Research Paper

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Longterm Followup Study of Biological Plating of Communited Fractures of Shaft of Femur

Medical Science

KEYWORDS : Biological plating, Communited fracture shaft femur, Biological plate osteosynthesis.

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ABSTRACT

Objective: To study longterm followup of biological plating of communited fractures of shaft of femur with respect to stabilization,mobilization and union.

Methods:A series of 31 cases of communited fractures of shaft of femur were studied at an average followup of seven years. Assessment was done using Neers rating system .The results were compared to comparabale studies done by various authors in past by statitistical evaluation using SPSS ver. 21.0.

Results:In our series excellent to good results were obtained in 83.67% cases while 12.24% shows fair and 4.8% showed poor results. The results obtained in our series were comparable to results obtained in previous series.

Conclusion:The technique of minimally invasive biological plating in communited fractures of shaft of femur is safe and reliable modality for fractures of shaft of femur.

Introduction:

From 1860 until mid 20th century internal fixation implants ranged from extramedullary like wires ,screws,transfixation devices and plates and intramedullary nails. According to Mears plating of Facture is treaceble into the last century when Hansman described a percutaneous removable plate in 1886.

After formation of AO group in 1950,fracture fixation was based on principles of anatomical reduction, stable, rigid internal fixation and early active mobilization.This gave consistantly good results in simple fractures but in communited fractures despite good looking xrays initially, fractures led to delayed union, ,nonunion and infections. Much focus of research was then shifted to bioloby of bone and fracture healing. Then concept of biological fixation using plate(Biological plating) was evolved in which fracture communition was not opened and reduction achieved by indirect reduction techniques and fracture fixed with percutaneous passage of plate with minimal incisions.Thus blood supply and biology of bone was preserved.

This type of fixation is particularly useful in communited periarticular fractures where intramedullary nailing is difficult or not amenable.

In past various authors like Hietemeyer u(1991),Heirholzer G(1994),Gautier E,Gerry R(1996),Christian Krettek et al(1997) John Chrisovistinos have done such study.

Our study group involved 31 cases of communited fractures of femur and we evaluated results at average follow up of 7years.

Material And Methods:

This retrospective study included 31 cases of communited fractures of shaft of femur treated at the institute of Author 2 during 1998 to 2002.Intraarticular fractures of femur ,infection, poor skin condition, pathological fractures were excluded from our study. Fractures were classified according to Winquest Hansen classification. Implants used were DCP and LCDCP which were precontoured on xrays of opposite extremity. In cases where concomitant injuries delayed fracture fixation high tibial traction was applied to facilitate reduction. After suitable anaesthesia reduction was done by traction on fracture table in supine position and ,limb length ,rotation checked under C-arm. With minimal incision Plate was passed percutaneously extraperiostealy and fixed with 4.5mm screws in shaft of 6.5 mm screws in supracondylar and sub trochanteric region .

Post operatively static quadriceps exercises were begun on 2nd postoperative day.Patient was advised knee,hip and ankle exercises. CPM therapy was started from 14th day.

All patients were followed up up to fracture union and thereafter also for long term follow up.

Results were evaluated using Neers rating system at each follow up.

Observations and Results:

The mean age of patients was 35.04 years (range 12-70 yrs) with 26 males and 5 females. All fractures resulted from road traffic accidents. Right extremity was predominantly involved. Out of 31 cases 30 were closed and one was compound .Five patients had poly trauma. The average injury surgery interval was 10.22 days. The average period of fracture union was 23.05 weeks.The average period of full weight bearing was 19.71 weeks. The average hospital stay was 16.30 days.Average duration of surgery was 45 to 120 minutes. Average blood loss was 150 ml. Three patients were lost to follow up .

All fractures united. There was 16% incidence of superficial infection which was controlled with antibiotics and dressings.

Overall In our series excellent to good results were obtained in 83.67% cases while 12.24% shows fair and 4.8% showed poor results. The results obtained in our series were comparable to results obtained in previous series.

Discussion:

Communited peri articular fractures pose difficult management in orthopaedic practice.These fractures are most of the times are difficult to nail. Hence Previously open method of reduction and rigid internal fixation was applied which sometimes led to delayed unions ,non unions ,infection.Then this method of biologicasl fixation was evolved.

There was no case of non union in our series. The average shortening in our series was 0,5 to 2.5 cm. Joint stiffness was observed in knee joint 26.53%,hip2.04%.The stiffness in knee was observed in supracondylar fractures. In our series four cases of delayed union were observed which united without any secondary procedure. Malunion was seen in subtrochanteric femur which had 20 external rotation deformity .

Four plates were removed and no incidence of refracture was noted. Good functional results were obtained in isoloated fractures. The functional results were affected by associated injuries as weight bearing was delayed.

In series of C.Krettek et al 75% results were excellent without any failure rate. Similarly K Wenda reported 76.47% execellent results.J.S.Chhina had 93% execellent results.

Thus results of our series were comparable to previous series.

Conclusion:

The technique of minimally invasive biolocal plating is a safe and reliable treatment modality for communited fractures of femur. The technique is easy and has a shorter learnig curve.Minimal inventory is required. Tecnique causes much less blood loss as compared to conventional plating.Operating time is less. Only limitation of this technique is that it requires intact soft tissue cover over fracture site.

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Table NO. 1
Age incidence

Age group in year	No. of cases	Percentage %
10-20	4	12.9
21-30	10	32.25
31-40	12	38.7
41-50	2	6.4
51-60	2	6.4
61-70	1	3.2
Total	31	100

Comparative Series

	Mean age in years	Range in year
C.Krettek et al[15]	39.87	21-75
J.Chrisovitsion et al	45	18-83
K.A.Siedenrock et al	49.8	19-87
C.Krettek et al	54.45	27-97
J David et al	43	25-59
J.S. Chhina et al	35	21-40

Table No 2 :
Sex Incidence

Sex	No. of Cases	Percentage %
Male	26	83
Female	5	16.1
Total	31	100

Table No. 3
Side of Fracture

Side	No	%
Right Side	20	67.74
Left Side	11	35.4
Total	31	

Table No . 4:
Primary Treatment Modality

Stabilizing Mode	No. of Cases	Percentage
External Fixator	0	0
POP Slab or cast	0	0
Skeletal Traction	10	33.3

Table No . 5
Injury to surgery Interval .

Injury surgery interval in days	No Of Cases	Percentage
	Femur	
0-8	15	48.38
9-15	10	32.25
>15	6	19.3

Comparative series

	Bone	Average	Range
C.Krettek et al[15]	Femur	5.5 days	5 to 27 days
J.Chrisovitsinos et al	Femur	7.05 days	1 to 22 days
K.A.Siebenrock et al	Femur	Operated within 48 hours	
C.Krettek et al	Femur	5.5 days	1 to 7 days
J.S. Chhina et al	Femur & Tibia	Operated within 10 days	
M.J.Radziejowski et al	Femur	7 days	

Table No. 6
Duration of surgery

Time (in Minutes)	No. of Cases	Percentage (%)
<90	4	12.9
>90	27	81

Comparative Series

	Average Duration
C.Krettek et al15	125 minutes
K.A.Siebenrock et al	126 minutes (Range 35 to 220 minutes)
A.K. Varshneya et al	20 to 90 minutes

Table No. 7
Period of Union of Fracture

Union in Weeks	Femur		
	Closed	Compound	%
12-18	4	0	12.9
19-24	18	0	58.06
25-31	5	0	16.12
>31	3	1	9.67
Total	30	1	3.22

Comparative series

	Average of union duration	Range
C.Krettek et al15	11.6 weeks	8-17 weeks
J.Chrisovitsinos et al	18.4 weeks	12-24 weeks
K.A.Siebenrock et al	12.8 weeks	4.4-40 weeks
C.Krettek et al 16	16.3 weeks	7.7-29.6 weeks
H.L.David et al 8	10.7 weeks	8-16 weeks
J.S. Chhina et al 4	20.4 weeks	16-29 weeks

COMPLICATIONS
Table No.8
Infection

Infection	No.of cases	Percentage
Superficial	5	16
Chronic osteomyelitis	0	0
Total	5	16

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Comparative series

	Superficial
K.A.Siebenrock et al	1 (5.88%)
H.L.David et al 8	2 (10%)
M.J.Radziejowski et al 34	2(9.09.%)
A.K.Varshbeya et al	2 (8%)

Table No. 9
Shortening

	No	%
0.5	1	3.22
0.5 to 1.5 cm	5	16.1
1.5 to 2cm	3	9.67
2 to 2.5 cm	1	3.22
Total	10	

Comparative Series

	Cases	Shortening	Percentage
C.Krettek et al15	2	>1cm.	25
J.Chrisovitsinos et al	4	1 to 2cm	20
K.A.Siebenrock et al	2	1 & 1.5 cm	10
C.Krettek et al 16	12	0.2 to 2 cm	84
K.Wenda et al 43		3 (17.64%)	1 (5.88%)

Table No. 10
Results According to Neer's Criteria.

Excellent		Good		Fair		Poor	
Cases	%	Cases	%	Cases	%	Cases	%
19	63.15	6	20.5	4	12.2	1	5.26

Comparative series

	Excellent	Good	Fair	Poor
C.Krettek el16	4 (50%)	2 (25%)	2 (25%)	0
C.Krettek et al15	6(60%)	1(10%)	3(30%)	0

References:

1. Anderson Randolf :- Conservative treatment of fractures of the femur. JBJS : 1967, 49-A(7) :1371-1375.
2. Baumgaestel F, M. Buhl, B.A. Rahn : Fracture healing in biological plate osteosynthesis Injury ; 1998, 29 (3) : 3-6
3. China J.S. Sohal H.S. et al : Biological fixation in segmental comminuted fractures of long bones. Indian journal of Orthopedics July 2001 , Vol. 35 No. 3:171-173.
4. Farouk O, Krettek C, Miclau T, Schandelmaier P. Tscherne H : Effects Of Percutaneous and Conventional plating techniques on the blood supply to the femur. Arch. Orthop Trauma Surg. 1998, 117 (8) 138-441.
5. John P. Chrisovitsions, Theodore, Xenakis, Kostask G P, Papatastides. Bridge Plating Osteosynthesis of 20 Comminuted fractures of the femur. ACTA Orthop. Scand, (Supp 275), 1997 68: 72-76
6. Karnezis I A., Biomechanical Considerations in "Biological osteosysthesis" and experimental study of the "Bridging" and "Wave" Plating techniques, Archives of orthopedic trauma surg, 20000,120 (5-6) 272-275
7. Kempf I Grosse A ,Beck G : Closed locked intramedullary nailing its application to comminuted fractures of the femur . J. Bone joint surg (Am); 67(5) , June 1985 , 709-720.
8. Krettek C, Schandelmainer P, Miclau T, Tscherne H : Minimally invasive Percutaneous plate osteosynthesis (MIPPO) Using the DCS in Proxial and distal femoral fractures. Injury , 1997, 28(1) :31-34.
9. Krettek C. T. Miclau ,O . Grun Schandelmaier P, Tscherne H : Intraoperative control of axes rotation and length in femoral and tibial frectures . Injury 1998, Vol .29 Supp. 3:29-39.
10. Melcher G.A. Ruedi T : Towards Minimally invasive Osteosynthesis Ther Umsch , July 1993, 50(7) : 449-453.
11. Muller M.E.M. Allgrove , R.Chneidr, H. Willeneggr, Manual of internal fixation techniwues recommended by AO-ASF group. Third edition, 1991, 13,27,62 -79,229
12. Neer C.S.Grantham S.A. Shelton M. L. et al : Supracondylar fracture of adult femur . JBJS , 1967,49-A:591-613.
13. Olerud S, Karlstorm G : Tibbial fractures treated by AO compression Osteosyntesis . Experiences from a five-year material. Acta orthop scand. 1972, Suppl. 140(1).
14. Ruedi T.P, Sommer C, leutenegger A : New techniques in indirect reduction of long bone fractures . Clinicla Orthopaedics. February 1998 27-34.
15. Siebenrock K.A.Muller U. Ganz R : Indirect reduction with condyler blade plate for osteosynthesis of subtrochanteric femoral fractures. Injury . 1998 Vol. 29 Supp. 3:7-15
16. Tile M, Schatzker L : Orthopaedics , Principles and their application 4th edition , Vol, 1:180-86
17. Wenda K, Runkel M : Minimally invasive plate fixation in femoral shaft factures. Injury , 1997 28 (1) : 13-19
18. Wisniewski T.F. Radziejowski M.J. : Minimally invasive treatment of pilon fractures . JBJS (BR) 1998, 80 (B-2):164.