

# Proximal Tibiofibular Joint Instability and Treatment Approaches: A Systematic Review of the Literature



Bradley M. Kruckeberg, B.A., Mark E. Cinque, M.S., Gilbert Moatshe, M.D.,  
Daniel Marchetti, B.A., Nicholas N. DePhillipo, M.S., A.T.C., O.T.C.,  
Jorge Chahla, M.D. Ph.D., and Robert F. LaPrade, M.D., Ph.D.

**Purpose:** To evaluate the treatment options, outcomes, and complications associated with proximal tibiofibular joint (PTFJ) instability, which will aim to improve surgical treatment of PTFJ instability and aid surgeons in their decision making and treatment selection. **Methods:** A systematic review was performed according to Preferred Reporting Items for Systematic Review and Meta-Analysis guidelines. Inclusion criteria were as follows: PTFJ instability treatment techniques, PTFJ surgical outcomes, English language, and human studies. Exclusion criteria were cadaveric studies, animal studies, basic science articles, editorial articles, review articles, and surveys. Furthermore, we excluded studies that did not report patient follow-up time and studies without any patient-reported, clinical or radiographic outcomes at the final follow-up. **Results:** The systematic review identified 44 studies (96 patients) after inclusion and exclusion criteria application. For the treatment of PTFJ instability, there were 18 studies (35 patients) describing nonoperative management, 3 studies (4 patients) reported on open reduction, 11 studies (25 patients) reported on fixation, 4 studies (10 patients) that described proximal fibula resection, 3 studies (11 patients) reported on adjustable cortical button repair, 2 studies (3 patients) reported on ligament reconstructions, and 5 (8 patients) studies reported on biceps femoris tendon rerouting. The most (77% to 90%) PTFJ dislocations and instability were anterolateral/unspecified anterior dislocation or instability. Improved outcomes after all forms of PTFJ instability treatment were reported; however, high complication rates were associated with both PTFJ fixation (28%) and fibular head resection (20%). **Conclusions:** Improved outcomes can be expected after surgical treatment of PTFJ instability. Proximal tibiofibular ligament reconstruction, specifically biceps rerouting and anatomic graft reconstruction, leads to improved outcomes with low complication rates. Nonoperative treatment is associated with persistent symptoms, whereas both fixation and fibular head resection are associated with high complication rates. **Level of Evidence:** Level IV, systematic review of level IV studies.

Instability of the proximal tibiofibular joint (PTFJ) can present as frank dislocations, subtle symptoms of lateral knee pain, discomfort during activity, or symptoms related to irritation of the common peroneal nerve.<sup>1-3</sup> The posterior ligaments have been reported to be weaker than the anterior ligament complexes, and

hence the anterolateral PTFJ dislocation is the most common instability pattern accounting for more than 85% of all cases.<sup>1,4</sup> The most common mechanisms of PTFJ injury include falling onto a flexed knee with the foot inverted and plantar flexed, twisting the knee with the foot planted on the ground, or spontaneous/inherent instability.<sup>2</sup> In the setting of multiligament injury and chronic instability, PTFJ instability may be missed or misdiagnosed.

The true incidence of PTFJ instability is likely higher than previously reported in the literature because of spontaneous reduction and neglected diagnosis in the chronic cases with spontaneous instability. Reported treatment options include nonoperative treatment with temporary immobilization,<sup>5</sup> internal fixation,<sup>6</sup> arthrodesis,<sup>2,7</sup> fibular head resection,<sup>8</sup> direct ligamentous repair,<sup>9</sup> and ligament reconstruction using a free graft<sup>10</sup> or rerouting of the biceps femoris tendon.<sup>7</sup> The optimal treatment options, indications, complications, and patient outcomes for PTFJ instability are lacking in

From the Steadman Philippon Research Institute (B.M.K., M.E.C., G.M., D.M., J.C., R.F.L.); The Steadman Clinic (N.N.D., R.F.L.), Vail, Colorado, U.S.A.; Oslo University Hospital and University of Oslo (G.M.); and OSTRC, The Norwegian School of Sports Sciences (G.M.), Oslo, Norway.

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Address correspondence to Robert F. LaPrade, M.D., Ph.D., Steadman Philippon Research Institute, The Steadman Clinic, 181 West Meadow Drive, Suite 400, Vail, CO 81657, U.S.A. E-mail: [drlaprade@sprivail.org](mailto:drlaprade@sprivail.org)

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the literature, with most of the data available being presented as case series with short-term follow-up.

The purpose of this systematic review was to evaluate the treatment options, outcomes, and complications associated with PTFJ instability, which will aim to improve surgical treatment of PTFJ instability and aid surgeons in their decision making and treatment selection. We hypothesized that there would be a wide range of treatment options, improved clinical outcomes in most patients regardless of treatment, and lower complication rates after nonoperative treatment compared with operative treatment of PTFJ instability.

## Methods

### Article Identification and Selection

This study was conducted in accordance with the 2009 Preferred Reporting Items for Systematic Review and Meta-Analysis statement.<sup>11</sup> A systematic review of the literature regarding the existing evidence for the outcomes and complications of PTFJ instability treatment approaches was performed in October 2016 using the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials, PubMed (1980-2016), Embase (1947-2016), and MEDLINE (1980-2016). The queries were performed in September 2016. The terms “proximal” and “tibio-fibular” were used in all text fields to perform each search. Registration of this systematic review was performed in October 2016 using the PROSPERO International prospective register of systematic reviews (registration number 42016050207).

The search strategy inclusion criteria were technique descriptions, outcomes, and complications of PTFJ instability treatment, English language, and human studies. Exclusion criteria were cadaveric studies, animal studies, basic science articles, editorial articles, review articles, and surveys. Furthermore, we excluded studies that did not report patient follow-up time and studies without any patient-reported, clinical or radiographic outcomes at the final follow-up.

Three investigators (B.M.K., G.M., J.C.) independently reviewed the abstracts from all identified articles. Two reviewers were board-certified orthopaedic surgeons (G.M., J.C.), whereas the third reviewer was a final year medical student who was involved in the initial review. The 2 board-certified surgeons reviewed all the papers eligible for inclusion. Full-text articles were obtained for review if necessary to allow further assessment of inclusion and exclusion criteria. In addition, all references from the included studies were reviewed and reconciled to verify that no relevant articles were missing from the systematic review and that no duplicate articles were included in the final analysis. All 3 investigators unanimously agreed on the included articles.

### Data Collection

The level of evidence of the studies was assigned according to the classification as specified by Wright et al.<sup>12</sup> The information was collected from the included studies. Patient demographics, follow-up, and objective and subjective outcomes were extracted and recorded. For continuous variables (e.g. age, timing, follow-up, outcome scores), the mean and range were collected if reported. The timing of treatment was recorded as acute or chronic, with acute defined as less than 6 weeks from injury to treatment. In [Table 1](#), the number of patients was recorded for each treatment group with their respective demographic information, including mean age and sex, as well as the mean follow-up time. [Table 2](#) was constructed using the mechanism of injury, dislocation or instability pattern, acute or chronic nature of the injury, length of period of fixation, and subjective outcomes scores (Lysholm score, International Knee Documentation Committee [IKDC] score, and Modified Cincinnati Knee Survey). Data were recorded into a custom spreadsheet using a modified information extraction table.

## Results

### Study Selection

A total of 44 studies (96 patients) met the inclusion criteria for this study ([Fig 1](#)). Patient demographics and study characteristics for all 44 studies are reported in [Tables 1](#) and [2](#). All studies included had a level of evidence of IV. Studies were divided into 5 groups for analysis depending on the treatment method: nonoperative treatment, open reduction, internal fixation, fibular head resection, and ligament reconstruction studies.

Of the 96 patients with PTFJ instability, 35 (37%) underwent nonoperative management, 4 (4%) had open reduction, 25 (26%) underwent fixation, and 10 (10%) underwent resection of the fibular head. In addition, 22 (23%) patients underwent PTFJ reconstruction, with 2 patients having an anatomic reconstruction and 20 patients a nonanatomic reconstruction. The mechanism of injury and the type of dislocation are reported in [Table 2](#).

### Nonoperative Treatment

There were 18 studies (35 patients) describing nonoperative management after PTFJ instability. Postoperative protocols for patients in the nonoperative group were variable. Twenty-seven patients were immobilized for a duration between 1 and 6 weeks. Seven of these patients were casted, 2 patients used a brace, and the method of immobilization was not reported in the remaining 18 patients. Furthermore, 3 patients did not receive any postoperative physical therapy, 1 patient wore a support bandage, and

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