Transphyseal ACL Reconstruction in Juveniles

- Controversy
- Physial damage
  - Basic science studies unable to give accurate guidance on “safe” drill-hole size for immature patients
  - Clinical studies are heterogeneous, cohort, or retrospective
  - Multi-centre studies lacking

Assessment of Maturity

- Skeletal age vs Chronological age
- Tanner Stage
  - Pre-pubertal
  - Tanner 1 and 2
  - Pubertal/Growth Spurt
  - Tanner 3

Pediatric ACL Reconstruction

- Why?
  - Anatomic reconstruction is the standard of care in adults.
  - Why should children be different?
- How?
  - Transphyseal

Outcome of Anatomic Transphyseal Anterior Cruciate Ligament Reconstruction in Tanner Stage 1 and 2 Patients With Open Physees

- Familiar technique
- Do not need to change much from adult
- No new “gadgets” required
- Anatomic
- As in the adult procedure
- Low complication rate
- Concerns
  - Tethering effect with growth

Transphyseal and Femoral Tunnel

Measuring Femoral Tunnel

Marking Femoral Tunnel
**Femoral Tunnel Drilling**

**Distal Femoral Physis**

- Anatomical footprint
- Set jig as vertical as possible and mark entry point
- Position to avoid violation of tubercle apophysis
- Drill at slow speed, single pass

**Distal Tibial Tunnel**

- Extra-physeal fixation using RCI screws, endobutton and/or staple.

**Proximal Tibial Physis**

**Extraphyseal Fixation**

**ACL Reconstruction < 18 years**

- Autograft
- Parental Allograft
- Cadaveric Allograft

**Graft Selection < 18 years**

**Survival of Endoscopic Transphyseal ACL Reconstruction in Skeletally Immature**

Justin Roe, Lucy Salmon, Emma Heath, Robert Cooper, Leo Pinczewski
Our Experience 2005-2014

Demographics

- 148 patients grade Tanner 1, 2 or 3
- Mean age 12 years (range 8-17)
- 78% Male 22% Female
- 25% + ve Family History of ACL Injury
- Mean follow up 35 months (range 6-107)

Exclusions (n=6):
- Previous contralateral ACL (n = 5)
- Genetic connective tissue disorder n=1

154 ACL reconstruction in Tanner 1, 2, 3 subjects

148 Tanner 1, 2, 3 subjects

Tanner Grade at Surgery

- 44 Tanner 1
- 35 Tanner 2
- 69 Tanner 3

Graft Source

- 120 Parental Living Donor
- 8 Cadaveric Allograft
- 20 Autograft

Further ACL Injury

- 15 (10%) sustained ACL graft rupture
- 19 (13%) sustained contralateral ACL rupture (p=0.53)
- 2 patients had a ACL graft rupture & contralateral ACL rupture

Kaplan-Meier Survival

- ACL graft survival 97 92 83 80
- Contralateral ACL survival 99 99 90 70

Patient Reported Outcomes

- Return to pre injury level of activity was reported in 73% of subjects
- 86% of subjects reported no current knee activity restriction
- Mean Subjective IKDC was 94

Lower limb alignment

- Immediate Post-op stay in recovery room
- Regular clinical evaluation 6, 12, 24 months...further dependent on Tanner stage
- Xrays 6-month, 1 year, and yearly x 5yrs until growth plates closed
- Long leg views at 2 years post-op and on 18th birthday
- No detected growth abnormalities so far

Radiology
Conclusion

• Transphyseal ACL R/C in Paediatric patients
  • possible, practical
  • should be performed by experienced operator
  • Clinical and Radiological follow-up until skeletal maturity