

Osteosynthesis in Lower Pole of Patella Fracture: A Follow up Study in Churu District of Rajasthan

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ABSTRACT

Introduction: Patella is an important component of extensor apparatus and it has a major role in making the extension of knee efficient. Patella fracture accounts for 1% of all fractures. Treatment options for fracture of lower pole of patella are Tension Band Wiring, Circumferential Wiring or with screw if the fragment is large enough. Tension Band Fixation involves both static and dynamic forces.

Objectives: To assess the functional outcome of osteosynthesis in fracture of lower pole of patella using Tension band Wiring technique.

Materials and Methods: The present study was a follow-up study conducted in Churu Multispecialty Hospital and Research Center, Churu during Sept 2017 to April 2019. All the patients with lower pole of patella fracture and whose age was 16 or more were included in the study. Tension Band wiring is done in all the 15 patients under spinal anesthesia. Patients were followed at 1, 6 and 12 weeks after the date of surgery. Patients were evaluated according to Bostman's method of clinical grading of knee scoring system and patients were graded as excellent, poor or unsatisfactory depending on the score obtained.

Results: In present study maximum patellar fractures were in age group 31 to 50 years. Most of the patients in our study were males. All the variables like flexion loss, extension loss, pain, quadriceps atrophy, effusion, giving way and stair climbing improved in all the cases at final follow-up. One

patient was lost to follow-up at 12 weeks. Clinical grading also improved and 12 out of 14 patients had excellent scoring at final follow-up. Superficial infection developed in one patient and that was recovered fully after antibiotic coverage. One patient developed kneeling discomfort and that was also recovered at 12 week of follow-up.

Conclusion: Osteosynthesis using tension band wiring technique is a viable treatment option lower pole fracture of patella with good functional results despite the technical difficulty associated with this procedure.

Key words: Osteosynthesis, Patella, Tension Band Wiring, Bostman's Scoring.

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INTRODUCTION

Patella is an important component of extensor apparatus and it has a major role in making the extension of knee efficient.^{1,2} Patella fracture accounts for 1% of all fractures.¹ Direct injuries are the most common mechanism of injury of patella.³ Most fractures of patella are transverse and involve middle third of patella.⁴ Fracture of lower pole of patella accounts for 5% of total patellar fractures.⁵ Lower pole fractures of patella are bony avulsions at the origin of patellar tendon and are commonly comminuted. The rate of displacement in lower pole of patellar fracture is 3 times more common than superior pole.⁶ Lower pole of patellar fracture are common in productive age group i.e. between 20 to 50 years and are more common among males as compared to females.^{7,8} Routine treatment in case of fracture lower pole of patella is partial patellectomy but this has many complications including weakness of extensor mechanism, instability of knee joint, patello-femoral

osteoarthritis and injury to femoral condyles.⁹ Surgical management in lower pole of patella is done with the objective to preserve the knee cap to the maximum possible extent, anatomical reduction of the joint surface by stable fixation and restoration of knee extensor mechanism and thus allowing early mobilization.¹⁰ Treatment options for fracture of lower pole of patella are Tension Band Wiring, Circumferential Wiring or with screw if the fragment is large enough. Excision can be done if the fragment is comminuted and can't be fixed and are treated by excision of small fragments of bone with attachment of patellar tendon by trans-osseous pull out sutures.¹¹⁻¹⁵ Tension Band Fixation involves both static and dynamic forces.¹⁶ Static compression is achieved by implant fixed under tension and dynamic compression by normal physiological loading. The tensile forces are absorbed by the tension band and patella bears the

axial compression so that the implant bears all the tension and patella bears all the compression.

OBJECTIVE

To assess the functional outcome of osteosynthesis in fracture of lower pole of patella using Tension band Wiring technique.

MATERIALS AND METHODS

The present study was a follow-up study conducted in Churu Multispecialty Hospital and Research Center, Churu during Sept 2017 to April 2019. All the patients with lower pole of patella fracture and whose age was 16 or more were included in the study.

After taking written consent a detailed history about mode of injury and clinical examination was done to rule out any other life threatening injuries. After that Patients were subjected to X- ray examination including antero-posterior and lateral views of the knee to confirm the diagnosis. Patients with displaced patella fractures were taken up for surgery after necessary investigations like hemoglobin, serum electrolyte, random blood sugar, blood urea, urine - routine & microscopic examination and chest x –ray. The surgery was performed under spinal anesthesia in 15 patients. The position used in all the patients was supine position and tourniquet was placed on the thigh. After preparation and draping, tourniquet was inflated. A midline incision from upper pole of patella to tibial tubercle was given. After exposure, the

fracture was cleared of all clots and debris. The knee Joint was inspected for loose fragments and intra-articular damage to the cartilage. All The findings were recorded. The fracture was reduced and held with reduction clamps, the articular surface was evaluated for any mal-reduction. K-wires were passed in ante grade direction in both the fragments, Stainless Steel wire passed around the patella in “figure of 8” configuration and once anatomical reduction was achieved Stainless Steel wire was tightened, cut and retracted. K-wires were cut and retracted. Knee joint was flexed up to 90° to check the stability of fixation/construct. Additional K-wires were used if required for additional fixation of fragments. Associated retinacular tears were also repaired. Wound was closed in layers. A posterior cylindrical slab/Brace was given to provide support and immobilize the limb. Immediate post-operative x-rays in antero-posterior and lateral views of the knee were done. The patient was allowed to ambulate without bearing weight on the first post-operative day. In all patients, Isometric and stiff leg exercises were encouraged beginning on the first post-operative day or as soon as possible as pain was relieved. First postoperative dressing was done after 48 hours. Stitch removal was done on 14th day in all the patients. Patients were followed at 1, 6 and 12 weeks after the date of surgery. Patients were evaluated according to Bostman’s method of clinical grading of knee scoring system¹⁷ and patients were graded as excellent, poor or unsatisfactory depending on the score obtained.

Clinical Grading Scale of Bostman et al For Knee Scoring System:¹⁷

Variable	Point
Range of movement (ROM)	
Full extension and the ROM >120° or within 10° of the normal side	6
Full extension, movement 90° to 120°	3
Pain	
None or minimal on exertion	6
Moderate on exertion	3
In daily activity	0
Work	
Original job	4
Different job	2
Cannot work	0
Atrophy (difference of circumference of thigh 10 cm proximal to the patella)	
<12 mm	4
12 to 25 mm	2
>25mm	0
Assistance in walking	
None	4
Cane part of the time	2
Cane all the time	0
Effusion	
None	2
Reported to be present	1
Present	0
Giving way	
None	2
Sometimes	1
In daily life	0
Stair-climbing	
Normal	2
Disturbing	1
Disabling	0
Total score	

Excellent: 30 to 28; Good: 27 to 20; Unsatisfactory: <20

Table 1: Age and Sex distribution of study population

Age groups	Frequency
16-30	4
31-40	6
41-50	4
51-60	1
Total	15

Sex	Frequency
Male	12
Female	03
Total	15

Table 2: Distribution of variables at various follow-up periods.

Sn	Variable	At 1 week follow up (No of Patients)	At 6 week follow up (No of Patients)	At 12 weeks follow up (No of Patients)
1	Flexion loss			
	More than 30 degree	8	0	0
	21-30 degree	7	0	0
	11-20 degree	0	3	0
	0-10 degree	0	12	14
2	Extension loss			
	>20 degree	6	0	0
	11-20 degree	7	0	0
	6-10 degree	2	4	0
	0-5 degree	0	11	14
3	Pain			
	None or minimal	10	12	13
	Moderate (on exertion)	4	3	1
	Severe(in daily activities)	1	0	0
4	Quadriceps Atrophy (in mm)			
	>25	0	0	0
	12-25	7	4	1
	<12	8	11	13
5	Assistance in walking			
	None	6	13	14
	Part of time	8	2	0
	All the time	1	0	0
6	Effusion			
	Present	4	1	0
	Absent	11	14	14
7	Giving way			
	None	11	13	14
	Sometimes	4	2	0
	In daily life	0	0	0
8	Stair climbing			
	Normal	6	11	13
	Disturbing	8	4	1
	Disabling	1	0	0

Table 3: Clinical grading as per Bostman et al's scoring system

Clinical Grading	At 1 week (No of Patients)	At 6 weeks (No of patients)	At 12 weeks (No of Patients)
Excellent	1	8	12
Good	13	7	2
Unsatisfactory	1	0	0



Fig.1. Pre-Operative X-ray of lower pole of Patella



Fig. 2: Post –Operative X-ray of Fracture lower pole of patella(Tension Band Wiring)

RESULTS

In present study maximum patellar fractures were in age group 31 to 50 years. Most of the patients in our study were males. (Table 1) Most common mode of injury was direct hit in road traffic accidents (11 out of 15). Swelling and extensor lag was present in all the 15 cases. Most of the cases (10 out of 15) were operated within 6 hrs of injury and remaining 5 cases were operated within 2 days of injury. Duration of surgery was 45-60 minutes for 13 cases and 60-80 minutes for remaining 2 cases. Most of the patients (13) were mobilized within 24 hours of surgery and 2 patients were mobilized within 48 hrs of surgery. Patients were followed-up at 1, 6 and 12 weeks. Out of 15 patients 1 patient was lost to follow-up at 12 weeks.

All the variables like flexion loss, extension loss, pain, quadriceps atrophy, effusion, giving way and stair climbing improved in all the cases at final follow-up. (Table-2) Clinical grading also improved and 12 out of 14 patients had excellent scoring at final follow-up. (Table-3) Superficial infection developed in one patient and that was recovered fully after antibiotic coverage. One patient developed kneeling discomfort and that was also recovered at 12 week of follow-up.

DISCUSSION

The male to female ratio was 4: 1. It was similar to other studies in which males were more than females (K. H. Yang et al⁵, Ashish anand et al¹⁸, Ramesh prasad et al¹⁹, Lavack et al²⁰). In the study conducted by Saltzman et al²¹ this ratio was 7:3 and in the study conducted by Young Mo Kim et al²² this ratio was 5:4. Male patients dominated the series due to their nature of outdoor activities. Thus we can conclude that fractures of patella affects the vocationally active part of the population, mainly the males. In our study, the most common mechanism of injury was road traffic accidents. It was similar to the study conducted by Saltzman et al²¹, and Hung et al.¹⁴

Early physiotherapy was started in all patients treated by osteosynthesis using tension band wiring. Isometric and stiff leg exercise was started from the first postoperative day, and range of motion exercises were started within the first 2 weeks after the surgery. Active flexion and passive extension was encouraged for all the patients. This was similar to the study conducted by Ramesh Prasad et al,¹⁹ Ashish Anand et al¹⁸, Saltzman et al,²¹ Young Mo Kim et al²² and Matej kastelac et al.²³ Only in one case mobilization was delayed in our study due to swelling and pain. She was mobilized on the eighth post-operative day. Early mobilization helped in keeping up the tone and bulk of muscles in addition to early recovery of range of motion. Early mobilization decreases articular adhesions and it has been shown to be beneficial for the nutrition of articular cartilage. In the present study, none of patient complained of knee effusion at final follow up and there was no objective evidence of any knee effusion on final follow up which signifies the preservation of patella to maximum extent possible there by reducing the chances of joint incongruity and less chances of post-operative arthritis. Results of our study are comparable to the results in other studies like Ashish Anand et al¹⁸, Ramesh Prasad et al¹⁹, Matej kastelec et al²³ and Marya S.K.et al.²⁴ In our study, infection was seen in one case. The patient had superficial infection which healed with a few dressings and oral antibiotics. The functional result of this patient despite the infection was good. One patient in present study

complained of difficulty in kneeling at Six weeks of follow up. The probable reason could be because the Indian population engages themselves in lot of routine activities in which one has to kneel or squat. This patient also recovered when he presented for 12 weeks follow-up.

CONCLUSION

We conclude that Osteosynthesis using tension band wiring technique is a viable treatment option for lower pole fracture of patella with good functional results despite the technical difficulty associated with this procedure.

LIMITATIONS

The present study was not having any comparison group. The number of cases were only 15.

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