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## OBJECTIVES



- Review anatomy of the knee
- Discuss recent research on patellar instability
- Identify treatment options
- Design and implement preventative and reconditioning programs for patellar instability
- Utilize an individualized approach to treatment recognizing the differences that age plays

## How do athletes describe patellar instability?

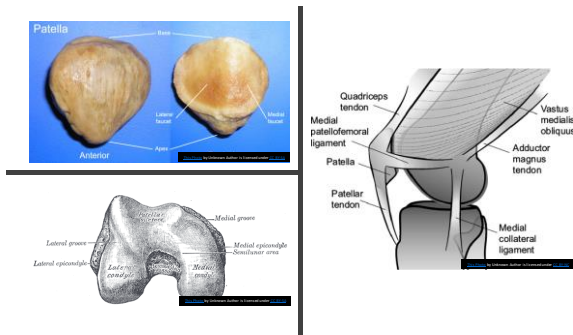
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## They say.....



## What is the anatomy?

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## What are the biomechanics?



Outward rotation of tibia

Valgus Knee position

Patella shifts laterally

## What does the research say?



### Askenberger et al. 2018



- RC Trial, Level 1
- 74 skeletally immature pts ages 9-14
- Knee Brace 4 wks & PT or athro MPFL REPAIR, soft cast splint 4 wks & PT
- Follow-up 2 years
- Redirection 16 pts (43%) vs 8 pts (22%)
- Subjective & Objective function > in brace group
- Conclusion – individualized approach based on all factors, but surgical treatment not likely superior based on follow-up function

### Pascual-Leone et al. 2022



- Review
- Patellar dislocation incidence 50-100/100,000
- Bacarek et al. 1<sup>st</sup> dislocation prior to age 16, 11x more likely to redislocate
- Skeletal maturity: physis open, closing, closed
- Anatomical risk factors: trochlear dysplasia, patella alta, lateralized tibial tubercle, genu valgum, femoral anteversion, tibial torsion
- Sex (females > males); Family hx only significant for contralateral dislocation
- Conclusion – anatomical risk factors guide management & patients & families should be counseled on redislocation risk

## Jimenez et al. 2021



- Cross-Sectional Retrospective Study, Level 3 evidence
- 97 patients with patellar instability, 100 control with ACL tears; mean age 14.5 +/- 1.8 yrs
- MRI to measure patellar & trochlear morphology
- Found Minimal association between patellar morphology & trochlear dysplasia
- Found high variability of patellar morphology in all knees, not just PI
- Conclusion – primary patellar dysplasia rare, & patellar morphology minimal contributor to PI

## D'Ambrosi et al. 2021



- Systematic review of complications & recurrent instability following MPFL Reconstruction, patients < 20 yrs old
- 332 pts, 195 female, 112 male, (352 knees); mean age 14.28 yrs; mean follow-up 30.17 months
- Results – 16 complications (4.5%); 18 recurrences (5.1%)
- Conclusion MPFL reconstruction effective tx in young patients, BUT more long term follow-up is needed

## Malecki et al. 2021



- Small study. 33 pts (6 with bilateral) recurrent patellar dislocation
- After patellar dislocation dynamic position of femur in relation to tibia plays significant role in joint stability
- Does weakness in knee flexor muscles predispose to recurrent patellar dislocations?
- Found statistically significant weakness in knee flexors in pts with recurrent dislocations on BOTH affected and unaffected limbs
- Potentially weakness of knee flexors predisposes pts to recurrent dislocations

**What are the  
conservative  
treatment  
options?**



## Physical Therapy



- Control Pain & Inflammation
- Restore Motion
- Strengthen
- Assess Function
- TIME

## Tape or Brace



**What should  
the history  
include?**



## Important History

- Mechanism of Injury
- Dislocation vs. Subluxation
- Self-reduced? Reduced in ER?
- Number of Dislocations
- Frequency of Dislocations
- Previous Treatments
- Prior injuries to knee
- Immediate Swelling?
- Location and Type of Pain?
- Mechanical Symptoms

**What should  
the objective  
exam include?**

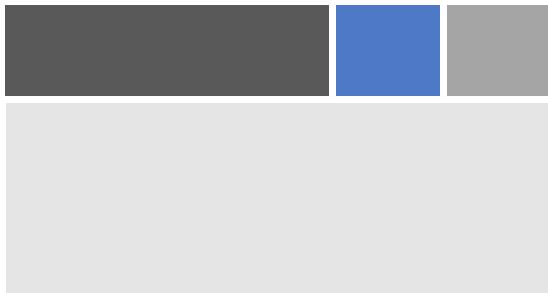


**What does  
imaging tell  
us?**

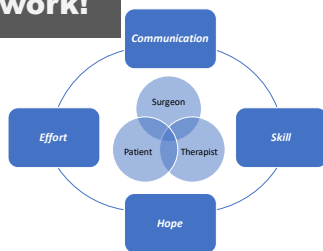


**What are the  
surgical  
options?**





## Teamwork!



## REHABILITATION GUIDELINE SUMMARY

- Precautions
- Corrective Interventions
- Functional Testing
- Patient Reported Outcomes
- Criteria to Discharge Assistive Device
- Criteria to Discharge NMES
- Criteria to Initiate Running and Jumping
- Criteria to Return to Sports Participation

## Phase IA: Protection (0-2 weeks)

Protect repair and associated autograft soft tissue

Control pain and inflammation (effusion < 2+)

Hinged knee brace for 6 weeks with WB activity and sleep

Knee PROM to tolerance without brace (90°)

Full passive knee extension

Prevent muscle atrophy (NMES)

Early active quadriceps contraction with superior patellar glide

WBAT with crutches with brace locked into full extension

MD F/U at 2 weeks with 0 – 90° ideal (anything > 45° okay)

## PHASE IB: PROTECTION (2-4 WEEKS)



Continue to protect repair with bracing during ambulation

Reduce pain and inflammation (effusion < 2+)

Combat muscle atrophy

WBAT advancements each week with or without crutches if no pain or effusion

Single leg stance > 15 seconds without loss of balance

No OKC quad strengthening until after the 4th postoperative week

## PHASE IIA: MODERATE PROTECTION (4-6 WEEKS)



FWB without increased pain or effusion without crutch while equalizing mechanics

Good quadriceps control in WB

Controlled effusion (< 1+)

Improving tolerance to loading progression

Prepare to discontinue brace

Single leg stance > 30 seconds without loss of balance

Good volitional quadriceps activation with TKE and no lag with SLR

## PHASE IIB: MODERATE PROTECTION (6-10 WEEKS)



Achieve normal gait mechanics

Normal patellar mobility without apprehension

Improve thigh and hip strength and neuromuscular control

Full, pain-free ROM (symmetric to uninvolved LE)

Pain-free functional movements

Tolerates exercise program without residual pain or effusion

Normal mechanics with CKC exercises

Application of early jumping activities

## PHASE III: RETURN TO FUNCTION (10-12 WEEKS)



•Maintain full, pain-free knee and hip ROM

Improve strength, balance, and endurance

Tolerating exercise program without pain or effusion

Isometric or isokinetic quadriceps and hamstrings strength > 80% limb symmetry

Prepare for jogging program if applicable

## PHASE IV: RETURN-TO-SPORT (12 ~ 20 WEEKS)



No reactive effusion with activity

Normal gait and jogging technique <24 hours of post-activity soreness

Good multi-planar dynamic neuromuscular control

Cardiovascular endurance fit for desired activity

Quadriceps and hamstring strength 90% of opposite limb

Progress plyometric and jogging activities after functional tests are passed

Neuromuscular control evident with appropriate mechanics with high level agility, plyometrics, and high impact movements

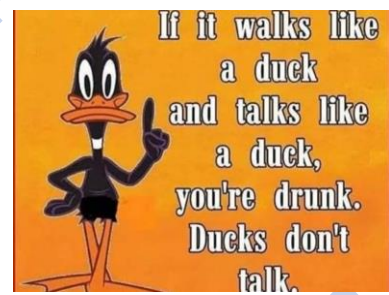
Physician clearance

# Return to Play



**Timeline****Criteria**

**What about  
those  
zebras?**



**Questions?**



**Thank You**



## References

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