

Research Article

Operative Treatment of Peritrochanteric Osteoporotic Fractures with Proximal Femur Locking Compression Plate: A Consecutive Study

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Abstract

Advances in modern medical science have increased life expectancy and the incidence of peritrochanteric fractures. Conventional implants such as sliding hip screws and angular blade plates can be used to effectively treat these fractures, but proximal femoral locking compression plates offer superior three-dimensional fixation and angular stability. From December 2012 to May 2015, 40 peritrochanteric fracture treated with LCP (Locking Compression Plate) were studied prospectively. With an average age of 69.77 years (range: 60 -80 years), there were fifteen females and six males. Patients with multiple fractures, open fractures, co morbidities, pathological fractures and more than 3 weeks old fractures were excluded. After six weeks, partial weight bearing was initiated and serial radiographs were taken at six, twelve and two months. 1.5 years later, union was achieved. The peritrochanteric fractures were categorized by AO classification. In our study, the majority of patients (n=21) had A1 fractures, with A1.1 (n=13 patients) being the most common, followed by A1.3 and A1.2 (n=5 and n=3, respectively). In our study, seventeen patients had A2 fractures, with A2.1, A2.2 and A2.3 occurring in eight, four and five patients, respectively. We only had two patients in A3 and one each in A3.1 and A3.2. The surgery ranged from 50 to 90 minutes, with a mean of 69 minutes (SD 11.29). In our study, complications included superficial wound infection in two individuals and deep infection in one patient. Three patients (n=3) developed Coxavara with shortening and one patient had a screw back out. At the final follow-up, patients were evaluated using the Modified Harris Hip Score. Our study found that LCP plates are more useful for unstable peritrochanteric fractures in elderly osteoporotic patients, with a higher percentage of Coxavara in our study. This can be prevented by delaying weight bearing in unstable fractures. However, there was no control group to compare our results with other modalities of treatment.

Keywords: Peritrochanteric Fractures; LCP (Locking Compression Plate); Coxa Vara; AO Classification; Unstable Fractures

Introduction

Aided by the advances of modern medical science, expectancy of life of people world over has increased and the incidence of Peritrochanteric fractures has been on the rise because of osteoporotic bones of the elderly people which get easily fractured [1,2]. The aim of surgery in these fractures is to achieve stability and early mobilization of the patient to avoid complications such as pulmonary embolism, urinary tract and lung infection, decubitus ulcers and thrombophelbitis [3,4]. These fractures can be treated successfully with conventional implants, such as sliding hip screws and angular blade plates and rarely by a primary hip arthroplasty with good clinical outcomes [5,6]. Proximal femoral Locking compression plate provides three-dimensional fixation and angular stable fixation compared with conventional treatment even in the case of unstable fracture in osteoporotic bone [7].

Materials and Methods

A consecutive study of management of peritrochantric fractures by LCP was conducted in Department of Orthopaedics in a tertiary care institute from Dec 2012 through May 2015. It included all peritrochantric fractures above 60 years ages with osteoporosis. Those with multiple fractures, open fractures and co morbidities were excluded. Similarly, patients with pathological fractures and patients with more than 3 weeks old fractures were excluded. The clinical examination was followed by radiological examination. The Singh Index was assessed on the opposite, non-fractured hip by means of an AP radiograph [8]. DVT prophylaxis was given right from the date of admission.

Surgical Technique

After spinal anaesthesia, patient was put on the fracture table; closed reduction of the fracture was done under image intensifier. A standard lateral approach was performed by a straight incision from the greater trochanter. In some patients, provisional indirect fracture reduction was done by attaching the Locking Proximal Femoral Plate to the proximal segment with appropriately oriented screws and then to the diaphysis with plate holding forceps.

Prior to placing the plate on the bone, wire guides were threaded into the plate holes for each of the three proximal locking screws. For two proximal screw holes, 7.3 guide wires were used and 5.0 wire guide was used in the third locking screw. Accurate positioning of the proximal guide wire (and ultimately the locking screw) assured frontal plane alignment. Before a guide wire was inserted into the second wire guide, we verified correct sagittal plane alignment of the plate on the proximal femur which required both visual and fluoroscopic assessment and it prevented an extension (apex anterior) deformity when the plate is attached to the diaphysis. When this alignment was satisfactory, guide wires were inserted through the next two wire guides, maintaining biplane fluoroscopic control [Fig. 1,2]. Appropriate length 7.3 mm cannulated locking screw were selected and inserted through proximal two screws holes. After that plate was secured to the lateral femoral shaft with clamps, adjusting horizontal plane alignment (rotation) as appropriate. We inserted a K-wire or a conventional 4.5mm screw in the most distal combi-hole of the plate for holding alignment. To obtain compression, we placed drill guide at the end of the non-threaded hole away from the fracture. As many standard 4.5 mm cortex screws as necessary were inserted. Necessary insertion of all additional locking screws was done. Insertion of oblique 5.0 mm cannulated locking screw was done in the end or after first two cannulated locking screws and need for this screw was fracture configuration dependent (in case of fractures with comminution around this screw insertion site, screws was inserted at the end after compression was achieved if required). Wound was closed in layers over suction drain.

After Treatment

Range of motion started next day as per pain tolerance. Patients were allowed touchdown weight bearing and walker mobilization from first postoperative day. X-rays were done at 6weeks, 12 weeks and then after every 2 months. The patients were followed regularly till union and an average of 1.5 years.

Results

In our study 100 patients with peritrochantric fractures were treated with with LCP. During our study period, patients were in age group of 60-80 years, average age 69.77 years (SD 7.378). 62 patients were females and 38 were males. In our study, we had more of left sided fractures with 52.5% while right side were 47.5%. The mechanism of injury is discussed further. In majority of patients (n=82) the mode of injury was trivial trauma. Out of 62 females in our study, 54 females had trivial injury as the mode of trauma and in males, 28 had this as a mode of trauma. 12 patients had fall from height while 6 patients had road traffic accidents as mode of injury. The fractures in our study were classified by AO classification. In our study most patients (n=52) had A1 fractures with majority falling in A1.1 (n=33 patients). 43 patients in our study had A2 type fractures. We had only 5 patients in A3 group and with 2 in A3.1 and 1 in A3.2. We had no patient in A3.3. The duration of surgery ranged from 50 to 90 minutes with mean of 69 minutes (SD 11.29). Most of our patients (n=80) were mobilized on walker on 2nd Postoperative day. In most patients (n=60) full weight bearing was allowed at 12-13 weeks while it was delayed to 14-15 weeks in 40 patients. Most of the fractures in our study united between 3 and 4 months with a mean of 3.4 months (13.7 weeks). Clinically union was presumed when patient had no pain on full weight bearing without any support and radiologically union was presumed as bridging of trabeculae across fracture site [Fig. 3]. The mean range of motion of hip at final follow-up was 197degrees (SD 16.11). Complications in our study are shown in Table 2. At final follow-up patients were assessed by Modified Harris Hip Score as

shown in Table 1. Excellent results were seen in 50 while as good results were seen in 42 Patients. Statistical analysis was done using Chi-square tests. There was no significant difference in results between two sexes ($p=0.786$). There was also no significant difference between two sexes with regards to complication also.

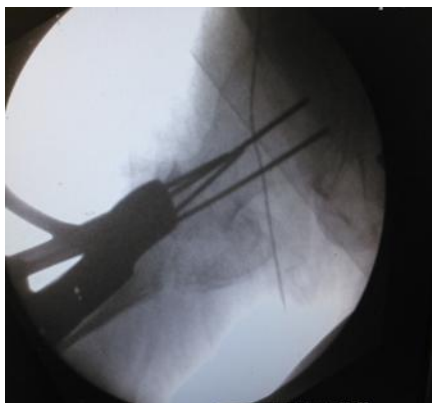


Figure 1: Placement of guide wires in lateral view.

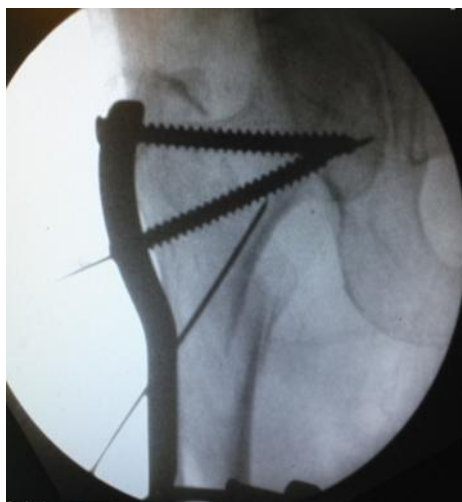


Figure 2: Placement of proximal two screws in AP view.



Figure 3: Fracture united at 6 months.

Results	Number of Patients
Excellent	50
Good	42
Fair	6
Poor	2

Table 1: Results at final follow up as per Modified Harri's Hip Score.

Complications	Number of Patients
Superficial Wound Infection	4
Deep Infection	1
Coxa Vara and Shortening	5
Screw Backout	3

Table 2: Complications.

Discussion

Fractures of the proximal femur, including fractures affecting the peritrochanteric region, have become a public health problem. Owing to ageing of the population, we have to operate on ever more elderly patients who sometimes present with significant co-morbidities. However, the indication for surgery is indisputable, given the considerable morbidity and mortality related to prolonged confinement to bed [19]. There is a wide array of operative treatments available for this type of fractures like sliding hip screw, Medoff's plate. These implants have given considerable success in stable fractures. However, limitations with these implants are poor results in comminuted, unstable and osteoporotic fractures [10-12]. Some Intramedullary fixation devices have been introduced like gamma nail, intramedullary hip screw and femoral reconstruction nails. These devices are theoretically more load sharing with medial cortex of femoral neck than lateral cortical constructs, so that bending at the nail screw junction is lower than that at the plate screw junction [13-15]. Till date clinical studies with the devices have not demonstrated a clear advantage of these devices over sliding hip screw. However, an incidence of 3% to 6% secondary fractures of femoral shaft at the tip of intramedullary device has been reported and many other problems like heterotrophic ossification, abductor muscle weakness, trochanteric region pain, interference with endosteal blood supply, technical complications high fluoroscopic exposure, screw back out and penetrations, etc. [13]. Locking plates have biological advantages over the standard plates [16,17]. A standard plate grips the bone by the friction created by the compression of plate against the bone by the screws. This leads to impaired blood supply resulting in decreased cortical thickness and cancellous transformation of bone [18]. Locking plates do not compress the bone or periosteum and are best suited for minimal invasive technique. The risk of peri- implant fracture is also reduced. It has been suggested that by reducing avascularity within the bone the risk of infection may be reduced. Further shorter locking plates could be used providing equivalent strength and requiring less dissection [19]. The stability allows for immediate weight bearing in the case of a stable fracture, with 100% consolidation at 3 months.

Complications as shown in Table 2 in our study included infection in 5 cases with superficial wound infection in four, deep infection in one. Deep infection was initially managed with daily dressings and antibiotics but patient did not improve. Patient was admitted and culture was taken. Patient was put on intravenous antibiotics as per culture sensitivity. Infection persisted; later debridement was done. Infection regressed to some extent but was still present. As fracture had united by that time, early removal of plate was done by 4 and ½ months and weight bearing was delayed. This was comparable to study of Sun-Jun Hu, et al., where he had 3 cases of superficial infection managed by antibiotics and dressings and one case of deep infection, managed by local debridement and intravenous vancomycin [30]. Weiting lee, et al., had one case of deep infection among 26 patients [31].

Although neck shaft angle was preserved in most patients, 5 patients developed coxa vara. Dou Yong- Feng, et al., had one case of coxa vara (n=1) out of 45 cases [28]. Zhou Ming Quan, et al., had 2 cases of coxa vara (n=2) out of 72 [27]. Wei Ting, et al., had no case of coxa vara in 26 patients [31]. Although we had slightly higher incidence of coxa vara compared to other studies which can be explained by the fact that coxa vara developed in higher fracture types as per AO classification in our study, more-so it developed in the patients who were taken at the start of study when we had technical difficulties. There were 3 cases of screw back out (of proximal locking screws) which is consistent with study of CQ Zhang, et al., who had two cases (n=2) of screw back out and loosening of proximal screws [22]. Sun-Jun Hu, et al., had also two cases (n=2) of implant failure out of 45 cases, while as Ting W, et al., had four cases of loosening of screws among 26 cases [30,31]. Early weight bearing and non-locking of the proximal screw was found to be the cause of screw back out in our study. Weight bearing was delayed in this patient and fracture united normally. There was no case of screw breakage or implant failure in our study. Proximal screw breakage was found in two cases, out of 45 in study of Sun-Jun Hu, et al. and Zha GC, et al., had one case of proximal screw breakage out of 110 cases [29,30]. Jhonson B, et al., reported complication in 12 out of 29 patients in terms of bending, cut out, breakage of screws, plate fracture, etc particularly in elderly [32]. 2 patients were lost to follow up due to death as patient had multiple co morbidities which is consistent with most of studies like Zha GC, et al., who had two deaths out of 110 cases and peritrochanteric fractures in elderly routinely as mentioned in introduction [29]. Sun Jhu Min, et al., had one death out of 45 cases [30]. Evans reported 15% mortality associated with these fractures [33]. We had excellent to good results in most (n=37) patients as assessed by Modified Harris Hip Score.

Conclusion

Although there are variety of implants available for treatment of peritrochantric fractures, in our view, LCP plates are more useful for unstable peritrochantric fractures in elderly osteoporotic patients. In our study there was higher percentage of coxa vara as compared to others which we believe can be prevented by delaying weight bearing in unstable fractures. The drawback of our study is that we had no control group to compare our results with other modalities of treatment.

Conflict of Interest

The authors have no conflict of interest to declare.

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