture

Open epiphysial plate

- ▶ 2 options
 - ▶ Conservative, even though rupture >50%
 - ▶ 3-4 months PT
 - ▶ No pivoting sports
 - ▶ Bracing
 - ▶ Disadvantage: Increased risk of secondary meniscus or cartilage injury
 - ▶ Reconstruction
 - ▶ 12-18 months PT

Treatment: reconstruction with open epiphysial plate

- ▶ IOC consensus statement, surgery:
 - ▶ *If* a meniscus lesion or a cartilage-deficiency needs surgery, it can be combined
 - ▶ *Or if* there is persistent instability after good conservative treatment
 - ▶ *Or if* there are unacceptable sportsrestrictions

Treatment: reconstruction with open epiphysial plate

▶ Benefits:

- ▶ Some evidence (guideline ACL injury) for better 'return to sport'

▶ Disadvantages:

- ▶ Higher risk of re-rupture after childhood reconstruction (8 times)
- ▶ Reconstruction and soccer → Follow up 15 years: 30% re-rupture

For now:

More research is needed and being performed

- ▶ Studies to examine long term effects of surgery in children with open epiphysial plates.

Then what?



Considerations of Pediatric Physical therapy both conservative and after reconstruction

- ▶ Skeletal and developmental age of the child / adolescent
- ▶ Pain believe / anxiety
- ▶ Learning strategy
 - ▶ *Starting level* → demonstrate, time for exploration, knowledge of performance
 - ▶ *Semi skilled* → time on task, let the child correct itself, stimulate finding boundaries
 - ▶ *Skilled level* → surprise elements, very specific feedback, variable surroundings, sport spec. exercizes.
- ▶ Motivation child and parents!!
- ▶ You have to look at the whole package!



Physical therapy

- ▶ Return to play/sport **criteria AND continued injury prevention** (UCI statement):
 - ▶ Single-leg hop tests: >90% of the contralateral limb (with adequate strategy and movement quality)
 - ▶ Step by step build up is performed: gradual increase in sport-specific training without pain and effusion
 - ▶ **Knowledge** of knee function and at risk knee positions and **confidence** in knee function
 - ▶ **Mentally ready** to return to sport (!)

Training vs. overtraining

- ▶ **Strength training:** ‘Children can’t and shouldn’t train their strength because of growth plate injuries’ is a myth.
- ▶ Both prepubertal children and adolescents show significant changes in **muscle strength** (13-30% gain) with resistance training.
- ▶ **Muscle hypertrophie** is rarely seen in prepubertal children, more frequently seen in adolescents, due to growth and sex hormones. **Neuromuscular adaptations** are seen prepubertal.
- ▶ Strength training has the **potential** of improving sport performances, and **reducing the rate of sport injury** and rehabilitation time following injury.
 - ▶ **But make sure its safe and prevent overtraining!**

Neuromuscular training / overtraining

- ▶ **Freq.:** 2-3x p.w.
- ▶ **Intensity:** 70% 1 RM or body weight
- ▶ **# rep.:** 13-15
- ▶ **# sets:** 1-3
- ▶ **Type:** activity training
- ▶ **Tests:** normal and modified (sub-)maximal tests → ½ Bruce test, 6 min. running test, hop tests.

- ▶ **Watch out:** overtraining. Not much known but → 30% of the 13-18 yr old are overtrained at least once → physical and mental effects!
- ▶ **Result:** no training, 'feeling more heaveniss' and lack of motivation.

Considerations:

- ▶ Consider a home-based program, with emphasis on playful exercises and variation to discourage boredom → don't forget **parents!**
- ▶ Focus on evaluating the **quality** of movements during exercising and testing instead of the leg symmetry index measures.
- ▶ A lot of tests and criteria to assess movement quality are yet to be validated, so the responsible clinician needs to have **skills** and **experience** in this area.
- ▶ **Return to sport criteria** were designed and scientifically tested in the skeletally mature patient and are recommended for the child who is close to maturity. The validity of these criteria in the prepubescent child is **unknown**.

Conclusions:

- ▶ We **don't** know enough about ACL rupture and recovery in childhood and adolescence
- ▶ We **do** know they are vulnerable both physically and mentally
- ▶ Be critical, careful and adjust
- ▶ Let's work together and place the child in the spotlight

- ▶ **Don't** treat them like an adult because they are **not** a miniature version

Questions?



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