



# Isolated posterolateral corner knee injuries: high incidence in Jiu-Jitsu athletes and with anterolateral ligament injuries

Nicholas N. DePhillipo<sup>1^</sup>, Zachary S. Aman<sup>2</sup>, Travis J. Dekker<sup>3</sup>

<sup>1</sup>Department of Orthopaedic Surgery, University of Pennsylvania, Pennsylvania, PA, USA; <sup>2</sup>Department of Orthopaedic Surgery, Duke University, Duke, NC, USA; <sup>3</sup>Department of Orthopaedic Surgery, U.S. Air Force Academy, 10th Medical Group, Colorado Springs, CO, USA

*Correspondence to:* Nicholas N. DePhillipo, PhD, MBA, ATC. Department of Orthopaedic Surgery, University of Pennsylvania, 3401 Grays Ferry Ave. Bldg. 450, Pennsylvania, PA 19146, USA. Email: Nicholas.Dephillipo@Pennmedicine.upenn.edu.

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The posterolateral corner (PLC) of the knee is made up of three main static stabilizing structures: the fibular collateral ligament (FCL), the popliteus tendon, and the popliteofibular ligament (PFL) (1). In addition, there are multiple structures that provide dynamic and secondary stabilization to the lateral side of the knee, including the distal attachments of the biceps femoris muscle, the iliotibial band, the anterolateral ligament (ALL), posterior horn of lateral meniscus, and the popliteomeniscal fascicles. Once referred to as the “dark side of the knee”, researchers and clinicians have made giant advancements over the past two decades in understanding the anatomy, biomechanics, and clinical characteristics of PLC injuries in order to better serve patients (2-4). A common trend reported in the literature is that isolated PLC injuries are extremely rare and typically do not occur without concomitant anterior cruciate ligament (ACL) or posterior cruciate ligament (PCL) injuries, resulting in multi-ligament knee categorization and treatment (often complex surgery) (3).

In their recent study titled, “*Patient demographic and magnetic resonance imaging evaluation of isolated posterolateral corner knee injuries*”, Costa *et al.* (5) retrospectively analyzed magnetic resonance images (MRIs) of patients with reported PLC knee injuries over a 5.5-year period

in two hospitals in Brazil. Both 1.5T (91%) and 3.0T (9%) magnets were used, and all MRIs were assessed by two experienced radiologists with specialization in musculoskeletal injuries. A total of 248 cases of PLC injuries were identified, however, only 23 patients (9.2%) had isolated PLC injuries. The mean age of patients was 32.0±8.1 years, and the majority of patients were male (91% *vs.* 9% female). Authors reported that nearly half of all isolated PLC injuries (48%) occurred during Brazilian Jiu-Jitsu, with 35% of injuries resulted from playing soccer. The PFL was damaged in 83% of cases on MRI evaluation, while 0 common peroneal nerve injuries were identified. The most common associated concomitant injury was damage to the ALL, reported in 43% of isolated PLC injuries. Also, bone bruising patterns involving the medial femur and tibia were identified in 22% of isolated PLC cases. Authors reported that PLC injuries were best appreciated on T2 weighted, fat saturation sequences with coronal and axial views most helpful for diagnosing PLC injuries (5).

Overall, this diagnostic imaging study confirms prior knowledge that PLC injuries rarely occur in isolation and a posteromedial tibial bone bruise pattern on MRI should increase the suspicion for PLC injury (5). Prior studies have reported an incidence of less than 2% for isolated

<sup>^</sup> ORCID: 0000-0001-8946-4028.

PLC injuries (6,7), which is lower than the 9.2% reported by Costa and colleagues (5). Geeslin *et al.* (8) reported a medial-sided bone bruise pattern was associated with isolated PLC injuries in 64% of cases. However, these bone bruise patterns are not limited to lateral sided knee injuries. In recent years, posteromedial tibial bone bruises have been more closely associated with meniscal ramp lesions or tears involving the peripheral attachment of the posterior horn of the medial meniscus (9). DePhillipo *et al.* (10) reported that this bone bruise pattern was identified on MRI in 72% of cases with medial meniscal ramp lesions. Therefore, both PLC injuries and meniscal ramp lesions ought to be suspected when a posteromedial tibial bone bruise is present on knee MRI.

Perhaps new insights that can be drawn from this study are that isolated PLC injuries were highly associated with Brazilian Jiu-Jitsu (5). Jiu-Jitsu is a martial art that can place tremendous stress on the knee joint during grappling and various types of technical maneuvers to control the opponent. These forces often include varus stress, hyperextension, and rotation of the knee which are mechanisms of injury directly related to PLC injuries (1,11). These atypical traumatic mechanisms may be possible explanations for why these injuries were more prevalent in Jiu-Jitsu fighters as reported by Costa *et al.* (5). According to the authors, this was also particularly interesting and correlated to the sport mechanics, rather than a coincidental finding, because Jiu-Jitsu is less popular and has a much lower participation rate than soccer in Brazil. Therefore, clinicians treating Jiu-Jitsu patients ought to educate patients of the potential risks of suffering isolated PLC knee injuries while participating in this sport and be aware of this higher association when examining these athletes with reported lateral knee pain.

Helito and co-authors also reported a high incidence of concomitant ALL injuries with isolated PLC injuries (5). Based on prior quantitative anatomy studies, the ALL femoral attachment is in close proximity to the femoral attachment of both the FCL and popliteus tendon—which may help to explain the concomitant injuries of PLC and ALL structures (12-14). However, this is an interesting finding and it is unclear whether this association is diagnostic for better identifying isolated PLC injuries or prognostic in that ALL reconstruction ought to be considered to help support PLC surgical techniques and clinical outcomes. Although no associated injuries to the common peroneal nerve were identified on MRI, physical examination ought to be performed to rule out common

peroneal nerve injury whenever a PLC injury is suspected or confirmed (5).

The main limitations of the excellent study performed by Costa *et al.* (5) are the lack of reported physical exam findings and lack of correlating MRI findings and surgical data to confirm injuries as reported by radiologists. Thus, this study may help with identifying potential high-risk patients for isolated PLC injuries (such as Jiu-Jitsu and soccer players) but does not provide insight to clinical treatment. Future clinical research is needed to confirm the reported association between isolated PLC injuries and the sport of Jiu-Jitsu. Additionally, further investigations are needed to identify the biomechanical consequences of concomitant posterolateral and anterolateral knee laxity which could affect the clinical or surgical management of these patients.

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