Sports Health Symposium: Patella Instability

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After patella instability....

- How to get athletes back and when to operate
Non operative treatment

- Quad / VMO strength
- Hip abductor / ER strength
  - Limit dynamic valgus
- Patella tracking brace / taping
- Immobilization not effective
MPFL

- 60% of restraining force

Acute Patellar Dislocation

- MPFL rupture in 87%
- 15–80% will have repeated dislocations\(^1\)
- >50% redislocation rate after a second dislocation\(^2\)

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Imbrication or VMO advancement stretches with time – MPFL not anchored!!
Outcomes – MPFL Repair

- 80 pts randomized to non op or MPFL repair - no difference in redislocation rates (20% v. 17%). Christiansen¹
- 46% redislocation rate after MPFL repair. Arendt²

Use a GRAFT

• Strong, reliable, predictable
  – MPFL mean tensile strength 218N
  – Gracilis 350N – 550N
    • Noyes 1984; Hamner 1999
  – Allows anatomic positioning and fixation
  – WHERE TO PUT IT IS THE KEY

Outcomes - Reconstruction

- Dislocation rates consistently below 10%
- Recent meta-analysis\(^1\)
  - 84.1% RTS
  - Recurrent instability risk – 1.2%
- WBAT, crutches 4 weeks, ROM as tolerated, symptom based RTS at 3-5 months
- Need to identify other risk factors prior to isolated MPFL reconstruction to avoid failures!

Anatomic Risk Factors

- Patella Alta
- Malalignment – TTTG / Q angle
- Valgus
- Trochlear dysplasia

• Can’t pull the patella over the bone. Must put the bone under the patella
Anatomic Risk Factors (ARF)

- Huntington AJSM 2020 – Systematic Review and MA
  - 17 studies, risk of recurrent dislocation
- Odds ratio for anatomic risk factors
  - Trochlear Dysplasia 4.1
  - Open physes 2.7
  - Elevated TT-TG 2.9
  - Patella alta 2.4
- Combining ARF’s, risk of recurrence
  - None: 8-14%
  - Two: 30-60%
  - Three: 70-79%
- Threshold to correct?
Malalignment - TTTG

Tibial tubercle - trochlear groove distance

> 20 mm abnormal.  Goal 10 mm post
Tendon draped over condyle – PT-LTR

 Indicates lateral tracking

PT-LTR > 5.5 mm
73% sensitivity
89% specificity
Further instability

Patellar Tendon–Lateral Trochlear Ridge Distance - A Novel Measurement of Patellofemoral Instability. R J Mistovich, MD, J Urwin, PD. Fabricant, T Lawrence; AJSM 2018
Tubercle Osteotomy indications

• TT-TG > 20 mm
• AND lateral tracking, tilt
• Especially if combined with alta
• Not an absolute number
Malalignment - Valgus

- Mechanical axis > 6 deg valgus    LDFA < 83 deg
- Mechanical axis > 50% into lateral compartment

Distal Femoral Osteotomy

Note:
DFO will correct TTTG by 7 to 10 mm
Frings KSTA 2018
Nha AJSM 2018
Guided growth if > 12 months remain
Malrotation

- Femoral anteversion > 25 deg
- Hip IR > ER by 30\(^\circ\), or hip IR > 90 degrees
- Patellas face inward, toward each other
- Flexion instability
- Greater lateral force vector from quads
Patella Alta
Patella Alta

- C D Index = H/P > 1.2

- Patella Trochlear Index = T/P

- < 25%

P = articular length of patella, excludes nose

Short trochlea or high patella
The “J” sign – Why?

- Patella leaves bony restraint of the groove in full extension.

Either:

- Patella Alta
- Dysplasia with spur
- Or both – this combination especially important
Correct patella alta if

• CD ratio > 1.4
• PT index < 20%
• J sign on exam
• Combined dysplasia and alta
  – Moving the patella distally reduces the influence of the bump or spur
Step Cut for large corrections >1 cm
Trochlear Dysplasia - Look for the spur....

Lateral x-ray is key to identify dysplasia

Then need MRI or CT

Spur – convex and anterior to cortex

Crossing sign – flat at this point
Not about “flatness” on sunrise view

Same knee at 45 and 0 degrees

Patella congruency?
Convex shape - Without the trochleoplasty.

Which way is the patella going to go?
Who Doesn’t need it – “flat”, PTI > 50%, no J sign

Does the spur influence patella tracking? Flatness is not the indication

Flat on flat is balanced
When do a Trochleoplasty?

- MPFL reconstruction always

- Deepening Trochleoplasty
  - Type B or D with convex trochlea
  - Spur height 7mm +
  - J sign on exam
  - Especially in setting of alta or short trochlea
    - Pat troch index < 20 to 25%
    - CD radio > 1.2
  - Especially for revision procedures
    - Hiemstra AJSM 2016. worse outcomes for spur > 5mm or types B, D (233 cases)
Deepening Trochleoplasty

Drop spur to level of femoral shaft

Re-shape new groove
Pre and Post
Sulcus Deepening Trochleoplasty and Medial Patellofemoral Ligament Reconstruction for Patellofemoral Instability: A 2-Year Study

S. Evan Carstensen, M.D., Scott M. Feeley, B.S., M. Tyrrell Burrus, M.D., Matthew Deasey, M.D., Jeremy Rush, M.D., and David R. Diduch, M.D.

- 44 knees, > 2 year f/u (mean 3.6)
- No recurrent dislocations
- No radiographic progression of arthritis
- Satisfaction 9.1/10; 100% return to work
- 85% return to sport
- Postoperative stiffness can be an issue.
Systematic Review

- Heimstra J Knee Surg 2019
- 21 studies with f/u 1-15 years
- Dislocation rates 0-10%
- Return to sport 55-92%
- Patient satisfaction 81-94%
Rehab

- Outpatient, regional blocks
- PT within 1-3 days
- Encourage immediate motion
- Brace for fall risk first 6 weeks: 0-90
  - Remove for ROM exercises to full as tol
- 50% weight bear for 6 weeks
- Progress as tolerated by 3 months
- Return to sport at 5 – 6 months
Summary - Instability Decision Making

- MPFL reconstruction always
- TTO if TT-TG > 20 and lateral tracking; consider PT-LTR > 6 mm
- DFO if > 6 deg valgus; LDFA < 83 deg
- Trochlear dysplasia
  - Type B or D, convex with spur > 7 mm and J sign
- Patella alta
  - Move distal if CD ratio > 1.4, PTI < 20%
- Malrotation > 25 degrees
  - May need to do TTO at same time
- Lateral release only if needed – do last