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Periprosthetic Femoral Fractures: A Retrospective Study of 24 Cases

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Abstract **Original Research Article**

Periprosthetic fractures are classically considered rare. Their incidence is constantly increasing due to the aging of the population and the large number of prostheses put in place. The management of this pathology is not always easy. The therapeutic strategy should integrate the patient's condition, his functional expectation and the integrity of the sealing of the implant and the neighboring bone stock. The main objective is to restore limb and joint function by ensuring bone consolidation and implant stability. In this work, we report the results of a retrospective study of 24 cases of periprosthetic fractures of the femur following prostheses (intermediate and total) of the hip and knee with a minimum follow-up of 6 months. The Vancouver classification was used to guide the therapeutic choice and the functional results were very satisfactory. The objective of this study is to take stock of the treatment and management of periprosthetic fractures of the femur.

Keywords: Arthroplasty, Periprothetic, Fractures, Femoral.

INTRODUCTION

The frequency of periprosthetic fractures has been steadily increasing for several years [1]. Its prevalence is between 0.2 and 2.5% [2]. This is indeed a topical issue due to the aging of the population, but also the placement of prostheses in increasingly young patients whose functional capital must be preserved. Perfect knowledge of this complication, of its various therapies, but also of its prevention methods is therefore necessary. The aim of this study is to determine the elements of a diagnostic approach and the therapeutic strategy to be adopted in the face of a fracture of the femur in a patient with a prosthesis.

MATERIAL AND METHODS

This is a retrospective clinical and radiological study of 24 cases of periprosthetic femoral fractures followed in our department between 2014 and 2020 with a minimum follow-up of 6 months. Included were femoral fractures that occurred on all types of hip prostheses (intermediate or total), as well as total knee prostheses. We excluded from the study known or unrecognized intraoperative fractures or fragilisations, pathological fractures on tumor or infection and fractures of the implant itself. We used the Vancouver classification [3] of periprosthetic fractures for the analysis of these fractures.

RESULTS

The average age of our patients at the time of the operation was 73.5 years, with extremes of 67 years and 82 years. In our series we note a female predominance since 16 cases of operated patients were women, or 66.66% of cases 8 cases of operated patients were men, or 33.33% of cases. The affected side was the right side in 14 patients, ie 58.33% of cases. The prostheses were cemented in 18 cases, ie 75% of the cases and uncemented for the rest. The time between the placement of the prosthesis and the peri-prosthetic fracture varied between 6 years and 14 years, with an average of 8.33 years. The autonomy of the patients was evaluated according to the Katz score [4] with an average of 4.8 / 6. The circumstances of the trauma were a fall from one's own height in 14 cases, a fall down the stairs in 4 cases and a slip in 2 of our patients. The ASA score, considered to be a good reflection of co-morbidities, was ASA 1 in 4 patients (16.66%) and ASA 3 in 20 patients (83.33%).

On clinical examination, all patients presented with pain and complete functional impairment of the

lower limb, in addition to a deformity. None of our patients presented with a skin opening, vascular lesion or sensory-motor deficit. According to the Vancouver radiological classification, our study included 2 patients classified Vancouver type A (8.33%), 6 patients classified VANCOUVER type C (25%), and 12 patients classified Vancouver type B1 (50%) (Figure 1 and 2) and 4 patients ranked Vancouver B2 (16.66%).

The treatment was orthopedic in only one of our patients and surgical in the 23 others. For the operated patients, 12 of them (50%) benefited from a plate associated with a strapping either by a steel wire or under tension cables, 8 patients (33.33%) of a plate alone, and 3 patients (12.5%) of an isolated cerclage. The approach used initially was lateral, in all the operated cases. A prosthetic revision or stem change was performed in 7 patients (29.16%), replacing the standard femoral stem with a long stem in the case of hip prostheses. The operative consequences were identical to those of internal fixation.

In our series and with a follow-up of 6 months, only one case of phlebitis of the lower limb was reported and treated with anticoagulants. Otherwise, no case of complications, neither immediate nor secondary, has been reported. The fracture sites were consolidated without prosthetic loosening. Functional results were improved by correct postoperative management and appropriate early rehabilitation.

Fig-1: Anteroposterior view of the right hip showing a periprosthetic fracture of the femur type B1 occured on total hip replacement

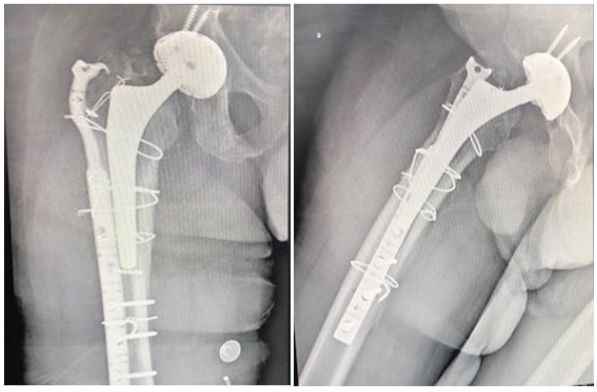

Fig-2: Anteroposterior and lateral view of the right hip showing a periprosthetic fracture of the femur type B1 benefiting from a plate and steel wire

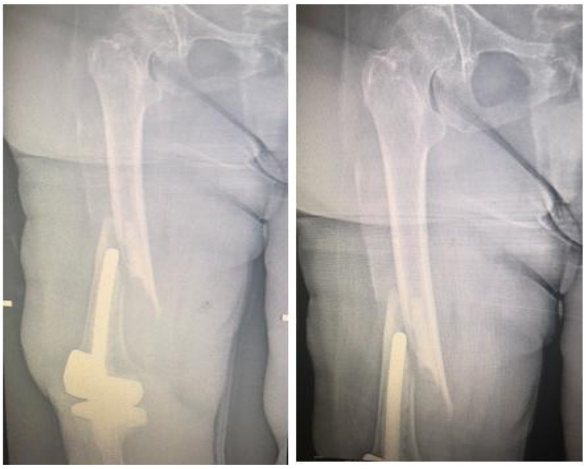

Fig-3: Anteroposterior and lateral view of the right hip showing a periprosthetic fracture of the femur type B1 occured on total knee replacement

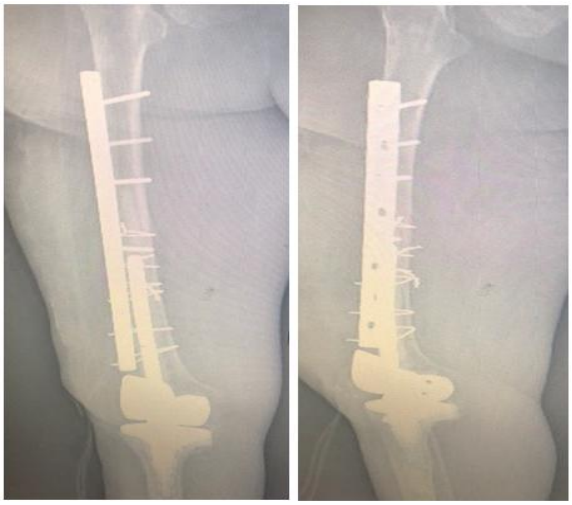

Fig-4: Anteroposterior and lateral view of the right hip showing a periprosthetic fracture of the femur type B1 benefiting from a plate and steel wire

DISCUSSION

Periprosthetic fractures of the femur can be secondary to high-energy trauma, and femoral conditions are relatively minor. But most often, there is a femoral weakening explaining the occurrence of the fracture at the time of a minimal trauma [5, 6]. This

makes it possible to distinguish a certain number of risk factors [7] such as age, osteoporosis, osteolysis, femoral loosening, intraoperative wrong roads and development of not cemented femoral parts.

The average age of our series (73.5 years) is slightly equivalent than that of the various series published in the literature. Indeed, it is 77 years in a multicentric study of SOFCOT [8] and 70 years in a study by Haddad and Duncan [9]. Similarly, and as in our study, periprosthetic fractures more often concern women than men, in the main series of the literature [10].

Different classifications have been described to classify periprosthetic fractures, the most important of which are the classification of Johansson [11], Bethea [13] and Beals and Tower [14]. But to be useful, a classification must be sufficiently descriptive and reproducible. Therefore, the Vancouver classification [14] is the one that seems best suited to discuss the therapeutic indication. This is the one we also used in our study. Regarding the indications, several parameters make it possible to determine the therapeutic choice. Type A and C fractures are of clear therapeutic indication, since orthopedic treatment is preferred for the 1st and internal fixation for the 2nd except in the case of obvious loosening. In contrast, type B fractures (Figure 3 and 4) are subject to debate between internal fixation and prosthetic change. The therapeutic indication seems to us to be based on the state of fixation of the prosthesis. Thus, for B3 fractures, where the fixation is clearly failing and is accompanied by osteolysis, replacement of the prosthesis is the rule [14]. For type B1 fractures, the remaining fixation index helps determine the treatment decision, but internal fixation is generally preferred. For type B2 fractures, the general condition of the patient and the functional demand tip the balance either towards internal fixation or prosthetic revision. However, given the high rate of complications and the risk of life threatening in patients with impaired or frail conditions, the prevention of periprosthetic fractures is undoubtedly the best therapeutic approach.

CONCLUSION

Due to the improvement in life expectancy, the frequency of prostheses tends to increase. Femoral fractures on hip or knee prostheses are a not uncommon complication of prosthetic surgery. It is therefore essential to know how to take charge of and treat this pathology by implementing an appropriate therapeutic strategy and to know how to prevent osteoporosis and the fall syndromes which are often associated with this entity. The choice between internal fixation and prosthetic change is based on several criteria, in addition to the Vancouver classification which helps to guide the therapeutic indication.

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