

Examination and Treatment Algorithm for Patellar Dislocation or Malalignment

Knee Update 2016
Gelsenkirchen, Germany

June 3, 2016

K. Donald Shelbourne, MD



Disclosure

- I have nothing to disclose.

Overview

- Discuss differences between acute and chronic dislocators
- Evaluation of the patellofemoral joint
- Our approach to treatment
 - Surgical
 - Non-surgical
- Rehabilitation

Introduction

- Many different treatment approaches to patellar dislocation, including non-operative rehabilitation
- Surgical options:
 - Proximal, soft tissue
 - Distal, bony realignment
 - Proximal and distal
- For PF instability, we need to customize our treatment based on the underlying problem

Introduction

- In young competitive athletes, surgical treatment for patellar dislocation is not as common as ACL tears
- In 30 years of practice devoted to treatment of knee injuries
 - - 6000 ACL reconstructions and only 500 patellar realignment procedures

Introduction

- General orthopaedic surgeon who may treat 50 patients for ACL injuries per year may see only 10 patellar dislocations in the same period
 - Trend is the same for PTs and Athletic Trainers
- Without a high number of patients with patellar dislocation, it is difficult to arrive at a treatment algorithm

Introduction

- In the 1980's, we performed a Trillat procedure for all patellar dislocations showing significant lateral alignment of the patella
 - Medialize tibial tubercle
- As we have systematically researched our patients with long-term follow-up, we began to sort out the anatomical differences in patients with patellar dislocation
- Treatment approach has been refined based on the research results

Introduction

- Not all patellar dislocations are the same
 - Traumatic vs. atraumatic
 - Unilateral vs. bilateral malalignment or injury
 - Normal patella height vs. patella alta
 - Many factors to consider

Patellofemoral Instability 2 Main Categories

- | | |
|---|--|
| <ul style="list-style-type: none"> ▪ Acute, traumatic dislocations <ul style="list-style-type: none"> • Patient without any previous PF instability in either knee | <ul style="list-style-type: none"> ▪ Chronic/Recurrent Instability <ul style="list-style-type: none"> • Often non-traumatic mechanism of injury • Bilateral instability common |
|---|--|

Patellofemoral Instability

- Most often, patients with recurrent or bilateral instability have congenital alignment problems that predispose them to dislocations
 - Lateral patella
 - Proximal patella (alta with J-sign)
 - Combined lateral and proximal alignment

Evaluation

- We evaluate the following factors:
 - Height of the patella on physical exam
 - Integrity of medial retinaculum
 - Position of the patella in relationship to the trochlea (radiograph)
 - Height of patella and length of the patella tendon on radiographs

Evaluation

- Comparison to the opposite patella is critical
 - Observe for asymmetries between the patellae
 - In patients with unilateral instability, you have a guide as to what the alignment of the involved patella should be
 - When the patient has congenital malalignment or bilateral instability, the alignment of the opposite patella may not be normal

Clinical Examination

- J-sign
 - Patient sits on the side of an examination table with knees bent
 - Observe the movement of the patella during active knee extension
 - Positive J-sign occurs when the patella moves out of the trochlea laterally
 - Indicates patella alta

J-Sign



Clinical Examination Patella Height

Normal Patella Height



Patella
Alta



Patella
Baja



Patella Height and VMO Size

- It has been our experience that patients with long patella tendons have smaller VMO muscle mass
- Patients with short patella tendons have larger VMO muscle mass
- We don't believe that the smaller size of the VMO leads to PF instability
- BUT, patients with instability often have patella alta and hence, small VMOs

Clinical Examination: Patella Tilt

- Patella Tilt
 - Move the patella medially and gently lift the medial aspect of the patella with your finger tips
 - Observe for increased laxity of medial retinaculum compared to opposite side



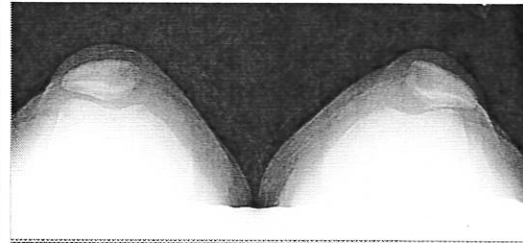
Radiographic Examination

- Merchant view
- Lateral view (60 degrees)
- Lateral view with knee extended and quadriceps contracted
- Bilateral films

Merchant View

- Assesses the relationship of the patella to the trochlear groove
- Provides a direct comparison to the opposite knee
- Observe for presence of an avulsion fracture

Merchant View



Lateral View

- Patella Tendon Length
 - Inferior pole of patella to tibial tubercle
- Normal Values
 - 45 mm for females
 - 50 mm for males



Lateral View

- Patella Height
 - Inferior tip of patella chondral surface to Blumensaat's line



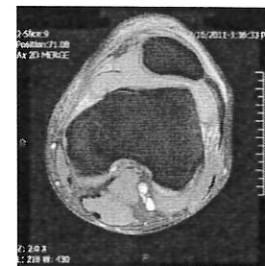
Quad Contraction Lateral view

- Evaluate the height of the patella in relationship to the trochlear groove
- Inferior tip of patella chondral surface to superior edge of trochlea



MRI

- Used primarily to assess
 - integrity of the medial retinaculum
 - status of the articular cartilage



Surgical Treatment

- In general, proximal procedures are for traumatic problems in previously normal knees
 - Soft tissue corrections
- Distal procedures are done to correct underlying congenital problems
 - Procedures involving tibial tubercle

Treatment Algorithm

- Use the subjective history and evaluation of the patient to categorize patients
 - Dislocations without preexisting congenital malalignment
 - Dislocations in patients with preexisting congenital malalignment
 - Lateral patellae, normal patella height
 - Lateral and proximal patellae
 - Centered, but proximal patellae

Acute patellar dislocations

- Treatment is straightforward when knee was normal prior to dislocation

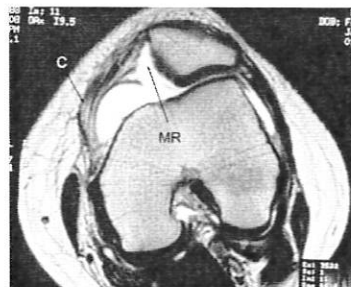
Acute patellar dislocations Nonoperative treatment

- Symmetric Merchant view with both patellae centered in trochlea
- Focus on reducing effusion and regaining symmetric ROM and strength prior to functional progression back to sport
 - Patients tend to have large effusion and problems with quad control initially
 - Flexion loss due to effusion
 - Usually don't have extension ROM loss (if so, it is easily regained)

Acute patellar dislocations

- Exception is competitive athlete with MRI showing medial retinaculum tear despite the patella being centered
- Often require surgery to be able to return to sports without instability because the medial retinaculum cannot heal if it is badly torn

MRI: Torn Medial Retinaculum



Acute patellar dislocations Operative Treatment

- Surgery done subacutely- ↓ swelling and ↑ ROM 1st
- Medial retinaculum imbrication and open lateral release (MI/LR)
 - Clear asymmetry between the two patellae on Merchant view x-ray
 - Contralateral patella centered within trochlea
- Elmslie-Trillat procedure (with MI/LR)
 - Clear asymmetry between two patellae
 - Contralateral patella is not centered within the trochlea

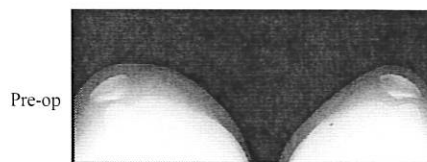
Acute patellar dislocations Operative Treatment

- Surgery is not done until swelling resolves and symmetric ROM is restored
- Pre-op rehab and patient education is very important
- Focus on
 - ROM, swelling control, quadriceps control, normal gait pattern

Medial Imbrication and Lateral Release

- Arthroscopy performed to evaluate articular cartilage status
- Open lateral release performed through a small incision on the lateral side of the patella leaving synovium intact
- Parallel incision made on medial side
- "Pants over vest" technique to imbricate the medial retinaculum

Medial Imbrication/Lateral Release: Merchant View

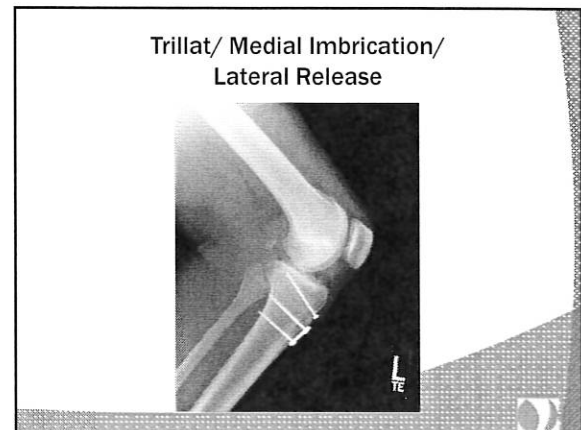
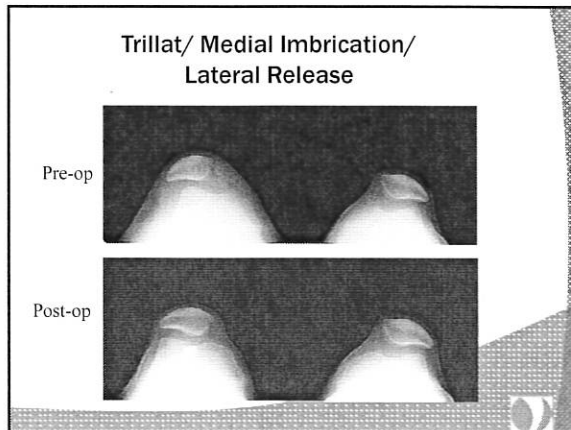


Elmslie-Trillat Procedure

- Lateral release
- Medialize tibial tubercle
- Medial retinaculum imbrication

Elmslie-Trillat Procedure

- Medial imbrication and lateral release is done to repair the acute injury
- Medialization of the tibial tubercle corrects the preexisting congenital abnormality: lateral patella alignment



Chronic Patellar Dislocation

- Patients grouped into the following categories:
 - Normal patella height, patellae centered on Merchant view
 - Normal patella height, patellae not centered on Merchant view
 - Patella alta

Chronic Patellar Dislocation

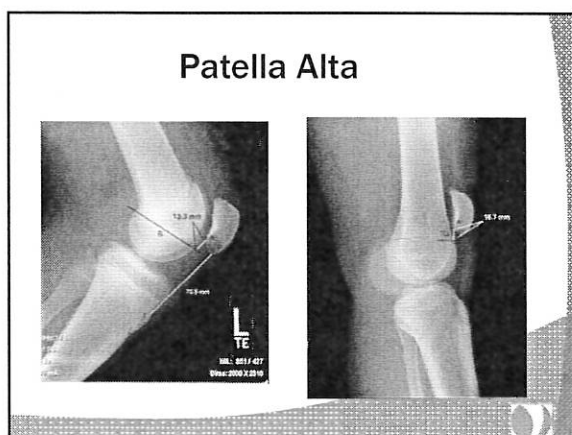
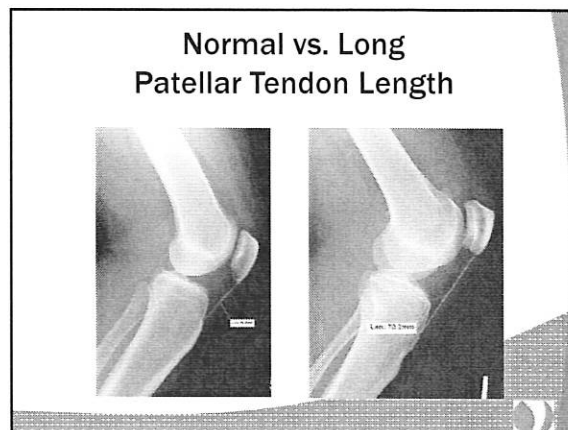
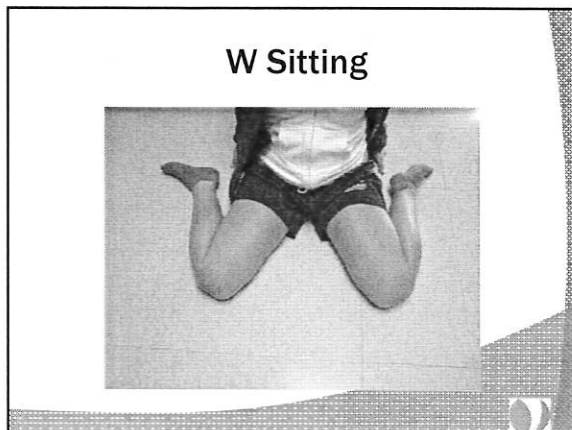
- Category 1
- Despite normal Merchant view x-rays and normal patella height, some patients will experience chronic instability
- Indicates laxity of medial retinaculum
 - Detected by comparing medial patellar tilt to opposite knee or by MRI
- Treated with medial imbrication and lateral release

Chronic Patellar Dislocation

- Category 2
- Patients with lateral patellae on Merchant view and normal patellar height
- Treated with an Elmslie-Trillat procedure combined with medial imbrication and lateral release

Chronic Patellar Dislocation

- Category 3
- Patella Alta
 - Positive J-sign
 - Observable patella alta
 - Patella tendon length longer than normal
 - Increased patella height
 - Increased knee flexion allows patients to "W sit" between their heels



Chronic Patellar Dislocation Patella Alta

- Our previous treatment theory
 - All chronic instabilities were treated with Elmslie-Trillat procedure between 1982-1998
 - Research follow-up revealed that a small percentage of those patients experienced recurrent instability after surgery
 - This group of patients with recurrent instability had significantly longer patellar tendons
 - Theorized that medialization procedure only corrected part of their anatomic problem

Chronic Patellar Dislocation Patella Alta

- Distalization procedures have been used in the past, but became unpopular due to a high incidence of patellofemoral OA (Hauser)
- Historically, these were done indiscriminately for all instability problems without looking at patella tendon length or patella height
- When done as a correction for longer-than-normal patella tendons this procedure restores the normal anatomy, correcting the patella alta and positive J-sign abnormalities

Chronic Patellar Dislocation Patella Alta

Treatment for recurrent dislocations w/ patella alta

	Distalize Tubercle	Elmslie-Trillat	MI/LR
Centered patellae Medial retinaculum intact	X		
Lateral patellae Medial retinaculum intact	X	X	
Lateral patellae Medial retinaculum torn	X	X	X

MI/LR = medial imbrication/lateral release

Chronic Patellar Dislocation Patella Alta

- Our current treatment
 - Our experience has shown that patients perceive an asymmetry between their knees when only one patella is distalized
 - We now recommend bilateral tubercle distalization in this patient population to restore stability while maintaining symmetry

Distalization Procedure

- Amount of distalization is determined pre-operatively based on radiographic measurements
 - Height of patella above Blumensaat's line
 - Height of patella above the trochlear groove
 - Patella tendon length

Distalization Procedure

- Similar surgical approach to the Elmslie-Trillat procedure
- Tubercle is transferred to a distal, or distal and medial, position

Pre-op and Post-op Trillat with Distalization

Pre-op and Post-op Trillat with Distalization

Rehabilitation 1st Week Post-op

- Prevent hemarthrosis
 - Continuous use of a cold/compression device
 - Anti-embolism stockings
 - CPM machine to keep knee elevated above the heart
 - Bend to 90° and hold for 3-5 minutes (3x/day)
 - Flexion helps center the patella

Rehabilitation

- Patients remain on bed rest, except for bathroom privileges, for 5-7 days
- Use immobilizer for 2-3 weeks with weightbearing allowed
- Concentrate on strengthening exercises at 4-6 weeks
- Gradual return to activities as tolerated

Conclusions

- Our treatment algorithm has been developed after years of consistent observation and long-term research follow-up
- The treatment needs to be directed to resolving the underlying pathology
- Primary goal is to obtain symmetry between knees

Conclusions

- Rehabilitation should focus on early ROM
 - Knee flexion works as a “centering device” for the patella
 - As swelling resolves, knee flexion will continue to improve
- Promote quadriceps muscle control
 - Regain protective control as soon as possible
- Once these goals are achieved, begin functional progression for return to sports