Management of distal femur fractures with bicolateral fixation with condylar buttress plate and TENS nail

Anil Gupta MS, Shafiq Hackla MS, John Mohammad, Naresh Rana, Kamalji Pandit and Shujat Ali

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Abstract

Introduction: The fractures of distal femur are usually the result of high energy trauma. They are often very severe and difficult to treat. The incidence of these fractures is 0.4% of all fracture and 3% of femoral fracture. There is bimodal distribution with highest in woman older than 75 years and adolescent boys and men 15 to 24 years old. Because of proximity of these fractures to knee joint, regaining full knee motion and function may be challenging.

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2. Methods and Materials

A prospective study was conducted in GMCH, Jammu from June 2012 to July 2015. Fifty three patients with comminuted intercondylar fracture of femur were operated. There were thirty seven males and sixteen females. The average age of the patients was 36.22 years the oldest being 56 years old and youngest being 23 years. The forty patients were having road traffic accident and twelve patients were having fall from height. One patient was having implant failure after fall. All the patients were operated within a week after they were hemodynamically stable. The detailed preoperative planning and evaluation was done. Fig 1.
The swashbuckler approach was used [3]. The patient was placed supine on radiolucent fracture table. An incision was made in the midline of thigh from above the fracture laterally to across the patella. The vastus lateralis muscle was retracted medially after lateral para-patellar arthrotomy was made. Condylar fragments were reduced, stabilised and then minimally fixed with condylar buttress plate on lateral side (two screws distally and only one screw proximally). The amount of varus angulation was also corrected during the procedure.

By using C-arm guidance, a two cm incision made over medial aspect of distal femur. Entry portal was made with the help of curved awl. An appropriate size TENS nail was then fixed from medial side into the medullary canal of the femur. The final position was then checked under C-arm guidance and remaining screws were put to fix the lateral plate. The wound was then closed in layers and antiseptic dressing was applied Fig 2.

The final outcome was assessed using Schatzker and Lambert scoring system which is excellent if full extension, no varus or valgus deformity, no pain and perfect joint congruity is present. Good result includes not more than one of following like loss of length not more than 1.2 cm, less than 10° varus or valgus deformity, flexion loss more than 20° and minimal pain and failure when flexion to 90° or less, varus or valgus more than 15°, joint incongruity and disabling pain [4]. The following were noted at six month follow up. Clinical union, range of motions at knee joint, power, and mobility of quadriceps, walking distance, radiological union, any limb length discrepancy, total time for union and complications fig 5. The average operative time, amount of blood loss and infection rate was also noted.

2(B) Rehabilitation Protocol
The POP back slab was applied for initial 3 to 4 days. Drains were removed on first dressing. On 4th post-operative day, range of motion and quadriceps strengthening exercises were started. The patient was allowed to walk with a pair of crutches and bear partial weight bearing till they achieved good quadriceps power and radiological examination revealed fracture union Fig 3, 4.

| Table 1: Shows average union time |
|----------------------------------|
| **Time taken** | **No. of cases** | **Percentage (%)** |
| 10 weeks or less | 0 | 0 |
| 11-14 weeks | 36 | 68 |
| 15-20 weeks | 15 | 28 |
| More than 20 weeks | 2 | 4 |
| Total | 53 | 100 |
Complications include superficial wound infection in five patients, minimal pain in ten patients, varus angulation less than 5 degree in seven patients. The range of motion greater than 90 degree was present in thirty six patients while seventeen patients were having ROM less than 90 degree. (table.2).

Table 2: Shows the range of movement of knee joint

| Range of movement(°) | No. of patients |
|----------------------|----------------|
| 0-30                 | 3              |
| 31-60                | 4              |
| 61-90                | 10             |
| 91-120               | 15             |
| 121-140              | 21             |
| Total                | 53             |

The final outcome was evaluated using schatzker and Lambert scoring system which was excellent in fifteen patients, good in twenty three, fair in eleven and poor in four patients.(table.3).

Table 3: Shows result according to schatzkar and Lambert scoring system

| Results  | No. of cases | Percentage (%) |
|----------|--------------|----------------|
| Excellent| 15           | 29             |
| Good     | 23           | 43             |
| Fair     | 11           | 21             |
| Poor     | 4            | 7              |
| Total    | 53           | 100            |

4. Discussion

Current fracture patterns veer towards complex comminuted type due to prevalence of high energy trauma. The violent nature of injury in young individuals who sustain high velocity during road traffic accident and osteoporotic bones in elderly patients make single column fixation unsatisfactory option [5]. The goal of treatment is to achieve bone healing and restore function of the affected limb in shortest possible time without compromising stability [6]. The distal femoral fractures has been classified by Muller (AO) into extra-articular, partial articular and intra-articular types [10, 11]. We have based our study on intraarticular type C fractures which are generally associated with severe comminution and bony loss. The mode of trauma in distal femoral fractures is usually severe varus, valgus or rotational force with axial loading sustained in young as result of high energy trauma as in road traffic accident and in elderly as result of minor slip or fall on flexed knee. In intercondylar fractures, there will be rotational malalignment because of separate attachments of gastrocnemius muscle to each condyle. Complications of distal femoral fractures include malunion, nonunion, varus angulation, limb length discrepancy, infections and secondary osteoarthritis of patellofemoral and tibiofemoral joints. The principle of treatment in these fracture include restoration of bony continuity, maintenance of good reduction, articular congruity, and good range of movements [7]. These fractures earlier treated nonsurgically were associated with angular deformity, joint incongruity, knee stiffness and delayed patient mobilisation. The different fixation devices used include angle blade plate (schatzker 1979), rush rods (Shellbourne1981), enders nail (Kolmert 1986) and zickel device. However, these devices were technically demanding and didn't achieve rigid fixation of articular surface [8, 15]. Dual plating used in comminuted fractures often result in extensive soft tissue stripping on both sides of femur resulting in reduced blood supply, delayed or nonunion and failure of implant. Callus formation was inconsistent and irregular with these plates [9, 12]. The average union time was 13.8 weeks in Markmiller et al. study while it is 14.2 weeks in our study [13]. No evidence of disability was nited in our study which is comparable to the study of Schultz et al. [14]. The advantages of fixation includes active range of motions can be started earlier, maximum range of motion is preserved, stable internal fixation does not allow malunion to occur, maintenance of articular congruity and incidence of implant failure and hospital stay is reduced [17].

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6. Conflict of interest: None

7. References

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