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Original Article

Injury of the knee ligaments associated with ipsilateral femoral shaft fractures☆

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ABSTRACT

Objective: With the objective of identifying the incidence of ipsilateral knee ligament injury, thirty-six patients with femoral shaft fractures were evaluated.
Methods: During the osteosynthesis procedure to repair the femur while under anesthesia, all patients underwent a physical examination and X-ray examination.
Results: The most common mechanism of injury observed was motorcycle accidents. Of the thirty-six patients that were studied, eleven patients (30.5%) had a knee ligament injury. Of the eleven patients, 64% had a cruciate ligament injury. The ligament injury was not treated at the time of the osteosynthesis procedure.
Conclusion: We highlight the difficulty of diagnosis at the time of admission and the need for systematic physical examination before and after surgical treatment of femoral fracture.

Lesão ligamentar do joelho associada à fratura diafisária do fêmur ipsilateral

Palavras-chave:
Fratura
Fêmur
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RESUMO

Objetivo: Determinar a incidência de lesão ligamentar do joelho em pacientes com fratura diafisária de fêmur ipsilateral.
Métodos: Foram avaliados 36 pacientes. Todos foram submetidos a exame físico e radiológico sob anestesia no momento da osteossíntese do fêmur.
Resultados: O mecanismo de trauma mais comum foi o acidente com motociclistas. Apresentaram lesão ligamentar do joelho 11 (30,5%) pacientes e foram encontradas lesões centrais (64%) e periféricas (36%). Nenhuma das lesões foi tratada no momento da fixação da fratura.

☆ Study conducted at the Hospital Maria Amélia Lins, Fundação Hospitalar do Estado de Minas Gerais, Belo Horizonte, MG, Brazil.
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Conclusão: Ressalta-se a dificuldade do diagnóstico no ato da admissão e a necessidade de exame físico sistematizado antes e após o tratamento cirúrgico da fratura femoral.

Introduction

Femoral fractures are severe injuries that quickly draw physicians' attention and are often associated with other fractures. Ipsilateral knee ligament injuries may also be associated with such factures, and most of these are diagnosed at a late stage. Walker and Kennedy[1] reported that these ligament injuries were silent or occult and that up to 78% of them progressed undiagnosed at this stage, with negative consequences for patients and orthopedists.

In the literature, there are references to an association between these injuries and increased occurrences of high-energy accidents.[2,3] Trickey[4] reported that traffic accidents were the most frequent type of trauma for this association of injuries.

Incidences of 32%[5] to 48%[6] have been reported for ligament injuries among individuals with ipsilateral femoral fractures. Van Raay et al.[6] reported that time that elapsed between the initial trauma and the diagnosis was up to 12.8 months.

To diagnose ligament injuries within this association, several methods have already been reported. Esmaeilijah et al.[3] used physical examination under anesthesia, De Campos et al.[2] used arthroscopy, Walker and Kennedy[1] used distal fixation of the femur in association with knee radiographs under stress, and Dickson et al.[7] performed magnetic resonance imaging on their patients. In referral care centers for orthopedic trauma, establishment of a protocol for identifying these cases is fundamental, with a view to determining the correct treatment within the proper window of opportunity.[4,7–9] For multiple trauma patients who present femoral shaft fractures, knee ligament injuries are a diagnostic challenge because of the difficulty created in the physical examination, although such examination is fundamental for defining the treatment and prognosis.[4,6–8,10]

Materials and methods

Between March 1, 2011 and March 1, 2012, the knees of all patients with ipsilateral femoral shaft fractures who were attended at our service and who underwent osteosynthesis using any method were evaluated with the aim of assessing the prevalence of ligament injuries.

The routine examination was performed during the same induction of anesthesia as for the osteosynthesis on the femoral fracture. This did not generate any risks, discomfort or additional costs for the patient or for the institution. In all cases, the semiological examination was conducted by more than one professional and was always confirmed by a professional with experience of knee surgery.

The data were gathered into a database and were evaluated later on using the Epi-Info software.

It is known that in evaluating acute knee injuries, the gold standard is physical examination, sometimes done under anesthesia, in association with magnetic resonance analysis.[7] In our institution, magnetic resonance imaging is difficult to obtain, which has made physical examination under anesthesia and radiographs under stress fundamentally important for the diagnosis.

Patients with femoral shaft fractures but without any history of other acute or chronic injuries to the ipsilateral lower limb were included. Patients with previous injuries to the knee investigated and those with other fractures in the ipsilateral lower limb were excluded.

The patients signed a free and informed consent statement at the time of their own hospital admission or at a subsequent outpatient consultation. The research project was approved by the Research Ethics Committee.

Results

Our sample comprised 36 femoral shaft fractures, among which there were 11 cases (30.5%) with ipsilateral knee ligament injury (six left-side and five right-side).

The trauma mechanism was a traffic accident in most cases. Of these, three involved cars and six, motorcyclists (Fig. 1).

The patients' ages ranged from 16 to 45 years, with a mean of 27.5 years, and only one patient was female.

The fractures were identified in accordance with the Arbeitsgemeinschaft für Osteosynthesefragen (AO) classification. Six were type A, four were type B and one was type C.

The distribution according to injury type is shown in Table 1. There were three cases of injury to both cruciate ligaments (one associated with the lateral and medial periphery and two associated only with the medial periphery), three cases of posterior cruciate ligament injury (two associated with the lateral periphery and one with the medial periphery), one case of anterior cruciate ligament (associated with

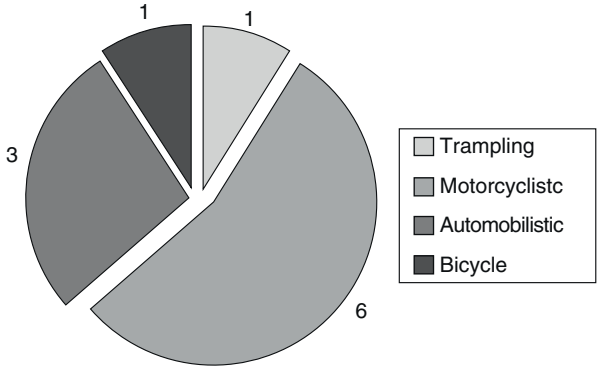

Fig. 1 – Representation of the incidence of trauma mechanisms.

Table 1 – Frequencies of ligament injury types observed in 36 cases of ipsilateral femoral fractures.

Ligament injury type	Number of cases	Percentage
ACL + PCL injury[a]	3	27%
PCL injury[a]	3	27%
ACL injury[a]	1	9%
Peripheral injury alone	4	36%

[a] Associated with the periphery.

Table 2 – Frequencies of central ligament injuries with or without associations.

Injury type	Associations	Number of cases
ACL injury	Without periphery	0
	With periphery	1
PCL injury	Without periphery	0
	With periphery	3
ACL + PCL injury	Without periphery	0
	With periphery	3

the medial periphery) and four cases of peripheral injury alone (two medial and two lateral).

The ligament injuries identified had not been diagnosed or reported in the medical files previously.

None of the ligament injuries were treated at the time of fracture fixation.

Discussion

Regarding the incidence of knee ligament injuries associated with ipsilateral femoral shaft fractures, some studies have shown results similar to ours. Szalay et al.[9] found that among 114 patients with knee fractures, 27% presented knee instability. Faccini et al.[11] reevaluated 97 knees of patients with femoral fractures and diagnosed that 26.7% had knee ligament injuries. Braga et al.[5] found that 31% out of 29 cases had knee ligament injuries.

Other studies have shown lower incidence. Moore et al.[10] observed that only 5.3% out of 320 fractures reviewed showed knee ligament injuries. Dickob and Mommsen[12] reviewed 59 femoral shaft fractures and found that 18.6% had knee ligament injuries.

High-energy trauma capable of fracturing the femur increases the incidence of other associated injuries and the knee is one of the regions most frequently affected.

We emphasize that the greater incidence of posterior cruciate ligament injuries, in relation to anterior cruciate ligament injuries, was probably due to involvement of trauma of the anterior region of the knee and also to associations with central ligament injury, which in all cases was associated with a peripheral injury (Table 2).

With almost one-third of the patients affected by this association, greater frequency of early diagnosis would be expected. However, what happens is that because of difficulty in performing ligament examination during the pre-osteosynthesis stage, many cases are only diagnosed later on and, in some cases, the opportunity of undertaking a surgical approach during the acute phase is lost.

Conclusion

Associations between knee ligament injuries and ipsilateral femoral fractures occur frequently and affect almost one-third of the cases recorded. Attention directed toward femoral fractures and the difficulty in performing physical examination before the fracture has been stabilized may explain the high proportion of cases that are diagnosed at a late stage. Physical examination performed just after fracture fixation, with the patient anesthetized and with the aid of stress radiographs, may help to explain the majority of the diagnoses and enable early treatment, which would be more appropriate.

Conflicts of interest

The authors declare that there were no conflicts of interest.

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