Management of First-Time Patellar Dislocations

MICHAEL GEARY, MD; ANTHONY SCHEPSIS, MD

The average annual incidence of first-time patella dislocation is 5.8 per 100,000.¹ When risk is stratified by age and gender, the risk of first-time dislocation is highest in females aged 10-17 years. In this group, the annual incidence of first-time patella dislocation is 33 per 100,000.¹

Stability of the patellofemoral joint against lateral dislocation is based on osseous constraint in >30° of flexion and medial soft-tissue restraints in the early flexion range where instability usually occurs. The medial patellofemoral ligament is the most important of these medial soft-tissue restraints.²

The typical mechanism of injury is external rotation of the tibia with concomitant contraction of the quadriceps. Less frequently, glancing blows to the patella may produce a dislocation. Factors that predispose to dislocation include an increased quadriceps angle, trochlear dysplasia, patella alta, vastus medialis obliques atrophy, insufficient medial patellofemoral ligament, genu recurvatum, increased femoral anteverision, external tibial torsion, foot pronation, increased patellar tilt, and patellar hypermobility. With greater anatomic predisposition, the force required to dislocate the patella decreases.

EVALUATION AND MANAGEMENT

Patients having sustained a first-time traumatic patella dislocation usually present with a reduced patellofemoral joint and a history of feeling their knee “go out of place.” On examination, a large hemarthrosis is typically present, with tenderness over the medial femoral epicondyle and medial border of the patella, in addition to pain with lateral translation of the patella. Arthrocentesis should be considered in the acute setting for both patient comfort and to allow for a more accurate physical examination.

The typical lesion associated with lateral patella dislocation is injury to the medial patellofemoral ligament.³-⁵ Associated injuries frequently include osteochondral fractures, and less frequently medial collateral ligament (MCL) sprain, anterior cruciate ligament (ACL) injury, and meniscal injury.³-⁵ Initial management consists of immobilizing the affected knee in extension.

Radiographic evaluation should include anteroposterior (AP), lateral, and tunnel views of the affected knee and Merchant or axial views of both knees. These studies should be reviewed for osteochondral fracture and adequacy of patellofemoral joint reduction. Consideration should also be given to magnetic resonance imaging (MRI), which is more sensitive for osteochondral injury and can also aid in diagnosis, given a characteristic set of MRI findings seen with patellar dislocation. These findings include disruption of the medial patellofemoral ligament and osteochondral bone bruises or fractures involving the inferomedial patella and lateral femoral condyle.³-⁵

Treatment recommendations for first-time patellar dislocations are controversial. Our practice has been to manage first-time patellar dislocations nonoperatively, unless a displaced osteochondral fracture or asymmetric reduction of the dislocated patella is noted when compared to the normal knee. In the latter two cases, arthroscopy is performed and the knee is surveyed. Smaller displaced osteochondral frag-
ments that are not amenable to fixation are excised; larger fragments are fixed in an arthroscopic or open fashion depending on the size and location of the injury. If indicated, tears of the medial patellofemoral ligament are repaired primarily in an open fashion.

**CASE REPORTS**

**Case 1**

A 16-year-old high school football defensive back sustained a first-time lateral dislocation of the left patella during a tackling drill in practice. The patient recalled sudden knee pain after twisting his knee in the drill. He was diagnosed by the athletic trainer as having a lateral patellar dislocation. This was reduced on the field by extending the injured knee and applying a medially directed force on the dislocated patella. The patient’s left knee was then placed in extension in a knee immobilizer.

On evaluation the following day, the patient reported no history of patella dislocation or instability in either knee prior to the current episode. The patient was otherwise healthy.

On physical examination, the patient had a large effusion in the left knee and pain with minimal range of motion. An arthrocentesis was performed and 120 cc of sanguineous fluid with fat globules was removed. Crepitus was noted with range of motion. The patient was able to perform a straight leg raise. The knee was stable to varus and valgus stress at 0° and 30°. Lachman and anterior and posterior drawer tests were negative. The patient reported tenderness along the medial patella border and medial femoral epicondyle. Pain occurred with lateral translation of the patella. Significantly increased asymmetric lateral patellar translation and Merchant views of both knees were obtained. A displaced osteochondral fragment could be seen on the Merchant and lateral views of the left knee (Figure 1). The left patellofemoral joint was reduced and symmetrical in appearance with the right patellofemoral joint.

Magnetic resonance imaging of the left knee demonstrated an effusion and a midsubstance tear of the medial patellofemoral ligament. In addition, a displaced osteochondral fracture measuring 2 cm in diameter, involving the lateral femoral condyle, was present. The ACL, MCL, posterior cruciate ligament, and menisci were intact.

**Figure 1:** Case 1. Merchant view demonstrating a displaced osteochondral fracture.
Arthroscopy demonstrated a displaced osteochondral fracture of the lateral femoral condyle measuring 2 cm in diameter, and hemorrhage in the medial retinacular region (Figure 2). Both menisci and ACL were intact.

Open reduction and internal fixation of the displaced osteochondral fracture was performed using Arthrex Chondral Darts (Arthrex, Naples, Fla). A 4-cm medial parapatellar arthrotomy was performed and primary repair of the medial patellofemoral ligament was carried out.

Postoperatively, the patient was placed in a hinged knee brace, locked in extension, and he remained partial weight bearing for 6 weeks. Early range of motion was instituted, initially at 0°-90°, and progressed to full passive range of motion by 4 weeks. At 6 weeks the patient was advanced to weight bearing as tolerated, with full active range of motion while wearing a dynamic lateral buttress patellar stabilizing brace. Strengthening exercises were begun 12 weeks postoperatively, and the patient returned to full activity 16 weeks postoperatively. At last follow-up, approximately 2 years postoperatively, the patient reported no symptoms of instability, pain, or swelling.

**Case 2**

A 19-year-old female NCAA division 1 soccer player presented with a large effusion and knee pain after sustaining a twisting injury to the left knee during a game the previous day. The patient reported immediate onset of pain and the sensation that her “knee had gone out of place.” The patient was initially evaluated by the athletic trainer, and placed in a knee immobilizer.

No history of injury or surgery of either knee was reported. In addition, no history of patellofemoral instability in either knee was noted prior to the current injury. She was otherwise in good health.

On physical examination, a large effusion was present and range of motion was limited secondary to pain. An arthrocentesis was performed and 70 cc of sanguineous fluid was obtained. The

---

**TABLE**

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Treatment</th>
<th>Sample Size</th>
<th>Mean Follow-Up</th>
<th>Surgical Technique</th>
<th>Outcome</th>
<th>Recurrence Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cofield⁷</td>
<td>Retrospective</td>
<td>Conservative</td>
<td>35</td>
<td>11.8 y</td>
<td>NA</td>
<td>91% satisfied</td>
<td>44</td>
</tr>
<tr>
<td>1977</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawkins⁶</td>
<td>Retrospective</td>
<td>Conservative</td>
<td>20</td>
<td>40 mo</td>
<td>NA</td>
<td>50% moderate/severe pain</td>
<td>15</td>
</tr>
<tr>
<td>1986</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash⁸</td>
<td>Retrospective*</td>
<td>Conservative</td>
<td>69†</td>
<td>8 y</td>
<td>NA</td>
<td>52% G to E</td>
<td>43</td>
</tr>
<tr>
<td>1988</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garth⁹</td>
<td>Retrospective</td>
<td>Conservative</td>
<td>69</td>
<td>2 y</td>
<td>NA</td>
<td>78% satisfied</td>
<td>26</td>
</tr>
<tr>
<td>1996</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maenpaa¹⁰</td>
<td>Retrospective</td>
<td>Conservative</td>
<td>100</td>
<td>13 y</td>
<td>NA</td>
<td>37% no complaints</td>
<td>44</td>
</tr>
<tr>
<td>1997</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dainer¹¹</td>
<td>Retrospective</td>
<td>Surgery</td>
<td>29</td>
<td>25 mo</td>
<td>Scope, scope + LR</td>
<td>83% G to E</td>
<td>27% with LR, 0% no LR</td>
</tr>
<tr>
<td>1988</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vainionpaa¹⁴</td>
<td>Prospective</td>
<td>Surgery</td>
<td>55</td>
<td>2 y</td>
<td>Medial repair +/- LR</td>
<td>80% G to E</td>
<td>9</td>
</tr>
<tr>
<td>1990</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avikainen¹⁵</td>
<td>Retrospective</td>
<td>Surgery</td>
<td>14⁹</td>
<td>6.9 y</td>
<td>Augment of MPFL</td>
<td>86% G</td>
<td>7</td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harilainen¹²</td>
<td>Prospective</td>
<td>Surgery</td>
<td>53</td>
<td>6.5 y</td>
<td>Medial repair/realign +/- LR</td>
<td>60% satisfied</td>
<td>17</td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sallay¹⁶</td>
<td>Retrospective</td>
<td>Surgery</td>
<td>12</td>
<td>36 mo</td>
<td>MPFL repair +/- LR</td>
<td>58% G to E</td>
<td>0 (33% sublux)</td>
</tr>
<tr>
<td>1996</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ahmad¹¹</td>
<td>Retrospective</td>
<td>Surgery</td>
<td>8</td>
<td>3 y</td>
<td>VMO, MPFL repair + LR</td>
<td>96% satisfied</td>
<td>0</td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nikku¹⁷</td>
<td>Prospective, randomized</td>
<td>Conservative</td>
<td>55</td>
<td>2 y</td>
<td>NA</td>
<td>70% G to E</td>
<td>30</td>
</tr>
<tr>
<td>1997</td>
<td></td>
<td>Surgery</td>
<td>70</td>
<td></td>
<td>Proximal realignment</td>
<td>70% G to E</td>
<td>20</td>
</tr>
<tr>
<td>Fithian¹</td>
<td>Prospective</td>
<td>Conservative</td>
<td>64‡</td>
<td>2-5 y</td>
<td>Scope 9%, stabilize 12%</td>
<td>NA</td>
<td>49</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td>surgery</td>
<td>125§</td>
<td></td>
<td>Scope 6%, stabilize 5%</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

---

*Abbreviations: E=excellent, G=good, LR=ligament repair, MPFL=medial patellofemoral ligament, NA=not applicable, and VMO=vastus medialis obliquus.
*²2 groups.
*†Predisposed.
*‡Normal.
*§Chronic and acute.
|History of patellofemoral instability.
*#No history of patellofemoral instability.”
The patient had active and passive range of motion of the knee from 0°-100°. The knee was maximally tender over the medial border of the patella and the medial femoral epicondyle. The knee was stable to varus and valgus stress at 0° and 30°. Lachman and anterior and posterior drawer tests were negative. Pain occurred with lateral translation of the patella, and increased asymmetric lateral patellar translation was noted at 30° of flexion. Anteroposterior, lateral, and tunnel views of the left knee and Merchant views of both knees were normal.

A diagnosis of acute lateral patella dislocation was made. The patient was placed in a hinged knee brace locked in extension. Magnetic resonance imaging demonstrated an effusion and disruption of the medial patellofemoral ligament at its insertions on the medial border of the patella. Magnetic resonance imaging also revealed osteochondral bone bruises of the medial facet of the patella and lateral femoral condyle (Figure 3). The ACL, PCL, MCL, LCL, medial and lateral menisci were intact. No evidence of a displaced osteochondral fracture was noted.

The patient remained in the hinged knee brace, locked in extension and partial weight bearing for 3 weeks. The patient was then placed in a dynamic lateral buttress patellar stabilizing brace and range of motion and strengthening exercises were instituted with physical therapy. During this time, the patient exhibited no signs or symptoms of loose bodies in the left knee. The patient returned to sports 8 weeks following injury and at 2-year follow-up the patient reported no recurrent dislocation of the left patella.

**DISCUSSION**

Treatment goals for patients who have sustained a first-time patella dislocation, include restoration of normal pain-free patellofemoral joint mechanics while minimizing the risk of recurrent subluxation and patella dislocation.

Numerous retrospective studies exist in the literature, which detail the success of nonoperative and operative treatment of first-time patellar dislocations. Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table). Comparison of these studies is problematic given their retrospective design, small sample sizes, differing follow-up times, varied surgical techniques both between and within individual studies, and heterogeneous sample composition where primary dislocators and patients with previous history of patellofemoral instability are grouped together (Table).
significance. However, if patients report loose-body symptoms, despite negative radiographs and MRI, these symptoms should be further investigated and treated, if necessary, with arthroscopy.

The disruption of the medial patellofemoral ligament may occur as a midsubstance tear, an avulsion from the patella, or an avulsion from the medial femoral condyle. Finally, the disruption may be multifocal in nature. An MRI is therefore helpful in determining the location of the medial patellofemoral ligament tear.

Variable rates of recurrent patellofemoral instability and subsequent dislocation following first time patellar dislocation have been reported in the literature. In retrospective studies in which treatment was nonoperative, recurrence rates range from 15%-44%. Recurrence rates following surgical intervention range from 0%-17%. Certain factors have been associated with increased risk of recurrent dislocation following first-time dislocation. These include young age at the time of dislocation, history of symptoms of patellofemoral subluxation prior to first-time dislocation, and anatomic predisposition. Regardless, no study to date has demonstrated any disadvantage, in terms of surgical outcome, in delaying surgical repair until after a patient has suffered a recurrent patella dislocation or subluxation versus operating after a first time dislocation. Furthermore, the results of delayed proximal realignment, performed in an open or arthroscopic fashion, have been good. If surgery was performed after all first-time dislocations, then many individuals who could have been successfully managed nonoperatively would be subjected to unnecessary surgery and its associated risks.

We therefore advocate for nonoperative treatment of all first-time patellar dislocations, unless a displaced osteochondral fracture or an asymmetric unreduced patella is noted.

**REFERENCES**