OUTCOME OF 95 DEGREE CONDYLAR BLADE PLATE IN COMPLEX PROXIMAL FEMUR FRACTURES: STUDY OF 30 PATIENTS

Abstract:
Background- Angled Blade Plates have been introduced in the 1960s by the AO and Synthes and belong still to surgeons basic armatorium used for fracture treatment, revision surgery and correction osteotomies. They serve as a tension band plate whenever possible (i.e., condylar plates with medial bony buttress). Due to their fixed-angle shape, successful application needs careful planning, concise orientation in all planes (AP and lateral views, rotation) and precise preparation of the channel for the blade. The purpose of this study was to study the use of 95 degree condylar blade plate in complex proximal femur fractures and evaluate the results for union rates, complications and functional outcomes.

Methods - Total 30 patients with complex proximal femur fractures were enrolled in our study. Out of 30 patients, 2 were lost to follow up. The inclusion criteria for this study were age between 18-50 years, all complex proximal femur fractures where nailing is not possible because of involvement of entry point and where proximal containment of the nail is not possible. Other indications were Narrow Medullary Canal, Non availability of the medullary canal because of distal femur fixation with an implant, while pathological fractures and fractures in less than 18 years people were not included. After fixation of the fractures with 95 degree blade plate, the patients were followed up every 1 month till radiological union was achieved. Results were evaluated using the HARRIS HIP SCORE & KYLE’S CRITERIA for clinical and radiological assessment after 1, 4 and 6 months from the day of surgery.

Results- Among the 30 cases enrolled in our study, 2 patients were lost to follow up. Out of the 28 patients, 18 (64.3%) were males and 10 (35.7%) were females. Mode of injury in most of the patients was road side accident which accounted for fractures in 22 (78.5%) patients. Radiological union was seen in 23 out of the total 28 patients (82.1%). The patients were evaluated post operatively using Harris Hip Score and Kyle’s criteria. Good to excellent results in Harris hip score were seen in 71.4% of the patients while 17.8% of the patients showed poor results. The average Harris Hip Score in our study was calculated as 79.3.

Conclusions- 95 degree condylar blade is an effective method of reduction of complex proximal femur fractures where nailing is impossible or is extremely difficult.

Keywords: 95 degree angled blade plate, proximal femur fracture, condylar plates.
Introduction

The Proximal femoral fractures account for a large proportion of hospitalization among trauma cases. The complex proximal femoral fractures require special methods of treatment and have their own set of complications and controversies regarding the optimal method of management. The management of the proximal femur fractures when the fracture is either neck of femur fracture, the intertrochanteric fracture, the subtrochanteric fracture or the reverse obliquity fracture has been already discussed at length in literature but when the fracture involves all three zones of the proximal femur including the neck, the intertrochanteric and the subtrochanteric area, there is a paucity of literature regarding the management options for these particular type of complex proximal femoral fractures. These complex proximal femoral fractures require special methods of treatment and have their own set of complications and controversies regarding the optimal method of management. Studies have reported various methods of extramedullary or intramedullary fixation in the management of these fractures. Studies have reported various methods of extra medullary or intra medullary fixation in the management of these fractures. The biomechanical aspects of an individual implant for these fractures need to be considered and the best device for each specific fracture pattern should be selected to increase the possibility of a favorable outcome. Currently, there are only a few published articles that report the use of the fixed angled blade plate, particularly a 95 degree angled blade plate, to treat complex proximal femoral fractures. Due to paucity of literature on the subject, we feel that there is an increased need for the study of optimal management of these complex proximal femoral fractures. The purpose of this study is to clarify the efficacy of using a 95 degree condylar blade plate fixation in the treatment of complex proximal femoral fractures.

Definition, classification and anatomical boundaries between fracture neck of femur, intertrochanteric fracture and subtrochanteric fracture has been well studied and well defined but there is a gray area when the fracture extends beyond the anatomical line of neck of femur, intertrochanteric area or the subtrochanteric area. Nowadays we are getting a lot of high velocity trauma, when fracture in the proximal femur is difficult to classify as fracture neck of femur, intertrochanteric fracture or subtrochanteric fracture as the fracture involves all the three zones of proximal femur namely the basal neck, the trochanter and the subtrochanter.

Though these types are rare but cases do occur especially in high energy trauma involving relative younger population. In the younger population, the major differences in physiology, injury characteristics and activity level necessitate a dedicated treatment pathway to restore the relationship of head-neck and the greater trochanter. In literature, these fractures are simply labeled as fracture proximal femur with subtrochanteric extension and labeled as comminuted proximal femoral fractures. No separate classification and guidelines exist for treatment of these proximal femoral complex fractures. Surgical stabilization of the proximal femur fractures is one of the most currently performed orthopaedic procedure. The goal of surgical intervention is to achieve anatomical reduction with a stable fracture fixation which helps bone union and allows early mobilization from the biomechanical viewpoint. The cephalomedullary nailing is the gold standard treatment in these fractures and has various advantages, namely shorter operating times and less blood loss, as well as lower rates of infection, non-union, and implant failure but few fractures are impossible to nail or extremely difficult to nail.

For cephalomedullary nail to be effective, proximal containment of the nail within the bone is must. In the absence of containment, because of comminution in the entry point, the nail just hangs on the two screws inserted to the head and neck which compromise the primary biomechanical stability of the nail. In certain proximal femoral fractures which are very high, proximal fragment is very short and nail has minimal capture in the proximal fragment and has minimal control over it but plating is simpler and easier in these fractures.

Methods

In the present study an attempt was made to study, evaluate, document and quantify our success in the management of such complex proximal femoral fractures which are impossible to nail or technically extremely difficult to nail due to the involvement of entry point of the cephalomedullary nail and where the greater trochanter is a separate free fragment by using the 95 degree condylar blade plate. This study included 30 patients of complex proximal femoral fractures and was conducted in the Department of Orthopaedics, Sri Guru Ram Das Institute of Medical Sciences and Research, Vallah, Amritsar. Out of the 30 patients, 2 patients were lost to follow up. 28 patients were followed...
up for a period of 6 months.

The fracture was approached through lateral approach. The patient was put on spica table. Formal open reduction was not attempted. Then via lateral incision, firstly if there is separation between greater trochanter and the head-neck fragment, the greater trochanter and the head-neck fragments are assembled together in proper alignment and fixed with 3.5mm inter fragmented screw. Next channel of blade was prepared as per preoperative planning (in AP view to restore the neck-shaft angle of the opposite normal femur and central in lateral view).

The proximal fragment was fixed with one/two additional screw going to the calcar region for the shaft fragments. Formal open reduction was not attempted. The fragments were grossly aligned with minimum dissection and the fracture zone was bypassed with plate and fixed with 4-5 screws distally.

If the fracture was stable, compression of the medial cortex was done but in the severely comminuted fracture, formal open reduction was not attempted and the blade plate was inserted via MIPO approach and indirect reduction was done. The fragments were grossly aligned with minimum dissection and the fracture zone was bypassed with plate and fixed with 4-5 screws distally. The wound was closed in layers over a negative suction drain.

Negative suction drains were removed at 24 hours. Postoperative antibiotic prophylaxis was stopped when the drains were removed. Passive range of motion exercises were initiated immediately on postoperative day 1. Non weight bearing or assisted weight bearing with the help of walker or crutches was maintained till radiological union occurs. Patients were re-evaluated with examination and radiographs at 1, 3 and 6 months postoperatively. The post-operative evaluation of the patients was done according to KYLES CRITERIA and HARRIS HIP SCORE.

Results

In our study, the age group of patients ranged from 18-48 years, with average age as 30.75 years. Most common mode of injury in our study was high velocity road traffic accident which accounted for fractures in 22 (78.5%) patients while 6 patients (21.5%) had fracture due to fall from height. Out of the 28 patients, 18 (64.3%) were males and 10 (35.7%) were females. The patients were followed up regularly till 6 months post-operatively. Non weight bearing protocol was maintained till radiographic union occurred. In our study, radiological union was seen in 23 out of the total 28 patients (82.1%). The rate of non-union in this study was 17.9%. In our study, union time of fractures ranged between 14 weeks and 24 weeks. The average union time in our study was 18.8 weeks. The patients were evaluated post operatively using Harris Hip Score and Kyle’s criteria. Good to excellent results in Harris hip score were seen in 71.4% of the patients while 17.8% of the patients showed poor results. The average Harris Hip Score in our study was calculated as 79.3. The postoperative outcome studied using Kyle’s criteria revealed good to excellent results in 78.5% of patients.

In this series, there were 8 complications (28.5%); 6 major (21.4%) and 2 minor (7.1%). In the major complications, 5 were complicated by nonunion and 1 patient had early implant failure in the form of plate bending within the first 4 weeks of surgery. In the minor complications, 2 patients had superficial infection over the incision site which was treated by oral broad spectrum antibiotics. No case of varus malunion was seen in our study.
management.

Despite the advances in surgical techniques and fixation devices, certain groups of complex proximal fractures of the femur continue to be a treatment challenge. The gold standard treatment of choice of complex proximal femoral fractures is cephalomedullary nailing but in certain cases where nailing is impossible or technically difficult; the 95 degree condylar blade plate is an excellent option for the stabilization of these fractures.

95 degree condylar blade plate possesses many unique qualities found in few other implants. It offers excellent stability and rotational control in complex fractures, provides immediate fracture compression through surgeon controlled application and offers valuable salvage options for failed fixation of other devices used in the proximal femur. Like any other technically demanding procedure, immediate and long term outcomes are optimized with experience and mastery of the surgical technique. It was seen in our study that complications occurred mostly because of non-compliance of the patients on non-weight bearing protocol coupled with long medial wall comminution of the proximal femur. Hence, these fixed angle implants can be effectively used in compliant patients and in fractures where preferably medial femoral cortex can be put under compression or at least where the lateral cortex is loaded under compression. In case of stable fractures, the medial femoral cortex is loaded under compression with the help of a compression device while in unstable fractures where there is comminution of the medial wall, indirect reduction of the fracture by minimal handling of the soft tissues and minimal disruption of the vascular supply to the medial cortex is done.

Proper handling of medial soft tissue structures result in high rates of union and less chances of implant failure. Fixed angle plating is an excellent implant when using indirect reduction and biological technique for sound stabilization, allowing high rates of union and decreased postoperative complications.

The advantages of our study are that it is a study in which a large amount (93.3%) of the patients were followed up and analyzed. It is a prospective study with long follow up of the patients. The 95 degree condylar blade plate was preferred as an implant based on patient’s characteristics. Only the younger patients with age between 18-50 years who sustained high velocity trauma were included in our study. Patients more than 50 years who suffered low energy trauma and pathological fractures were excluded from our study. The fracture geometry was given special consideration while selecting the patients. Only those fractures which were non nailable or difficult to nail due to the entry point of the nail or separation of the greater trochanter as a third fragment as assessed by 2 senior surgeons of our institution were included in our study. The 95 degree condylar blade plate was preferred as an implant based on patient’s characteristics. Proper handling of medial soft tissue structures result in high rates of union and less chances of implant failure. Fixed angle plating is an excellent implant when using indirect reduction and biological technique for sound stabilization, allowing high rates of union and decreased postoperative complications.

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in proximal femoral fractures but this study is unique in emphasizing the role of 95 degree condylar in a particular subset of patients with a specific fracture pattern occurring due to high velocity trauma.

**Conclusion**

Despite the advances in surgical techniques and fixation devices, certain groups of complex proximal fractures of the femur continue to be a treatment challenge. The gold standard treatment of choice of complex proximal femoral fractures is cephalomedullary nailing but in certain cases where nailing is impossible or technically difficult; the 95 degree condylar blade plate is an excellent option for the stabilization of these fractures.

But, 95 degree condylar blade plate in the fixation of complex proximal femoral fractures requires either a mechanically sound fixation with compression of the medial cortex or the biological integrity of the medial soft tissue structures when the medial cortex cannot be restored. (But, lateral cortex must be put under compression in all these cases). This implant also requires a compliant patient to follow non weight bearing protocol.

We believe that 95 degree angled blade plate is a recommendable alternative treatment of complex proximal femoral fractures which are deemed non nailable or technically difficult to nail. The surgical technique is technically demanding but can be a viable option for patients with these difficult fractures. Thorough preoperative planning, attaining an anatomic reduction, minimal medial soft tissue dissection, and secure fixation using screws and wires will ensure an optimal outcome.

**References**