

# Patellar Instability

*Extremities in the Carolinas: Trauma for General Orthopedics*

Elise Bixby, MD

5/6/2023

OrthoCarolina

*A better choice*

# Take Home Points

1. There are different flavors of patellar instability.
2. Underlying (patho)anatomy predisposes patients to patellar instability.
3. Most patients need an MRI to look for cartilage lesions.
4. Many need operative treatment, which is dependent on their (patho)anatomy.

# Vignettes



Chronic instability



Acute traumatic dislocation

# Vignettes



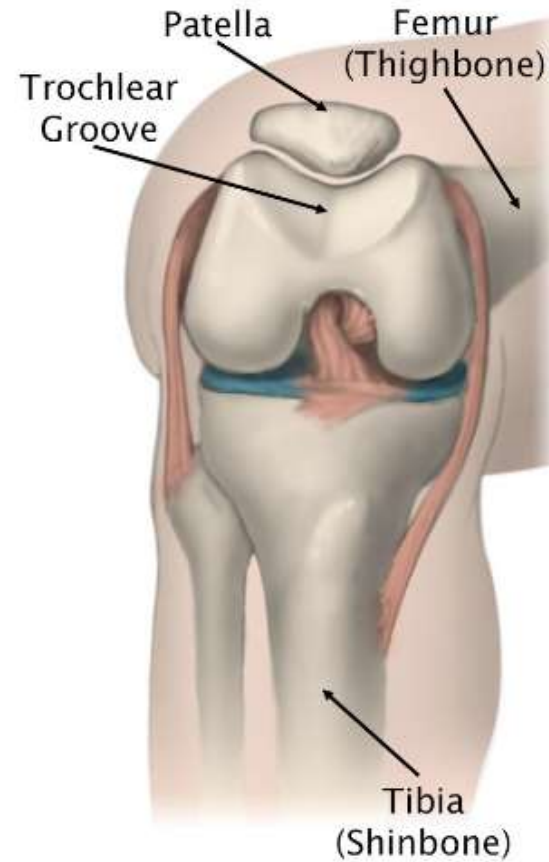
Traumatic rupture of a surgical arthrotomy



Congenital dislocation

# Why It Happens

There is (almost) always underlying pathoanatomy.

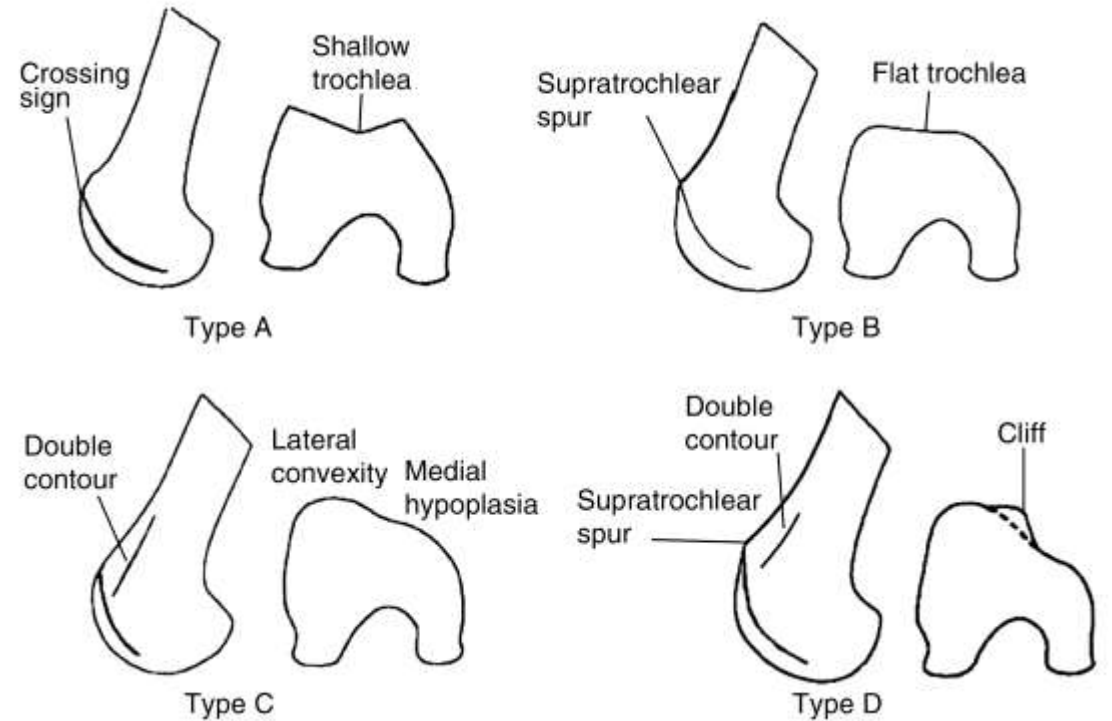


# Why It Happens

There is (almost) always underlying pathoanatomy.



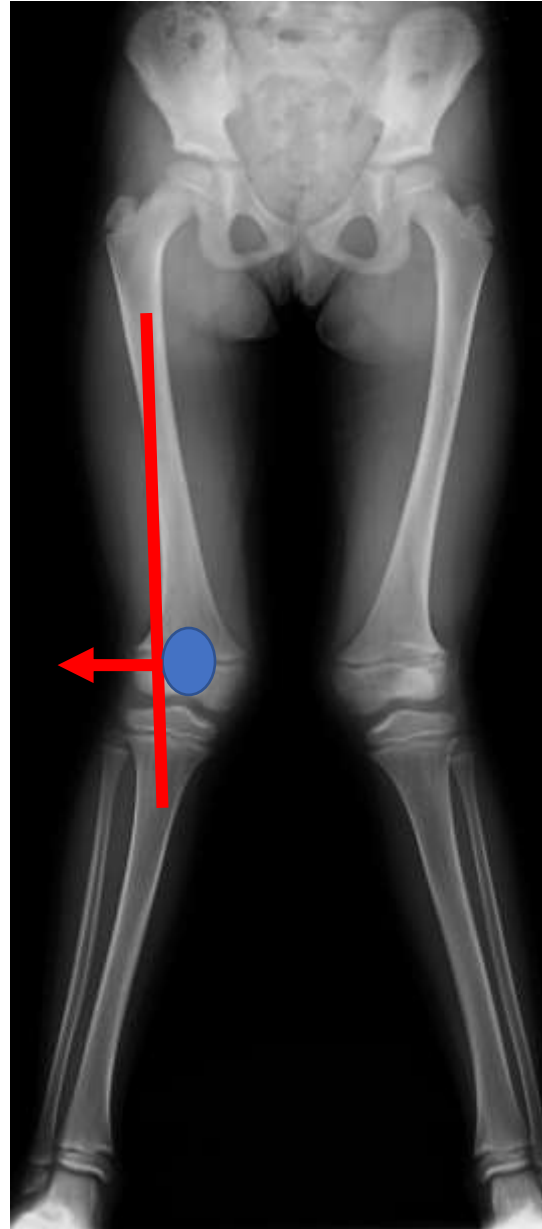
## Trochlear dysplasia



# Why It Happens

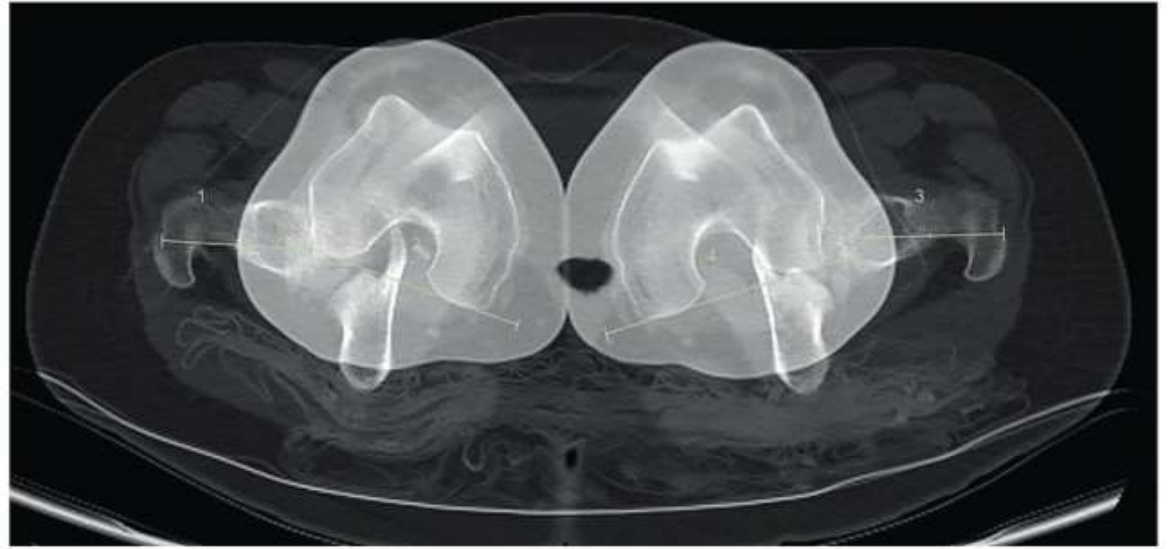
There is (almost) always underlying pathoanatomy.

**Genu  
Valgus**

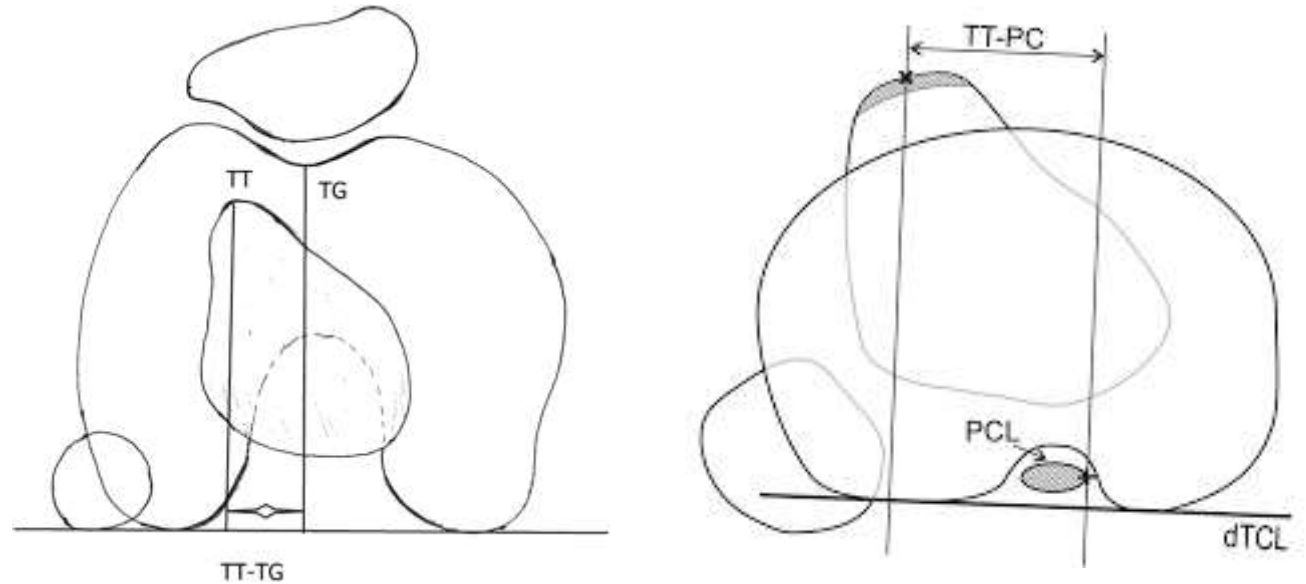


# Why It Happens

There is (almost) always underlying pathoanatomy.



## Rotational Malalignment

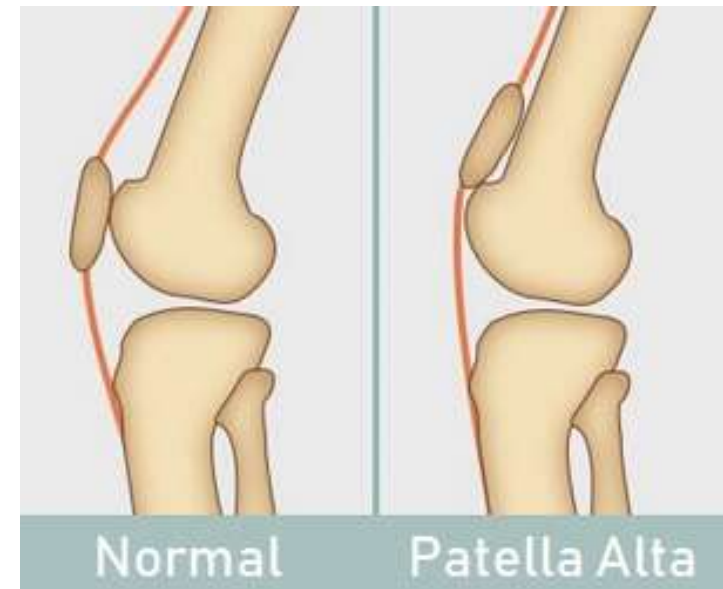




# Why It Happens

There is (almost) always underlying pathoanatomy.

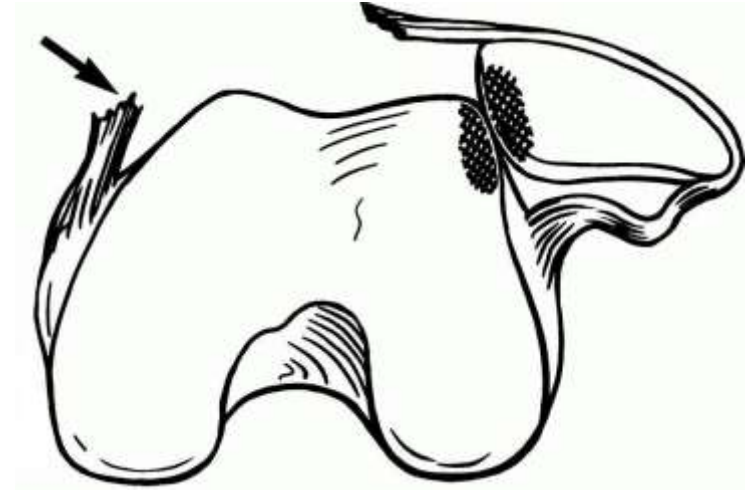
## Patella Alta



# Why It Happens

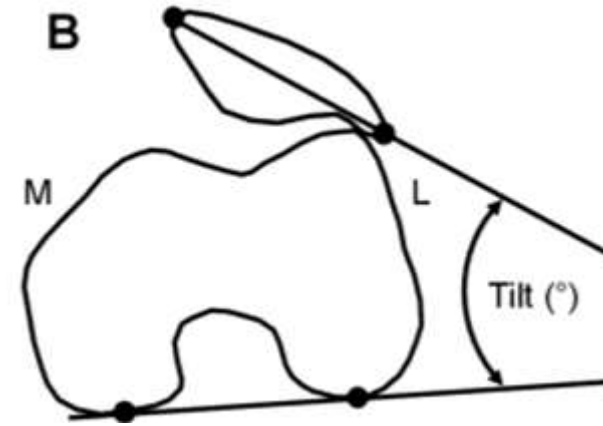
There is (almost) always underlying pathoanatomy.

**Torn medial  
retinaculum and  
medial patellofemoral  
ligament  
(MPFL)**

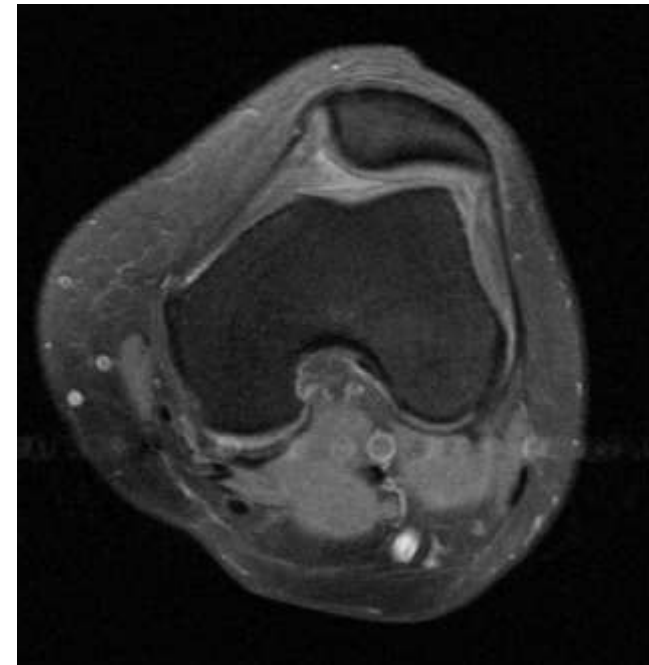


# Why It Happens

There is (almost) always underlying pathoanatomy.



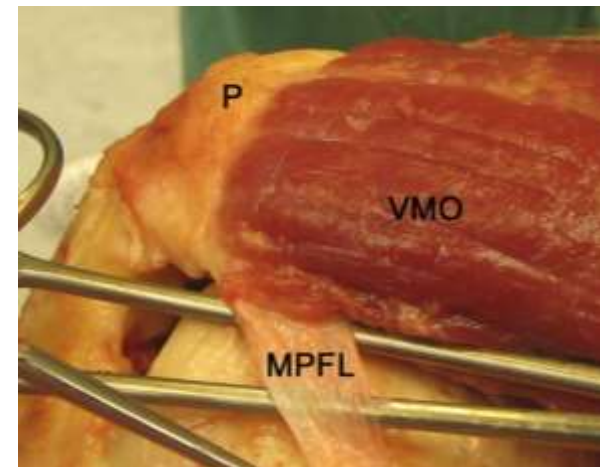
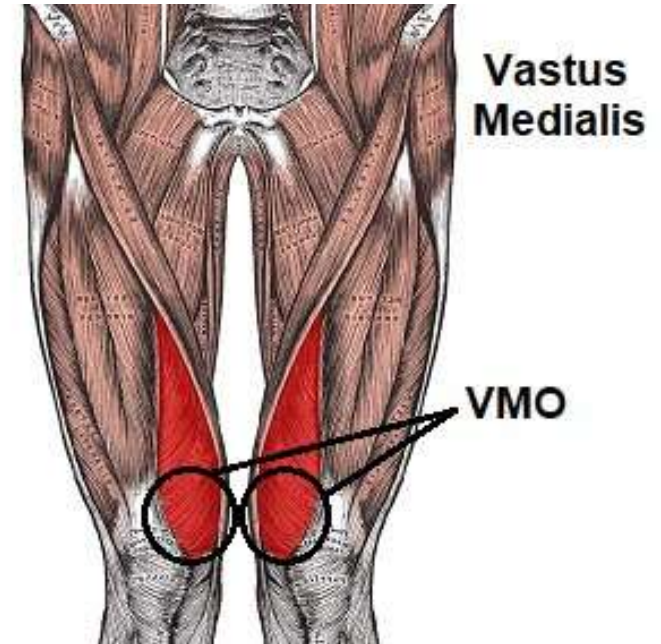
## Contracted lateral retinaculum



# Why It Happens

There is (almost) always underlying pathoanatomy.

## VMO Weakness



# What to Do About It...

## In the Emergency Department:

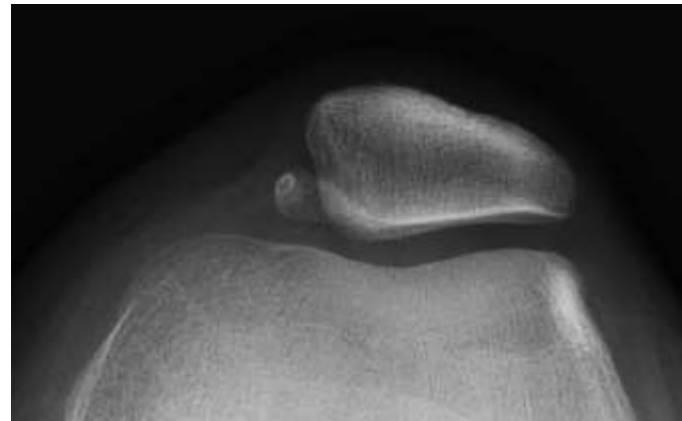
- Reduce the dislocation



# What to Do About It...

## In the Emergency Department:

- Reduce the dislocation
- Obtain radiographs
  - Dislocation
  - Osteochondral fragments
  - Patella alta
  - Trochlear dysplasia



# What to Do About It...

## In the Emergency Department:

- Reduce the dislocation
- Obtain radiographs
- Knee immobilizer +/- crutches
- Refer to an orthopedic sports surgeon



# What to Do About It...

## **In the Clinic:**

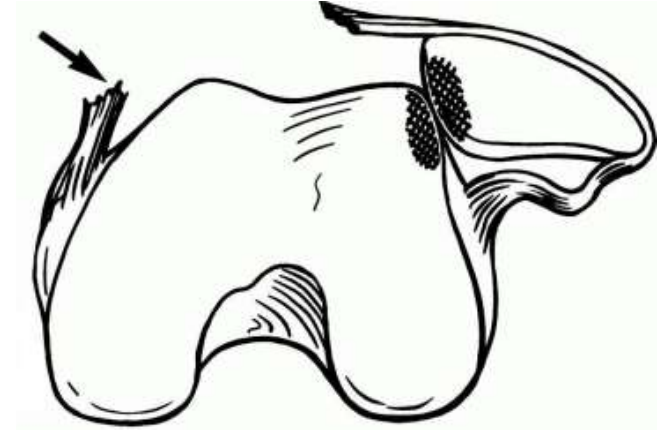
- History and physical exam
  - Frequency
  - Age of first dislocation
  - Subluxation events
  - Continued pain
  - Mechanical symptoms
  - Hyperlaxity/ CTD



# Physical Exam

Acutely:

- Effusion
- TTP over the medial patellar facet, tracking back to the medial epicondyle and over the lateral trochlea
- Limb alignment (valgus)
- Hyperlaxity



**Beighton score**  
Ehlers-Danlos Support UK  
Registered Charity 1157027

Give yourself 1 point for each of the manoeuvres you can do, up to a maximum of 9 points

Can you bend your thumb back onto the front of your forearm?  
Left thumb 1 point, Right thumb 1 point

Can you bend your knee backwards?  
Left knee 1 point, Right knee 1 point

Can you put your hands flat on the floor with your knees straight?  
1 point

Can you bend your elbow backwards?  
Right arm 1 point

Can you bend your little finger up at 90° (right angles) to the back of your hand?  
Left arm 1 point, Right hand 1 point

MAKING OUR INVISIBLE VISIBLE

www.ehlers-danlos.org  
T: 020 8736 5604

# Physical Exam

After things calm down:

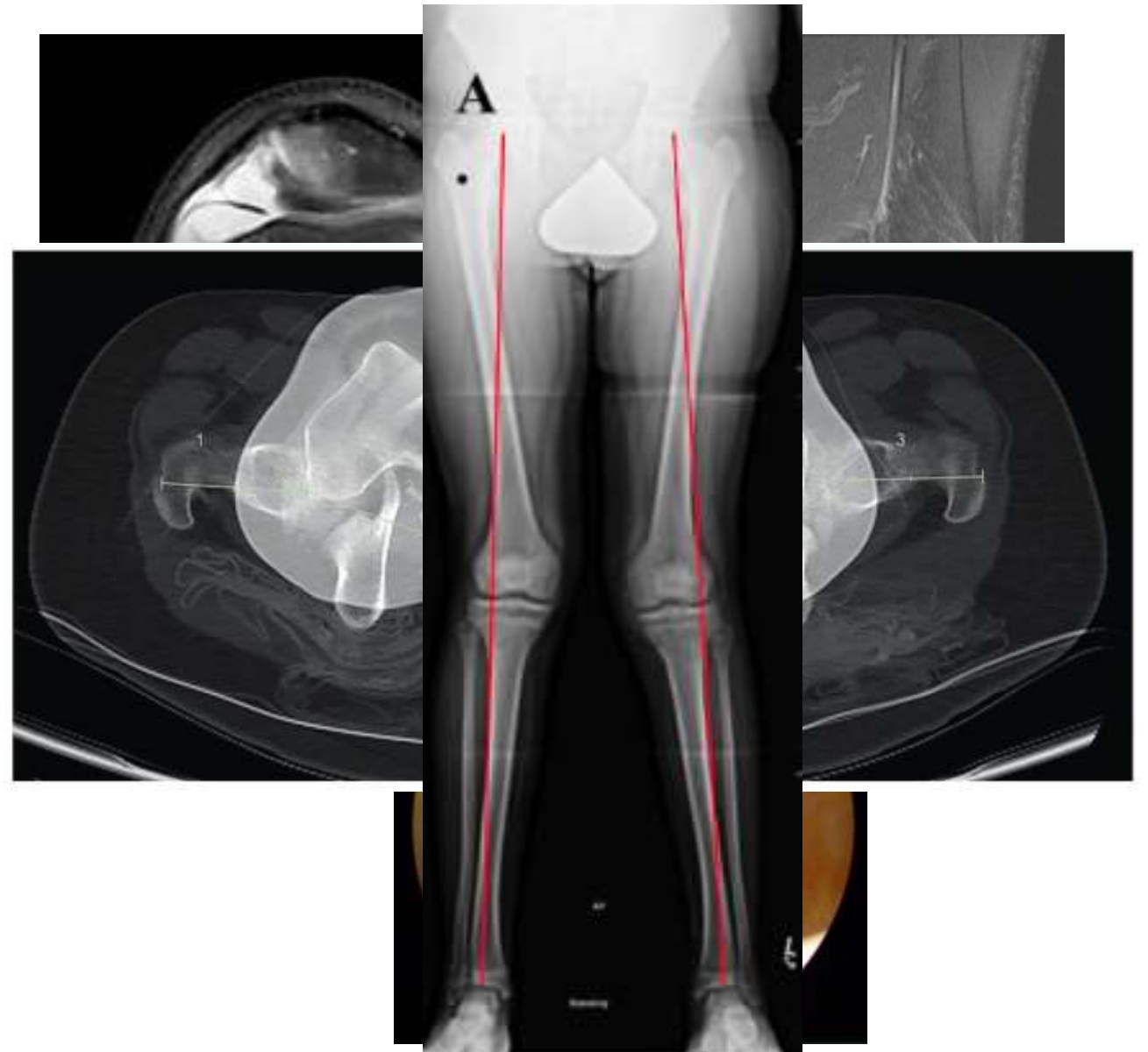
- Quadrants of patellar translation
- Lateral patellar tilt
- J-sign
- Patellar apprehension
- Hip internal and external rotation



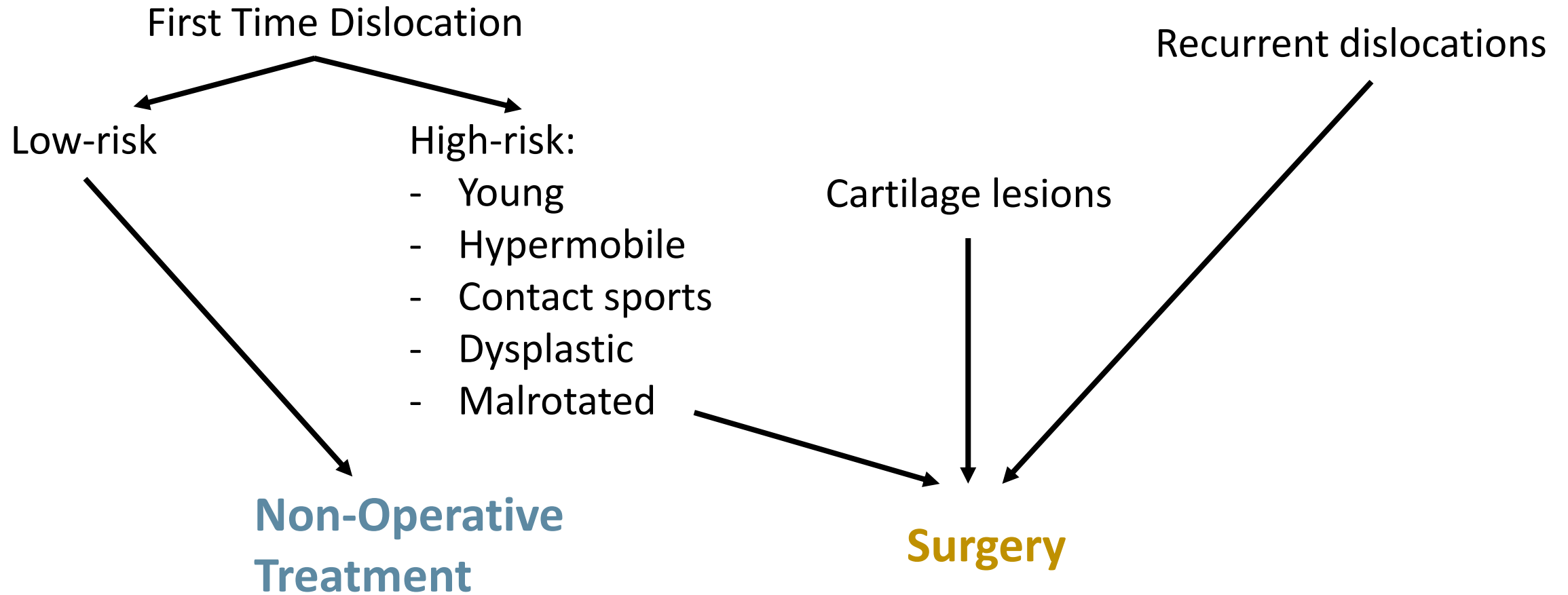
# What to Do About It...

## In the Clinic:

- History and physical exam
- MRI
- Consider additional imaging
  - Limb alignment radiographs
  - CT scan for rotation
- Discussion of operative vs non-operative treatment

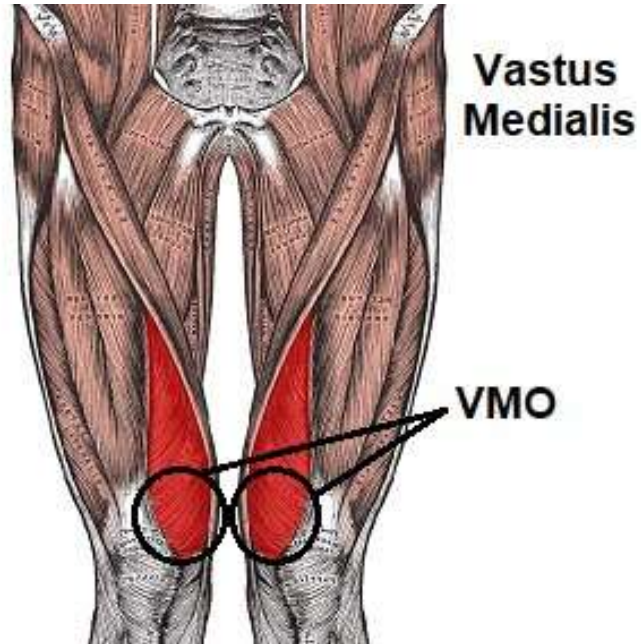


# What to Do About It



# What to Do About It

Non-operative treatment = PT + bracing





# What to Do About It...

## Operatively:

Torn MPFL → MPFL reconstruction

Tight lateral retinaculum → Lateral release

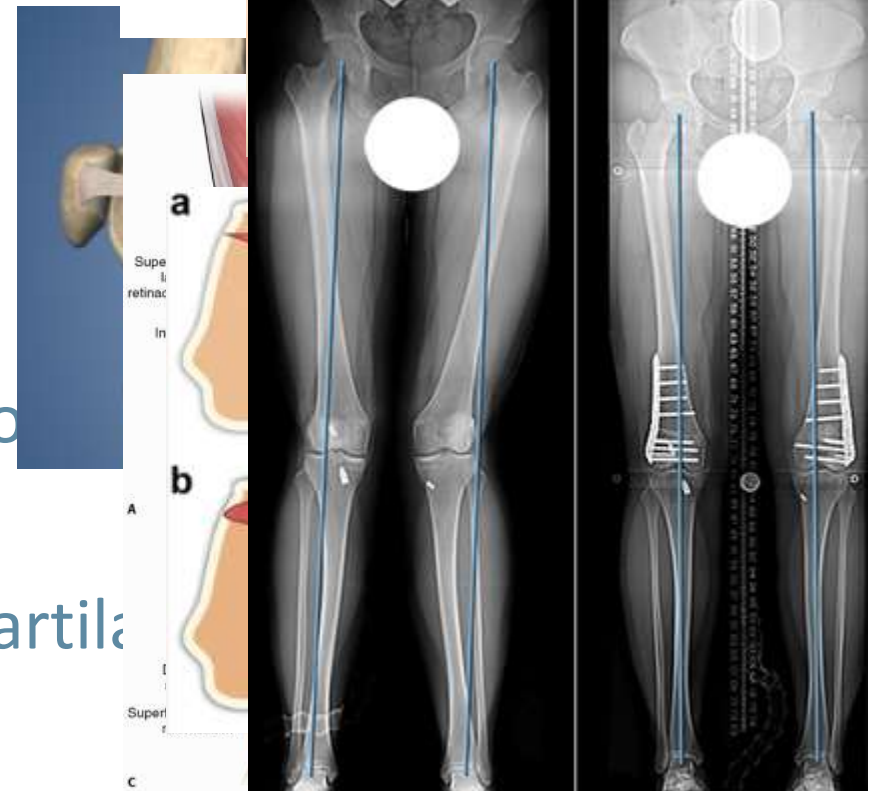
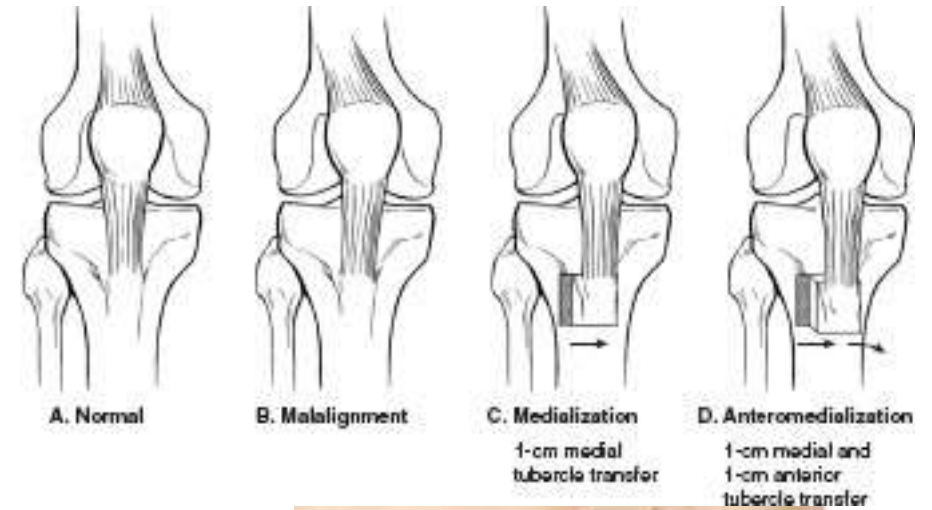
Trochlear dysplasia → Trochleoplasty

Genu valgus → Osteotomy (DFO)

Rotational malalignment → Osteotomy (DFO or

Patella alta → Osteotomy (TTO)

Chondral damage → Chondroplasty, ORIF or cartilage restoration +/- TTO



# Take Home Points

1. There are different flavors of patellar instability.
2. Underlying (patho)anatomy predisposes patients to patellar instability.
3. Most need an MRI to look for cartilage lesions.
4. Many need operative treatment, which is dependent on their (patho)anatomy.

# Want to Learn More?

## Surgical versus non-surgical interventions for treating patellar dislocation

Toby O Smith, Andrew Gaukroger, Andrew Metcalfe, Caroline B Hing Authors' declarations of interest

Version published: 24 January 2023 Version history

<https://doi.org/10.1002/14651858.CD008106.pub4>

### Review Article

#### Patellofemoral Instability Part I: Evaluation and Nonsurgical Treatment

Thierry Paulyo, MD, CM, MSc, FRCSC, FAAOS

J. Patrick Park, MD, CM, MSc

Isabella Bozzo, MD, CM (SOS), M Eng, BEng

Michelle Bernstein, MD, FRCSC, FAAOS

#### ABSTRACT

Patellofemoral instability (PFI) is a prevalent cause of knee pain and disability. It affects mostly young females with an incidence reported as high as 1 in 1,000. Risk factors for instability include trochlear dysplasia, patella alta, increased tibial tubercle-to-trochlear groove distance, abnormal patella lateral tilt, and coronal and torsional malalignment. Nonsurgical and surgical options for PFI can treat the underlying causes with varied success rates. The goal of this review series was to synthesize the current best practices into a concise, algorithmic approach. This article is the first in a two-part review on PFI, which focuses on the clinical and radiological evaluation, followed by nonsurgical management. The orthopaedic surgeon should be aware of the latest diagnostic protocol for PFI and its nonsurgical treatment options, their indications, and outcomes.

This article is part I in a two-part series presenting an approach to the clinical and radiological evaluation of patellofemoral instability (PFI), with a discussion on nonsurgical treatment, and part 2 of this series will discuss surgical management. PFI has a multifactorial etiology, often affecting young, active individuals.<sup>1,2</sup> The overall incidence of PFI in the general population is 5.8 in 100,000, whereas its incidence in female individuals between 10 and 17 years is reported at 29 in 100,000.<sup>3</sup> Patellofemoral disorders and patellar dislocations comprise approximately 25% and 3% of all knee injuries, respectively.<sup>1,4</sup> In patients with a first-time patellar dislocation, the rate of recurrence is 17% to 33%, with no difference across different age groups.<sup>4,5</sup> For those with recurrent dislocations, the risk of redislocation is over 50%.<sup>2</sup> Moreover, up to 48.9% of patients with a first-time patellar dislocation develop osteoarthritis of the patellofemoral joint after 25 years versus 8.3% in age-matched control subjects ( $P < 0.001$ ).<sup>6</sup> Therefore, an algorithmic approach to diagnosis and treatment of PFI is imperative (Figure 1).

Patients with PFI often present with sensations of patellar instability, previous patellar subluxations/dislocations, and knee effusion.<sup>1,7</sup> They may report difficulty with weight-bearing or standing upright and difficulty straightening their knee. They may have instability while walking, climbing stairs/bending their knee, running, or jumping. It is important to distinguish

#### Review Article

#### Lateral Patellar Instability in the Skeletally Mature Patient: Evaluation and Surgical Management

David R. Dituch, MD  
Abderrahman Kandil, MD  
M. Tyrrell Burris, MD

#### Abstract

Lateral patellar instability is a common disease process that affects all types of patients. Depending on the patient's anatomy and the results of preoperative imaging, surgical management options include medial patellofemoral ligament reconstruction, tibial tubercle osteotomy, and sulcus-deepening trochleoplasty. Medial patellofemoral ligament reconstruction or repair is useful for almost all patients, whereas tibial tubercle osteotomy is helpful to correct a lateralized tibial tubercle and the associated elevated lateral pull of the extensor mechanism. For a select subset of patients with severe trochlear dysplasia, a sulcus-deepening trochleoplasty can be a useful option to prevent future patellar instability. Many technical considerations exist for each procedure, and in most situations, no consensus exists to direct surgeons on the superior technique.

Patellar dislocations occur at a rate of 5.8 per 100,000 persons, with an increased risk in younger age groups (10 to 20 years), in females, and during sports participation in athletes.<sup>1,2</sup> The source of patellar instability may be an incompetent medial patellofemoral ligament (MPFL), trochlear dysplasia, patella alta, laterally positioned tibial tubercle, or femorocondyl malunion.<sup>1,4</sup> For patients with clearly defined anatomic variants, a surgical plan is easily decided on, supported by a recent meta-analysis demonstrating that surgical reconstruction substantially reduced dislocation rates in this population.<sup>3</sup> However, many patients' anatomy is not so straightforward, and deciding on a treatment plan can be challenging. In addition, there is ongoing research on how to correctly quantify normal knee parameters. Therefore, a combination of preoperative imaging

and a thorough physical examination must be used to guide surgical decisions.

#### Anatomy

Multiple studies have defined the knee structures that are important for patellar stability. The MPFL arises on the medial femur approximately 4 mm distal and 2 mm anterior to the adductor tubercle in a sulcus between the tubercle and the medial femoral epicondyle; it attaches to the proximal half of the patella in a variable linear footprint insertion pattern and, in some patients, in the quadriceps tendon as well.<sup>4,7</sup> Most cadaver studies have shown that the MPFL is isometric or nearly isometric throughout knee range of motion (ROM) and is particularly important for avoiding lateral patellar translation during the first 30° of knee flexion.<sup>4,8,9</sup> At 30°

From the Department of Orthopaedic Surgery, University of Virginia Health System, Charlottesville, VA (Dr. Dituch), BoneSpring Orthopaedics, Dulles, VA (Dr. Kandil), and Orthopaedic Associates of Central Texas, Austin, TX (Dr. Burris).

Dr. Dituch or an immediate family member has received royalties from Smith & Nephew, serves as a paid consultant to or is an employee of DePuy Synthes, Inc., has received research or institutional support from Arthrex, DJO Global, DePuy, and Zimmer Biomet, and serves as a board member, owner, officer, or committee member of the American Academy of Orthopaedic Surgeons and The American Orthopaedic Society for Sports Medicine. Member of the following dislosure not any immediate family member has received anything of value from or has stock or stock options held in a commercial company or institution related directly or indirectly to the subject of this article: Dr. Kandil and Dr. Burris.

J Am Acad Orthop Surg 2018;26:429-439

DOI: 10.5435/JAAOS-D-18-00052

Copyright 2018 by the American Academy of Orthopaedic Surgeons.

June 15, 2018, Vol 26, No 12

429

#### CURRENT CONCEPTS REVIEW

### An Algorithmic Approach to the Management of Recurrent Lateral Patellar Dislocation

Alexander E. Weber, MD, Amit Nathani, MD, Joshua S. Dines, MD, Answorth A. Allen, MD, Beth E. Skubitz-Stein, MD, Elizabeth A. Arendt, MD, and Ashesh Bedi, MD

Investigator performed at Sports Medicine and Shoulder Service, MedSport, Department of Orthopaedic Surgery, University of Michigan, Ann Arbor, Michigan

- ▶ High-level evidence supports nonoperative treatment for first-time lateral acute patellar dislocations.
- ▶ Surgical intervention is often indicated for recurrent dislocations.
- ▶ Recurrent instability is often multifactorial and can be the result of a combination of coronal limb malalignment, patella alta, malrotation secondary to internal femoral or external tibial torsion, a dysplastic trochlea, or disrupted and weakened medial soft tissue, including the medial patellofemoral ligament (MPFL) and the vastus medialis obliquus.
- ▶ MPFL reconstruction requires precise graft placement for restoration of anatomy and minimal graft tension. MPFL reconstruction is safe to perform in skeletally immature patients and in revision surgical settings.
- ▶ Distal realignment procedures should be implemented in recurrent instability associated with patella alta, increased tibial tubercle-trochlear groove distances, and lateral and distal patellar chondrosis.
- ▶ Groove-deepening trochleoplasty for Dejour type-B and type-D dysplasia or a lateral elevation or proximal recession trochleoplasty for Dejour type-C dysplasia may be a component of the treatment algorithm; however, clinical outcome data are lacking. In addition, trochleoplasty is technically challenging and has a risk of substantial complications.

**Peer Review:** This article was reviewed by the Editor-in-Chief and one Deputy Editor, and a unselected clinical review by two or more outside experts. The Deputy Editor selected each reviewer of this article, and it underwent a final review by the Editor-in-Chief prior to publication. Final corrections and distributions occurred during one or more exchanges between the author(s) and the publisher.

The average annual incidence of primary patellar dislocation has been reported to be 5.8 cases per 100,000, and the rate is higher for younger and more active populations.<sup>1</sup> Dislocations can lead to articular cartilage injuries, osteochondral fractures, recurrent instability, pain, decreased activity, and patellofemoral arthritis.<sup>2,3</sup> Recurrence has been reported to range from 15% to 80%<sup>4-6</sup>. After a second dislocation, the chance of continued episodes of patellofemoral instability is >50%.<sup>4</sup>

Recurrent lateral patellar dislocation is a multifactorial problem as patellar stability relies on limb alignment, the osseous structure of the patella and trochlea, and the integrity

**Disclosure:** None of the authors received payments or services, either directly or indirectly (i.e., via his or her institution), from a third party in support of this work. One or more of the authors, or his or her institution, has had a financial relationship, in the thirty-six months prior to submission of this work, with an entity in the biomedical arena that could be perceived to influence or have the potential to influence what is written in this work. No author has had any other relationships, or has engaged in any other activities, that could be perceived to influence or have the potential to influence what is written in this work. The complete **Disclosures of Potential Conflicts of Interest** submitted by authors are always provided with the online version of this article.

J Am Acad Orthop Surg. 2018;26:417-471. <http://dx.doi.org/10.5435/JAAOS-D-18-00052>