

Original research article**A study on clinical profile of patients with patellar fractures****¹Dr. Syed Natiq Hussain, ²Dr. Ambreen Fatima, ³Dr. Vishal Huggi, ⁴Dr. Subbukannu Balaravindran**¹Assistant Professor, Department of Orthopedics, GIMS, Gulbarga, Karnataka, India²Assistant Professor, Department of Orthopedics, KBNU FOMS, Gulbarga, Karnataka, India³Senior Registrar, Department of Orthopedics, GIMS, Gulbarga, Karnataka, India⁴Junior Consultant, MIOT Hospital, Madurai, Tamilnadu, India**Corresponding Author:**

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Abstract

The functions of the patella are to increase the mechanical advantage of the quadriceps tendon, aid in nourishment of the anterior articular surface of the femur, and protect the femoral condyles from injury. The patella transmits the tensile forces of the quadriceps muscle to the patellar tendon. As soon as the patient was admitted, a detailed history was taken and a meticulous examination of the patient was done. The required information was recorded and proforma was prepared. Radiographs were taken in approximate views and diagnosis was established by clinical and radiological means. Study observes that, patients with right sided fracture were more 22 (55%) in both groups A and B, patients with left sided fracture were 18 (45%). But there was no statistical significant difference of side of fracture between the groups A and B. Present study observes that, mode of injury which was domestic in nature were more 17(42.5%), RTA were 16(40%), by assault was 3(7.5%) and by sports were 4(10%). And there was no statistical significant difference of diagnosis between the groups A and B.

Keywords: Patellar Fractures, RTA, Clinical Profile**Introduction**

The patella is the largest sesamoid bone in the body and lies within the quadriceps tendon. The ossification center usually appears at 2 to 3 years of age, but its appearance may be delayed until as late as 6 years. Anomalies of ossification usually are related to an accessory ossification center located at the superolateral corner of the patella. This is called the bipartite patella. If a similar lesion is present on the radiograph of the opposite knee, the diagnosis is clear ^[1].

If not, special radiographic views, including CT, may be necessary to differentiate it from nonunion of a patellar fracture. Stress fractures of the patella may be difficult to diagnose and are often seen in osteopenic elderly patients complaining of anterior knee pain after minor trauma. Bone scanning of the patella several days after injury may reveal "hot areas" corresponding to the patient's symptoms and confirming the diagnosis ^[2].

The functions of the patella are to increase the mechanical advantage of the quadriceps tendon, aid in nourishment of the anterior articular surface of the femur, and protect the femoral condyles from injury. The patella transmits the tensile forces of the quadriceps muscle to the patellar tendon. The patella improves the efficiency of the quadriceps muscle by elevating the extensor mechanism from the axis of rotation of the knee joint. It also increases the leverage of the quadriceps muscle by making it act over a greater angle ^[3].

Daily activities generate patellofemoral compressive forces of greater than three times body weight, while forces generated with stair climbing and deep squatting may exceed seven times body weight. Tensile forces across the patella may reach 3000 N and may increase to 6000 N in athletes.

Several authors have estimated patellofemoral contact stresses of 2 to 10 N/mm², nearly double the estimated tibiofemoral contact stresses of 2 to 5 N/mm². These estimates provide evidence for the importance of maintaining anatomical articular reduction and rehabilitation of the knee after patellar fracture to maximize stress distribution across the patellofemoral joint.

Various factors influence the classification of patella fractures such as fracture pattern, degree of displacement, or mechanism of injury ^[4].

Orthopaedic Trauma Association (OTA) classification is based upon the degree of articular involvement and the number of fracture fragments. The clinical usefulness of the classification remains uncertain. For clinical research though, the OTA classification is widely used.

Basic form of classification of patella fractures is as displaced or nondisplaced. Displaced patellar fractures are those in which fracture fragments are separated by more than 3 mm or articular incongruity is more than 2 mm.

Further classification of patella fractures can be based upon the morphology of the fracture. It can be transverse or horizontal, vertical or longitudinal, apical or marginal, stellate or comminuted, and osteochondral.

Another distinct entity are the patellar sleeve fractures which occur in the skeletally immature patients in which a distal pole fracture with a large part of the articular surface separates from the patella ^[5, 6].

Methodology

Study Design: Prospective interventional study.

Place of Study: The study was conducted in the Department of Orthopaedics.

Sample Size: 40 Patients (divided into two groups of 20 cases each)

Patients with patella fractures were divided into two groups of 20 each. Group A was treated using Tension band wiring and the Group B was treated using circumferential wiring.

Inclusion Criteria

1. Age above 18 years
2. Fresh and old fractures of Patella.
3. Either sex

Exclusion Criteria

1. Infected fractures.
2. Age below 18 years.

After obtaining institutional ethics committee clearance and written informed consent, patients attending the OPD of Orthopaedics department, satisfying the inclusion/ exclusion criteria, were enrolled in the study.

As soon as the patient was admitted, a detailed history was taken and a meticulous examination of the patient was done. The required information was recorded and proforma was prepared. Radiographs were taken in approximate views and diagnosis was established by clinical and radiological means.

Then splinting of fractures was done with the above knee POP slab for patellar fractures. All patients were taken for elective surgery as soon as possible after necessary blood, urine and radiographic preoperative work-up. Patient’s attenders were explained the nature of injury and its possible complications and the need for surgery.

Written and informed consent was obtained. Preoperative intravenous cephalosporin antibiotics were given and continued at 12 hourly intervals postoperatively for five days and then switched to oral form till suture removal.

Then the patients were allocated into two groups by simple random sampling technique, i.e. group A & group B. Group A was treated using Tension band wiring and the Group B was treated using circumferential wiring.

Results

Table 1: Age wise distribution of patients

Age in years	Group A		Group B		Total	
	No.	%	No.	%	No.	%
21-30	4	20	3	15	7	17.5
31-40	5	25	5	25	10	25
41-50	5	25	5	25	10	25
51-60	6	30	7	35	13	32.5
Total	20	100.0	20	100.0	40	100.0
Mean ± SD	42.15±6.7		43.25±6.3		42.7±6.5	
t-test value P-value	t = 0.309 P = 0.759 NS					

NS= not significant, S=significant, HS=highly significant, VHS=very highly significant

Study observes that, maximum number of patients in both the groups 13 (32.5%) belong to the age group of 51-60 followed by 10 (25%) and 10 (25%) belonged to the age groups of 41-50 and 31-40 respectively and 7 (17.5) patients were in the age group 21-30. But there was no statistical significant difference of age between the groups A and B

Table 2: Gender wise distribution of patients

Gender	Group A		Group B		Total	
	No.	%	No.	%	No.	%

Females	09	45.0	08	40.0	17	42.5
Males	11	55.0	12	60.0	23	57.5
Total	20	100.0	20	100.0	40	100.0
X2-test valu P-value	X2 = 0.106		P = 0.912		NS	

NS= not significant, S=significant, HS=highly significant, VHS=very highly significant

Study observes that, Male patients were 23 (57.5%), female patients were 17 (42.5%). But there was no statistical significant difference of gender between the groups A and B

Table 3: Fracture side wise distribution of patients

	Group A		Group B		Total	
	No.	%	No.	%	No.	%
Right	10	50.0	12	60.0	22	55
Left	10	50.0	08	40.0	18	45
Total	20	100.0	20	100.0	40	100.0
X2-test valu P-value	X2 = 0.106		P = 0.912		NS	

NS= not significant, S=significant, HS=highly significant, VHS=very highly significant

Study observes that, patients with right sided fracture were more 22 (55%) in both groups A and B, patients with left sided fracture were 18 (45%). But there was no statistical significant difference of side of fracture between the groups A and B.

Table 4: Mechanism of injury wise distribution

Mechanism of injury	Group A		Group B		Total	
	No.	%	No.	%	No.	%
Direct	10	50.0	8	40.0	18	45.0
Indirect	10	50.0	12	60.0	22	55.0
Total	20	100.0	20	100.0	40	100.0
X2-test value P-value	X2 = 0.439		P = 0.643		NS	

NS= not significant, S=significant, HS=highly significant, VHS=very highly significant

Present study observes that, fracture of patella cases by indirect mechanism of injury were more 22 (55.0%), than by indirect mechanism 18 (45%). And there was no statistical significant difference between the groups A and B.

Table 5: Mode of injury wise distribution of patients

Mode of injury	Group A		Group B		Total	
	No.	%	No.	%	No.	%
Domestic in Nature	8	40.0	9	45.0	17	42.5
Road Traffic Accident	9	45.0	7	35.0	16	40.0
Assault	1	5.0	2	10.0	3	7.5
Sports	2	10	2	10	4	10
Total	20	100.0	20	100.0	40	100.0
X2-test value P-value	X2 = 0.439		P = 0.643		NS	

NS= not significant, S=significant, HS=highly significant, VHS=very highly significant

Present study observes that, mode of injury which was domestic in nature were more 17(42.5%), RTA were 16 (40%), by assault was 3(7.5%) and by sports were 4(10%). And there was no statistical significant difference of diagnosis between the groups A and B.

Discussion

Table 6: Comparison of average age between present study and other series

Sl. No.	Series	Age average
1.	Maini and Kochar ⁷	35.7 years
2.	Bostman ⁸	42.0 years
3.	Gary Wolfgang ⁹	40.5 years
4.	Mehdi ¹⁰	39.2 years
5.	Levack ¹¹	49.0 years
6.	Chawda ¹²	42.5 years
7.	Present study	42.67. years

In the present study, fracture incidences are more in males (57.5%) than females (42.5%). Similar sex incidence was found in study made by Al-Sudani¹³, Mohapatra¹⁴. This indicates that males are more exposed to trauma.

Table 7: Comparison of Sex Incidence between Present Study and other series

Sl. No.	Series	Males (%)	Females (%)
1.	Srinivasulu 9	81.81	18.19
2.	Maini and Kochar 7	75	25
3.	Chawda12	74	26
4.	Al-Sudani13	65.7	34.3
5.	Mohapatra14	77.5	22.5
6.	Mehdi10	70	30
7.	Present study	57.5	42.5

In the present study, the right side (55%) was involved more than the left side (45%). Other series (Maini and Kochar, Mehdi) have reported higher incidence of fracture on the right side. It may be due to the fact that the right dominant side is more vulnerable for trauma.

Table 8: Comparison between the Side involved

Sl. No.	Series	Right (%)	Left (%)
1.	Maini and Kochar 7	55	45
2.	Al-Sudani13	52.9	47.1
3.	Mehdi10	52	48
4.	Present study	55	45

Indirect trauma was more common in our study (55%), the common mode of injury being domestic in nature.

Table 9: Comparison of mechanism of injury between the present study and other series

Sl. No.	Series	Direct (%)	Indirect (%)
1.	Maini and Kochar 7	65	35
2.	Gary Wolfgang 9	7	93
3.	Mohapatra14	50	50
4.	Mehdi10	45	55
6.	Present study	45	55

Transverse fractures (60%) were more common in present study, indicating indirect trauma and transverse fractures go hand in hand most of time.

Table 10: Comparison of type of fractures in present study and other series

Sl. No.	Series	Transverse (%)	Oblique (%)	Comminuted (%)
1.	Maini and Kochar 7	70	10	20
2.	Daniel F. Murphy 15	57.5	32	-
3.	Dudani and Sancheti 10	73.3	26.7	-
4.	Chawda12	52	32	16
5.	Present study	60	20	20

Most of the patients (70%) in our series were operated within a period of 48 hours.

Conclusion

1. The commonest mode of injury is slipping and stumbling constituting 42.5% of cases slightly more than road traffic accidents (RTA) that accounted for 40% of fractures.
2. Indirect injury accounted for 55% of the fractures.
3. The most common type of fracture in decreasing order of frequency were transverse (60%), oblique (20%) and comminuted (20%).

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