



BIOLOGICAL PLATING: A WONDER IN THE TREATMENT OF COMMUNATED TIBIA FRACTURE.

Dr. Naresh Rana

Post Graduate. Department Of Orthopaedics, GMC, Jammu.

Dr. Gagandeep Singh*

Post Graduate. Department Of Orthopaedics, GMC, Jammu. *Corresponding Author

ABSTRACT The concept of biological osteosynthesis refers to the conservation of vascularity of the bone during surgical intervention to ensure the continued vitality of the individual fragments and to achieve improved fracture healing. Main principle of biological fixation by minimally invasive locked plate osteosynthesis (MILPO) in long bone fractures is relative stability which is provided by using long plate with limited number of screws. Some biomechanical studies have been reported about this issue. However, clinical studies are still missing. The aims of this prospective study were to evaluate the clinical and radiological results of adult tibia fractures treated by MILPO. **MATERIALS AND METHODS:-**A prospective study was conducted with in a period of one and a half year; from June 2017 to Dec. 2018 on 60 patients who presented to emergency wing of orthopaedic department at our institution which is a tertiary care hospital. In our series of 60 patients most of the patients were in the age group of 25-40 years, average age was 35.7 years. RTA accounted for 50% of cases in our series. Most of the patients had a follow up ranging from 6-15 months. Patients were assessed as per the criterion laid down by S.J Lam at each follow up. Most of the patients (70%) had radiological union between 16-25 weeks. 2 patients with deep wound infection and infected non union did not ambulate and is still under treatment for infection and non union. **Conclusion:** MIPO technique provides good bone healing and decreases incidence of nonunion and need for bone grafting. The technique of biological plating can be used in fractures where locked nailing cannot be done like vertical slit and markedly comminuted fractures.

KEYWORDS : Minimally invasive Osteosynthesis, Biological Locked plate, Screw, care .

INTRODUCTION:-

Biological fixation by minimally invasive locked plate osteosynthesis (MILPO) has become an option for treating of long bone fractures. It has well-documented biological advantages compared to conventional plate osteosynthesis including reduced tissue devitalization, avoidance of iatrogenic damage of blood supply around the fracture and early fracture union with decreased wound complications.(6,12). The basic principles of this technique include indirect closed reduction, extraperiosteal dissection, anatomic alignment and relative stability which permits limited motion at the fracture site and creates secondary bone healing with callus formation.(7)

MATERIALS AND METHODS:-

A prospective study was conducted with in a period of one and a half year; from June 2017 to December 2018 on 60 patients who presented to emergency wing of orthopaedic department of government medical college and hospital, Jammu during this period. In our series of 60 patients most of the patients were in the age group of 25-40 years, average age was 35.7 years.

Fractures included : Fractures with longer defects, fractures with comminution with number of viable fragments filling the gap.

Fractures excluded:- simple spiral, oblique or transverse fractures where standard interfragmental compression must be used.

THE STRAIN THEORY OF PARREN:- In the case of short oblique or transverse fractures, all forces (bending, shear and rotation) are concentrated to the single fracture site, causing considerable deformation. In more complex and comminuted fractures, the same external forces are distributed over a much longer distance, resulting in only minimal deformation at a specific fracture line. So callus once formed is not repeatedly disturbed. So comminuted fractures are healed rapidly when their vascularity is preserved.

All patients were treated by the same surgical team in the first author's institution. The patients on admission after taking care of ABC of trauma management were examined carefully to rule out any head, neck, chest, abdominal and pelvic injuries. This was followed by primary treatment in the form of splintage to the affected limb(s) or Skin/skeletal traction, analgesics, I.V fluids, antibiotics and prophylactic immunization for tetanus. Routine investigations were done. Operative procedures were carried out at the earliest when patients were fit for anesthesia. Implants used were properly selected. Tibia being a superficial bone and could be reached easily through an anteromedial approach without damaging any important structure.

Thorough wound irrigation was done and wounds closed in layers with a suction drain in place. Patients were put on broad spectrum antibiotics for the shortest possible period depending upon wound condition. Post operative Skiagrams both AP and Lateral views were taken for permanent record. Active static exercises and movements of adjacent joints were started the next day. Sutures removed between 10th - 14th post op. day. Follow up of the patients was done at 4 weekly intervals until union occurred. Patients were assessed clinically as well as radiologically. Range of motion of adjacent joints and any other complications if present were noted.

Patients were made ambulatory with non weight bearing crutch walking as soon as the pain was tolerable. Patients were discharged as soon as the stitches were removed with the advice of non weight bearing ambulation and were followed up every 4 weeks in the OPD. Controlled (guarded) weight bearing was allowed gradually over a period of time and full weight bearing allowed after confirming both clinically as well as radiologically the evidence of union.

OBSERVATIONS:

The various facts that emerged during the course of this study were as follows.

| Age (In years) | No of patients | Percentage |
|----------------|----------------|------------|
| 20-25 | 4 | 7% |
| 26-30 | 20 | 33% |
| 31-35 | 10 | 17% |
| 35-40 | 12 | 20% |
| 41-45 | 8 | 13% |
| 46-50 | 2 | 3% |
| 50 and above | 4 | 7% |
| Total | 60 | 100% |

In our series of 60 patients most of the patients were in the age group of 25-40 years, average age was 35.7 years. RTA accounted for 50% of cases in our series

ASSOCIATED INJURIES/DISEASES

| Associated injury/Disease | No of patients |
|------------------------------|----------------|
| No Associated injury/disease | 40 |
| # Calcaneum | 2 |
| Diabetes Mellitus | 2 |
| HTN/COPD | 2 |
| Lacerated scalp | 2 |
| Degloving foot | 2 |
| Forearm bones # | 2 |

| | |
|-------------------------|---|
| Neck of humerus | 2 |
| Pelvic # | 2 |
| Soft Tissue Injury neck | 2 |
| Patella # | 2 |

FOLLOW UP: Most of the patients had a follow up ranging from 6-15 months. Patients were assessed as per the criterion laid down by **S.J Lam** at each follow up (**Excellent:** ROM 80-100%, No pain ; **Good:** ROM 60-80%, Mild pain; **Moderate:** ROM 30-60%, Moderate pain; **Poor:** ROM <30%, severe pain)

FULL WEIGHT BEARING IN MONTHS

| Months | No of patients | Percentage |
|--------|----------------|------------|
| 0-2 | 0 | 0 |
| 2-4 | 40 | 66.66% |
| >4-6 | 18 | 30% |
| >6-8 | 2 | 3.33% |

2 patients with deep wound infection and infected non union did not ambulate and is still under treatment for infection and non union.

BONE GRAFTING

| BONE GRAFTING | NO. OF PATIENTS | PERCENTAGE |
|---------------|-----------------|------------|
| PRIMARY | 6 | 10% |
| SECONDARY | 2 | 3% |
| NO BONE GRAFT | 52 | 87% |

RADIOLOGICAL UNION IN WEEKS

Most of the patients (70%) had radiological union between 16-25 weeks

LIMB LENGTH DISCREPANCY (LLD)

| Limb length | No of patients | Percentage |
|-----------------|----------------|------------|
| No LLD | 44 | 73% |
| Shortening 1 cm | 12 | 20% |
| Shortening 2 cm | 4 | 7% |
| Shortening >2cm | 0 | 0 |
| Total | 60 | 100% |

| Complications | No of patients |
|-------------------------------|----------------|
| Superficial wound infection | 8 |
| Deep wound infection | 4 |
| DVT | 2 |
| Implant failure and non union | 2 |
| Delayed Union | 2 |
| Mortality | 0 |

FINAL RESULTS

| Range of Motion | No of patients | Percentage |
|-------------------------------------|----------------|------------|
| ROM 80-100%, No pain | 42 | 70% |
| ROM 60-80%, Mild pain | 14 | 23.3% |
| ROM, 30-60%, Moderate pain | 2 | 3.3% |
| ROM <30%, Severe pain and non union | 2 | 3.3% |
| Total | 60 | 100% |

RESULTS:-

The technique of biological plating can be used in fractures where locked nailing cannot be done like vertical slit and markedly comminuted fractures. There is rapid fracture consolidation due to preserved vascularity. There are fewer incidences of delayed union and non union. There is decreased need for bone grafting. There is less incidence of exposure due to limited exposure and less chances of refracture. There is no chance of vascular complication by carefully inserting the plate submuscularly through limited incisions. The method is less time consuming and cost effective. The usefulness of BIOLOGICAL PLATING has been established in the present study. Hence the procedure can be used safely in comminuted fractures of long bones with proper indications.

REFERENCES

- Baumgaertel F, Parren SM: Treatment of experimental comminuted subtrochanteric femur fractures in sheep. J. of trauma 7(2): 160-162; 1993
- Baumgaertel F, Gotzen L. Biological plate fixation of comminuted fractures of femur. Unfallchirurg, 97: 78-84, 1994
- Bruce D Pitfalls error and complications in the use of locking kumtscher nails. Clin. orthop. 212, 1986
- Chrisovitsinos John P Bridge plate osteosynthesis of 20 comminuted fractures of femur. Acta. ortho. Scand. (supp.275)68:72-76< 1997
- David LH, Paul YS, David L, Joseph B, Jr. Minimally invasive plate osteosynthesis of distal fractures of tibia. Injury vol. 28 SA42-SA48, 1997
- Farouk O, Krettek C, Miclau T, Schandelmaier P, Guy P, Tschern H (1997) Minimally

invasive plate osteosynthesis and vascularity: preliminary results of a cadaver injection study. Injury 28(Suppl 1):7-12

- Gautier E, Sommer C (2003) Guidelines for the clinical application of the LCP. Injury 34(Suppl 2):63-76
- Gerner A, Ganz R: A biological approach to the treatment of complex fracture of proximal tibia ; Combined internal and external osteosynthesis. Injury, Vol.29, No.3; 1998.
- Krettek C, Schandelmaier-P, Tschern-H Distal femoral fractures . Transarticular reconstruction, percutaneous plate osteosynthesis and retrograde nailing. Unfallchirurg. 1996 jan; 99(1): 2-10.
- Krettek C, Schandelmaier-P, Tschern-H Distal femoral fractures: Minimally invasive percutaneous plate osteosynthesis using DCS in proximal and distal femoral fractures. Injury vol.28, S-A-20, S-A-30, 1997.
- Ravendra B. Gunaki, Hement D Sharma Study of comminuted fracture shaft of femur in adults. I.J.O. Vol. 34, No. 1; January 2000.
- Strauss EJ, Schwarzkopf R, Kummer F, Egol KA (2008) The current status of locked plating: the good, the bad and the ugly. J Orthop Trauma 22:479-486
- Schatzker J, Tile M The rationale of operative fracture care . Springer- Verlag , Berlin, 1996.
- O. Fafouk , C. Krettek, T. miclau , P. Schandelmaier, H. Tschern Effects of percutaneous and conventional plating techniques on the blood supply of femur. Arch Orthopedics trauma surgery, 117:438-441, 1998.
- Ostrum RF, Geel C Indirect reduction and internal fixation of supracondylar femur fractures without bone grafting. J. Orthop. Trauma, 9: 278-284, 1995.
- Thomas P Ruedi, sommer C, Leutenegger A. New technique in indirect reduction of long bone fractures. Clinical Ortho. And related Research : (347):27-34; Feb. 1998.
- Varshneya Ak, Srivastava A, and Gupta UN Interlocking plate for treatment of diaphyseal fractures of tibia - preliminary report of 25 patients. I.J.O . Vol.33 No. 4, Oct. 1999.
- Wenda K, Runkel M, Degreif J, Rudig L Minimally invasive plate fixation in femoral fractures. Injury Vol. 28, Suppl, no. 1, S-A-13-S-A-19, 1997.
- S. Terry canale, James H. Beat. Campbell's Operative orthopaedics , 12th edition, 2015