Outcome of Inferior Pole Patellar Fractures Treated by Surgical Excision

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ABSTRACT

Objective: To determine the effectiveness of excision of distal pole of patella in functional and rate of infection parameters.

Methods: An observational study was conducted from June 2012 to May 2014. Minimum of 10 patients of fractures of inferior pole of patella over the period of two years has been included in this study. All the patients with close fractures of inferior pole of patella of either sex in the age between 18-50 years were included in this study. All the fractures were treated by resection of the avulsed fragment.

Results: Overall average mean of age was 38.40 with SD±13.30 years of 10 patients. Out of 10 patients, 08 were male and 02 were female. From 1st month till 6th months follow up time period none of the patients developed surgical site infection. Functional status at 6th month showed that 6 patients had excellent and four patients had good outcome.

Conclusion: It is concluded that excision of the distal pole is a better option in comminuted fractures that are not amenable by fixation. To further enhance this treatment method long-term studies are required.

Key Words: Patella fractures – internal fixation – excision.

INTRODUCTION

Fractures of the Inferior pole of patella are notorious and still no definitive treatment of choice has emerged. The options for the treatment of fractures of the inferior pole of patella are internal fixation with tension band wiring, circumferential wiring, screw fixation, K wire fixation, suture anchors and excision of the avulsed fragment [1]. Different authors use suture anchors and it is still in the investigational stage. The suture anchors needs further studies for its use to reach universally acceptable level [2]. Tension band wiring is a most commonly performed procedure for fracture of patella [3].

Fractures of patella account for 1% of total skeletal injuries. Patella is subcutaneous seasamoid bone lying on the anterior knee and frequently faces injuries [4]. The inferior pole fractures treatment is controversial and needs operative method when the fragments are widely displaced. The excision of the inferior pole of patella is usually considered when there is massive comminution or the fragment shatters during surgery[5].

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Fractures of lower pole of patella are not easy to reduce and most of the time surgeon feels difficulty to fix anatomically. Therefore early range of motion of knee joint cannot be allowed [6].

Despite multiple treatments of patella fractures, patients commonly suffer from deficiency of movements of knee joint. In about 80% of the patient's anterior knee pain and deficient squatting disturbing the patient life style. In some of the patients the anterior scar becomes hypertrophied and painful [7]. To minimize surgical trauma authors have tried arthroscopic- assisted screw fixation so that good function can be achieved [8]. The functional assessment criteria have been developed to compare the results of different studies [9].

As no treatment method is prefect hence different authors have used computerized tomography for the initial planning to get best and perfect results [10]. The purpose of present study is to evolve a better method for the treatment of inferior pole fractures and excision of the patella was considered to be investigated.

METHODS

An observational study was conducted from June 2012 to May 2014. Total No. of 10 patients with fractures of inferior pole of patella over the period of two years

was included in this study. All the patients with close fractures of inferior pole of patella of either sex in the age between 18-50 years were included in this study. Patients with open fractures, knee deformity, associated femoral articular surface injury, multiple injuries and medically unfit for surgery were excluded from this study. Each patient was followed for 6 months till the completion of study.

All the consecutive patients as agreed upon based on the number of patients being received in the hospital during the period of last one year will be considered as adequate sample size. Ten patients were operated by the consultants/residents electively in the main operation theatre. All the fractures were treated by resection of the avulsed fragment and reattachment of the patella**r** ligament to the patella by circalage wire passed through proximal patella and tibial tuberosity.

Prophylactic antibiotics and tourniquet was used in all the patients. Patients received two more doses of antibiotics at 08 and 12 hours in the post-operative period. All the patients were operated by longitudinal incision under general or regional anaesthesia. Patients will be placed in knee immobilizer in full extension for four weeks to allow for healing of soft tissue including retinaculum repair as well as allowing healing of ligament to bone. Patients were followed on 1^{st}, 7^{th}, 15^{th} days and 1^{st}, 3^{rd} and 6^{th} months for detection of postoperative infection and assessment of function of the knee joint.

Using Bostman criteria [11] the entire patient's functional outcome were assessed. The following 3-points scale was used; excellent = symptom-free, motion range equal to the intact side; good = slight pain on exertion and /or 20^0-30^0 knee flexion lag; poor = pain on rest and 40^0-60^0 knee flexion lag. The demographic information regarding age, sex, duration of injury and mechanism of injury was retrieved. The data analyzed by using SPSS version 17.

RESULTS

Total 10 patients were included in study. Overall mean age of all 10 patients was 38.40±13.30 years as shown in table 1.

Gender distribution in these patients was given in table 2. Eight patients were male and two were female. Overall male patients were greater in number as compared to female patients.

Table -1: Descriptive Statistics for Age In Patients

	Patients
N	**10**
Mean	38.40
Std. Deviation	13.30
Range	38.00
Minimum	20.00
Maximum	58.00

Table-2: Gender Distribution in Patients

Gender	**Percentage**
Male	8(80%)
Female	2(20%)
Total	10

02 patients have right and 8 have left side involvement.

Table -3: Affected Sides of Patients

Affected Side	**Percentage**
Right	2(20%)
Left	8(80%)
Total	10

Table-4: Descriptive Statistics for Fragment Size In Patients (in mm)

	Patients
N	**10**
Mean	18.10
Std. Deviation	1.37
Range	5.00
Minimum	15.00
Maximum	20.00

Table -5: Surgical Site Infection at Different Follow Ups

SSI	**7^{th} Day**	**15^{th} Day**	**1 Month**	**3 Months**	**6 Month**
0	5(50%)	6(60%)	10(100%)	10(100%)	10(100%)
I	5(50%)	4(40%)	0(0%)	0(0%)	0(0%)
II	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)

Total	**10**	**10**	**10**	**10**	**10**

This table contains mean fragment size. Mean fragment size of all 10 patients was 18.10±1.37 respectively.

Surgical site infection in patients was observed from 1st day post operatively till 6 months follow up. At 1st day post operatively 3 patients had grade-I surgical site infection. At 7th day 5 patients had grade-I surgical site infection. At 15th day 4 patients had grade-I surgical site infection. From 1st month till 6th months follow up time period none of the patients had surgical site infection.

There was no wound infection at the time of removal of stitches.

Functional outcome was assessed by using clinical grading scale proposed by Bostman. At 1st month 9 patients had good outcome. At 3rd month 10 patients had good outcome. Follow up at 6th month showed that 6 patients had excellent and four patients had good outcome. At 1st month and 6th month post operatively outcome of patients was significant.

Table- 6: Functional Outcomes at Different Follow Ups

Functional Outcome	**1 Month**	**3 Months**	**6 Month**
Excellent	0(0%)	0(0%)	6(60%)
Good	9(90%)	10(100%)	4(40%)
Unsatisfactory	1(10%)	0(0%)	0(0%)
Total	**10**	**10**	**10**

DISCUSSION

Inferior pole of the patella is involved in about 20% of the patellar fractures. In the previous era this was debatable whether to execute internal fixation or excision of fractures of distal pole of patella. Many studies about resection of distal pole have proved clinically and biomechanically that there is shortening of lever arm of extensor mechanism [12]. Fixation of inferior pole with k wire leads to reoperation rates between 20 to 50%. In many of these re-operated knees restriction of knee joint range of motion developed. The modified anterior circalage wire fixation is a standard treatment method for simple displaced patellar fractures [13].

In the present study at six months follow up good to excellent results were noted in all the patients. However in one patient unsatisfactory outcome was noted at one-month follow up. The functional outcome in different studies shows that fixation with k – wires and basket – plate is definitely inferior to excision of patella [14]. Comminuted fracture of inferior pole of patella was investigated by Chang and Ji and reported that fixation usually fails and different metal implants does not offer any protection against failure [15].

There are studies in which broken wires have migrated into the heart and careful monitoring is required when K – wire fixation is done and there is implant failure [16]. In the present study we do not noticed any wire breakage and migration. Excision of the distal pole of the patella is reserved for fractures that all not treatable by other methods Malvin and Mehta reported good to excellent results in comminuted fractures of the distal pole of patella. These authors conclude that different treatment options other than excision lead to poor or unsatisfactory results in most of the patients [17].

Distal pole fractures were treated by suture fixation by Schuett 2015 in 13 patients and at one year follow up 20% of the patients were having poor or unsatisfactory results [7]. To improve the knee function in these difficult fractures, Arthroscopic excision of distal pole fractures and re-attachment of the patellar ligament to the proximal patellar fragment has been advocated and investigated. Short-term results are encouraging and this might prove to be the treatment of choice in the near future [18]. Due to the patellar retinaculum tear back slab was applied and after four weeks it was removed and physiotherapy for range of motion knee was started. Hence it was improved.

In the present study the mean age of patients was 34.20±12.13 years. Minimum age of patients was 19 and maximum age of patients was 58 years respectively. Male to female ratio in this study was 3:1 Final outcome was assessed by using Bostman clinical grading scale (Annex-I). According to this scale patients who were treated with re-attachment had better outcome. These results were consistent with the results reported by study of Anand [19]. There is lot of controversy about the site of re-attachment of patellar ligament after excision of the distal pole fractures. However most of the authors prefer to re-attach the patella ligament near to the articular surface rather than near to anterior cortex [20].

CONCLUSION

It is concluded that excision of the distal pole is a better option in comminuted fractures that are not amenable by other methods of fixation. The functional outcome is excellent and rate of infection is very low with this method of treatment. To further enhance this treatment method long –term studies are required.

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