

Distal Osteotomy

For Patellar Realignment And Rehabilitation

Surgical Indications and Considerations

Anatomical Considerations: Patellar tracking and stability rely on two restraining mechanisms: a transverse group and a longitudinal group. The longitudinal group consists of the quadriceps superiorly and the patellar ligament inferiorly. Transversely are the medial and lateral retinacula from the vastus medialis and vastus lateralis, which include retinacular thickenings acting as medial and lateral patellofemoral ligaments.

Pathogenesis: Patellofemoral pain, patellar subluxation or dislocation can occur when abnormal tracking secondary to malalignment of the patella occurs. The origin of malalignment may be a result of obliquity in the pull of the quadriceps, unilateral tightness, unilateral weakness, trauma to any of the stabilizing structures, or structural abnormalities, i.e. increased Q-angle.

Epidemiology: There is a higher incidence of acute instability in young active patients between the ages of 13-20; recurrence is higher in patients who dislocate at younger than 15. Female athletes are at a greater risk for recurrent instability than males, possibly due to anatomic differences (greater Q-angle). Subluxation and dislocation occur most frequently laterally, though medial instability can occur as a result of trauma or overaggressive surgical treatment. The following guidelines discuss lateral instabilities.

Diagnosis: Patellofemoral instability is mainly a clinical diagnosis based on history and clinical examination. Diagnostic imaging can be utilized to rule out other pathologies. MRI may detect a disruption in the medial retinaculum, chondral lesions, and determine the angle of congruence.

Non-operative Versus Operative Management: Conservative treatment is generally done initially which includes physical therapy, taping, and bracing. Surgical intervention is indicated when conservative treatment fails and recurrent instability and/or pain persists. Distal bony realignment procedures are indicated for the skeletally mature patient.

Surgical Procedure: Distal realignment involves osteotomy reorienting the tibial tubercle medially to reduce the Q-angle. Distal osteotomy may be accompanied with proximal soft tissue procedures including lateral release, reconstruction of the medial patellofemoral ligament, or advancement of the vastus medialis. Currently, the most frequently used operations include a flat osteotomy cut with straight medialization of the tibial tubercle (Elmslie-Trillat procedure) or an oblique cut which uses anteriorization in addition to medialization of the tibial tubercle (Fulkerson's procedure). Medialization is recommended for isolated instability, while anteromedialization is preferred with accompanying patellofemoral pain or chondral lesions to reduce compressive forces on the patellofemoral joint.

Preoperative Rehabilitation:

- Control pain and inflammation
- Utilize bracing to prevent further subluxation or dislocation
- Maintain ROM and strength without promoting further instability

POSTOPERATIVE REHABILITATION

Note. The following rehabilitation guidelines are compiled from multiple sources (see references). A comprehensive plan of care should be individualized based on each patient's presentation and depending on the operative procedure(s) used. Many surgeons have specific protocols for use in post-op rehabilitation.

Phase I: Post-op - 6 weeks

Goals

- Protect fixation
- Control inflammatory process
- Re-gain quad and VMO control
- Minimize effects of immobilization
- Full knee extension

Intervention:

- ROM: 0-90°
- Brace: 0-4 weeks; locked in extension except for therapy and CPM use
4-6 weeks; unlocked brace for sleeping
- Weight Bearing: 0-4 weeks; crutches with weight bearing as tolerated
4-6 weeks; wean from crutches, maintain locked brace
- Therapeutic Exercise:
 - Quad sets with isometric adduction for VMO recruitment
 - Heel-slides 0-90°
 - Calf, hamstring stretches (non-weight bearing)
 - 4 way SLR (locked brace if extensor lag)
 - Resisted ankle ROM (non-weight-bearing)
 - Patellar mobilization
 - Begin aquatic therapy with emphasis on gait at 3-4 weeks

Phase II: 6weeks - 8 weeks

Criteria for advancement to Phase II: Good quad set
 Approximately 90° flexion ROM
 No active inflammation

Goals: Increase flexion ROM
 Avoid overstressing fixation
 Increase quadriceps and VMO control

Intervention:

- Brace: Discontinue for sleeping, unlock with ambulation
- Weight Bearing: as tolerated, no crutches
- Therapeutic Exercise:
 - Continue phase I exercise, progress to full flexion with heel slides
 - Calf stretch in weight bearing
 - Discontinue CPM
 - Balance exercises
 - Stationary bike: low resistance/high seat
 - Short arc quadriceps extension in pain free ranges
 - Wall slides 0-45° of flexion

Phase III: 8 weeks - 4 months

Criteria for advancement to Phase III: Good quadriceps tone without extensor lag with SLR
 Non-analgesic gait pattern
 Good dynamic patellar control with out evidence of lateral tracking or instability

Goals: Quad strength good to normal
 No patellar instability with exercise
 Normalize gait pattern

Intervention:

- Brace: may discontinue
- Weight Bearing: full weight bearing
- Therapeutic Exercise:
 - Step-ups, begin at 2 inches and progress to 8 inches
 - Stationary bike with moderate resistance
 - 4-way hip for flexion, extension, adduction, abduction
 - Leg press 0-45°
 - Closed kinetic chain terminal knee extension with resistance
 - Toe raises
 - Hamstring curls

Treadmill walking
Continue proprioceptive exercises

Phase IV: 4 months - 6 months

Criteria for advancement to Phase IV: good to normal quad strength
no evidence of patellar instability
no soft-tissue complaints
normal gait pattern
physician clearance for more concentrated closed chain
exercises and resume full or partial activity

Goals: Continue improvements in quad strength
Improve functional strength and proprioception
Return to appropriate activity level

Intervention:

- Therapeutic Exercise: Progression of closed chain activities
Jogging in pool with progression to land
Functional progression, sport/work specific

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