Rare multiligament injury of the knee with rupture of the patellar tendon: Is it equivalent to a grade V in Schenck classification? Case Report

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Abstract
Multiligament knee injury associated with knee dislocation is defined as an injury to two or more of the main knee ligaments. It corresponds to around 0.02% of all orthopedic injuries, and even less frequent is its association with complete rupture of the patellar tendon. Clinical case: 55-year-old patient, victim of a high-kinetic accident resulting in a knee displacement with a multiligament injury to the right knee associated with a rupture of the four main ligaments of the knee (ACL, PCL, MCL and LCL) and the patellar tendon. She underwent surgery in two stages, with good functional recovery after approximately two years of follow-up.

Current classifications for knee dislocation are insufficient in describing more complex ligament injuries, such as the association of patellar tendon rupture. With this case report, the authors propose an update to the current Schenck classification to include this rare lesion in grade V, equivalent to fracture/dislocation.

Keywords: Patellar tendon, multiligament injury, rupture

Introduction
Knee dislocation is a serious and infrequent injury that corresponds to approximately 0.02-0.2% of orthopedic injuries [1, 2]. Recognizing their real incidence is difficult, as they can present spontaneously reduced [1-3]. Instability from this injury occurs when two or more of the knee’s four main ligaments are completely ruptured: the anterior cruciate ligament (ACL), posterior cruciate ligament (PCL), medial collateral ligament (MCL), and lateral collateral ligament (LCL). This condition is classified as a multiligament injury of the knee [1, 4].

Knee dislocations can be classified based on the trauma mechanism as either high-velocity or low-velocity injuries. Alternatively, they can be categorized according to Kennedy's classic classification, which considers the position of the tibia relative to the femur: anterior, posterior, medial, lateral, and rotatory dislocations [5-7]. However, these classification systems have become inadequate for establishing the true degree of severity and prognosis of the injury, especially in those presenting spontaneously reduced. Schenck's anatomical classification emerged based on ligament injuries [Table 1] and was later modified to include associated nerve/vascular injuries [1, 5-7]. Injury to the popliteal artery can occur in up to 40% of cases. Therefore, clinical observation for a minimum of 24 hours and measuring the ankle-brachial index and Doppler ultrasound can eliminate the need for more invasive exams, such as routine angiography [7, 8]. Paralysis of the common peroneal nerve can be another consequence of knee dislocation, predominantly in those associated with lesions of the posterolateral corner, resulting in chronic pain or strength deficit in dorsiflexion of the foot [1, 2, 5-7, 9].

There is no consensus on the ideal method of treating multi-ligament injuries of the knee [10-12]. Nonetheless, functional outcomes are better in patients who receive surgical treatment compared to conservative treatment and in those who surgery is performed within the first three weeks after the injury compared to delayed surgery [11-13].

The authors present a rare case of posterior knee dislocation resulting in a multiligament injury that involved rupture of the four main knee ligaments (ACL, PCL, MCL, MCL), the patellar tendon, and the posterior horn of both menisci.
Case Report

In November 2021, a 55 years old female patient, referred from another institution, presented to the emergency department at Santa Maria hospital, victim of a high-kinetic motorcycle accident with a diagnosis of posterior dislocation of the right knee. Upon arrival at the emergency department, the joint was still dislocated within immobilization with a posterior plaster splint. During the initial approach, the patient reported paresthesia in the region of the lateral surface of the dorsum of the right foot, more predominantly at the level of the 4th and 5th toes, however with dorsiflexion of the foot maintained. She underwent an emergency surgical procedure of closed reduction and transarticular osteotomy of the right knee. An MRI was performed (two days after the injury) which demonstrated rupture of the patellar tendon at its distal insertion, rupture of the posterior horn of both menisci and injury to both cruciate ligaments and also to the MCL and LCL. Approximately two weeks later, she underwent surgery where it was possible to intraoperatively diagnose injury to the following structures: posterior and anterior cruciate ligaments; lateral collateral ligament and posterolateral corner; medial collateral ligament; complete rupture of the patellar tendon, anterior joint capsule and injury/disinsertion of the anterior root of the lateral meniscus. During this operative time, the patellar tendon was repaired using fixation with 1 anchor in the lower pole of the patella and 2 anchors in the tibia; reconstruction of the medial collateral ligament with semitendinosus and ipsilateral gracilis graft and fixation with an bioabsorbable screw in the femur and staple in the tibia; and reinsertion of the anterior meniscal root with a metal anchor.

The patient maintained follow-up in an outpatient setting with the use of an extension knee immobilizer for six weeks, and began physiotherapy for muscle strengthening and progressive partial load. Objectively, she presented a range of movement (ROM) of 0º-40º. At six months post-operatively, there was good progression and a ROM of 0º-100º, however the knee presented instability in the anteroposterior and varus planes. Approximately one year after the initial injury, a new surgical procedure was performed to reconstruct the PCL and ACL with an Achilles tendon allograft arthroscopically and reconstruct the LCL and posterolateral corner using the Arciero technique with a semitendinosus allograft.

At the end of one month post-operatively, the knee was stable and with a ROM of 0º – 45º, starting with partial weight-bearing. By eight weeks after surgery, he already had 0º – 90º of ROM and gait with an articulated knee brace. At twelve weeks post-operatively, she had a ROM of 0º-115º and started stationary cycling. At six months, the patient was already walking without walking aids, maintaining physiotherapy and exercises in the pool. At nine months post-surgery, the patient presents without limitations in activities of daily living.

Discussion

In the initial approach to knee dislocations, a radiographic exam is crucial to reveal the mechanism of the injury and classify it based on the displacement of the tibia relative to the femur [14]. However, Magnetic Resonance Imaging (MRI) is considered the gold standard for characterizing various soft tissue injuries, especially in cases where there has been spontaneous reduction or when the mechanism of dislocation is unclear. MRI provides detailed imaging that helps in assessing ligamentous, meniscal, and other soft tissue damages that might not be fully visible on radiographs alone [7, 12, 14, 15].

In road accidents with high-energy traumas, the ligaments most frequently affected in knee dislocation injuries are both cruciate ligaments, accompanied by the medial or lateral collateral ligament [14, 16]. Currently, the Schenck classification is the most used to describe ligament injuries in knee dislocations [1, 5-7]. Injury to the cartilage and menisci frequently occurs in knee dislocations and its incidence and severity increases proportionally with the delay in surgical treatment [17].

Schenck injuries classified as grade I are rare entities, as they require clinical or radiological evidence of a knee dislocation with only one of the cruciate ligaments injured in combination with rupture of one of the collateral ligaments [15]. Green et al., states that in the literature only 14 cases are truly classified as Schenck I [19]. Recently, a working group involved in the Schenck classification, warns of the importance to correlate the clinic and imaging exams, especially in Schenck grade I lesions, so as not to classify incorrectly multiligament injuries of the knee as dislocations [20, 21].

Table 1: Knee dislocation classification by Schenck

<table>
<thead>
<tr>
<th>Schenck classification</th>
<th>Description</th>
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<tbody>
<tr>
<td>KD I</td>
<td>Knee dislocation with disruption of one cruciate ligament (ACL or PCL)</td>
</tr>
<tr>
<td>KD II</td>
<td>Knee dislocation with disruption of both cruciate ligament (ACL and PCL)</td>
</tr>
<tr>
<td>KD III</td>
<td>Knee dislocation with disruption of both cruciate ligament (ACL and PCL) and MCL (KD III-M) or LCL (KD III-L)</td>
</tr>
<tr>
<td>KD IV</td>
<td>Knee dislocation with disruption of both cruciate ligament (ACL and PCL) and both collateral ligaments (MCL and LCL)</td>
</tr>
<tr>
<td>KD V</td>
<td>Fracture - dislocation</td>
</tr>
<tr>
<td>KD N</td>
<td>Knee dislocation associated with nerve injury are described as KD N and associated with arterial injury are KD C</td>
</tr>
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<td>KD C</td>
<td></td>
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</table>

Grade II Schenck injuries, described as knee dislocation with rupture of both cruciate ligaments and intact collateral ligaments, are uncommon, making it difficult to distinguish their prognosis with grade I. On the other hand, grade III injuries (dislocations with rupture of both cruciate ligaments and rupture of the medial or lateral collateral ligament) present a higher incidence of nerve and vascular injury compared to grade I and II injuries [1, 2, 22]. Clinical evaluation is important to distinguish grade III injuries, a dislocation with rupture of the medial collateral ligament that presents a stable posterolateral corner (PLC) in the varus stress test should be classified as grade IIIM, even if
the MRI describes edema or partial damage to the PLC [23]. Fahlbusch et al., in their recent systematic review including 709 patients, concluded that the risk of arthrofibrosis is more important in higher grades of injury (III and IV). In the total sample, 8.5% of patients had grade II injuries, 44.0% grade III-M and 31.4% grade III-L and 16.1% grade IV [24]. Engbreten et al., for 2 years followed 85 patients who suffered knee dislocation, obtaining similar numbers: 6% grade II injuries; 49% grade III-M; 32% grade III-L and 12% grade IV [25]. Contrary to this, the epidemiological study by Pinheiro et al., found that injuries to the PLC are more frequent than injuries to the medial collateral ligament, and explains that this may be due to some patients having been observed in the chronic phase of the injury, allowing the MCL to heal after conservative treatment with immobilization [4].

Knee dislocation associated with patellar tendon rupture is an extremely rare entity with few cases described in the literature [26,27]. The prevalence of acute ruptures of the patellar tendon is thought to be around 2.4% [28,29]. Canales-Zamora et al. described a case of Schenck grade V injury combined with rupture of the patellar tendon, highlighting the scarcity of information and guidelines for the treatment of these patients [30]. Also uncommon is the chronic presentation of a knee dislocation for more than 6 months with rupture of the ACL, PCL and MCL and patellar tendon documented by Maodah et al. [31]. Injuries classified as Schenck grade V are equivalent to fracture/dislocation and can also be included in other systems, such as the Schatzker classification for fractures of the tibial plateau [22].

Due to the complexity of the injury presented in this clinical case, the authors suggest that the injury with rupture of the four main knee tendons (ACL, PCL, MCL and LCL) in addition with patellar tendon can be classified as Schenck grade V. Therefore, a subclassification of grade V of the Schenck classification is proposed, which encompasses patellar tendon injuries.

There are no conflicts of interest declared by the authors regarding the publication of this article.

Written consent was given by the patient to share his personal data, including images and video.

References


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