ACL reconstruction in the skeletally immature – IT band

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Put Your Life in Motion

Disclosures

- Medico-Legal reviews

ACL tears in the growing patient

- ACL procedures increased 3-fold in patients <20yrs (1990-2009)
- ACL procedures increased 924% in patients <15yrs (1994-2006)

Why?

- competitive athletics
- Early sports specialization
- Year-round sports training
- Increased awareness of injury

Risk factors for ACL injury in youth athletes

- Quad-dominance
  - Higher quad-hamstring activation ratios
- Anterior pelvic tilt
- Increased quadriceps angle
- Decreased intercondylar notch width
- Increased posterior tibial slope
- Hormonal receptors within the ACL (not completely understood)
  - Estrogen, testosterone, and relaxin

- Females have injury rate per athletic exposure that is 2-8x that of their male counterparts

- Sports
  - Girls: soccer, basketball, LAX
  - Boys: football, LAX, soccer
- Weather conditions
  - Rainfall + evaporation = hard surfaces
- Footwear-surface interaction

Considerations in the growing patient with a torn ACL

- Activity level
- Growth
  - Menarche/Tanner stages
  - The Multiplier
  - Parental heights
- Level of understanding/ability to participate in post-op rehab

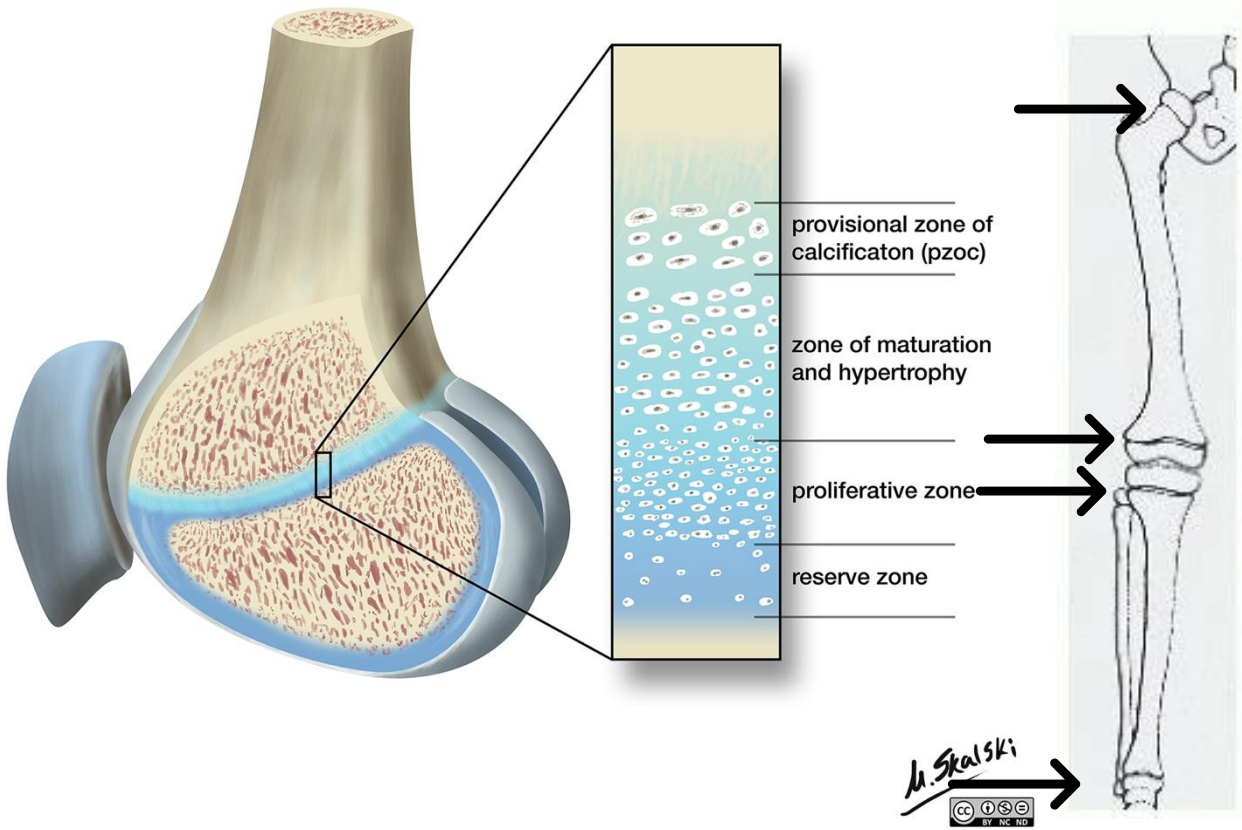
ACL treatment options in the growing patient

- Non-op
  - No pivoting activities
  - Knee is stable
- Surgical repair
  - If <50% of ACL is torn
- Surgical reconstruction
  - Fully torn ACL
  - Pivoting sports/activities

Non-Op?

- Non-operative OR delayed surgical treatment results in:
  - further damage to the cartilage/meniscus
    - Arthritic changes
    - Disinterest in modifying activity levels after injury
  - Sports dropout
    - 1 study showed:
      - 94% of 18 kids unable to perform at preinjury levels
      - 56% of 16 kids unable to participate at all
    - Recurrent buckling/giving-way

Physeal anatomy

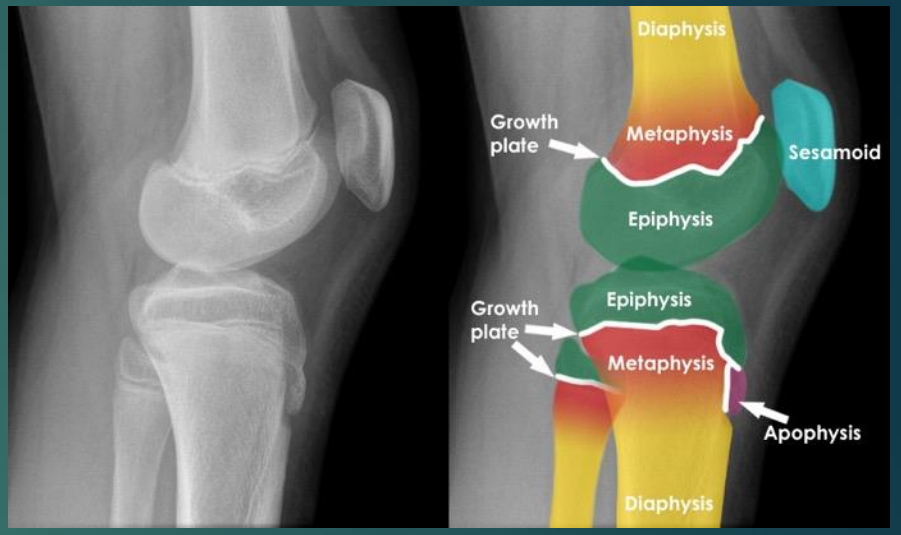


% Total Limb Growth	% Growth Per Bone	Average Growth At Physis > Age 5	Growth at Physis Per Year (Menelaus)	Growth At Physis Per Year (Dimeglio)
15%	29%	3-4 mm		
37%	71%	10 mm	9 mm	12 mm
28%	57%	6 mm	6 mm	8 mm
21%	43%	4-6mm		

End of Growth (Years)	Boys	Girls
Menelaus	16	14
Dimeglio	15.5	13.5

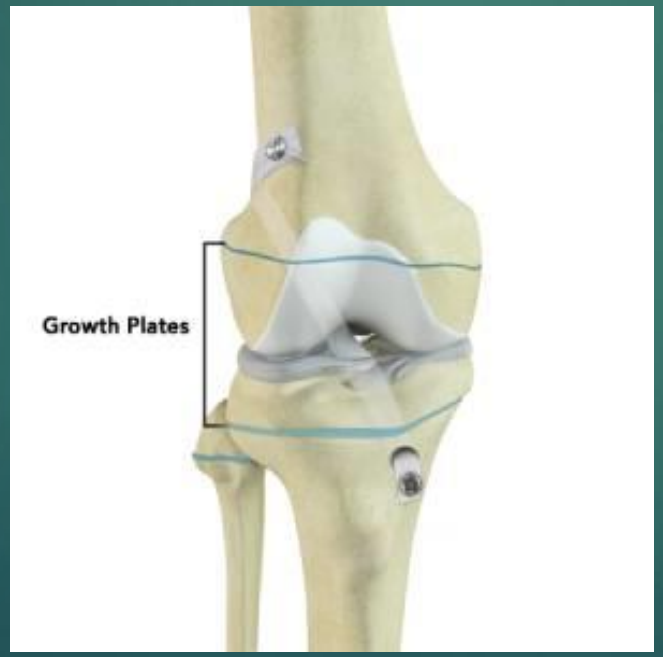
ACL treatment options:
Pre-pubescent patient with open growth plates

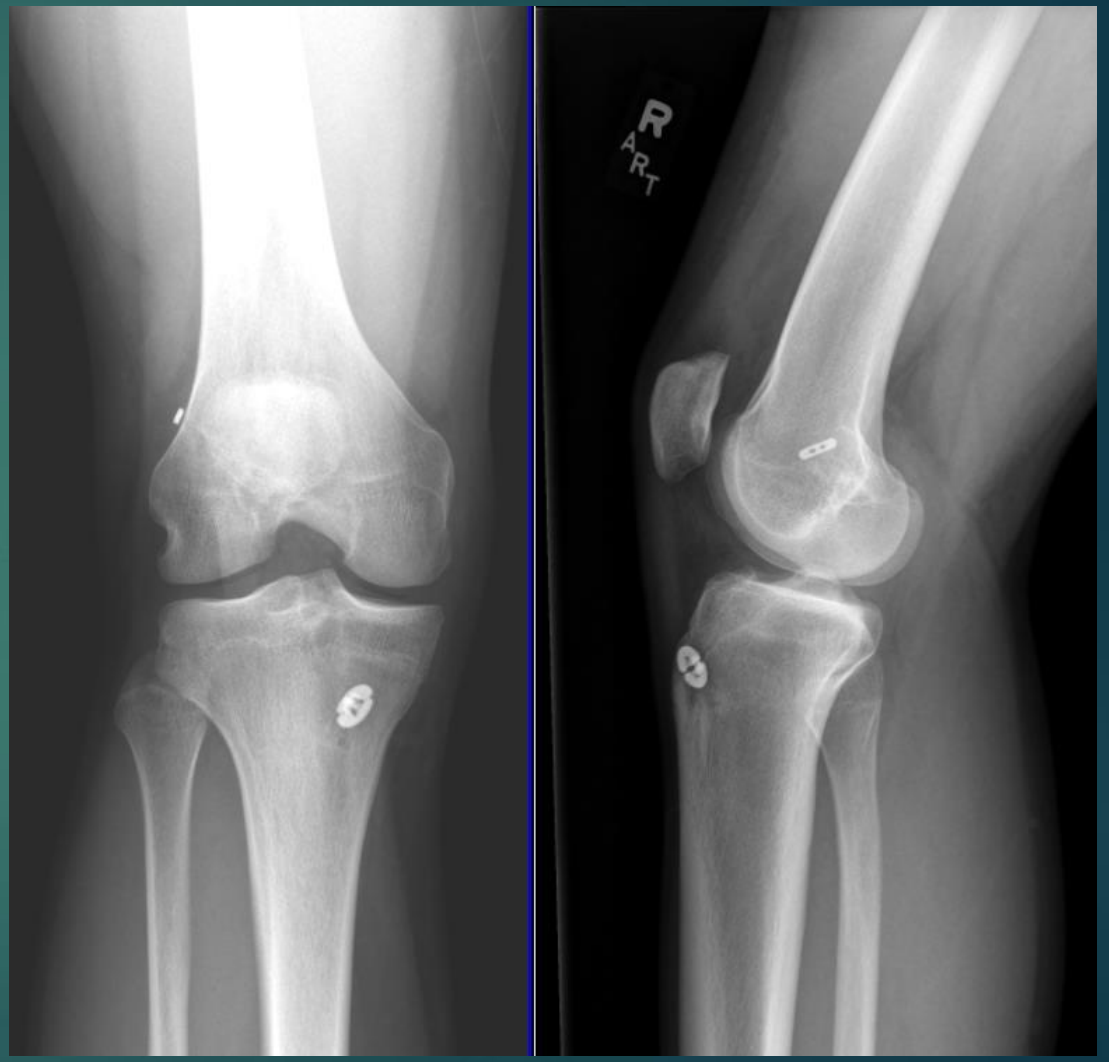
- Transphyseal ACL
  - Older children who have reached or are beginning puberty
- Partial transphyseal
  - At least 1 year or more of growth remaining
- Physeal-sparing all-epiphyseal
  - Children younger than 10-12 years of age with significant skeletal immaturity
- Physeal-sparing extra-epiphyseal
  - Children with significant growth remaining in the legs:
    - boys less than 13 years of age
    - girls less than 12 years of age



Transphyseal ACL

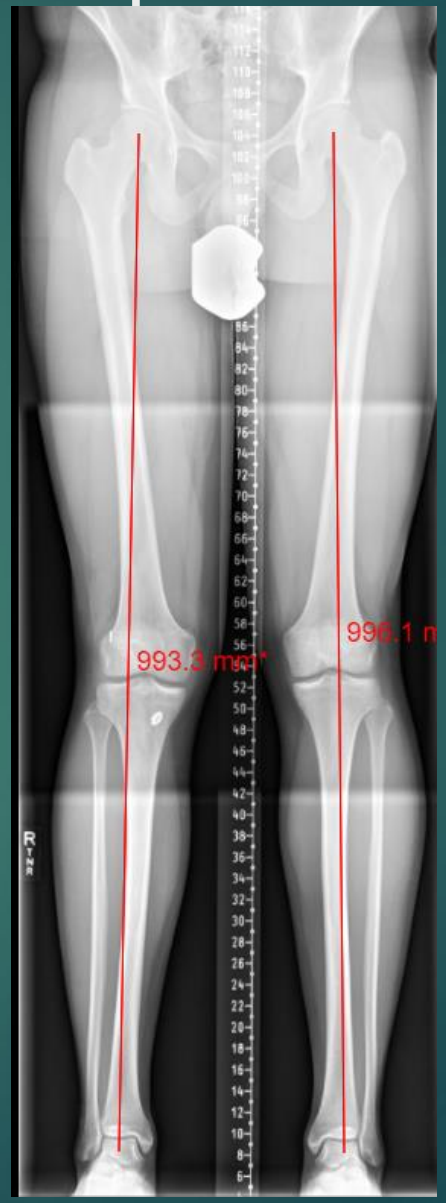
- Indications:
  - Older children who have reached or are beginning puberty
- Traditional ACL reconstruction
- quad/hamstring/BTB





Results of crossing growth plate too early

- Genu valgum
  - Disruption to lateral femoral physis
- Genu recurvatum
  - Disruption to anterior tibia
- Growth arrest
  - Leg length discrepancy



Partial transphyseal

- Indications
  - At least 1 year or more of growth remaining
- quad/hamstring

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End of Growth (Years)	Boys	Girls
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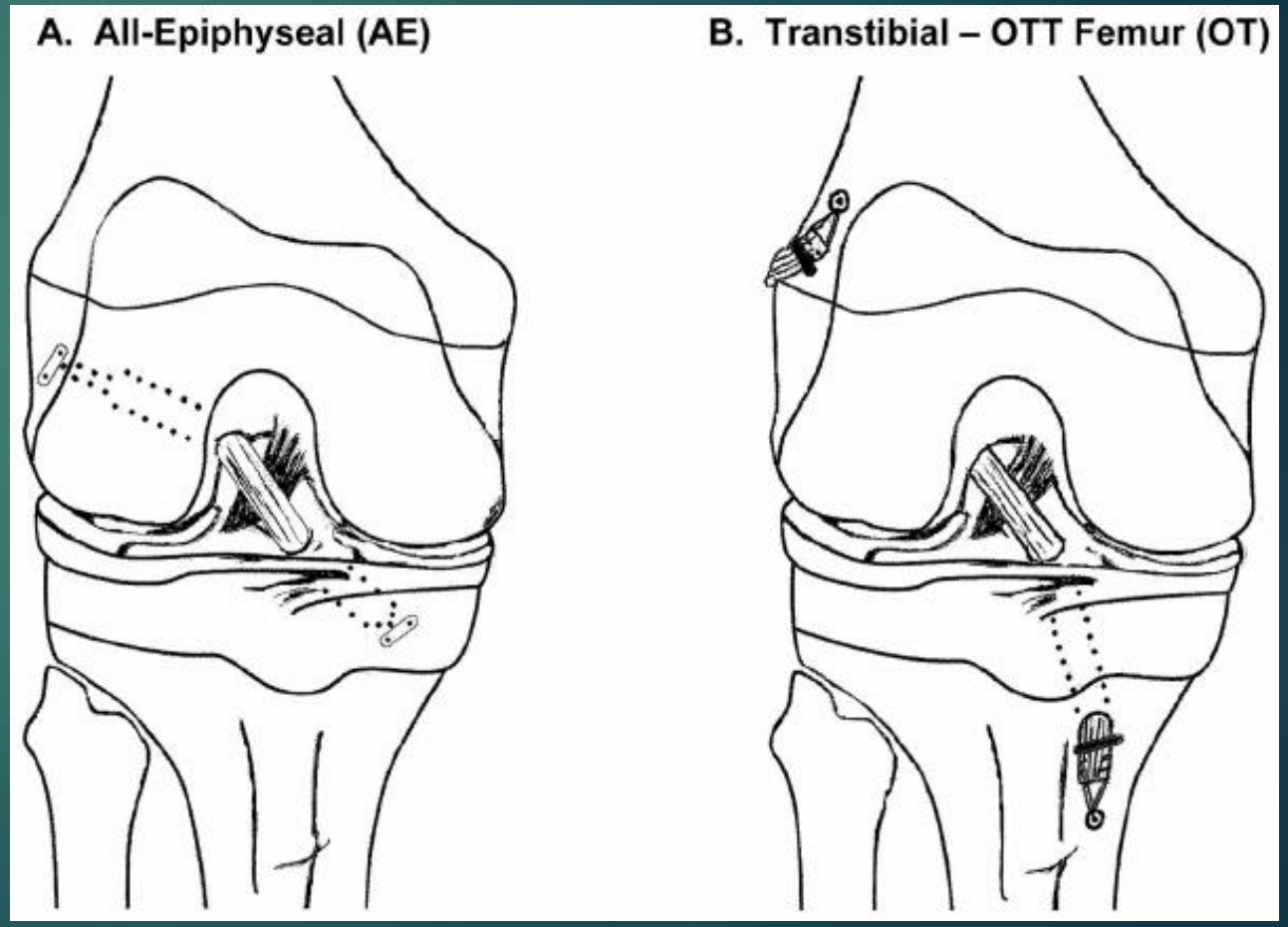
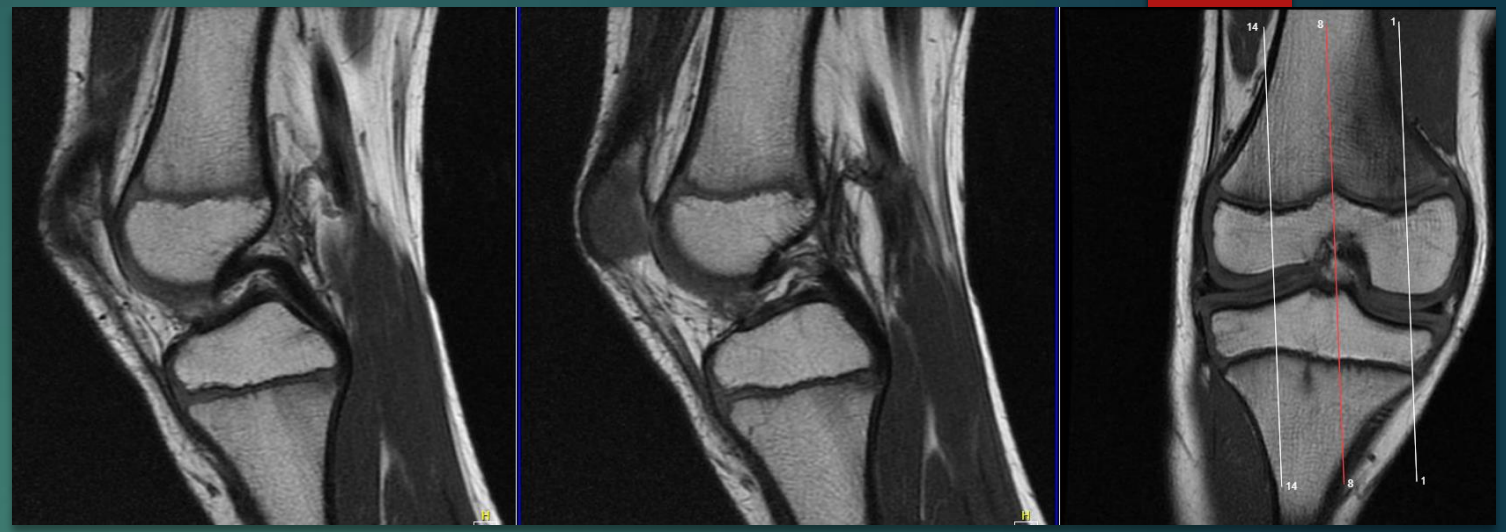
Physeal-sparing all-epiphyseal – Anderson Technique

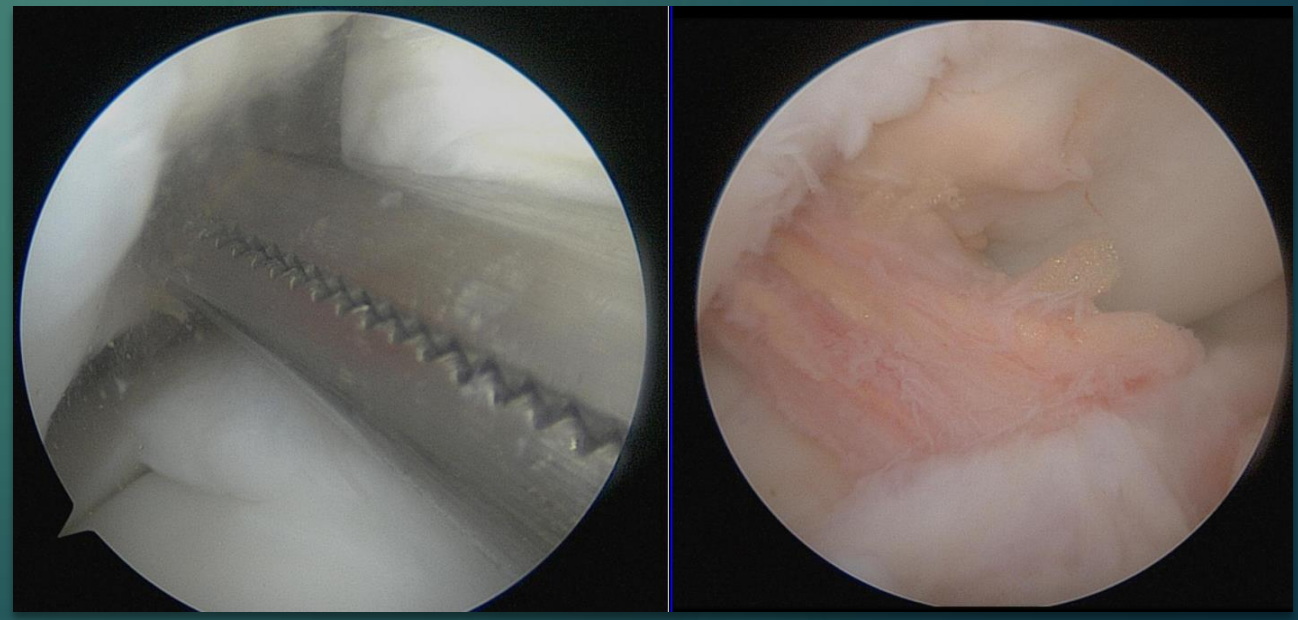
- Indications
  - Children younger than 10-12 years of age with significant skeletal immaturity
- Quad/hamstring



Physeal-sparing extra-epiphyseal Micheli-Kocher technique

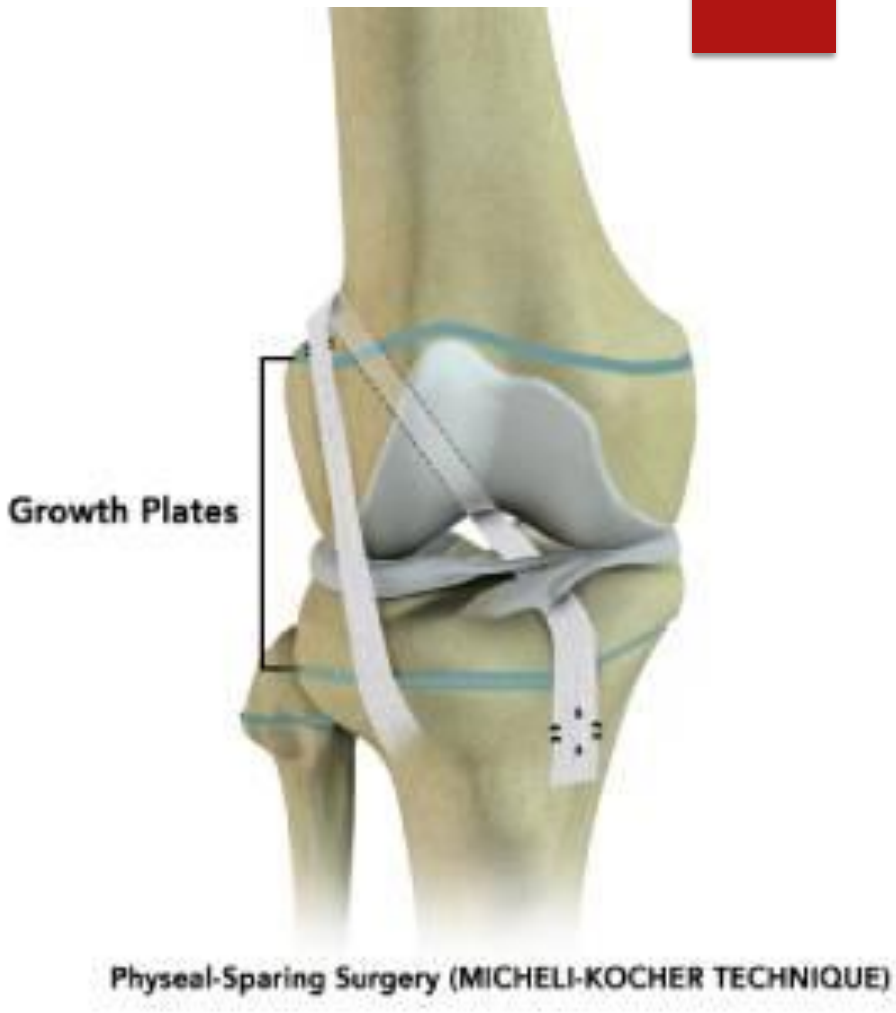
- Indications
  - Children with significant growth remaining in the legs:
    - boys less than 13 years of age
    - girls less than 12 years of age
- Intra-articular and extra-articular reconstruction
  - IT band strip wraps around and through the joint to mimic native ACL

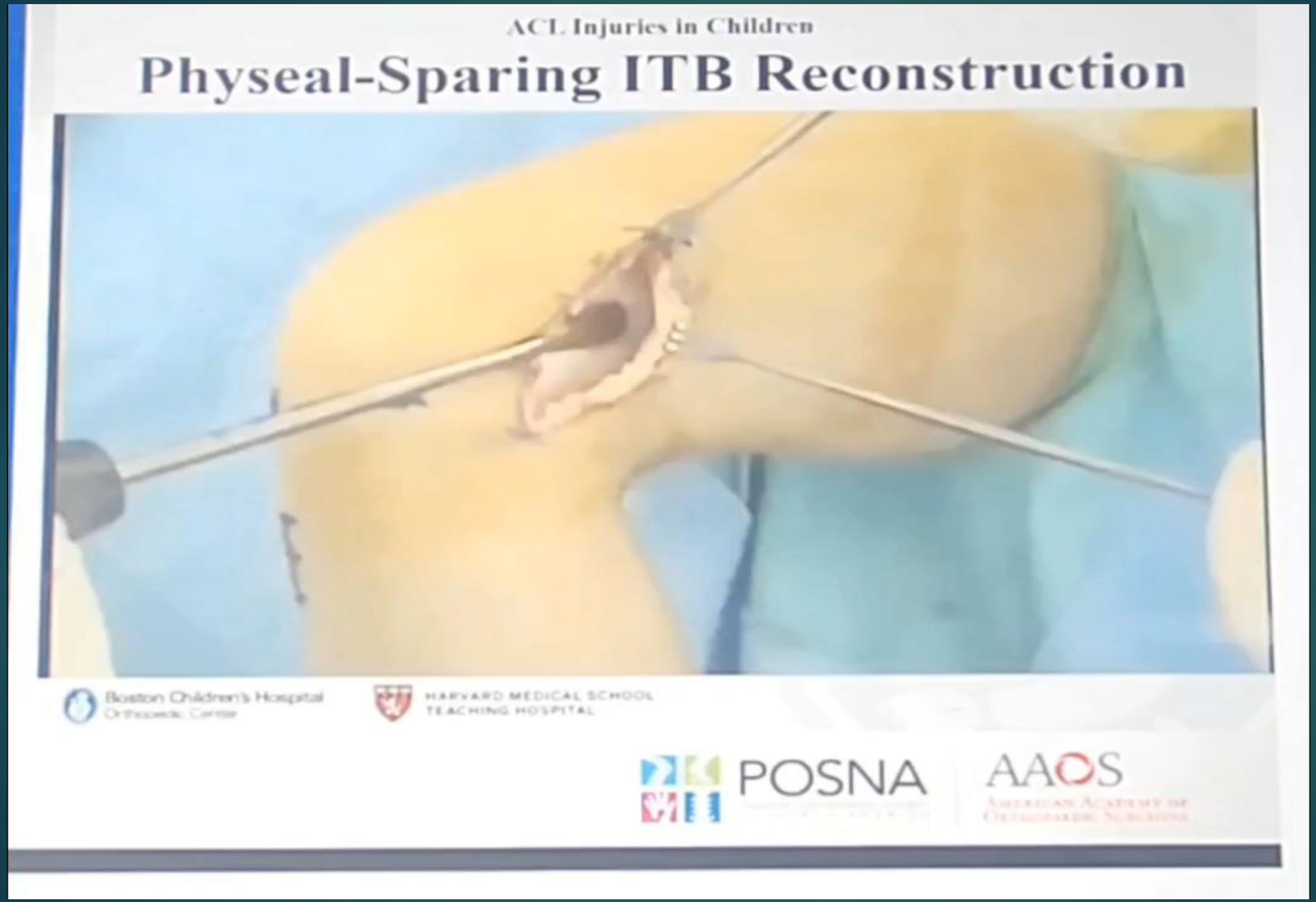




Technique

- Create a central band of the IT band and maintain attachment to Gerdy's tubercle at distal IT band
  - Detach proximally
- Bring proximal aspect of IT band strip around the lateral femoral condyle and enter the knee through the notch
- Secure the strip with sutures to the periosteum of the proximal tibia

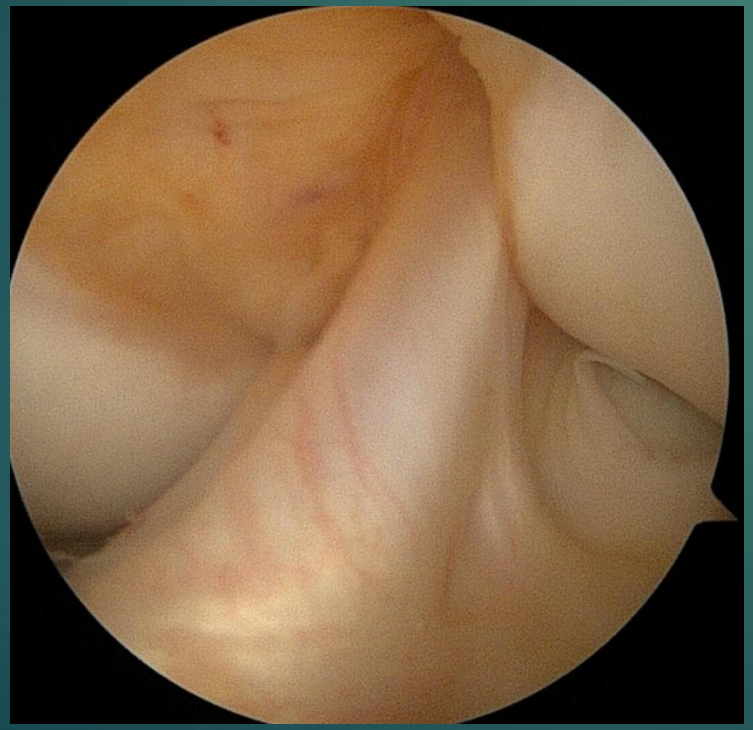




Dr. Mininder Kocher – Boston Children's Hospital Technique Video POSNA Dec 13, 2018

Risks

- Technically demanding
- re-tear of ACL
- Arthrofibrosis

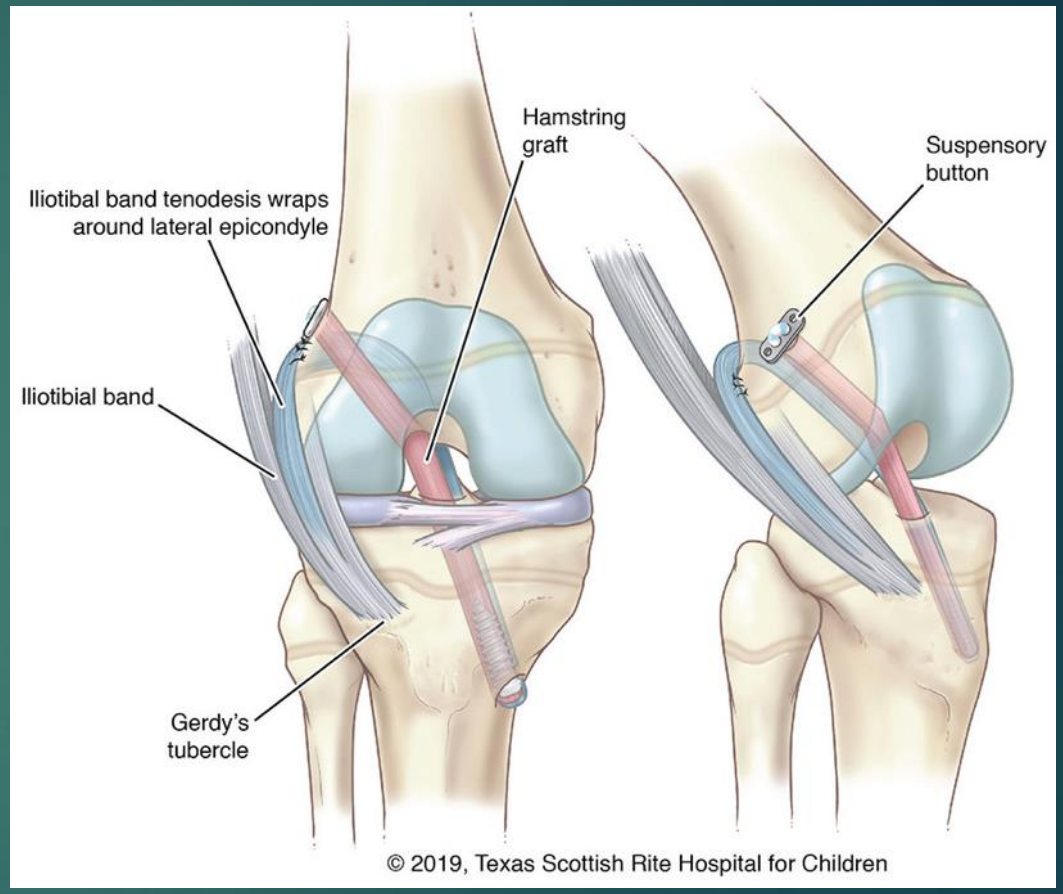


Post-op/Rehab

- TDWB x 6 weeks
- Brace locked in extension x 6 wks
- ROM:
  - Weeks 1-2: 0-30 degrees
  - Weeks 3-4: 30-60 degrees
  - Weeks 5-6: 60-90 degrees
  - Key for protecting periosteal stitch
- Week 6 – wean from brace, closed chain, hip and core strength
- Week 14 – running, single leg balance, stationary bike
- Week 22 – progressive agility, then sports retraining (return at 10 months)

ACL reconstruction + extra-articular IT band for adolescent patients at high risk of reinjury

-TSRH 2019 technique



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Thank you!