

Surgical Treatment of Acute Patella Dislocations: Review of 13 Consecutive Cases from Keller Army Hospital

Brett D. Owens*, Christopher P. Jordan, Amy E. Ross, Bradley J. Nelson, Dean C. Taylor and Thomas M. DeBerardino

Orthopedic Surgery Service, Keller Army Hospital, U.S. Military Academy, West Point, NY 10996, USA

Abstract: Most patella dislocations are treated nonoperatively. Surgery is indicated in cases with osteochondral defects, fractures, or loose bodies. We reviewed 13 consecutive patients who underwent surgical treatment of patella dislocations between 2001 and 2006. At surgery, all patients had MPFL tears and underwent repair at the site of injury. Five osteochondral lesions required open reduction and internal fixation. Six patients underwent loose body removal while 4 required lateral retinacular release. The outcome for twelve patients was excellent. Eleven patients remain on active duty in the military without restrictions. Surgical treatment should be considered for acute patella dislocations for the following indications: loose body, osteochondral fracture, or gross patellofemoral instability.

INTRODUCTION

While patella dislocations are relatively common injuries in young athletes [1], the surgical management of this injury is controversial. With reports of historically sub-optimal outcomes resulting from non-operative treatment [2, 3], early surgical treatment has been recommended [4, 5].

The medial patellofemoral ligament (MPFL) serves as the patella's primary medial restraint [6] and spans the distance from the femoral adductor tubercle to the medial patellar facet [7]. Disruption of this ligament has been termed "the essential lesion" of traumatic patellar dislocation [5]. In addition, vastus medialis obliquus (VMO) lesions [4, 5, 8-10] and osteochondral defects [5, 8, 11-16] have also been reported with this injury. The purpose of this study is to evaluate our experience with surgical management of acute traumatic patellar dislocations.

METHODS

Patient Selection

We identified all patients who underwent surgical treatment for acute patella dislocation between 2001 and 2006. A complete chart review was performed, to include surgical reports, outpatient records, and available radiologic studies.

Operative Technique

We recommended operative treatment to patients with acute patella dislocations for the following indications: loose body, osteochondral fracture, or gross patellofemoral instability. We planned our surgical procedures to address the pathologic changes noted at physical exam and upon MRI study (Fig. 1). We began with diagnostic arthroscopy to assess the integrity of the chondral surfaces and to address any loose bodies. Since the MPFL is an extraarticular structure, tears were not well appreciated during arthroscopy, with the

exception of avulsions from the patella. We then performed ORIF of any osteochondral fractures through a medial parapatellar arthrotomy. The MPFL was then repaired through the same incision, as well as vastus medialis fascial defects. MPFL repairs were performed with suture anchors placed into the adductor tubercle or the medial patella. After medial repair, the arthroscope was reinserted into the joint to assess patellar tracking. A lateral retinacular release was performed for persistent lateral tracking.



Fig. (1). Sagittal MRI showing large free osteochondral fragment.

Postoperative Management

After ensuring a full range of motion was possible intraoperatively, rehabilitation began immediately after surgery. Patients were placed into a hinged knee brace and started with continuous passive motion use. Patients were allowed full weight bearing with the brace locked in extension. Active and active-assisted range of motion was initiated from 0-90 degrees with the patient prone to avoid quadriceps work and advanced as tolerated. At 4 weeks, closed-

*Address correspondence to this author at the Keller Army Hospital, U.S. Military Academy, West Point, NY 10996, USA; Tel: (845) 938 4205; E-mil: b.owens@us.army.mil

chain quadriceps strengthening was initiated and patients were allowed to resume walking when adequate strength had been achieved.

RESULTS

Thirteen consecutive patients (11 male, 2 female) with an average age of 22 years (range: 13-41 years) were identified. Mechanism of injury was sports or military training in all patients (Table 1). Two patients reported direct trauma to the knee, while 11 were the result of indirect or twisting injuries to the knee. Five patients had experienced a previous patella instability event. Eight patients underwent surgery within one week of injury. The mean time to surgery for the remaining 5 patients was 9 weeks (range 2-16 weeks).

Table 1. Patient Information

Patient	Age/Gender	Mechanism	Prior History of Patella Instability
1	20/M	Wrestling	No
2	20/F	Skiing	No
3	19/M	Military training	Yes
4	13/F	Dancing	No
5	18/M	Military training	No
6	32/M	Obstacle course	Yes
7	41/M	Flag football	Yes
8	20/M	Football	No
9	20/M	Football	No
10	18/M	Boxing	Yes
11	23/M	Basketball	No
12	25/M	Basketball	No
13	19/M	Sports	Yes

MRIs were available for 12 of 13 patients. All patients sustained MPFL tears, with 50% avulsed from the adductor tubercle and 50% avulsed from the medial patella. The MRI findings are shown in Table 2.

Table 2. Pathologic Changes Identified on MRI for 12 Patients

Injury	Patients
Effusion	12
MPLF torn from medial patella insertion	6
MPFL torn from femoral origin	6
Increased VMO signal	7
Increased LFC signal	10
Medial patella bone bruise	9
OCD of patella	6
OCD of LFC	3
Loose bodies	6

MPFL (medial patellofemoral ligament), VMO (vastus medialis obliquus), LFC (lateral femoral condyle), OCD (osteochondral defect).

Intra-operative evaluation confirmed the MRI findings (Table 3). All patients had MPFL tears and underwent repair at the site of injury (Fig. 2). One patient also underwent repair of an attenuated VMO insertion. OCDs were repaired with a combination of headless screws, bioabsorbable darts, and sutures. Six patients underwent loose body removal while 4 required lateral reticular release.

The outcome for twelve patients was good at a mean follow-up of 14.5 months (range 2-36 months). Eleven of these patients returned to active duty in the military without restrictions, including successful completion of the Army Physical Fitness Test (push-ups, sit-ups and a two-mile run). The twelfth patient was a 14 year old civilian at the time of her injury. She returned to competitive athletics one year after surgery. There were no subsequent instability events or revision stabilization surgeries. One patient underwent an additional procedure for removal of headless screws and debridement of scar.

One of the thirteen patients was considered a failure as he was unable to return to his military duties due to persistent pain and stiffness. He underwent arthroscopic lysis of adhesions and loose body removal after 3 months and was medically discharged 6 months after surgery.

Table 3. Operative Procedures

Procedure	Patients	Percent of Total
MPFL repair	13	100
MPFL repair to patella	6	46
MPFL repair to femur	7	54
VMO insertion repair	1	8
ORIF of LFC OCD	2	15
ORIF of Patella OCD	3	23
Loose body removal	6	46
Lateral reticular release	4	31

MPFL (medial patellofemoral ligament), VMO (vastus medialis obliquus), LFC (lateral femoral condyle), OCD (osteochondral defect), ORIF (open reduction internal fixation).



Fig. (2). Intraoperative photograph showing avulsed MPFL being brought back to its origin at the adductor tubercle.

DISCUSSION

This study describes our experience with the surgical management of acute patella dislocations over a 5 year period. Acute patella dislocations were evaluated with plain radiographs and MRIs. The indications for surgery were loose bodies and/or osteochondral fractures. At surgery, MPFL disruptions were identified in all patients, in addition to a high rate of intraarticular pathologic changes. While postoperative stiffness is a concern, good results can be seen with repair of damaged structures coupled with an aggressive rehabilitation protocol.

This series is small with only 13 cases. However, this is similar to previous reports. In a series of 23 patients with confirmed patella dislocation, Sallay *et al.* described a subset of 16 patients who underwent open exploration of the medial aspect of the knee following repair of intraarticular lesions. In 15 of these 16 patients, MPFL tears were identified [5]. Ahmad *et al.* reported on 8 patients undergoing surgery for a patella dislocation and showed consistent tearing of the VMO (75%) in association with MPFL tears on MRI scan [4].

There is a fair amount of literature that supports the presence of an MPFL tear as the primary lesion of patella dislocation [5, 6, 10, 17]. However, others have reported lesions of the VMO [4, 5, 8-10] as well as osteochondral lesions [5, 8, 11-16]. Our results are consistent with these reports, as we found MPFL tears in all. While there was increased signal in the VMO on MRI in 7 of 12, only one of these patients required a formal VMO repair. While 9 of 13 had documented osteochondral lesions on MRI, only 5 were able to be repaired surgically.

While 55% of our patients were treated for a primary episode of traumatic patella dislocation, the remaining 45% of patients were treated for a recurrent episode. Anatomical predisposition to patellar instability events has been studied previously, with some authors suggesting that virtually all patients with recurrent patellar instability are likely to have some degree of anatomical predisposition to patella dislocation [15, 18, 19]. We saw no appreciable difference in pathological trends when separating patients by recurrence versus primary traumatic event, thus are unable to draw conclusions in this regard. This suggests that regardless of whether the patella dislocation is first-time or recurrent, if osteochondral defects, loose bodies, or fractures are present, operative treatment should be considered.

In summary, open reduction and internal fixation with MPFL repair is a safe and effective surgical option in the treatment of acute traumatic patella dislocations and offers improved patella stability with return to a full range of activities in a young athletic patient population.

ACKNOWLEDGEMENTS

The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or reflecting the views of the Department of Defense or United

States government. The authors are employees of the U.S. government. No grant funding was received for this study.

ABBREVIATIONS

MPFL	=	Medial patellofemoral ligament
MRI	=	Magnetic resonance imaging
OCD	=	Osteochondral defect
ORIF	=	Open reduction internal fixation
VMO	=	Vastus medialis obliquus

REFERENCES

- [1] Sillanpaa P, Mattila VM, Iivonen T, Visuri T, Pihlajamaki H. Incidence and risk factors of acute traumatic primary patellar dislocation. *Med Sci Sports Exerc* 2008; 40: 606-11.
- [2] Cash JD, Hughston JC. Treatment of acute patellar dislocation. *Am J Sports Med* 1988; 16: 244-9.
- [3] Cofield RH, Bryan RS. Acute dislocation of the patella: results of conservative treatment. *J Trauma* 1977; 17: 526-31.
- [4] Ahmad CS, Shubin Stein BE, Matuz D, Henry JH. Immediate surgical repair of the medial patellar stabilizers for acute patellar dislocation: a review of eight cases. *Am J Sports Med* 2000; 28: 804-10.
- [5] Sallay PI, Poggi J, Speer KP, Garrett WE. Acute dislocation of the patella. A correlative pathoanatomic study. *Am J Sports Med* 1996; 24: 52-60.
- [6] Conlan T, Garth WP Jr., Lemons JE. Evaluation of the medial soft tissue restraints of the extensor mechanism of the knee. *J Bone Joint Surg* 1993; 75A: 682-93.
- [7] Feller JA, Feagin JA, Garrett WE. The medial patellofemoral ligament revisited: an anatomical study. *Knee Surg Sports Traumatol Arthrosc* 1993; 1: 184-6.
- [8] Elias DA, White LM, Fithian DC. Acute lateral patellar dislocation at MR imaging: Injury patterns of medial patellar soft-tissue restraints and osteochondral injuries of the inferomedial patella. *Radiology* 2002; 225: 736-43.
- [9] Handy MH, Miller MD. Surgical treatment of acute patellar dislocations. *Oper Tech Sports Med* 2001; 9: 164-8.
- [10] Sanders TG, Morrison WB, Singleton BA, *et al.* Medial patellofemoral ligament injury following acute transient dislocation of the patella: MR findings with surgical correlation in 14 patients. *J Comput Assist Tomogr* 2001; 25: 957-62.
- [11] Dainer RD, Barrack RL, Buckley SL, Alexander AH. Arthroscopic treatment of acute patellar dislocations. *Arthroscopy* 1988; 4: 267-71.
- [12] Hawkins RJ, Bell RH, Anisette G. Acute patellar dislocations: The natural history. *Am J Sports Med* 1986; 14: 117-20.
- [13] Milgram JE. Tangential osteochondral fracture of the patella. *J Bone Joint Surg* 1943; 25: 271-80.
- [14] Nam EK, Karzel RP. Mini-open medial reefing and arthroscopic lateral release for the treatment of recurrent patellar dislocation. *Am J Sports Med* 2005; 33: 220-30.
- [15] Nomura E, Inoue M, Kobayashi S. Generalized joint laxity and contralateral patellar hypermobility in unilateral recurrent patellar dislocations. *Arthroscopy* 2006; 22: 861-5.
- [16] Stanitski CL, Paletta GA. Articular cartilage injury with acute patellar dislocation in adolescents. *Am J Sports Med* 1998; 26: 52-5.
- [17] Desio SM, Burks RT, Backus KN. Soft tissue restraints to lateral patellar translation in the knee. *Am J Sports Med* 1998; 26: 59-65.
- [18] Iwama Y, Fujii M, Shibamura H, *et al.* High-resolution MRI using a microscopy coil for the diagnosis of recurrent lateral patellar dislocation. *Radiat Med* 2006; 24: 327-34.
- [19] von Knoch F, Bohm T, Burgi ML, Von Knoch M, Bereiter H. Trochleaplasty for recurrent patellar dislocation in association with trochlear dysplasia. *J Bone Joint Surg Br* 2006; 88: 1331-5.