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Original Article

Posterior cruciate ligament tears in Taiwan: an analysis of 140 surgically treated cases

Huei-Fang Hsuan [a,1,2], Yu-Ching Lin [b,1,3], Chih-Hao Chiu [c,4], Jennifer Ni Mhuircheartaigh [d,5], Yu-Hsiang Juan [a,6], Yi-Sheng Chan [c,*], Jim S. Wu [d,5]

[a] Department of Medical Imaging and Intervention, Chang Gung Memorial, Hospital, Linkou and Chang Gung University, Taiwan
[b] Department of Medical Imaging and Intervention, Chang Gung Memorial, Hospital, Keelung and Chang Gung University, Taiwan
[c] Department of Orthopedic Surgery, Division of Sports Medicine, Chang, Gung Memorial Hospital, Linkou and Chang Gung University, Taiwan
[d] Department of Radiology, Beth Israel Deaconess Medical Center, Harvard, Medical School, Boston, MA, USA

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ABSTRACT

Introduction: Posterior cruciate ligament (PCL) tears are commonly due to motor vehicle accidents or sports-related trauma but can differ geographically. We report the various causes, types, and associated injuries of PCL tears in Taiwan.
Methods: One hundred forty patients with arthroscopically treated PCL tears were reviewed.
Results: Scooter-related trauma was the most common cause of PCL tear in our series and is typically an isolated ligamentous injury. High-velocity motor vehicle accidents accounted for a small percentage of PCL tears.
Conclusion: Scooter-related PCL tears are common in Taiwanese patients and are often isolated ligamentous injuries similar to low-velocity sports-related PCL injuries.

1. Introduction

The posterior cruciate ligament (PCL) is the primary stabilizer against posterior translation of the tibia, and PCL tears are relatively uncommon [1–4]. PCL tears are most often due to motor vehicle accidents (MVAs) or sports-related injuries [5–8]. MVAs account for 45%–56% [5–8] of PCL tears and are often associated with other ligamentous injuries (nonisolated) due to the high-velocity nature of the trauma [2,4,9–15]. Sports-related PCL injuries account for 20%–40% [5–8] of PCL tears. It is commonly due to low-velocity trauma to the front of the flexed knee and is usually an isolated ligamentous injury [2,4,9,10]. The mechanism of injury and degree of traumatic force to the knee can determine whether the PCL injury will be isolated or associated with additional structural injuries [16]; thus, it is important to understand the type of traumatic event so that injured structures can be promptly identified and treated.

PCL injury is seen in 1%–47% of patients with acute knee trauma [1,6,7,17,18], and the reason for this wide range may be due to differences in the populations studied. Much of the published literature on PCL injury is from Western countries [5–8], where cars and motorcycles are more common; however; in certain urban cities of the world, especially Asia, scooters are a very common mode of transportation. Anecdotally, we have noticed a very high incidence of PCL injuries related to low-velocity scooter-related accidents; however, to our knowledge, there have been no published reports on this association. The purpose of this study is to report on the various causes, types, and associated injuries of PCL tears in Taiwan.

2. Material and methods

The institutional review board at our institution approved this study. Between July 2002 and July 2012, we retrospectively reviewed a total of 151 patients who underwent arthroscopic PCL reconstruction by one orthopedic surgeon (Y.S.C.). All patients were symptomatic or had knee dysfunction after a period of rehabilitation therapy. We

* Corresponding author. Department of Orthopedic Surgery, Chang Gung Memorial Hospital, 5, Fu-Shin Street, Kueishan, Taoyuan, 333. Tel.: +886 3 3281200x2163; fax: +886 3 3278113.
E-mail addresses: hsuenlily@yahoo.com.tw (H.-F. Hsuan), yuching1221@gmail.com (Y.-C. Lin), joechiu0115@gmail.com (C.-H. Chiu), jnimhuir@bidmc.harvard.edu (J. Ni Mhuircheartaigh), jonat126@yahoo.com.tw (Y.-H. Juan), yschan512@gmail.com (Y.-S. Chan), jswu@bidmc.harvard.edu (J.S. Wu).
[1] Co-first author with equal contribution.
[2] Department of Medical Imaging and Intervention, Chang Gung Memorial, Hospital, 5 Fu-Shin Street, Kueishan, Taoyuan, 333. Tel.: +886 3 3281200x2575; fax: +886 2 25469220.
[3] Department of Medical Imaging and Intervention, Chang Gung Memorial, Hospital, 5 Fu-Shin Street, Kueishan, Taoyuan, 333. Tel.: +886 975366386; fax: +886 2 25469220.
[4] Department of Orthopedic Surgery, Chang Gung Memorial Hospital, 5, Fu-Shin Street, Kueishan, Taoyuan, 333. Tel.: +886 975366261; fax: +886 3 3196099.
[5] 330 Brookline Ave. Boston, MA 02215. Tel.: +1 617 667 1283; fax: +1 617 667 8212.
[6] Department of Medical Imaging and Intervention, Chang Gung, Memorial Hospital, 5 Fu-Shin Street, Kueishan, Taoyuan, 333. Tel.: +886 975366388; fax: +886 2 25469220.

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excluded 11 patients with prior knee surgery or poorly documented operative records.

The information was obtained by reviewing the clinical notes and operative data from one orthopedic surgeon (Y.S.C.) with 18 years of experience. The mechanism of injury (scooter related, sports related, and MVAs), type of PCL tear (isolated or nonisolated ligamentous injury), and presence of meniscal and chondral abnormalities were documented. Although scooters are motorized vehicles similar to cars and motorcycles, we have grouped them separately since scooters are not permitted on highways in Taiwan and are typically driven at low speeds. The type of PCL tear was classified as partial (Fig. 1), complete (Fig. 2), or bony avulsion based on the findings at arthroscopy. A partial tear had discontinuity of ligament fibers with some intact ligament fibers that could still resist tension; complete ligament tears had no intact fibers or a few but nonfunctional fibers; bony avulsion was documented when an avulsed bony fragment was displaced or nondisplaced from the fracture crater of the tibial or femoral insertion site.

Whether the PCL tear was an isolated or nonisolated ligamentous injury was also documented on arthroscopy. Nonisolated ligamentous injury was documented if any of the following ligaments were partially or completely torn: medial collateral ligament (MCL), anterior cruciate ligament (ACL), or lateral collateral ligament (LCL). In addition, partial or complete tears of the popliteus and biceps femoris tendons were assessed.

Meniscal and chondral injuries were also assessed at arthroscopy. The location (medial or lateral) of the meniscal tear was documented from the operative note (Fig. 3). Chondral injuries were documented in the three knee compartments if there were chondral blisters, fissures, fragmentation, or defects (Fig. 4) as reported in the operative note.

Associations between the cause of PCL tear with isolated/nonisolated ligamentous injury and meniscal/chondral injuries were assessed. Moreover, any association between isolated and nonisolated ligamentous injury with the presence of meniscal and chondral injuries was also analyzed. Statistical analysis was performed using SPSS version 20 for Windows. Categorical variables were analyzed using a χ^2 test.

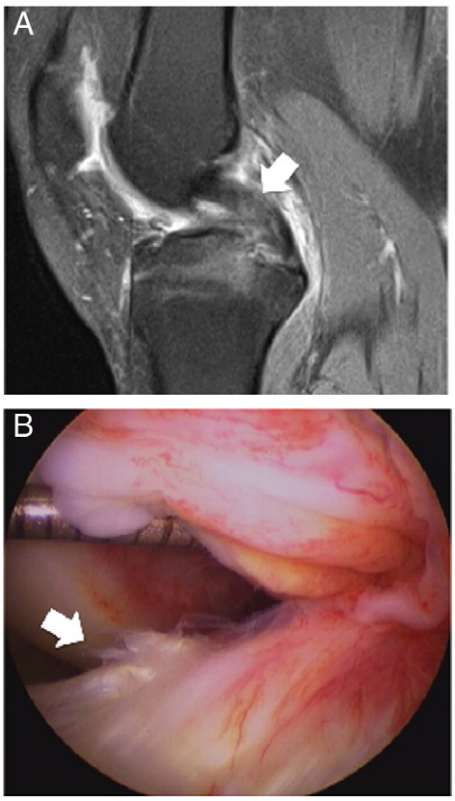

Fig. 1. A 42-year-old male with right knee pain and fall on a scooter. (A) Sagittal proton density-weighted fat-saturated magnetic resonance (MR) image of the right knee shows abnormal hyperintensity and partial tear of the PCL at its midsubstance (arrow). (B) Corresponding arthroscopy image shows a partially torn PCL with disrupted fibers (arrow).

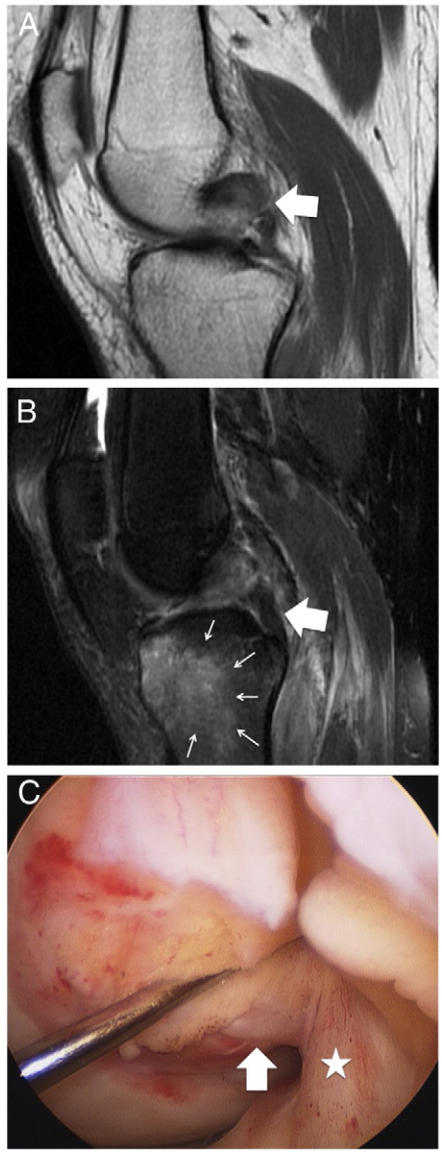

Fig. 2. A 29-year-old female with left knee pain and fall on a scooter 1 month prior to surgery. (A) Sagittal proton density-weighted MR image of the left knee shows abnormal hyperintensity and rupture of the PCL at its midsubstance (arrow). (B) Sagittal T2-weighted MR image of the left knee shows bone marrow edema at the anterior aspect of tibia (thin arrows). The distal PCL is intact at its tibial attachment (arrow). (C) Corresponding arthroscopy image shows complete rupture of the PCL (arrow) with a metal probe at the site of tear. The ACL (*) is intact.

3. Results

A total of 140 patients were studied which included 94 men (67%) and 46 women (33%) with an average age of 34.6 years (range, 12–67 years). The median time interval between injury and surgery was 91 days (mean=230 days; range, 1–2520 days). The cause of the PCL tear, types of PCL tears, and meniscal and chondral injuries associated with PCL tears are summarized in Table 1. Scooter-related accident (71%, 99/140) was the most common mechanism of injury, followed by sports-related injury (22%, 31/140) and MVAs (7%, 10/140). For the type of PCL tear, the vast majority were complete tears (94%, 132/140). Partial tear (2%, 3/140) or bony avulsion (4%, 5/140) was seen in