



Management of AO31A3 Intertrochanteric Femur Fractures Using 95° Dynamic Condylar Screw-Plate

KEYWORDS

Intertrochanteric fractures, Dynamic Condylar Screw (DCS).

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ABSTRACT *Background: Management of AO31A3 intertrochanteric fractures has unique problems because of peculiar anatomy, leading to high instability. There is no standard treatment protocol described in literature. So, this prospective study was done to evaluate clinical outcomes of management of these fractures by Dynamic Condylar Screw-plate (DCS). Methodology: 25 patients having AO31A3 fractures were managed with open reduction and internal fixation using DCS as per standard AO technique. Results: Average time of union was 18.66 weeks, with a mean Harris Hip score of 88.09. Complications seen were non-union, varus collapse, implant failure and limb length discrepancy. Conclusion: Results were comparable with other studies in the world. Design of DCS allows its use specially in AO31A3 fractures, where DHS has high failure rates. DCS is a very versatile implant which allows anatomical and rigid fixation. It allows rotational stability of proximal fragment because of extra screw fixation apart from lag screw.*

INTRODUCTION

Management of AO31A3 intertrochanteric fractures of femur still poses challenges for orthopaedic surgeons throughout globe. These fractures are characterized by having a fracture line exiting the lateral cortex of femur distal to vastus ridge¹. These fractures have been recognized to have unique anatomic and mechanical characteristics and are considered as unstable because of tendency towards femoral medialization due to pull of iliopsoas attached to lesser trochanter, which reduces the area of bone to bone contact, leading to delayed fracture healing or malunion or risk of fixation failure². Apart from these, degree of comminution and osteoporosis further adds to the woes of operating surgeon³.

The management of AO31A3 fractures is still a subject of debate as there is no standard treatment protocol recommended⁴. Fixation of these fractures using various implants like sliding hip screws, intramedullary nails, proximal locking femoral plates, fixed angled plates etc, had been done in various studies^{5,6}. Every implant and surgery is associated with its own unique set of complications. But still a final consensus has not been reached regarding which implant gives best fixation with least complications and failure rates.

This study is being carried out to evaluate the clinical outcomes of management of AO31A3 intertrochanteric fractures by DCS.

MATERIAL AND METHODS

This prospective study was conducted in Department of Orthopaedics, Maharaja Agrasen Medical College, Agroha (Hisar). A total of 25 patients having AO31A3 femur fractures admitted between September 2013 to December 2014, were managed using 95° dynamic condylar screw-plate (DCS). The patients include 16 males and 9 females ranging in age between 32 years to 75 years (average 58.05 years). According to AO/OTA classification 4 cases had AO31A3.1, 3 had AO31A3.2 and 18 had AO31A3.3 fractures. Patients having open or pathological fractures were excluded from the present study. 11 patients sustained the fracture due to trivial fall, 5 due to fall from height and 9 due to high velocity road traffic accident. All the patients were operated under spinal anesthesia in supine position on a fracture table. Dissection was done using standard lateral approach for thigh, open reduction and fixation was done using 95° Dynamic condylar screw with barrel plates as per standard protocol under C-Arm guidance.

Intravenous broad spectrum antibiotics were given till 3rd post operative day. Hip, knee and ankle range of movement exercises were started from day of surgery. Patient was ambulated on 1st post operative day with non weight bearing over operated limb with help of walker. Patient was discharged after suture removal. Partial weight bearing was allowed after 6 weeks, gradually increased from 25% to 100% in graded manner. Full weight bearing was allowed only after clinical and radiological evidence of un-

ion, ranging from 12 weeks to 30 weeks. All patients were followed up at 6,12,18,24, 30 weeks and 1 year post-operatively on OPD basis.

RESULTS

Average time of union was 18.66 weeks (range of 12 to 30 weeks). Non union was seen in one patient, that might be because of old age with osteoporosis and high degree of comminution with a large posteromedial defect. No case of screw cut out or side plate pull out was observed, though there was implant failure in one patient. Implant failure was seen in form of plate breakage due to early weight bearing over operated limb by the patient against advice, leading to stress on implant which ultimately gave away at 12 weeks. That patient was re-operated and union was achieved at 16 weeks post-operatively. Varus collapse was seen in one patient due to early weight bearing before complete fracture healing, leading to collapse at fracture site and bending of barrel plate. Limb length discrepancy was seen in three patients, with shortening of about 1cm in two patients and 2cm in one patient.

Figure 1.

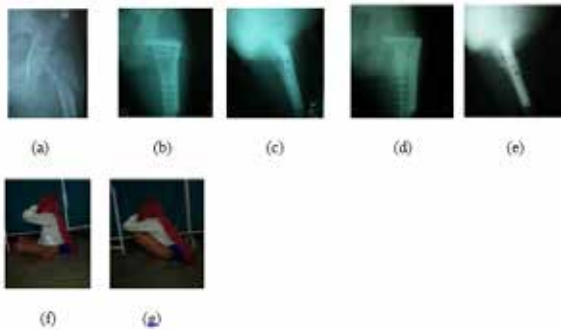
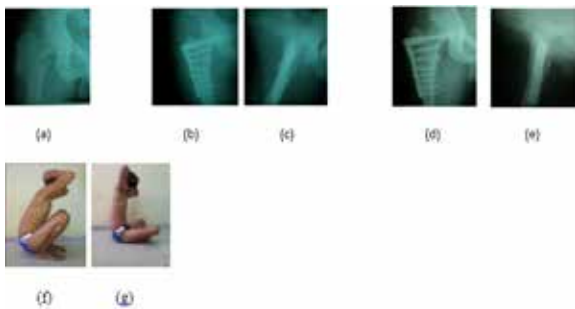
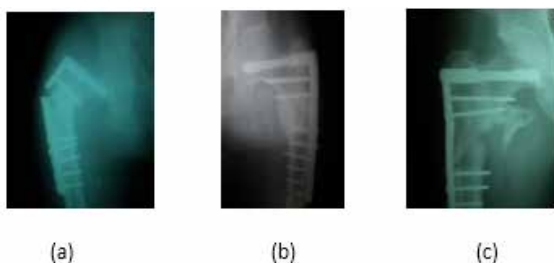


Figure 2.



[Figure1&2: (a) pre-operative x-ray, (b)&(c) post-operative x-rays, (d)&(e) union x-rays, (f)&(g) final functional outcomes]

Figure 3.



[Figure 3: complications (a) implant failure, (b) varus collapse, (c) non-union]

One patient had developed grade 2 bed sore before surgery, that might be because patient reported to hospital after a delay of 1 week from day of injury and further got delayed for surgery for nearly about a week because of hypertension diagnosed at time of admission. Regular dressing was done for bed sores. The bed sores healed spontaneously following fixation of fractures and making the patient ambulatory. Superficial infection was seen in one patient, which was controlled with regular dressings and antibiotics. None of the patient had any deep infection. All the patients were able to sit cross legged and squat after union except two patients who were having osteoarthritis of knee and were not able to perform these activities even prior to surgery.

The functional evaluation of results was done using Harris Hip score. The average Harris Hip score was 88.09, with 13 patients having excellent grade, 9 having good grade, 2 having fair and one having poor grade.

DISCUSSION

The incidence of complications and failures associated with various types of implants used for management of AO31A3 intertrochanteric femur fractures, compels the surgeon to give a second thought regarding selection of proper implant.

The average time of radiological union in present study was 18.66 weeks, with a range from 12 weeks to 30 weeks, which is on higher side though comparable to that reported in literature in some series (22.59 and 16 weeks in a study by Sahin et al⁷ and Bukhari et al⁸ respectively). This was probably because majority of cases in the present study were having highly comminuted fractures. Non union was seen in 4% cases in the present study as compared to 2.7%, 7.14% and 5.26% in studies done by Sahin et al⁷, Elis et al⁹ and Sadowski et al¹⁰ respectively. Implant failure was seen in 4% cases in the present study as compared to 5.41% and 5.26% in studies done by Sahin et al⁷ and Sadowski et al¹⁰ respectively. Varus collapse was seen in 4% cases in the present study as compared to 21.42% in a study done by Elis et al⁹. There is no case of screw cut out in the present study as compared to 2.7% and 26.32% in the studies done by Sahin et al⁷ and Sadowski et al¹⁰ respectively. Average Harris Hip score is 88.09 in the present study which is better than study done by Elis et al⁹ with an average Harris Hip score of 60.4 and comparable to study done by Bukhari⁸ et al with an average Harris Hip score of 88.

The reasons for the excellent results in present study is rigid fixation in almost anatomical reduction and with minimal soft tissue insult and early aggressive physiotherapy.

CONCLUSION

DCS allows better reconstruction in comminuted AO31A3 intertrochanteric fractures and prevents loss of reduction by giving lateral support. It provides better rotational stability of proximal fragment because of additional screw fixation¹¹. It is versatile implant, as it allows interfragmentary compression and fixation in selected cases. It has a slow learning curve but once technique is mastered, success rate is high.

DCS is a successful implant apart from PFN in AO31A3 intertrochanteric fractures, where DHS can not be used because of fracture of lateral wall leading to significant collapse and high failure rates^{3,6}. Many studies carried out worldwide shown no significant differences in long term

functional outcomes⁹ and complications rate in management of these fractures either by DCS or PFN. Although fracture of shaft of femur is known complication of PFN either intra-operatively or later on, but this is not seen with DCS. Till date no implant has one sided superiority over others in surgical management of AO31A3 intertrochanteric fractures. Research is still going on to find out the most suitable implant.

REFERENCES:

1. Kregor PJ, Obremsky WT, Kreder HJ, Swiontkowski MF. Unstable peritrochanteric femoral fractures. *J Orthop Trauma* 2005;19(1):63-6.
2. Brammar TJ, Kendrew J, ParkerMJ. Reverse obliquity and transverse fractures of the trochanteric region of femur; a review of 101 cases. *Injury* 2005;36(7):851-7.
3. Kulkarni GS, Limaye R, Kulkarni M, Kulkarni S. Intertrochanteric fractures. *Indian J Orthop* 2006;40:16-23.
4. Niedzwiedzki L, Kunicki P, Pilut D, Niedzwiedzki T. Treatment of reverse obliquity intertrochanteric fractures. *Pol Orthop Traumatol* 2012;77:77-82.
5. Schipper IB, Marti RK, van der Werken C. Unstable trochanteric femoral fractures: extramedullary or intramedullary fixation. Review of literature. *Injury* 2004;35:142-51.
6. Matre K, Havelin LI, Gjertsen JE, Vinje T, Espehaug B, Fevang JM. Sliding hip screw versus IM nail in reverse oblique trochanteric and subtrochanteric fractures. A study of 2716 patients in the Norwegian Hip Fracture Register. *Injury* 2013;44(6):735-42.
7. Sahin EK, Imerci A, Kinik H, Karanpinar L, Canbek U, Savran A. Comparison of proximal femoral nail antirotation (PFNA) with AO dynamic condylar screw(DCS) for the treatment for unstable peritrochanteric femoral fractures. *Eur J Orthop Surg Traumatol* 2014;24:347-52.
8. Bukhari SAH, Asghar A. Dynamic Condylar Screw Fixation for comminuted proximal femur fractures. *J Surg Pak (Int)* 2011;16:149-52.
9. Elis J, Chechik O, Maman E, Steinberg EL. Expandable proximal femoral nails versus 95° dynamic condylar screw-plates for the treatment of reverse oblique intertrochanteric fractures. *Injury* 2012;43:1313-7.
10. Sadowski C, Lubbeke A, Saudan M, Riand N, Stern R, Hoffmeyer P. Treatment of reverse oblique and transverse intertrochanteric fractures with use of an intramedullary nail or a 95 degree screw plate: a prospective, randomized study. *J Bone Joint Surg Am* 2002;84:372-81.
11. Singh AK, Thong G, Laloo N, Singh AM, Singh SN. Management of trochanteric fractures. *Indian J Orthop* 2006;40:100-2.