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COMPARISON OF CLINICAL RESULTS AFTER PATELLECTOMY AND COMPRESSION EXTERNAL FIXATION IN AN INFECTED COMPLEX FRACTURE OF THE PATELLA

Dr. Niralbabubhai Shah,[1] Dr. Kukadiya Hiteshbhai Labhubhai[2*]

[1]Associate Professor, [2*]Assistant Professor, Department of Orthopaedics, Gouri Devi Institute of Medical Sciences & Hospital, Durgapur (W.B)

Corresponding Author

Email id: dr_shahniral@yahoo.co.in

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ABSTRACT

Background: It is difficult to treat infected complex patella fractures with subcutaneous tissue scarring utilizing the extensor technique. Previously, these fractures were treated by patellectomy; however, it is now recommended to keep the patella to preserve the extensor mechanism's integrity.

Aim: The current study aims to compare the clinical results of patellectomy retrogradely and compression external fixation by JESS fixator prospectively in infected complex fractures of the patella.

Methods: The current study compared 10 previously performed patellectomy cases to prospectively performed comparable instances treated with compression external fixation utilizing a JESS fixator in 10 individuals. Both groups were compared in terms of knee joint range of movement as well as Knee Society clinical assessment six months after treatment completion.

Results: The study found that participants handled with patellectomy performed better than external fixation groups in terms of knee joint range of motion and Knee Society clinical rating 6 months after treatment.

Conclusions: The current study suggests that patellectomy is a better management choice in clinical outcomes for people with infected compound patella fractures than external fixation. In the treatment of infected compound patella fractures, patellectomy provides a greater range of mobility than external fixation.

Keywords: compression external fixation, fracture, infected complex patella fractures, knee society clinical score, patellectomy

INTRODUCTION

Patella fractures are relatively rare; they occur often in the Institute's Department of Orthopaedics. Patellar fractures are becoming more common over the world, with greater rates observed in developing countries such as India. Patellar fractures afflict people of all genders and ages, from active to elderly.[1]

Transverse fractures are the most prevalent in patellar fractures. Patellar fractures impair the affected patients' ability to walk and stand following the injury. Due to limited health care options and budgetary restrictions, the majority of injured people from backward parts of Southern India are subjected to ill-treatment during the early injury phase using traditional bone setters.2 Compound patella fractures are more likely to become infected due to limited treatment availability, limited access

to healthcare services, and economic constraints. Infected patients are referred to tertiary healthcare centers for further and adequate management.3

Generally, these infected complex patella fractures are treated with a patellectomy and extensor tendon restoration with suction closure for one week. The retention of the patella as a minor component is being proposed in order to boost the effectiveness of the extensor mechanism via the anterior translation of the pulley.4,5

The current study addressed this issue by saving patellar pieces and actively controlling fracture infection. The study also sought to examine the results of patellectomy in infected complex patella fractures. The study's goal was to compare clinical outcomes after treating infected compound patella fractures with patellectomy of compression external fixation and JESS fixators.

MATERIALS AND METHODS

The purpose of this combined prospective and retrospective clinical study was to compare the clinical results of retrograde patellectomy and compression external fixation with a JESS fixator in infected compound patella fractures. The study was conducted after receiving authorization from the Institutional Ethical Committee. The research subjects were members of the Institute's Orthopaedics Department. All individuals provided verbal and written informed permission before participating in the study.

The study included 20 subjects of both genders, with 10 being assessed retrospectively who had previously undergone patellectomy for compound infected patella fracture, and the other ten being managed prospectively with compression external fixation with JESS fixation to manage infected compound patella fracture. The research volunteers ranged in age from 34 to 52 years, with a male to female ratio of 2:3. The research's inclusion criteria were patients aged 20 to 60 who had a complex infected wound above the patella, transverse fractures, and were willing to participate in the study.

The research excluded participants with fresh compound patella fractures amenable to internal fixation, past knee contractures, severely comminuted patella fractures requiring patellectomy, and subjects who refused to participate. Ten individuals were handled at the institution using compression external fixation with JESS fixation, whereas the remaining ten were managed elsewhere and came to the Department with serious infection evidence.

The average presentation duration was 4.4 days, with a range of 3-6 days. The ten cases were evaluated prospectively. The prospectively managed individuals ranged in age from 41 to 54 years, with a male-to-female ratio of 1:4. Following the culture swab, all participants in the intervention group received empirical antibiotics such as amoxycillin and gentamycin. All ten instances were fixed on the second day due to pre-anesthetic examination and stabilization. There were no reports of comorbidities or diabetes among the subjects. During the procedure, a midline incision was extended to the longitudinal area, followed by thorough wound debridement. The inferior and superior pieces were then fixed with a transverse 1.8mm K-wire mediolaterally through the skin.

Then, medium-sized JESS distractor threaded rods with two-holed clamps were utilized, with one fastened with superior wires and the other with inferior wires, bilaterally. The two pieces were compressed to their maximum capacity using a JESS fixator. The skin was then separated and sutured. The drain was retained and removed on the third day after surgery. A splint was placed for 15 days, and sutures were removed on the 15th day after surgery.

Knee mobilization was initiated as soon as pain relief was achieved after surgery. Antibiotics were administered until release, and patients were instructed to attend the Department of Orthopedics every 15 days. X-ray radiographs were obtained, and the knee's range of movement was assessed each time. Radiological union time was measured and reported on radiographs.

Antibiotics effectively treated the infection in all participants, and no one required drainage or additional debridement throughout the 6-month follow-up period. The initial swab obtained from all individuals revealed pseudomonas/ Klebsiella organisms, and because all infections resolved following antibiotic treatment, the infected organism was not deemed a significant factor in the current investigation. Furthermore, no pin site infection at the skin entrance site was detected due to the clean dressing regimen and the use of povidone-iodine.

At 6 months, patients in both groups were examined using the Knee Society clinical score (modified from Insall JN, CORR 1989;248:12) and compared to patellectomy subjects. The Knee Society evaluated and compared clinical scores, alignment, extension lag, flexion contracture, mediolateral stability, anteroposterior stability, range of motion, and discomfort.

RESULTS

The purpose of this combined prospective and retrospective clinical study was to compare the clinical results of retrograde patellectomy and compression external fixation with a JESS fixator in infected compound patella fractures. The study included 20 subjects of both genders, with 10 being assessed retrospectively who had previously undergone patellectomy for compound infected patella fracture, and the other ten being managed prospectively with compression external fixation with JESS fixation to manage infected compound patella fracture.

All of the infected compound patella transverse fractures that were treated prospectively with the JESS fixation had a good and sufficient union clinically and radiographically, with no postoperative complications. The mean union time in JESS external fixation ranged from 17 to 24 weeks, with a mean length of 20.2 weeks. All of the fixators were removed once the fractures had healed. The study found that after 6 months after external fixation, the mean Knee Society clinical score was 71±2.447, with a range of 67-73 and a variation of 6. The average knee society clinical score in the patellectomy group was 81.6±2.165, with a range of 79-84 and a variation of 4.5. Table 1 shows a statistically significant difference between the two groups, with patellectomy having a higher Knee Society clinical score than external fixation ($p<0.0001$).

Table 2 shows that in the external fixation with JESS group, the mean range of knee movement was 94±4.1831, with a variance of 17.3. This was significantly lower than in the patellectomy group, where the mean range of knee movement was 113±4.8 with a variance of 23 and $p<0.0001$.

DISCUSSION

The current study evaluated 20 subjects of both genders, 10 of whom were retrospectively evaluated for compound infected patella fracture using the patellectomy and the other ten who were prospectively evaluated with compression external fixation with JESS fixation to manage infected compound patella fracture. This research design was consistent with that employed by Schuett DJ et al6 in 2015 and Matthews B et al7 in 2017, who used a study design comparable to the current study. In the current investigation, all infected compound patella transverse fractures that were treated prospectively with the JESS fixation had a good and appropriate union clinically and radiographically, with no complications in the postoperative period.

The mean union time in JESS external fixation ranged from 17 to 24 weeks, with a mean length of 20.2 weeks. All of the fixators were removed once the fractures had healed. These findings were close to those of Kapilow J et al8 in 2021 and Taylor BC et al9 in 2014, who found similar union times for patella fractures as the current investigation.

After 6 months after external fixation, the mean Knee Society clinical score was 71±2.447, with a range of 67-73 and a variation of 6. The mean knee society clinical assessment in the patellectomy group was 81.6±2.165, with a range of 79-84 and a variation of 4.5 points. The patellectomy group had a significantly higher Knee Society clinical score than the external fixation group ($p < 0.0001$).

These findings were congruent with those of Bonnaig NS et al10 in 2015 and Lebrun CT et al11 in 2012, who found comparable Knee Society clinical ratings after patella fracture repair, as shown in the current investigation.

The study found that external fixation with JESS resulted in a mean range of knee movement of 94±4.1831, with a variance of 17.3. This was significantly lower than the mean range of knee movement in the patellectomy group, which was 113±4.8 with a variance of 23 ($p<0.0001$). These findings were consistent with the findings of Miller MA et al12 in 2011 and Lin T et al13 in 2015, who proposed clinical outcomes measured as a range of motion of the knee, comparable to the current investigation, in their separate studies following patella fracture repair.

CONCLUSIONS

Considering its limitations, the present study concludes that patellectomy is a better management option in clinical outcomes to manage the subjects with infected compound patella fractures compared to the external fixation method of managing these fractures. Patellectomy also results in a better range of movement compared to external fixation in managing subjects with infected compound patella fractures.

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TABLES

S. No	Groups	Mean ± S. D	Variance	p-value
1.	**External fixation**	71±2.447	6	**<0.0001**
2.	**Patellectomy**	81.6±2.165	4.5	

Table 1: Comparison of knee Society clinical score in the two groups of study subjects using student t-test

S. No	Groups	Mean ± S. D	Variance	p-value
1.	**External fixation**	94±4.1831	17.3	**<0.0001**
2.	**Patellectomy**	113±4.8	23	

Table 2: Table 1: Comparison of range of knee movement in the two groups of study subjects using student t-test