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## Original Article

# Double bundle medial patello-femoral ligament reconstruction for recurrent patellar dislocation – A modified technique and documentation of importance of arthroscopy

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## ABSTRACT

**Aim:** Evaluation of outcome of double bundle MPFL reconstruction for recurrent patellar dislocation using semitendinosus tendon autograft passed through vertical tunnel in patella and to document the scope of arthroscopic assistance during the procedure.

**Methods:** The prospective case series study included 22 patients (17 females and 5 males) with recurrent lateral patellar dislocation. The average age was 29 years (15–55 years) and all underwent arthroscopy-assisted MPFL reconstruction using semitendinosus tendon autograft passed through vertical tunnel in patella.

**Results:** At an average follow-up of 30 months (17–43 months), none had apprehension or re-dislocation of patella postoperatively. Intraoperative arthroscopy was useful in the confirmation of patella tracking; removal of loose body (9 cases), performing chondroplasty (11 cases), simultaneous management of associated intra-articular pathology (4 cases) and careful tunnel placement for tendon graft. Radiologically, the congruence angle improved from pre-operative average of 13.41° (–9° to +53°) to 2.59° (–10° to +14°) and the lateral patellar tilt angle improved from 11.95° (2° to 21°) to 4.18° (0° to 9°) post-operatively. Functionally, the Kujala score improved from pre-operative average of 49.59 (42–76) to 92.18 (86–96), the Lysholm score from 62.13 (56–70) to 94.31 (90–100) and the Tegner activity scale from 2.31 (2–3) to 3.31 (3–4) post-operatively.

**Conclusion:** Double bundle MPFL reconstruction for recurrent patellar dislocation using looped semitendinosus tendon autograft passed through vertical tunnel in patella produces promising radiological and functional results. The study highlights the value of arthroscopic assistance during the procedure to improve the outcome.

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## 1. Introduction

Patellar instability is a painful disabling condition of the knee often characterised by repeated lateral subluxation or dislocation of the patella. Although many surgeries have been described, reconstruction of the medial patello-femoral ligament (MPFL) aims at correcting the primary pathology. Literature published by various authors has supported good outcome with MPFL reconstruction.<sup>1-3</sup> Kang et al.<sup>4</sup> explained functional double bundle configuration of MPFL paving the way for double bundle reconstruction. Initially, this was performed using 'Y' configuration of the graft with two transverse tunnels made in the patella for graft fixation.<sup>5,6</sup> Wang et al.<sup>7</sup> retrospectively reported good outcome with this type of double bundle reconstruction compared with single bundle reconstruction. Unfortunately, double bundle MPFL reconstruction performed with two transverse tunnels in patella places patella at high risk for fractures post-operatively.<sup>8</sup> We conducted a prospective case series study to radiologically and functionally evaluate the results of double bundle MPFL reconstruction for recurrent patellar dislocation using looped semitendinosus autograft passed through a vertical tunnel in patella and to document the scope of arthroscopic assistance during the procedure.

## 2. Materials and methods

A prospective case series study was done including 22 patients with recurrent lateral patellar dislocation operated between May 2010 and October 2012. The patients requiring combined osteotomy procedures (having TT-TG > 20 mm, severe trochlear dysplasia and patella alta with Insall-Salvati ratio > 1.4) were excluded from the study.<sup>9</sup> Approval for the study was obtained from the Institutional Review Board.

The study included 17 females and 5 males. The average age was 29 years (range 15-55 years). The pre-morbid Tegner activity scale in our patients was on an average 3.45 (range 3-5), since most of our patients were females, who were restricted to light labour activities only. Aetiology of primary episode was spontaneous in 5 patients and post-traumatic in 17 cases (accidental fall during daily activities in 9 cases, twisting injury of knee in 5 cases, fall from two wheelers in 2 cases and fall of weight over the knee in 1 case). Left knee was more commonly affected (left:right = 13:9). Generalised ligamentous hyperlaxity was noticed in 8 patients (including all the 5 cases with insidious onset). Patients commonly presented with anterior knee pain aggravated by climbing stairs or uphill, repeated episodes of patellar subluxation or dislocation with swelling and locking of the knee, feeling of giving way sensation of the knee during vigorous activities. The duration of symptoms ranged from 3 months to 31 years (average 60.22 months). The number of episodes of patellar dislocations among them ranged from 2 to 20 times (average 6 episodes).

Clinically all the patients had positive apprehension sign on attempted lateral displacement of patella. Retropatellar tenderness was present in 12 patients. Range of movement in the knee was painless and normal in 18 patients, and 4 patients had restriction of terminal 10° to 20° of movements. In the 4 patients

with terminal movement restriction, two patients had synovial hypertrophy, one patient had associated ACL ganglion cyst, and the other had associated medial meniscal tear. The Q angle was measured with patient supine and knee flexed to 30°, wherein patella is centralised over trochlea. It was found to be on an average of 13.68° (range 8° to 18°) in our cases.

Radiological evaluation was done with lateral view and Merchant axial view taken with knee flexed to 30°. Insall-Salvati ratio (Patella tendon length/Patella height) was measured in the lateral radiograph, which was found to be an average of 1.13 (range 0.9-1.38) in our cases. In the Merchant axial radiograph, the sulcus angle, congruence angle and the patella inclination angle (lateral patellar tilt angle) were measured as per standard guidelines<sup>10</sup> (Fig. 1a). The sulcus angle was on an average 141.77° (range 136° to 150°). The congruence angle was on an average 13.41° (range -9° to +53° negative and positive variable denote medial or lateral subluxation of patella, respectively). The normal congruence angle being -6°(±11°), there were 18 outliers pre-operatively.

Magnetic resonance imaging of the knee was done in all the patients that revealed thinning of MPFL in 17 patients and complete tear in 5 patients. Cartilage defect over patella was noticed in 11 cases, and loose body within the knee joint was picked up in 4 cases. Trochlea dysplasia with shallow groove (Dejour type A) was seen in 4 cases. Patello-femoral arthritis was present pre-operatively in 6 cases. The tibial tuberosity and trochlear groove (TT-TG) distance was measured in axial sections which were on an average 14.12 mm (range 10-17 mm).

All the patients underwent arthroscopy-assisted double bundle MPFL reconstruction using looped semitendinosus autograft passed through vertical tunnel in patella and fixed to femoral condyle using interference Bioscrew. Surgery was performed by single surgeon (first author) in all the cases.

## 3. Surgical technique

Surgical procedure was performed under regional spinal anaesthesia and tourniquet control. All the patients underwent intraoperative arthroscopy of the knee joint and looked for patella subluxation/tilt with excess medial parapatellar opening, patella maltracking, intraarticular loose bodies and chondral injuries (Fig. 2). Any associated knee pathology including patellofemoral arthritis was also documented (Table 1).

Through a 3 cm incision extending vertically below the tibial tuberosity, semitendinosus tendon graft was harvested and prepared. Another vertical incision was made midway between medial border of patella and medial epicondyle. A tunnel was made in the medial third of patella parallel to its supero-medial border using a 4 mm cannulated drill over a guide wire placed under fluoroscopy assistance. The position of the tunnel was carefully planned so as to avoid any rim fracture of patella or penetration into the knee joint, which was confirmed arthroscopically. The margins of entry and exit holes were smoothed by nibbling the margin so as to prevent any graft impingement. The tendon graft was then passed through the tunnel in patella creating a double bundle configuration (Fig. 3a). The ends of the tendon graft were then passed deep to medial retinaculum (between 2nd and 3rd

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