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Research Article

Functional Prognosis of Open Patella Fractures Treated by Guying at Yopougon University Hospital: Study of 16 Cases

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Abstract

Objective: To describe the factors that influence the functional outcome of surgical treatment of open patella fractures.

Method: A retrospective study for 5 years (January 2016 - December 2021) included records of open patella fractures. Treatment was exclusively surgical by guying. The minimum follow-up period was 6 months. The results were evaluated according to the Castaing score.

Results: Sixteen patients with 16 open patella fractures were selected, including two women. The mean age was 38.7 years (extremes: 26 and 64). According to the Gustillo classification, there were two type IIIA injuries. According to the Ricard-Moulay classification, two fractures were classified as type III. All fractures were treated by guying and were cured at recoil. Four fractures were complicated by infection of the surgical site. Two cases of knee stiffness were also remained. Functional results were good in 12 cases according to the Castaing score.

Conclusion: Two main clinical elements may affect the functional prognosis: skin opening and comminution of the fracture line.

Keywords: Functional; Results; Patella; Open

Introduction

Patella fractures are frequent and represent 1% of all skeletal fractures [1]. They can endanger the functional prognosis of the knee [1]. The mechanism of occurrence is a direct impact on the patella. On a knee in flexion, the impact often leads to a complex fracture. These fractures are sometimes followed by rupture of the extensor system [2]. The skin opening is due to high-velocity trauma. Treatment is often surgical but can also be orthopaedic even in the case of an open fracture [3]. Depending on the type of fracture line, the surgeon can choose between simple screw fixation, guying or patellectomy. New treatments are being tested, such as the Fragment Fixation System and the modified guying technique [4,5]. All these treatments aim to restore the anatomy of the patella and the continuity of the extensor system. The functional prognosis depends on the quality of management [6]. To better understand the results of surgical treatment, it is best to do comparative work. However, studies on open patella fracture are uncommon. The aim of this study was to describe the clinical elements that influence the functional outcome: the skin opening and the complex fracture.

Materials and Methods

This retrospective study for 5 years (January 2016 - December 2018) was monocentric and descriptive. All records of patients in hospital and treated for open patella fracture were identified. Incomplete records, discharges against medical advice and lost to follow-up were excluded. Only 16 records of 16 open patella fractures were included. The skin opening was classified according to GUSTILLO-Anderson classification. The fracture line was classified according to Ricard - Moulay classification [7]. All patients were treated with guying (Figure 1).

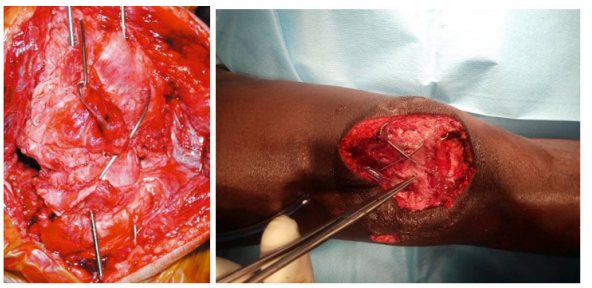

Figure 1

The surgical procedures were done without any particular difficulty. There was no case of revision surgery in this study. The minimum follow-up time was 6 months. The results were evaluated according to the Castaing score [8] (Table 1).

Surgical technique: The patient was positioned supine on an ordinary table. The surgical incision approach was a conventional anterior centred on the knee. A thorough trimming is then done followed by abundant saline lavage. The bone fragments are inspected and those that are pedicled are preserved and reduced anatomically with the fixed-field forceps. Then with the motor, the brooches are introduced in parallel from distal to proximal. The steel wire is passed manually as an "8" around the broochs. Finally, the fracture is covered as completely as possible, depending on the degree of skin opening after trimming. Post-operatively, support is allowed and the limb is kept in a Zimmer splint for three weeks. Re-education starts as early as possible in the three weeks depending on the healing process which sometimes prevents it because of the pain.

Results and Discussion

From January 2016 to January 2021, 16 patients with 16 open patella fractures were managed in the department. Males predominated (14 cases) with a sex ratio of four. The mean age was 37.1

Results	Pain	Mobility	Stability	Quadriceps	Stairs	Total
Very good	Zero 4 points	Flexion at >120° 4 points	Excellent 4 points	Zero amyotrophy 4 points	Normal practice 4 points	20 points
Good	Moderate 3 points	Bending 100 to 120° 3 points	Unstable in rugged terrain 3 points	Amyotrophy of < 2 cm 3 points	Painful practice 3 points	15 points
Average	Important 2 points	Bending 90 to 100° 2 points	Dérobement 2 points	Amyotrophy from 2 to 4 cm 2 points	Difficult practice 2 points	10 points
Bad	Permanent 1 point	Bending of < 90° 1 point	Permanent instability 1 point	Amyotrophy of > 4 cm 1 point	Impossible practice 1 point	5 points

Table 1: Castaing's score [8].

years (extremes: 19 and 64). The circumstances were road traffic accidents (15 cases) and attacks (one case). No preexisting pathology was found. According to the Gustillo-Anderson classification, there were two cases with type I, 12 cases with type II injuries and two cases with type IIIa injuries. According to the Ricard-Moulay classification, eight fractures were classified as type I (Figure 2), six as type II and two as type III. The mean time to care was 35.5 hours (extremes: 10 and 96).

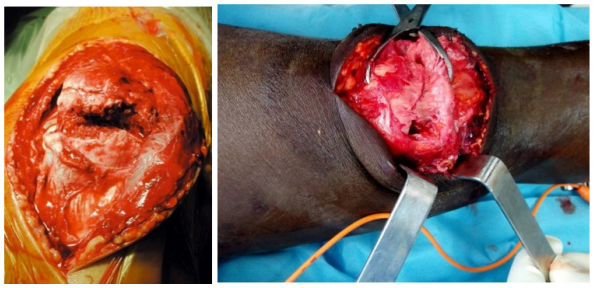

Figure 2: Fracture of the Ricard-Moulay type I patella. (Source: intraoperative image).

All fractures were treated by guying (Figure 1). No thromboembolic events was reported. Four patients had an infection of the surgical site at the immediate postoperative period. Two patients had knee stiffness at the late postoperative period. At a minimum follow-up of 6 months, all patients had consolidated. None of the patients had developed post-traumatic osteoarthritis at the follow-up. According to the Castaing score, eight patients had a very good result, six had a good result and two had an average result (Table 2).

The population size in this study was small. With 16 cases, satisfactory statistical results cannot be obtained. The study was therefore descriptive. It was of specific importance because it concerned only open fractures of the patella. In addition, the other series encountered had almost similar sample sizes [2,9]. The open fracture was considered an indirect factor in the development of infection at the surgical site. This is because the skin opening is a gateway for germs to enter. The delay in trimming allows a possible germ to multiply and thus increase the risk of infection. Sometimes the trimming that should be rigorous was not. It was in such a context

Patient	Age	Sex	Circumstance	Gustillo	Ricard	Treatment Deadline	Castaing
P1	26	M	AVP	Type IIIa	Type III	96h	Average
P2	34	M	Aggression	Type I	Type I	48h	Very good
P3	35	F	AVP	Type I	Type I	48h	Good
P4	28	M	AVP	Type II	Type II	12h	Good
P5	53	M	AVP	Type II	Type I	48h	Very good
P6	64	F	AVP	Type II	Type I	72h	Good
P7	39	M	AVP	Type IIIa	Type III	24h	Average
P8	49	M	AVP	Type II	Type II	10 h	Good
P9	29	M	AVP	Type II	Type I	4 h	Good
P10	30	M	AVP	Type II	Type I	24h	Good
P11	41	M	AVP	Type II	Type I	24h	Very good
P12	49	M	AVP	Type II	Type II	36h	Very good
P13	29	M	AVP	Type II	Type II	16h	Very good
P14	36	M	AVP	Type II	Type I	10h	Very good
P15	33	M	AVP	Type II	Type II	48h	Very good
P16	19	M	AVP	Type II	Type II	48h	Very good

Table 2: The series.

that the infection took hold. Some authors in the literature have confirmed this aspect [2,6]. Direct impact and high velocity were the cause of Ricard-Moulay type II fractures in 6 patients. The anatomical location of the patella directly under the skin favours the occurrence of skin opening during trauma. The maximum time to treatment was 96 hours. However, this time was longer than the 6 hours recommended for trimming an open fracture [9]. Thus, in addition to the entry point for bacteria, the appropriate time for trimming was often exceeded. The 4 cases of infection followed Gustillo-Anderson types II and IIIA (Table 2). Skin opening is considered a risk factor for surgical site infection [10]. The risk of sepsis is thought to increase with skin opening. On the other hand, several authors have found cases of infection in low proportions. The Gnandi-Piou team found only one case of early infection of the surgical site in a series of 36 patella fractures, 16 of which were open [2]. Out of 17 patients, one author noted only three cases of surgical site infection [9]. Others noted 11 cases of surgical site infection in a series of 203 patella fractures, 34 of which were open [8]. These authors also suggested that surgical site infection might be related to the initial skin opening. The diversity of working conditions and technical facilities would explain the difference between our results. The late management was due to the lack of financial means of the patients. For this study, the management of infection cases was not difficult enough because the cases were less severe. Re-operation was not indicated. Dressings with usual antiseptics preceded by saline washes were sufficient. At the same time, the postoperative antibiotic therapy was readjusted according to the results of the antibiograms. The different contexts and the severity of the infections had forced other practioners to carry out repeat operations [2,11]. Furthermore, in this study, the presence of the infection was the reason for the delay in starting rehabilitation. It was necessary to wait for the infection to subside. This led to the occurrence of the two cases of knee stiffness. These two cases of stiffness were in fact comminuted fractures initially classified as Ricard-Moulay type III. The risk of knee stiffness was increased with the degree of comminution of the fracture line. Comminuted patella fractures became difficult to operate on when the number of fragments exceeded 8 [2]. In this context, the risk of patellofemoral osteoarthritis is increased. This justifies the choice of patellectomy by some authors [12]. However, the indication for patellectomy should no longer be systematic, even in comminuted fractures with more than 8 fragments. It causes permanent discomfort with reduced flexion, reduced extension strength and reduced responsiveness to ground irregularities. This increases the risk of falling. An osteosynthesis technique for the salvage of comminuted patella fractures has been proposed since 1995 [13], but is increasingly less common. The cases of stiffness corresponded to the average result according to the Castaing score. Ralahy considered the multi-fragmentary feature as the primary factor of poor functional outcome [14]. Finally, the very good results following rehabilitation sessions were close to those found by Manou in Abidjan [15]. Apart from ankylosing stiffness, rehabilitation had the potential to resolve other cases of postoperative stiffness if it is well conducted.

Conclusion

It would be evident to mention skin opening and comminution of the fracture line as factors of poor results. The skin opening is an entry point for bacteria and can lead to infection of the surgical site. The comminuted fracture of the patella is difficult to operate on because of the small fragments that are fragile to the passage of the material of the osteosynthesis. The management must be rigorous and above all give importance to rehabilitation.

Conflict of Interest

The authors declare no conflict of interest.

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