ORIGINAL ARTICLE

Comparison of proximal femur nail and dynamic condylar screw in treating proximal femoral fractures

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Abstract

Objectives: To compare results of fixation of the 31A3 fracture with Proximal Femoral Nail (PFN) or Dynamic Condylar Screw (DCS).

Study Design:Prospective comparative randomized trial

Setting and Duration: The study was conducted in Liaquat National Hospital Karachi during February 2012 to August 2013

Methodology: 40 patients were enrolled for his study having 31A3 type fractures according to AO classification. 19 patients were treated with DCS and 21 with PFN. Evaluation was done in terms of operative time, operative blood loss by comparing number of post operative blood transfusion on basis of post operative haemoglobin, functional outcome was assessed using Harris hip score and time to achieve fracture union was also noted.

Results: PFN proved to have a better functional outcome (P<0.05). Patients treated with PFN had shorter operative times, and fewer blood transfusions compared with those treated with a DCS (P<0.001). Implant failure and/or nonunion was noted in six of the nineteen patients who had been treated with the DCS. Only one of the twenty one fractures that had been treated with PFN did not achieve union.

Conclusions: Proximal femoral nail is a superior implant than dynamic condylar screw in the treatment of 31A3 proximal femur fractures. It has better functional outcomes and early union rates.

Key Words: Proximal femoral fracture, dynamic condylar screw, proximal femoral intramedullay nail, Osteoporosis

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Introduction

Inter-trochanteric femur fractures are composed of different anatomic patterns that vary in their degree of stability following open reduction and internal fixation.[1] The unstable type of fractures constitute one half of the inter-trochanteric fracture classification described by Evans[2]; and time and experience has repeatedly cleared itself that this variety of fractures are not treatable by the standard sliding hip screw used frequently for the stable types.[3,4]

Trochanteric fractures represent a major health risk for elderly individuals. Although a large number of different implants are available for fixation, the ideal implant for treatment of peritrochanteric fractures is still a matter for discussion. The imperative goals of treatmentare early mobilization by means of stable fixation using as minimally invasive a procedure as possible. Intra-medullary devices appear to be most appropriate in view of their biomechanical properties. However, peri-operative and post-operative technical complications are common in some cases, necessitating reoperation.

Several fixation devices have been developed to overcome the difficulties encountered in the treatment of unstable trochanteric femoral fractures. Until recently, most of these fractures were treated by a sliding hip-screw system. Since this device performed less well in unstable trochanteric fractures, with high rates of failure, intra-medullary fixation devices have become

Table 1: *Comparison of various characteristics between group I and II*

	DSC (Group I) n=19	PFN (Group II) n=19	P-Value
Age	77 ± 14	80 ± 13	
Operative time(min)	166 ± 48	82 ± 53	<0.001 (Mann Whitney U)
Blood transfused(unit)	2.95 ± 1.7	1.45 ± 0.5	<0.001 (Mann Whitney U)
Type of reduction			
Open	19	5	
Closed	0	16	
Complications			
Implant Failure	6	0	0.040 (Chi-square)
Non union	1	1	
Functional Outcome			
Harris Hip Score	56.84 ± 21.81	72.76 ± 11.41	0.003 (Mann Whitney U)

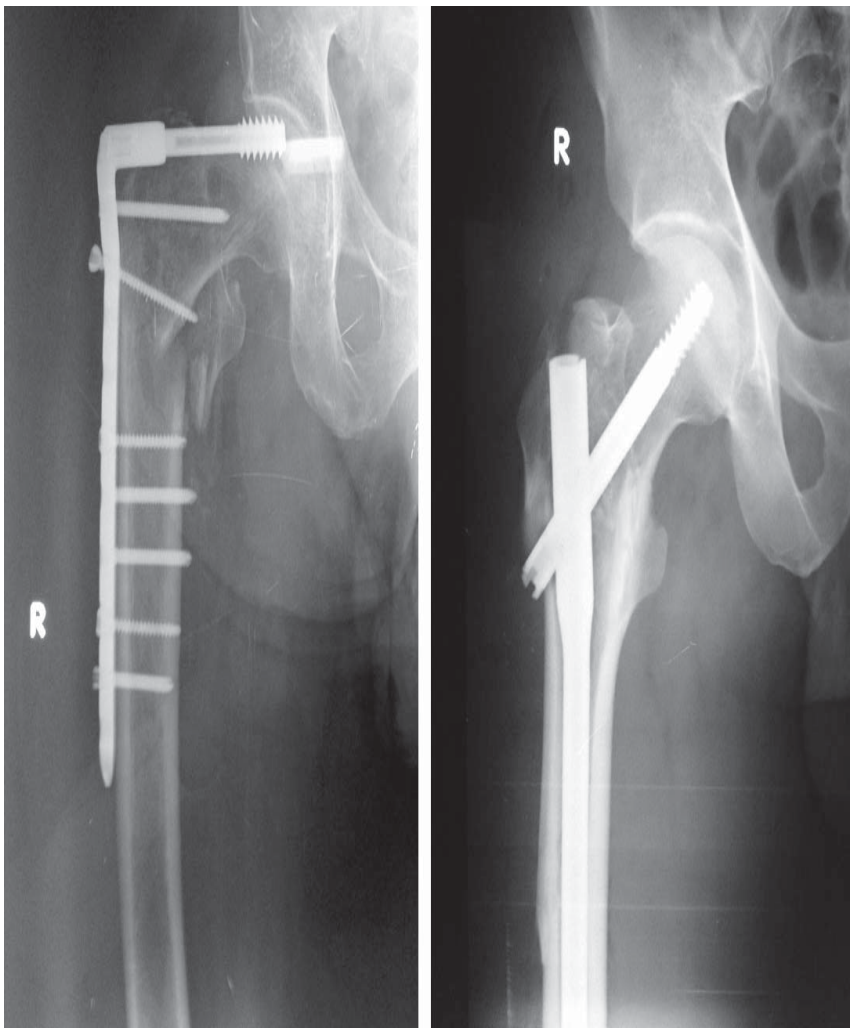

Fig.1: *Post operative radiographs of two different patients at 5 months. Proximal femoral nail with fracture in union, while dynamic condylar screw cut out from the femoral head*

increasingly popular.[5] The main principle of this type of fixation is based on a sliding screw in the femoral neck-head fragment, attached to an intra-medullary nail. The latter has advantages from the biomechanical point of view.

The newer cephalo-medullary nails are getting much attention in this regards. Despite being technically difficult to perform, these implants are gaining wide acceptance in treating unstable inter-trochanteric fractures because of its advantages of being inserted through small exposure, preservation of hematoma and less blood loss.[6,7] One implant of such type is the proximal femoral nail (PFN). Developed by the AO/ASIF in 1996[8], it is commonly used now internationally[9] as well as nationally.[10]

Different inputs have been put forward by various researchers with some reporting PFN as a better option to some stating no significant differences between the two. At our centre we carried out a trial to compare results of fixation of the 31A3 fracture with PFN or DCS and share our experience regarding these implants.

Methods:

It was a prospective randomized comparative study. All the patients with age 55 years or more presenting to our outpatient or emergency department during February 2012 till August 2013 with 31A3 fractures that was sustained after a simple fall were enrolled. Those patients who were unfit for surgery or had other disorders affecting their outcomes, i.e. cognitive disorders or mental illness or stroke or limb paresis were excluded out. After obtaining informed consent, demographic data and pre operative hemoglobin value was recorded.

Patients were randomized in either Group I being treated with DCS, or Group II being treated with a PFN. All surgeries were performed by senior surgeon. Operative time for both groups was recorded. Number of intra-operative and post-operative blood transfusions were recorded. Post-operative hemoglobin level of <9.5 gm/dl was considered as threshold for transfusion. After discharge, regular follow up meetings were arranged in outpatient department and union was assessed radiologically. At 6 months post-

operative interval, the functional capacity of the patient was evaluated using the Harris hip score. Any complications such as implant failure and Non-union were also noted. Data was analyzed using SPSS version-17. Mann Whitney U test was utilized to compare the operative times, blood transfusions and Harris hip score. Chi square test was used for comparison of complications.

Results:

There were total 40 patients, 19 of them were operated and had their fractures fixed with a DCS and 21 underwent treatment with a PFN. All of the patients sustained the fracture during a low-energy injury, after a fall from standing height.

The mean operative time for the patients who received DCS was more than twice as that for the patients who received PFN (See Table – I). All of the patients who were treated with the dynamic condylar screw had an open reduction. In comparison, only five of the twenty one patients(23.8%) who were treated with the intramedullary nail had an open reduction. Eighteen of the nineteen patients in Group I received a transfusion, compared with eleven of the twenty one patients in Group II.

Six (31.5%) patients in Group I had a failure of implant, i.e. five had screw cut-out from the femoral head, and one had plate breakage. One patient had a nonunion with an intact DCS implant (figure–1). In comparison, one patient in Group II had a nonunion and persistent pain with an intact implant. The difference between the groups with regard to the failure rate at 6 months was significant ($p = <0.05$). Harris Hip Score at 6 months was 56.84 ± 21.81 in Group I while it was 72.76 ± 11.41 in Group II ($p<0.05$).

Discussion:

The basic purpose of study at our centre was to determine whether there is a difference between a fixed-angle screw-plate device such as DCS and an intra-medullary nail in the treatment of unstable inter-trochanteric fractures, namely, AO/OTA 31-A3 fractures. A3 intertrochanteric fractures differ from A1 and A2 pertrochanteric fractures in that the fracture line extends through the lateral femoral cortex distal to the vastus ridge of the greater trochanter. While a sliding hip-screw device has been favored most often for the stabilization of A1 and A2 fractures, such an implant is not generally favored for A3 fractures.[3,4] A few authors have specifically used the terms reverse oblique fracture and A3 fracture.[3, 4,11] Many authors have commented on the unsatisfactory results associated with the use of a sliding hip screw for fixation of these fractures.[4,11] In A1 and A2 fractures, axial loading leads to fracture impaction. In A3 fractures, such impaction does not occur and medial displacement of the distalfragment with instability of the fracture is common. To eliminatethe problem of medial displacement and loss of fixation, afixed-angle implant has been recommended for these fractures.[4]

Haidukewych et al.[4] retrospectively reviewed intertrochanteric or subtrochanteric. The results of treatment with a sliding hip screw were then compared with the results of treatment with a 95° fixed-angle device (a blade-plate or a dynamic condylar screw). The authors concluded that the overall failure rate associated with the sliding hip screw was higher when the device was used for A3 fractures than when it was used for "standard" (A1 and A2) fractures, and they suggested that a 95° fixed-angle implant was the preferable alternative for the treatment of reverse oblique fractures such as DCS. However, Rosso et al.[12] concluded that unstable intertrochanteric fractures in elderly patients should not be treated with this implant. This was consistent with our own experience, which prompted us to perform the present study to specifically analyze the potential benefit of an intramedullary device for patients with these difficult fractures. Many authors prefer the use of an intramedullary implant for the treatment of unstable intertrochanteric fractures.[5, 8] In most reports in the literature, sliding hip screw devices have been compared with intramedullary nails for the treatment of all types of stable and unstable intertrochanteric fractures but A3 fractures have not been considered separately.

Our study had limitation regarding the operative technique which varied with regard to the exposure of the fracture for fixation. In Group II (PFN), open reduction was performed for only five patients(23.8%) in whom the fracture could not be reduced closed, and in those cases only a limited open reduction was required to pass the nail into the distal fragment. In contrast, all of the fractures that were treated with the dynamic condylar screw i.e Group I, were exposed through a direct approach in order to achieve reduction and fixation. This likely resulted in loss of fracture hematoma, and some degree of devascularization of the bone; and may have an adverse effect on the time to fracture union. Moreover open reduction lead to more blood loss and higher transfusion rate.

Conclusion:

PFN is a better implant than DCS in the treatment of 31A3 proximal femur fractures. It results in a more biological healing of fracture and gives better stability when considered in above mentioned unstable fracture types. Shorter anaesthesia times and fewer blood transfusions is a safe practice in general and an essential when considering the elderly population and PFN delivers these benefits well. Moreover early union may be achieved with closed method of treatment and this aid in early weight bearing and better functional outcome.

Role and contribution of Authors:

Dr Asad Khan Ghilzai, MBBS, Liaquat National Hospital, Karachi, Resident Orthopaedics, collected the data and references.

Dr Zaki Idrees, MBBS, FRCS, Liaquat National Hospital, Consultant Orthopaedic surgeon, is a consultant surgeon collected the data and helped in writing the discusison, result and conclusion.

Dr Muhammad Ayub Khan, MBBS, Liaquat National Hospital, Senior Registrar Orthopaedics, collected the data and helped in initial write up of introduction, methodology and result.

Dr Muhammad Kazim Rahim Najjad, MBBS, FCPS, AO Trauma Fellow, Liaquat National Hospital, Senior Registrar Orthopaedics, wrote the initial introduction, methodology and result.

Dr Ibrahim Idrees, MBBS, Hamdard College of Medicine and Dentistry, collected the data and references

Dr Mehroze Zamir, MBBS, Liaquat National Hospital, Resident Orthopaedics, collected the references and helped in writing the methodolgy.

Conflict of Interest: None

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