International Journal of Medical and Health Research
ISSN: 2454-9142; Impact Factor: RJIF 5.54
Received: 20-05-2019; Accepted: 22-06-2019
www.medicalsciencejournal.com
Volume 5; Issue 7; July 2019; Page No. 107-110

Functional outcome of early movement of knee after open reduction and internal fixation of close fracture patella

Dr. Md Aminur Rahman[1], Dr. Md Zakir Hossain[2]
[1, 2] Assistant Professor Department of Orthopedic Colonel Malek Medical College, Manikganj, Bangladesh

Abstract
Background: Patella is the sesamoid bone in the body to an integral part of the extensor mechanism of the knee joint. The functional outcome of patella fracture depends on age, severity of injury, treatment modality, anatomical reduction, restoration of articular congruity and postoperative rehabilitation.
Aim of the study: to evaluate the functional status of the knee joint by allowing early knee movement after stable open reduction and internal fixation of fracture patella in 15 patients.
Material and Method: This is a prospective study of 15 patients conducted in 250 bedded district hospital, Manikganj, over the period of 18 month (January 2016-july 2017. The age group involved in fracture patella was at over18 yrs. Road traffic accident (RTA) and injuries like fall in the slippery ground were the major causes of fracture.
Open reduction and internal fixation was achieved by applying modified tension band wiring.
Postoperatively (after 14 days of operation) when the pain was tolerable, assisted active movement of the knee was started, gradually passive and active movement of knee allowed and quadriceps exercise was continued. The functional status of the knee was assessed according to knee society score chart.
11 patients (73.32%) found satisfactory (Excellent and good).
Conclusion: It has been revealed that early postoperative knee movement after open reduction and internal fixation of fracture patella can prevent stiffness of knee movement and shows better function.

Keywords: movement, fixation, movement, postoperative, reduction

Introduction

Patella fracture account for approximately one percent of all fractures 1. In Bangladesh though there is no accurate data, however the disease is not uncommon. Fracture patella is an intra-articular fracture involving the patellofemoral joint. Loss of knee movement or knee stiffness is a common sequela to patellar fracture2. Prolong immobilization sometime as part of treatment and sometimes for the sake of soft tissue healing is one of the important causes of knee stiffness. Stiff joints, persistent oedema, wasted muscle which can produce postoperative functional disability persisting long after the fracture has healed3. With the advent of new technique of fracture treatment and with advances in the use of internal fixation, methods of immobilization have changed and no longer demand prolong periods in plaster to obtain fracture union.

Modified tension band wiring alone stable fixation of fracture patella and so early post-operative knee movement can be given, there by complication like knee stiffness can be avoided. So, postoperative management without or early removal of cast and early movement of knee joint gives it better function.

Materials and Methods

This is a prospective study and conducted at 250 bedded District Hospital, Manikganj at the period of January 2016 to December2017.

The patients of this study were selected on random basis after fulfilling the following criteria:

- Transverse displaced fracture.
- Closed fracture.
- Presented within two weeks of injury.
- Adult (>18 years)

Each patient was designated by a case number15 cases included in this study, comminuted fracture excluded from the study. Functional evaluations of all patients were carried out postoperatively for about 12 months. In this study results obtained and the functional status of the knee were analyzed and compare with the study shown by Hung *et al* 4. Open reduction and internal fixation of the fractures were done by modified tension band wiring within two weeks of incidence of fracture. Stability of fixation was checked per operatively and post operatively when pain was within tolerable limit (after 14 days of operation) assisted active movement of knee and isometric quadriceps exercise were started. The patients were allowed to walk with crutch (non weight bearing) after two weeks and gradual weight bearing started after 3 weeks.

The patients were followed up at the end of 3rd, 6th, 8th, 12th, 14th, 2oth, 24th, 36th and 48th week. Every time the functional status of knee was assessed and looked for any complications.

Results

Male (12, 79.99%) patients were more frequently affected than female (03, 19.99%) age of the patients varied from 18-60 years. The mean age of the patients was 38.08.+1.68 years. Commonest age group in this study was between 31-50 years (72.72%)

Table 1: Age incident of patients (n=22)

Age group (year)	Number of patients	Percentage
18-30	4	26.66%
31-40	5	53.32%
41-50	5	53.32%
51-60		6.66%

Table 1: Results according to knee society score (n = 15)

Grading	Number of patients	Percentage
Excellent	03	19.19%
Good	08	53.33%
Fair	03	19.19%
Poor	01	66.66%
Combined excellent + good)	11	73.32%

Table 3: Comparative proportions of satisfactory and unsatisfactory results

Results	functional evaluation No %
Satisfactory	11(73.32)
Un Satisfactory	04(26.66)

Satisfactory was 11 (73.32%) unsatisfactory was 04 (26.66%). Male 12(79.99%) patients were more frequently affected than female 03, (19.19%). Age of the patients varied from 19-60 years. The mean age (±SE) of the patients was 38.08±1.68 years. Commonest age group in this study were between 31-50 years ((10, 66.66%) (Table-I). According to knee society score evaluation-3 (19.19%) patients showed excellent, 8 (53.33%) patients good, 3(19.19%) patients fair and 01 (6.66%) patient showed poor function (Table-II). Hung *et al* designated the excellent and good results as satisfactory outcome on the basis of functional status of the knee.

In this study satisfactory results (excellent + good) were in 11(73.32%) cases. The number of fair and poor result was 04(26.66%). Satisfactory and unsatisfactory results are compared and shown in the Table-III. In this study 2 (13.33%) patients were complicated by protrusion of Kwire. In 01 case there was superficial wound infection. This complication was overcome by repeated dressing and antibiotic therapy after culture and sensitivity of the wound discharge. Gross joint stiffness and reflex sympathetic dystrophy, which affects the knee function were absent in this study.

Knee Society Score

Part 1: Knee Score

Pain

- (●) None
- ( ) **Mild / Occasional**
- ( ) **Mild (Stairs only)**
- ( ) Mild (Walking and Stairs
- ( ) Moderate – Occasional
- ( ) Moderate – Continual
- ( ) Severe

Flexion Contracture (if present)

- ( ) 5°-10°
- ( ) 10°-15°
- ( ) 16°-20°
- ( ) >20°

Extension lag

- ( ) <10°
- ( ) 10-20°
- ( ) >20°

Total Range of Flexion

( ) 0-5	( ) 6-10	( ) 11-15	( ) 16-20	( ) 21-25
( ) 26-30	( ) 31-35	( ) 36-40	( ) 41-45	( ) 46-50
( ) 51-55	( ) 56-60	( ) 61-65	( ) 66-70	( ) 71-75
( ) 76-80	( ) 81-85	( ) 86-90	( ) 91-95	( ) 96-100
( ) 101-105	( ) 106-110	(●) 111-115	( ) 116-120	( ) 121-125

Alignment (Varus & Valgus)

( ) 0	( ) 1	( ) 2	( ) 3	( ) 4
		( ) 5 – 10		
( ) 11	( ) 12	( ) 13	( ) 14	( ) 15
		( ) Over 15°		

Stability (Maximum movement in any position)

Antero-posterior	Mediolateral
<5mm	( ) <5°
5-10mm	( ) 6-9°

10+mm	10-14°
	15°

Grading for the knee Society Score

Score 80-100	Excellent	**Score 70-79**	Good	**Score 60-69**	Fair	**Score below 60**	Poor

Knee Society Score – Function
Clinician's name (or ref) Patient's name (or ref)

Part 2 – Function

Part 2 - Function

Walking

Unlimited
>10 blocks
5-10 blocks
<5 blocks
Housebound
Unable

Stairs

Normal Up and down
Normal Up down with rail
Up and down with rail
Up with rail, down unable
Unable

Walking aids used

None used
Use of Cane/Walking stick deduct
Two Canes/sticks
Crutches or frame

Discussion

The aim of surgical treatment of patella fracture is anatomic reduction; restore articular congruity, preservation of patellar bone stock, repair of extensor mechanism and rehabilitation. Fracture of the patella is a common injury in the adult and constituting approximately 1% of all skeletal injuries [5]. Many patellar fractures are not displaced and may be treated conservatively [6]. Indications for surgical management include displacement >2mm, a step off involving the articular surface, or inability to extend the knee actively [7].

As with any intra-articular fracture, the goals of surgical treatment are to obtain an anatomic reduction and restore normal joint function while achieving bony union. Many surgeons maintain cast immobilization for three to six weeks[6]. Previous result have demonstrated that patient with diminished range of motion had experienced prolong cast immobilization[6-8]. This can best be avoided by initiating early knee movement. Ideally knee movement should be started in the immediate postoperative setting since motion aids in the prevention of intra and periarticular fibrosis and having salutary effects on healing articular cartilage [9, 10].

Internal fixation of patellar fracture is to achieve fixation that is strong enough to allow immediate range of motion[8]. Several techniques have been described for internal fixation of fracture of patella [11-13]. Satisfactory compression at a fracture site reduces the risk of failure of fixation, loss of reduction (inter-fragmentory gap > 2mm) and subsequent risks of mal-union, delayed union and ultimately non-union from exercise movement [14]. The strength and ease of application of four different forms of patellar fracture fixation were evaluated. Modified tension band, screw fixation, Lotke, longitudinal anterior band and Magnusson wiring were examined. Of the four techniques of fracture fixation tested, modified tension band wiring gave the most consistent result, followed by screw fixation. The simple wiring techniques i.e. Lotke and Magnusson yielded less consistent result [8].

Modified tension band wiring is commonly used method to treat transverse patellar fracture[15]. This technique also gives better results [16].

In this study, open reduction and internal fixation was done by modified tension band wiring. Early knee movement was initiated in all the cases at 14post operative day initial assisted active movement then passive and finally active movement. In Bangladesh some surgeon still keeps the limb in posterior cast for 3-4 weeks after stable fixation at the cost of poor knee function. Lotke demonstrated that patients with diminished range of motion had experienced prolong cast immobilization[6]. In this study satisfactory result showed 73.32% according to knee society evaluation score of knee function respectively. Hung *et al*, studied the efficacy of early knee movement after stable fixation and found a similar satisfactory results [4].

Karim MRU [1] *et al.* studied fracture patella- outcome of early movement of the knee after stable fixation and found satisfactory results 72.23% [20] simillar to our study. So after stable fixation of fracture patella early knee movement after 2 weeks gives better functional status of knee than keeping in long leg posterior cast for 3 or more weeks.

Conclusion

Fracture patella is not an uncommon injury in Bangladesh. There are several methods of treatment of this fracture, for transverse fracture modified tension band wiring gives stable fixation. For the purpose of soft tissue healing it is believed that without long leg posterior cast for 3=4 weeks affects soft tissue healing but this effects an individual in the following way:

- Achievement of satisfactory knee function delayed.
- Prolong hospital stay.
- Not cost effective.
- Delay in return to work.

It has been revealed that after 0pen reduction and internal fixation of fracture patella all the above disadvantages could be overcome by initiating early postoperative movement of the knee joint and thereby confers better knee function. `

References

1. Bostrom A. Fracture of the patella. Acta OrthopScand 1972; 143(Supp):1-80.
2. Nummi J. Fracture of the patella: a clinical study of 170 patellar fractures. Ann ChirGynaecol Fenn 1971; 60(Suppl 179):1-85.
3. Wilson JN. Joint stiffness and traumatic ossification. In:Watson-Jones fracture and joint injuries. 6th ed. Edinburgh: Churchill Livingstone, 1992, 45-75.
4. Hung LK, Chan KM, Chow YN, Leung PC. Fractured patella: operative treatment using the tension band principle. Injury [Br]. 1985; 16:343-7.
5. Hohl M. Fracture of the patella. In: Rockwood CA, Green DP, editors. Fractures. Philadelphia: JB Lippincott, 1975, 1148-77.
6. Lotke PA, Ecker ML. Transverse fracture of the patella. Clin Orthopaedics Related Res. 1981; 158:235-41.
7. Perry CR, McCarthy JA, Karin CC, Pearson RL. Patellar fixation protected with a load-sharing cable: a mechanical and clinical study. J Orthop Trauma. 1988; 2:234-40.
8. Benjamin J, Breid J, Dohen M, McMurtry M. Biomechanical evaluation of various forms of fixation of transverse patellar fracture. J Orthop Trauma. 1987; 1:219-22.
9. Salter RB, Simmonds DF, Malcolme BW. The biologic effect of continuous passive motion on the healing of full-thickness defects in articular cartilage: an experimental investigation in the rabbit. J Bone Joint Surg [Am]. 1980; 62:1232-51.
10. Curtis MJ. Internal fixation for fracture of the patella: a comparison of two methods. J Bone Joint Surg [Br]. 1990; 72B:280-2.
11. Schanwecker F. The practice of osteosynthsis: a manual of accident surgery. Stuttgurt: George Theme Publishers, 1974.
12. Muller ME, Allgower M, Schneider R, Willenegger H. Manual of internal fixation: technique recommended by the AO Group. 2nd ed. Berlin: Springer Verlag, 1979.
13. Ma YZ, Zhan YF, Qu K, Yeh YC. Treatment of fractures of the patella with percutaneous suture. Clin Orthop. 1984; 191:235-41.
14. Hughes SC, Stott PM, Hearnder AJ, Ripley LG. A new and effective tensionband polyester suture technique for transverse patellar fracture fixation. Injury 2007; 38(2):212-222.
15. John J, Wagner WW, Kuiper JH. Tension-band wiring of transverse fractures of patella. The effective site of wair twists and orientation of stainless steel wire loop: a biomechanical investigation. Int Orthop. 2007; 31(5):703-707.
16. Ozdemir H, Ozenci M, Dabak K, Aydin AT. Outcome of surgical treatment for patellar fracture. Ulus Travma Derg. 2001; 7(1):56-59.
17. Insall JN, Dorr Scott RD, Scott WN. Ratoionale of knee society clinical rating system. Clinorthop Relat Res. 1989, (248)13-4.
18. Assif S, choon DS. Midterm results of cemented press fit condylar sigma total knee arthplastysystem.Jorthop surg (Hong Kong), 2005, 13(3):280-4.
19. Bostman O, Kinilusto O, Nirhamo J. Comminuted displaced fractures of the patella. Injury 1982; 13:196-9.
20. KarimMRU *et al*. Fracture patella-outcome of early movement of knee after stable fixation JFMC. Bangladesh, 2009, 5.