Patellofemoral Disorders in the Pediatric Population

Megan Carter, PT, DPT, SCS, CSCS
Staff Physical Therapist, North Druid Hills
Children’s Healthcare of Atlanta – Sports Medicine

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Objectives

• What does patellofemoral pain syndrome look like in the pediatric population?

• Incidence, demographics, risk factors and patient presentation for kids with patella instability

• Clinical pearls for treating PFPS

• Review various post-operative rehab protocols for MPFL reconstruction, tibial tubercle osteotomy

• Clinical presentation of Osgood-Schlatters Disease and Sinding-Larsen-Johansson Syndrome in pediatric and adolescent population

• How do we treat kids with “growing pains?”

• What are we missing when treating this population?

OBJECTIVES

PATELLOFEMORAL JOINT

PFPS

PATELLA INSTABILITY

OSGOOD-SCHLATTERS / SINDING-LARSEN-JOHANSSON
**ANTERIOR KNEE PAIN**

**Patellofemoral Pain Syndrome**
- Osgood-Schlatters Disease
- Sinding-Larsen-Johansson Disease
- Patella Instability/Subluxation
- Patellar Tendinopathy
- ITB Syndrome
- Fat pad irritation/inflammation
- Trauma
- Chondromalacia of Patella

**Incidence of PFPS in Pediatrics**

- 25% of all athletes experience anterior knee pain
- Adolescent girls 2x more likely than boys
- Female basketball players screened over 3 years [Barber Foss et al., 2012]
  - Patellofemoral pain: 6.7% high school, 7.5% middle school
  - Osgood-Schlatters Disease: 1.8% high school, 2.4% middle school
  - SLJ Disease: 9.7% high school, 3.1% middle school*
- Single sport specialization increases risk of PF diagnoses [Pal et al., 2011]
  - PFPS x 1.5 fold
  - Osgood-Schlatters and SLJD x 4 fold

**What Does PFPS Look Like?**

- **HISTORY/Patient Complaints**
  - Insidious onset, diffuse pain
  - Pain with prolonged positions (walking/sitting), running, going up/down stairs, jumping
- **Daily Demands**
  - School PE
  - Sports (multiple sports, multiple teams per sport)
  - Ask very specific questions about training!*
What Does PFPS Look Like?

**Functional Screen**
- Walking, running, jumping
- Squats, SI squats, SI balance eyes open and closed

**Objective Measures**
- Standing Assessment/Alignment
- ROM
- Strength*
- Flexibility*
  - Thomas Test
  - Ober’s
  - QL’s
  - Hamstring WVVI
- Special Testing
  - "J Sign"
  - Reduction in symptoms with manual medial glide of patella during resisted knee extension

PFPS Treatment

- Impairment-based treatment approach
- Number one priority: **gluteal and core strengthening**
  - Isolate and prescribe exercise with purpose
  - Many kids are quadriceps-dominant
- Don’t forget about **flexibility component**!
  - Remember hamstrings and gastrocnemius complex
- **NEUROMUSCULAR RE-EDUCATION**
  - "Hands on" to CORRECT muscle firing patterns and mechanics
- Functional progression
- Kids like sport-specific exercises!!

Treatment Clinical Pearls

**Can they fire gluteus muscles correctly?**

**Perturbation Training → Sport-Specific**

*Fitzgerald et al., 2000*
Isolated Glute Strengthening

- High GLUTE - Low TFL activation
  - Clamshells
  - Sidesteps
  - Squat
  - SL bridge
  - DL bridge
  - Quadraped with hip ext

- High Gluteus Medius activation AND TFL activation
  - Supine hip abduction
  - Hip hike

Selkowitz et al., 2013

Core and Proprioceptive Exercises

Patellar Instability

- First-time dislocators - females 10-17 years old
  - Patellofemoral dysplasia, female gender, and positive family history
- Prior history of subluxation/dislocation - females 18-29 years old
  - Prior history and age
- 61% of first-time dislocations occur during sports activity
- 10-17 year old female age group 33% higher risk for recurrent subluxation/dislocation after first dislocation
- Prior history of subluxation or dislocation has 6.6x higher odds of subsequent patellar instability episodes in 2-5 year follow-up period

Fithian et al., 2004
Patellar Instability – Conservative Treatment

- PATIENT PRESENTATION
- ASSESSMENT
- TREATMENT EMPHASIS
  - FLEXIBILITY
    - Eliqueus, rectus femoris, ITB
  - STRENGTH
    - Glute and core strength
    - Restore proper quad mechanism
  - NEUROMUSCULAR CONTROL!
    - Most important for rehab with this injury

Neuromuscular Control – What do we look for?

Proper Quad Activation Exercise

"Lift heel up but keep back of leg touching the table"
POST-OPERATIVE TREATMENT

MPFL RECONSTRUCTION

Week 1-4
• PWB x 2 weeks
• 0-90 x 2 weeks
• Immediate restoration of full knee extension
• Patella mobilization, quadriceps, bicep femorus, knee flexion and calf stretching

Weeks 5-8
• Each: ICU knee immobilizer and crutches per MD recommendation
• ROM to tolerated, restore quad strength
• Use of NMES, strengthening (legs, abdomen, back)
• Begin cardio (jog, pool, walking, strengthening)

Weeks 9+
• Goals: d/c knee immobilizer and crutches per MD recommendation
• ROM as tolerated, restore quad strength – CKC and OKC strengthening (stay 0-60 for PF contact)
• Begin cardio (bike, pool, walking, strengthening)

POST-OPERATIVE REHABILITATION

• FOLLOW MD PROTOCOL
• DECREASE SWELLING AND JOINT EFFUSION
• NORMALIZE AMBULATION
• BENEFITS OF USING NMES*
• RESTORE KNEE ROM PER PROTOCOL
• RESTORE QUADRICEPS FUNCTION*/ ELIMINATE QUADRICEPS LAG
• RESTORE QUAD/HAM SYMMETRY
• NEUROMUSCULAR RE-EDUCATION
• AND CONTROL CRUCIAL

ADDITIONAL POST-OPERATIVE REHAB PROTOCOLS

TIBIAL TUBERCLE OSTEOTOMY +/- MPFL RECONSTRUCTION

• 0-30 degrees x 2 weeks
• 0-60 degrees x 4 weeks
• 0-90 degrees x 8 weeks
• D/C crutch and knee immobilizer with good quad control and normalized ambulation 8+ weeks
• Stationary biking x 8 weeks
• Emphasis on restoration of quadriceps strength, neuromuscular retraining and full knee ROM
• Weeks 16-24 – begin running pending functional assessment and strength
• 6+ months – 90% limb symmetry (quadriceps index and hop testing)
**Osgood-Schlatters Disease**

- Apophysitis of tibial tubercle due to stretch on quadriceps tendon
  - Rapid growth
  - Overuse, microtrauma
- Sinding-Larsen-Johannson
  - Apophysitis of inferior pole of patella due to stretch on quadriceps/patella tendon complex
  - Rapid growth, overuse, microtrauma
- Female basketball players screened over 3 years (Barber Foss et al., 2012)
  - Osgood-Schlatters Disease: 1.8% high school, 2.4% middle school
  - Sinding-Larsen-Johannson Disease: 9.7% high school, 3.1% middle school

**Treatment Focus in Growing Kids**

- **PATIENT PRESENTATION**
- **ASSESSMENT**
- **TREATMENT EMPHASIS**
  - **FLEXIBILITY**
    - Most important component of rehab
    - Hamstring, rectus femoris, ITB
  - **STRENGTH**
    - Glute and core strength
    - Restore proper quad mechanism

**Post-Test Questions**

1. What muscle is overdominant in patients with patellofemoral pain syndrome?
   a) Gluteus medius
   b) Hamstring
   c) Quadricep
   d) Gluteus maximus
   e) Abdominals/core
Post-Test Questions

2. Muscle tightness that contributes to patellofemoral pain include all of the following muscles except for:
   a) Iliopsoas
   b) Rectus femoris
   c) Piriformis
   d) Hamstring
   e) Gastroc-soleus

Post-Test Questions

3. Proper form during a functional double leg squat includes all of the following movement patterns except for:
   a) Posterior weight shift
   b) Excessive trunk flexion
   c) Knees behind toes
   d) Equal weight bearing between lower extremities
   e) Heels down

Thank You

Questions?
References