

A Study on Etiology and Management of Patellar Fractures In a Teaching Hospital

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ABSTRACT

Background: The Patella is the largest sesamoid bone in the human body. The Posterior aspect of the Patella contains a thick cartilage layer, which is the thickest cartilage in the body. The Patella protects the anterior aspects of the knee joint, serves as the insertion for the quadriceps tendon, and function as a fulcrum to maximize the efficiency of the extensor mechanism. Fractures of the Patella may be due to direct or indirect forces, and the mechanism of injury often determines the fracture pattern. Fractures of patella accounts for the approximately 1% of all fractures in the body. Males are commonly affected than Females.

Aim of the Study: To study about different causes and management of patellar fractures in a teaching hospital.

Materials and Methods: This study has been conducted in the department of orthopaedics, in Gowridevi Medical College, West Bengal, for 7 months from June 2021 to December 2021. We have included total 85 number of patients out of these 85 patients, male patients were 58 and female patients were 27.

Results: We have examined 85 total number of patients out of these 85, Males were 58 and Females were 27. The common age group is between 20 years and 60 years. Most common

type of fractures is closed fractures.

Conclusion: Patellar Fractures commonly occurs in males especially in younger age group 2nd and 3rd decade. Common causes of Fracture Patella are motor vehicle accidents and fall from height and few are caused by domestic violence.


Keywords: Patella, Fracture, Knee Joint, Tendon, Trauma.

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INTRODUCTION

The Patella is also known as knee cap. It is a largest sesamoid bone in the body. It is a thick, flat, triangular bone with its apex pointing downwards. The bone has a medial and lateral border. The attachment of quadriceps muscle found on superior surface, extends distally on to the exterior surface. Fractures of Patella may be due to direct or indirect forces, and the mechanism of injury often determines the fracture pattern. Due to Patella subcutaneous position, a direct injury may result from a blow to the exterior knee, such as from a fall or impact from the dash board in a motor vehicle accident. Fracture of patella accounts for approximately 1% of all fractures. They occur more commonly in males. Open injuries accounts for 6% to 9% of patellar fractures and are commonly associated with other injuries given the high energy mechanism.¹ Most frequent causes are traffic accidents in 78.3%, followed by work related accidents in 13.7% and domestic accidents in 11.4%.² Acute dislocation of patella is associated with fracture of lateral femoral condyle in up to 70% cases. In principle the traumatic fractures of patella are classified as transverse, vertical, comminuted, marginal or osteochondral.³

Fractures of the patella are serious injuries with a broad range of subtypes. These injuries account for about 1% of all skeletal injuries and are most prevalent within the age group of 20–50 years. Epidemiologic studies demonstrated that the incidence in men is twice as high as in women.⁴ Because of the subcutaneous anterior location, the biomechanical function and the high level of force transmission during extension and flexion, stable reconstruction of patellar fractures continues to represent a major surgical challenge. The majority of cases are caused by direct injury mechanism. The resulting fracture type depends on the trauma mechanism (i.e., direct or indirect), the energy transmitted to the bone and the bone quality. The most common fracture pattern is a simple 2-part diversion caused by a direct blow (i.e., dashboard injury). As a result of the bony lesion the extensor mechanism of the knee joint can become insufficient. The degree of the insufficiency depends among other factors on accompanying damage to the reserve extensor mechanisms. Additional injuries to the adjacent bones are rare but can affect the articular surface of the distal femur. The most frequent indirect

mechanism is a fall on the feet with eccentrically contraction of the quadriceps muscle. Depending on the velocity of the fall and the resistance of the extensor mechanism, either the patella or the adjacent tendons fail.

Closed fractures of the patella represent the vast majority of this injury. However, up to 7% of the cases result in open fractures.⁵ The underlying mechanisms of open fractures are mostly high velocity accidents. These can result in devastating soft tissue conditions with comminated fractures as well as additional ruptures of the reserve extensor mechanism. Of note, approximately 80% of open patellar fractures are associated with multiple accompanying injuries, namely fractures of the femur or acetabulum, traumatic dislocation of the hip joint or disruption of knee ligaments.

The adjacent quadriceps muscle consists of four muscles, of which the rectus femoris is the longest and most superficial. The deep layer of the quadriceps tendon inserts at the proximal basis of the patella whereas the superficial fibres extend over the patella itself continuously to the tibial tuberosity.

The fascia late spreads over the anterior surface of the knee and forms the patellar retinaculum in combination with aponeurotic fibres introduced by the lateral and medial vastus muscle. Deep transverse fibres of the joint capsule, known as the patellofemoral ligaments radiating from the patella to the femoral epicondyles – contribute to the patellar retinaculum. These fibres have a crucial function as they allow some degree of active extension even in presence of a patellar fracture (reserve extensor mechanism).

MATERIALS AND METHODS

This study has been conducted in Gowridevi Medical College, in the department of orthopaedics for 6 months June 2021 to December 2021. We have included total 85 number of patients in this study. Out of these 85, Male patients were 58 and Female patients were 27. We have obtained consent form all the patients by giving consent forms in their local language. After taking careful history. We have examined all the patients. The investigation advised are complete Blood Picture, Random blood sugar, Serum Creatinine, Blood Urea, Serum electrolytes, Blood grouping and RH typing, X-ray AP and Lat view of the joint and CT scan. After collecting the data, it is compelled in systematic manner and computerized by using MS office.

Table 1: Age Wise Distribution

Age in Years	No. of Patients M (58)	No. of Patients F (27)
20 – 29	22 (37.95%)	9 (33.5%)
30 – 39	18 (31.03%)	8 (29.62%)
40 – 49	9 (15.51%)	5 (18.5%)
50 – 60	7 (12.06%)	5 (18.5%)

Table 2: Different Causes of Fracture Patella

Causes	No. of Patients M (58)	No. of Patients F (27)
Mortar vehicle accident	31 (53.5%)	16 (59.3%)
Fall	16 (27.58%)	7 (25.9%)
Trauma at Workplace	7 (12.6%)	3 (11.2%)
Other Causes	4 (6.9%)	1 (3.72%)

Table 3: Different Type of Fractures

Types of Fracture	No. of Patients M (58)	No. of Patients F (27)
Transverse	21 (36.5%)	9 (33.35%)
Vertical	15 (25.86%)	8 (29.62%)
Comminuted	11 (18.9%)	5 (18.51%)
Marginal	9 (12.06%)	5 (18.51%)

Fig 1: X-Ray of Knee Joint Showing the Features of Fractur Patella



Fig 2: X-Ray of Knee Joint Showing the Features of Fracture Patella

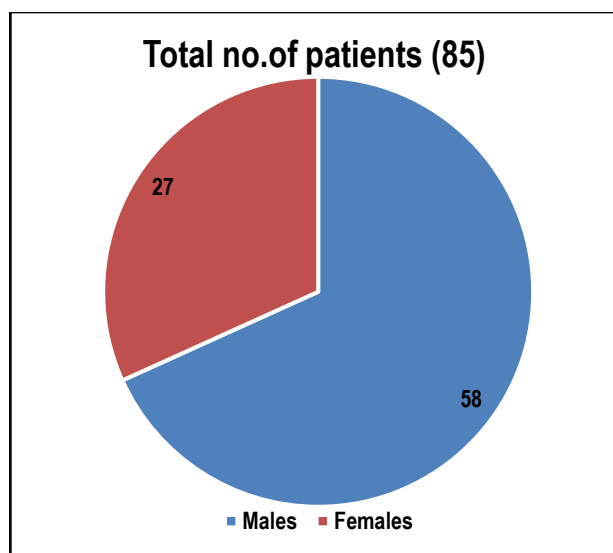


Fig 3A: X-ray of a comminuted patella fracture



Fig 3B: X-ray of Patella Fracture after surgery by using K-wires, screws, and an eight-shaped band



RESULTS AND DISCUSSION

We have included 85 patients in this study. Out of these 85, Male patients were 58 and Female patients were 27. The commonest age group is between 2nd and 3rd decade. According to study conducted by Bohlor, J. (IBfil) Behandlung et al shows that Male, Female ratio is 4:1 and the common age affected is 3rd decade.⁶ According to our study patella fractures are 37.95% in 2nd decade in Males and 33.5% in Females; 31.03% in 3rd decade in Males and 29.62% in Females. We observed in our study that motor vehicle accidents are most common causes of patellar fracture 53.5% in males and 59.3% in females, followed by fall from height in which, 27.58% of Male patients are affected and 25.9% of Female patients are affected.

The study conducted by Kota GR, Vamshi D et al show almost similar results 22.5% in Males and 19.2% in females.⁷ 6.9% of Males and 3.72% of females had patellar fracture due to other causes.⁸ Among the types of patellar fractures, transverse type of fractures are most common, followed by vertical, communicated and marginal type. In our study transverse type of fractures seen in 36.5% of male patients and 33.35% of female patients. Vertical fractures are seen in 25.86% in males and 29.62% in female patients. Comminuted fractures are seen in 18.9% in males and 18.5% in females, and marginal type of fractures are seen in 12.06% of male patients E1nolas.S, A.J. Aho and P. Kallio et al

observed 41.5% of transverse fracture; 38.2% of vertical fracture in their study.⁹

The indications for operative treatment of patella fracture are disruption of the extensor mechanism, articular incongruity with more than 2mm of step off. More than 3mm of separation between primary fracture fragments, modern treatment options including internal fixation by using tension bands with Kirschner wires or canulated screws, leg screw fixation, partial patellectomy and rarely total patellectomy, physiotherapy is very crucial post operatively. We have a treated transverse fractures by using k wires and tension band wiring TBN technique, described by the AO foundation. The vertical patella fractures are fixed by plate and screws with bone graft.

Patella is a largest sesamoid bone in the body. Fracture of patella accounts for about 1% of all skeletal injuries and can lead to profound impairment due to its crucial function in the extensor mechanism of the knee. Diagnosis is based on injury mechanism, physical examination and radiological findings.¹⁰ The type of treatment depends on underlying fracture type, the associated soft tissue damage and the patient factors (age, bone quality and the stability of the extensor mechanism. Incidence in men is twice as high as in women. The majority of fractures are caused by direct injury mechanism. The resulting fracture type depends on trauma mechanism. The most frequent indirect mechanism is a fall on the feet with eccentric contraction of the feet quadriceps muscle. Closed fractures of the patella represents the vast majority of this injury, 7% of cases results in open fracture.¹¹ The underlying Mechanism of open fractures are mostly high velocity accidents. Most frequent causes are traffic accidents 53.9%, followed by fall and work-related injuries.

In the present study we studied total 85 cases of patellar fracture out of them 30.03% patients were 31 ages followed by 21-30 years of age (31.95%). The mean age of the study patients was 42.77±16.78 with youngest case 20 years old and the eldest 70-year-old. Alexandre Felicio Pailo et al in their study revealed that the average age in cases of patellar fractures was 39.4 years old, ranging from 13 to 87 years old. Mohammad Alamzeb Durrani et al observed the mean age of patients with patellar fracture was 40 years with range from 25 to 55 years. Thus, it was seen that majority of the patients were young and middle aged.

Similar findings were also observed by Gangadhara Reddy Kota et al and Siddaram Patil et al. It was observed that majority of the patients were male (59.78%) with 1.49:1 of male to female ratio. Similarly, Siddaram Patil et al observed 70% males and 30% females of patellar fracture in their study. In study done by Einolas et al, there were 71% males and 29% females. Felicio Pailo et al observed 32% of the cases were females and 68% were males of patellar fracture. Gangadhara Reddy Kota et al reported that 76.7% of the patellar fractures were seen in males and 23.3% in females.

Direct injury was the mode of injury in 38.04% patients. Gangadhara Reddy Kota et al in their study observed that fall from height (indirect) was the most common mode of injury which accounted for 80% cases followed by road traffic accidents (20% cases).

CONCLUSION

Patellar Fractures commonly occurs in males especially in younger age group 2nd and 3rd decade. Common causes of

Fracture Patella are motor vehicle accidents and fall from height and few are caused by domestic violence. Most common type of fractures are Transverse Fractures, early diagnosis and early intervention will decrease the morbidity. Physiotherapy plays a major role after surgery.

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