



# The Joystick Method: A Mini Open Technique for Repairing Patellar Osteochondral Fractures With Concomitant Medial Patellofemoral Ligament Reconstruction

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**Abstract:** Fixation of osteochondral fractures after patellar dislocation is typically done using an open approach due to the location of the defect. This is traditionally performed through a medial parapatellar arthrotomy to allow adequate visualization. By using the joystick method, adequate visualization is achieved with a smaller arthrotomy. Careful placement of the joystick in the planned anchor site of the medial patellofemoral ligament reconstruction reduces the number of drill sites in the patella.

Osteochondral fractures (OCFs) of the patella are a common complication associated with lateral patellar dislocations and associated with a medial patellofemoral ligament (MPFL) rupture.<sup>1,2</sup> OCFs in the weight-bearing surface measuring greater than 10 to 15 mm are best treated with fixation and MPFL reconstruction.<sup>1</sup> Without MPFL reconstruction, recurrent patellar dislocation has been seen in approximately 60% of pediatric patients who undergo OCF fixation.<sup>3,4</sup> In contrast, the recurrence rate drops to 10% to 20% with MPFL reconstruction.<sup>3,5</sup> Typically, a large medial or lateral parapatellar arthrotomy is required to evert the patella to expose its articular surface for OCF fixation.<sup>6,7</sup> Cases involving medial patellar facet OCFs can be fixed using a mini-medial parapatellar arthrotomy since the patella does not need to be fully exposed. In our experience, we have observed that, following MPFL rupture, the patella and quadriceps tendons have

increased laxity, allowing increased patellar lateral mobility. We present a technique to repair OCFs of the patella by exploiting these findings to avoid the use of a large arthrotomy while obtaining adequate exposure to the articular surface of the patella. This is done using the same approach used in MPFL reconstruction.

## Surgical Technique (With Video Illustration)

The patient is placed in a supine position under general anesthesia. A tourniquet is placed high on the thigh. The landmarks for arthroscopy and MPFL reconstruction are marked on the skin. Preoperative radiography including x-rays (Fig 1A-C) and magnetic resonance imaging (MRI) are reviewed to locate the loose fragment (Fig 2). Diagnostic arthroscopy is performed to identify and size the lesion, analyze the osteochondral fragment and donor site to ensure suitability for fixation, and isolate the fragment for retrieval in subsequent medial arthrotomy (Fig 3A). Small osteochondral fragments can be retrieved through the arthroscopy portal while larger fragments must be retrieved during arthrotomy. A 3-cm incision is made medially over the proximal third of the patella. A medial arthrotomy is performed, exposing the medial aspect of the patellofemoral joint. Any remaining osteochondral fragments are retrieved at this time. A 2.0-mm Steinmann pin is drilled into the future superomedial attachment site of the MPFL graft. The

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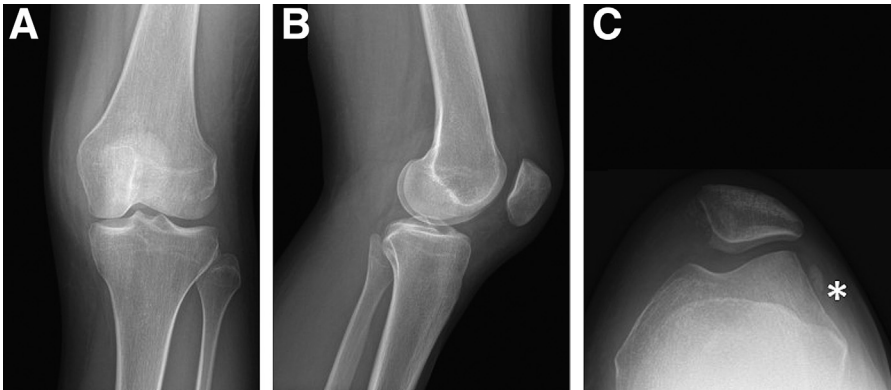
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**Fig 1.** Preoperative radiographs: anteroposterior (A), lateral (B), and Merchant (C) views of the left knee demonstrate a medial patellar osteochondral fracture with a loose body in the lateral recess best seen on the Merchant view (loose body marked with an asterisk).

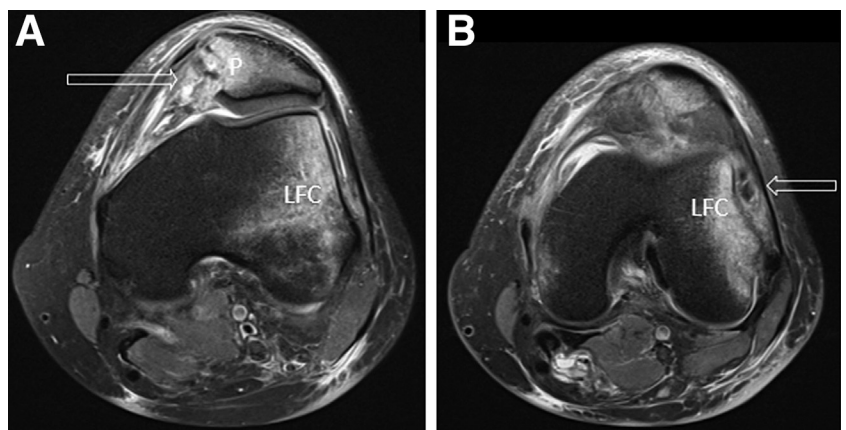
Steinmann pin is then bent into an “L” shape, which will be used as the “joystick.” The joystick is used to pull the patella laterally, thus exposing the lateral femoral condyle and evert the patella exposing its articular surface. The osteochondral fragment donor site is curetted for reduction of the fragment. The fragment is cleaned and reduced. Headless compression screws are used to fixate large osteochondral fragments to the patellar donor site (Fig 3B). After fixation of the fragment, the knee is ranged slowly to ensure the patella tracks centrally in the trochlear groove without catching. Subsequent MPFL reconstruction is performed as follows. The “joystick” is removed, and a 2.9-mm hole is drilled through a drill guide (JuggerKnot 2.9 All-Suture Drill; Zimmer Biomet, Warsaw, IN). An all-suture anchor is then placed into the hole (2.9 All-Suture JuggerKnot; Zimmer Biomet) in the medial patella at the superomedial graft attachment site. This technique is demonstrated in Video 1. MPFL reconstruction can then be performed with a single tendon allograft in a V configuration similar to previously reported techniques.<sup>8</sup> The inferomedial attachment site is drilled using a large JuggerKnot drill and the JuggerKnot anchor is inserted. The femur is drilled at

Schottle’s point and the graft is passed from the medial parapatellar arthrotomy to the incision made at Schottle’s point. The semitendinosus graft is attached at Schottle’s point using an interference screw. The superomedial or inferomedial limb of the graft is attached to the patella. The knee is placed at 30° of flexion to ensure proper graft tension. The other limb of the graft is then attached to the patella. The knee is ranged to ensure proper function and the incisions are closed. Postoperative x-rays demonstrate the screw placed in the fragment (Fig 4A and B). The screw can be removed arthroscopically once the fragment is healed (Fig 5).

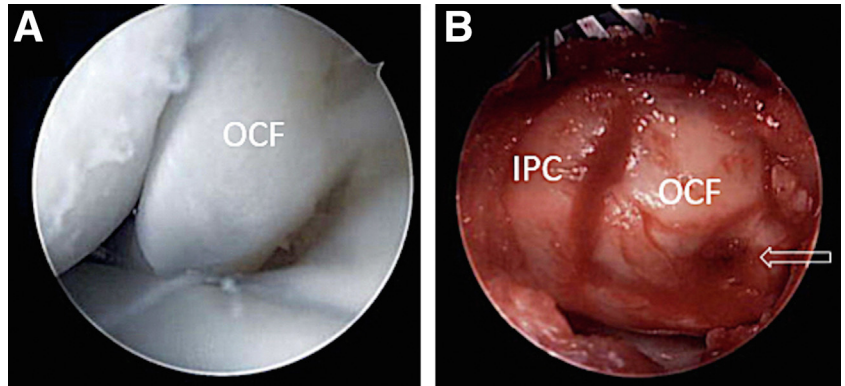
### Postoperative Rehabilitation

Postoperatively, patients are placed in a continuous passive motion machine if available, starting at 0 to 45° of passive motion for 6 to 8 hours per day. The continuous passive motion machine is advanced 10° per day as tolerated. Patients are placed in a hinged knee brace, which is locked in extension at night-time and with weight-bearing. For the first 2 weeks, patients are non-weight-bearing, then weight-bearing as tolerated with crutches for 2 to 6 weeks’ postoperatively. After 6 weeks, patients are bearing weight

**Fig 2.** Magnetic resonance imaging proton density fat-saturated axial images of a left knee demonstrating the osteochondral fracture donor site on the medial patella (A, white arrow) and the osteochondral fragment in the lateral recess (B, white arrow). Classic bone bruising pattern from lateral patella dislocation is also seen in the medial patella (P) and lateral femoral condyle (LFC).



**Fig 3.** Arthroscopic imaging from the index procedure of a left knee showing the osteochondral fragment (OCF) in the lateral recess from the anterolateral portal (A) and a view of the completed fixation through the mini-open incision with the osteochondral fragment (OCF) secured adjacent to the intact patella cartilage (IPC) with screw fixation (white arrow) (B).



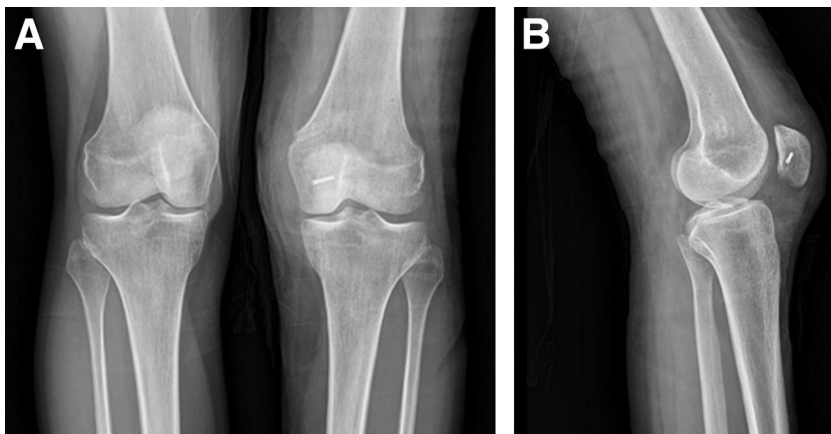
without crutches and discontinue the hinged knee brace. From 6 to 12 weeks, patients are permitted to ride a stationary bike and perform wall sits and lunges with a physical therapist. After 12 weeks, patients are cleared to advance closed-chain exercises and do leg press, leg curls, and plyometric training.

### Discussion

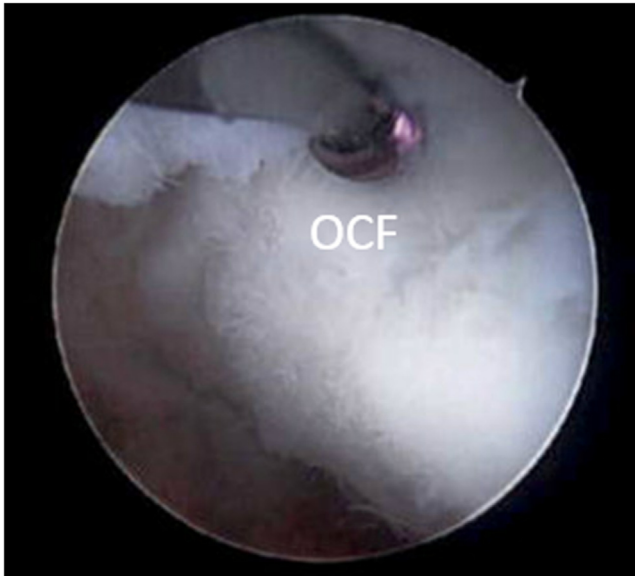
Although data suggest that MPFL reconstruction significantly reduces the rate of recurrent patellar dislocation, consensus is still lacking regarding the treatment algorithm. In a recent survey among Paediatric Research in Sports Medicine (PRISM) members, 89% of respondents proceeded with OCF fixation if identified on imaging acutely on first-time patellofemoral dislocations.<sup>9</sup> Acute OCF is typically defined as within 2 weeks of injury, as the fragment can start to undergo chondral degeneration beyond that point.<sup>1</sup> Of the survey respondents who proceeded with acute OCF fixation, 36% performed MPFL repair, 38% performed MPFL reconstruction, and 27% of respondents performed no concomitant procedure for the MPFL.<sup>9</sup> This is an interesting finding, as there has been shown a 59% to 61% redislocation rate among individuals

who underwent MPFL repair or no MPFL procedure at the time of OCF fixation.<sup>3,4</sup> Although other factors for recurrent patellar dislocations also must be considered, such as increased tibial tuberosity-trochlear groove distance, a trend is becoming more apparent in the literature that MPFL reconstruction is superior to repair.<sup>4</sup> Our technique demonstrates that both procedures can be performed concomitantly with a single minimally invasive approach.

The joystick technique offers the advantage of fixing lateral lesions of the patella with a mini-medial parapatellar approach and potentially allowing fixation of lesions on the lateral femoral condyle without needing a large arthrotomy. This approach keeps the procedure minimally invasive, due to a smaller arthrotomy and allows for fewer incisions. Fixing OCFs on the patella's articular surface using this method shows great promise, based on patients who have undergone this approach, and can potentially allow quicker recovery and better surgical outcomes. Using the same drill hole for the 2.0-mm Steinmann pin as the 2.9-mm drill hole for the all-suture anchor minimizes the number of stress risers, and the small diameter drill hole reduces the risk of iatrogenic



**Fig 4.** Postoperative anteroposterior (A) and lateral (B) radiographs of the left knee demonstrate screw fixation of the patellar osteochondral fragment (white arrow).



**Fig 5.** Arthroscopy pictures from second-look surgery of the left knee for screw removal from the anteromedial portal demonstrate the patellar osteochondral fracture (OCF) is stable and has healed.

patella fracture.<sup>10</sup> Although outside of the scope of this paper, further research is needed to follow outcomes using this technique compared with classic techniques.

There are several pearls and pitfalls that have been observed with this technique (Table 1). It is recommended to find the fragment arthroscopically first,

then place it in the medial gutter. Once the mini-medial arthrotomy is performed, remove the fragment by sweeping the medial gutter with a finger. Care must be taken not to drop the fragment on the floor. If a tissue grasper is used, take care not to grasp the fragment too hard or it may be damaged. When everting the patella, the quadriceps tendon may be released proximally, or a subvastus approach may be used. Release down the medial edge of the patella tendon. The medial meniscus can be protected with a finger when releasing the medial retinaculum from the patella tendon. When determining the orientation of the fragment into the parent bone, examine the thickness of the cartilage. The more central portion will have thicker cartilage. If the fragment is large enough, place 2 Steinman pins before placing a screw to avoid rotating the fragment. If fibrin glue is being used, place the glue between the parent bone and fragment before screw placement.

## Conclusions

The joystick method of patellar OCF fixation along with MPFL reconstruction allows the surgeon to obtain stable fracture fixation with a minimally invasive approach and adequate visualization while reducing the number of drill holes needed.

## Acknowledgments

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**Table 1.** Pearls and Pitfalls When Performing Patella Osteochondral Fracture Fixation

Pearls	Pitfalls
Find the fragment arthroscopically and place it in the medial gutter.	When sweeping to remove the patella fragment, make sure to not drop the fragment on the floor if it pops out.
Perform a medial arthrotomy and remove the fragment by sweeping the medial gutter with a finger.	Do not grab the fragment too hard with a tissue grasper, or you may damage it.
When everting the patella: <ol style="list-style-type: none"> <li>Release the quadriceps tendon proximally</li> <li>A subvastus approach can be performed</li> <li>Release down the medial edge of the patella tendon</li> <li>Protect the medial meniscus with a finger while releasing the medial retinaculum from the patella tendon</li> </ol>	Turning a single screw without a derotation pin may rotate the fragment.
For a medial fragment, aim the screws anterolateral on the patella (remember, the patella may be everted). This will make it easier to remove arthroscopically from a medial percutaneous incision.	Aiming the screw too anterior medial in the patella will make it difficult to remove arthroscopically.
Wait to rongeur the bone of the medial patella until after you have placed the joystick pin and fixed the fragment to give the joystick pin better cortical bone fixation.	Rongeur the medial patella before placement of joystick pin, can make the joystick loose.
When fitting fragment into parent bone, look at the thickness of the cartilage in progeny fragment to guide where it should key in. The more central portion of the fragment should be thicker.	
For larger fragments, place 2 pins first to act as an antirotation pin while placing the first screw.	
If using fibrin glue, place between the fragment and patella parent bone before screw placement.	

## Disclosure

The authors report no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

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