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ORIGINAL ARTICLE

AO/OTA 31A2 and 31A3 Intertrochanteric Fractures Managed by Proximal Femoral Nail Antirotation (PFNA)

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ABSTRACT

Aim: To study the clinical and radiological outcome of unstable intertrochanteric fracture AO/OTA 31A2, 31A3 fixed by proximal femoral nail antirotation

Study design: Descriptive cross sectional study.

Place and duration of study: Department of Orthopedic Surgery and Traumatology, Pir Abdul Qadir Shah Jilani Institute of Medical Sciences, Gambat, Sindh from 1st January 2016 to 31st December 2019.

Methodology: Forty four cases having intertrochanteric fracture AO/OTA 31A2, 31A3 with age ranging from 18 year to 55 year of either gender were selected; patients having close fracture, who were willing were included in the study, while patients older than 55 year and younger than 18 year, AO/OTA 31A1 fracture, open fracture, bilateral injuries, smoker, alcoholic, drug addicted, poly-trauma, pathological fracture and history of poor compliance, psychiatric disease were excluded.

Results: There were 26(59.09%) males and 18(40.91%) females with mean age was 41.3±7.7 years. Regarding classification; AO/OTA 31A2 were 33 (75%), and 31A3 were 11 (25%). Mean time for union was 18.5±3.55 weeks. The average time of follow-up was 48.5±6.6 weeks. Harris Hip Score was excellent (90-100) in 31(70.45%), good (80-89) in 7(15.91%), fair (70-80) in 3 (6.81%) and poor (<70) in 3 (6.81%).

Conclusion: Intramedullary device proximal femoral nail antirotation can be labelled as implant of choice for unstable intertrochanteric fractures AO/OTA 31A2, 31A3, with fruitful clinical and radiological outcomes, and with fewer complications. Hip Harris score was excellent-good in 86% of the patients.

Key words: Proximal femoral nail antirotation (PFNA), AO/OTA 31A2, 31A3, *I*ntertrochanteric, unstable fracture

INTRODUCTION

The occurrence of proximal femoral fractures has expanded extensively during later a long time in light of the overall expansion in life expectancy[1]. Conservative treatment and confinement to bed till fracture consolidation can be life threatening as it can drive to systemic and local complications including anxiety, pneumonia, bed sores and deep venous thrombosis[2]. Treatment of these injuries in a modern world requires an implant with a minimally invasive operation procedure, full body weight-bearing after the surgery and low complication rate[3]. The dynamic hip screw (DHS) has acquired far and wide acknowledgment during the most recent decade and is at present still considered the standard method for stable fractures[4]. The DHS has been appeared to deliver great outcomes however complications are regular, especially in unstable pertrochanteric fractures as extended surgery time, bleeding, screw cut-out, screw penetration to joint, and implant failure leading to varus malunion, nonunion of fragments[5,6].

Various implants have been created and promoted by various makers; Gamma nail (Stryker Howmedica), the intramedullary hip screw (Smith and Nephew Richards), the proximal femoral nail (Synthes) and the ACE trochanteric nail (DePuy Orthopedics). Cephalocondylic intramedullary implant proximal femoral nail first time used in 1997, and later on Proximal femoral nail Antirotation device, by Arbeitsgemeinschaft für Osteosynthesefragen/Association for the Study of Internal Fixation (AO/ASIF) in 2004, an intramedullary device with a helical cutting blade instead of a screw for better engage in the femoral head.[7-9] The principle plan for the implant is the utilization of a single spiral blade with a huge surface zone, that compacts the cancellous bone, thus providing ideal securing and solidness when used into osteoporotic bone.[10] Points of interest of proximal femoral nail antirotation are less invasive surgery with biologic as well mechanical advantage, because of close percutaneous fixation, it might diminish measure of additional surgical injury, preservation of the fracture hematoma and blood loss. Being biomechanically, predominant this load sharing device give significantly more angular and rotational stability[9,11]. Not only this but PFNA offers early movement and proper rehabilitation on contrary to extra medullary devices[12] *It avoids surgeon caused* devascularization of fracture fragments *thus declining the rate of fracture nonunion and simultaneously providing considerably mor*e axial stability because of its intramedullary property thus it facilitates the patients to mobilize relatively early after surgery[13].

Unstable fractures of this kind previously fixed with DHS presented usually with mentioned complications, so we intended this study to analyze the various outcomes of AO/OTA 31A2, 31A3 fractures fixed by PFNA at our institute so the surgical practice can be standardized with lesser complications and that we can share our experience with orthopedic community so the patients of this kind can be benefited by standard methods.

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MATERIALS AND METHODS

This descriptive prospective study was conducted at Department of Orthopedic Surgery and Traumatology, Pir Abdul Qadir Shah Jilani Institute of Medical Sciences, Gambat, Sindh, between January 2018 and December 2020 after permission from Ethical Review Committee of the institute. 44 consecutive cases having intertrochanteric fracture AO/OTA 31A2, 31A3 with age ranging from 18 year to 55 year of either gender were selected; patients having close fracture, who were willing were included, while patients older than 55 year and younger than 18 year, AO/OTA 31A1 fracture, open fracture, bilateral injuries, smoker, alcoholic, drug addicted, poly-trauma, pathological fracture and history of poor compliance, psychiatric disease were excluded.

Included cases dealt according to advance trauma life support protocol, tetanus, fluid/blood replacement, analgesics, empirical antibiotics were started. All the cases received standard treatment according to protocols. After needed emergency management, patient was moved to ward. Patient's brief history, examination points, X-rays and routine labs were noted on pro-forma. After taking consent for surgery and publication, all the

cases were managed by PFNA by standard guidelines (Fig. 1)[14] After satisfaction on clinical and radiological aspects, patients discharged and directed for follow-up in outpatient department till fracture consolidation and rehabilitation. Follow-up was carried out in OPD till fracture union. Those who lost follow-up were excluded from the study. Hips assessed functionally by Hip Harris Score[15] at final visit and graded as excellent, good, fair and poor. Each variable noted on predesigned pro-forma and analyzed by SPSS version 18.

Fig. 1: Intertrochanteric fracture fixed by PFNA

RESULTS

Twenty six (59.09%) were males and 18 (40.91%) were females with mean age was 41.3±7.77 years (Table 1). Low energy trauma domestic falls was highest reported in 29 (65.9%) patients and road traffic accident in 5 (34.1%); among them 6 (13.63%) had pedestrian hit by motor vehicle. Twenty five (56.81%) cases having left sided while 19 (43.19%) having right sided injury. Regarding classification; AO/OTA 31A2 were 33 (75%), and 31A3 were 11 (25%). Three cases were known diabetic with controlled blood sugar levels on medications, 2 were hypertensive and 3 were ex-smoker.

Average time from injury to hospital arrival was 28.5±11 hours. Average time of surgery was 69±15.5 minutes. Average hospital stay was 10±4.7 days. Mean time for union was18.5±3.55 weeks. The average time of follow-up was 48.5±6.6 weeks (Table 2). Closed reduction of the fracture was gained in all cases. All patients were full weight bearing by 7.1±2.2 weeks after fixation. Among complications; Superficial surgical site infection was noticed in 3 (6.81%) and dealt with sterilized dressings and antibiotics, deep seated infection was evident in 1 (2.27%) that managed with repetitive debridement and culture specific antimicrobials, while per-operative iatrogenic femoral shaft fracture, implant failure, medialization of distal fragment and spiral blade cut out was not seen in any case. Harris Hip Score was excellent (90-100) in 31 (70.45%), good (80-89) in 7 (15.91%), fair (70-80) in 3 (6.81%) and poor (<70) in 3 (6.81%) [Table 3]

Table 1: Demographic information and complications (n=44)

Variable	**No.**	**%**
Gender		
Male	26	59.09
Female	18	40.91
Mean age (years)	41.3±7.7	
Classification		
AO 31A2	33	75.0
AO 31A3	11	25.0
Side		
Right side	25	56.81
Left side	25	56.81
Average time from injury to hospital arrival (hours)	28.5±11.7	
Average surgery time (minutes)	69±15.55	
Average hospital stay (days)	10±4.7	
Complications		
Superficial surgical site infection	3	6.81
Deep infection	1	2.27

Table 2: Functional results (n=44)

Variable	Mean±SD
Mean duration of follow-up (weeks)	48.5±6.6
Mean time of bone union (weeks)	8.5±3.5
Mean time of full weight-bearing (weeks)	7.1±2.2

Table 3: Frequency of Harris Hip Score (n=44)

Harris Hip Score	**No.**	**%**
Excellent (90-100)	31	70.45
Good (80-89)	7	15.91
Fair (70-80)	3	6.81
Poor (<70)	3	6.81

DISCUSSION

Lot of work has been done on unstable intertrochanteric fractures fixed by either intramedullary or extra medullary device nationally and internationally in terms of different functional and radiological variables[16]. Proximal femoral nail is an intramedullary device and has all favorable circumstances of intramedullary biomechanics, for example, diminishing the moment arm, can be performed by close procedure, which save the haematoma and it's a significant thought to promote union, it likewise decline blood loss, contamination hazard, limits soft tissue dissection and wound associated complications[17]. Axial loading in 31A1 and 31A2 breaks prompts segment impaction, while in 31A3 such impaction doesn't happen, and medial displacement of the distal part is usual because of the highly unstable reverse oblique pattern of fracture.[18] As of now, PFNA is an adequate stable construct for insecure proximal femoral fractures, personal satisfaction and quality of life are generally points that are significant for patients and medical care providers, one is able to perform activities of daily life as to walk, squat, sit cross leg, and to climb stairs.[19] This magic device is not only indicated for intertrochanteric fractures but has been recommended as implant of choice in subtrochanteric fractures as described in study of 33 patients at civil hospital Karachi by Kumar.[13]

Qidwai[20] has done recent study of 18 months with 9 month follow-up in Lucknow India; comparative study between DHS and PFN in terms of functional outcome, they suggest PFN as better device to get required outcome. Saleem[21] has done the same comparative study in Karachi in 108 patients in two different groups and he concludes the PFN predominance over DHS; with average time taken for union with mentioned device PFN was 13.67±1.72 weeks, while we observed the same in18.5±3.5 weeks.

Functional result of such injuries depends upon a few variables including patient's general wellbeing and movement level before that trauma. Essential objective in the old patients is to restore the patient to his pre-trauma state of health and mobility as quickly as time permits. This point can be accomplished by having stable satisfactory fixation, negligible anesthesia time and blood loss furthermore, early movement as possible[22].

Study done retrospectively at Pakistan Naval Ship (PNS) Shifa Hospital Karachi in 35 patients with mean age of 69.7 years by Shah[23] discusses the early outcomes of PFNA in the unstable intertrochanteric fractures and reported average operative time of 39.8±12.38 minutes, while we completed same in 69±15.5 minutes. He claims PFNA as suitable implant for such fractures.

Takigami[24] reported complications; no any superficial infection, greater trochanter fracture in 2%, lateral sliding of the blade >10 mm in 8%, spiral blade Cut out in 2%, and femoral shaft fracture in 2%. On other hand Sadic[25] has reported one cut out (p = 0.009), two deep and one superficial infection (4.8%). In a study from Bojan[26] by using gamma nail in 3066 patients there was 1.5% infection, 1.85% cut out and 0.6% femoral shaft fractures. On contrary, in our study superficial surgical site infection was noticed in (6.81%) and deep seated infection was evident in (2.27%), while per-operative iatrogenic femoral shaft fracture, implant failure, medialization of distal fragment and spiral blade cut out was not seen in any case.

Adeel[27] has done comparative study at the Mayo Hospital, Lahore, in 68 patients with 34 in each group of DHS and PFNA, he compared the functional outcome by hip Harris score, according to his result 8.8% cases had poor, (2.9% had good and 82.4% had excellent HHS, while Ghilzai[28] in study at Liaquat National Hospital Karachi, he observed excellent outcome in 28.6% patients, good in 45.1%, fair outcome in 16.5% and only 9.9% poor outcome, while we observed the excellent in 70.45%, good in 15.91%, fair in 6.81% and poor in 6.81%.

CONCLUSION

Intramedullary device proximal femoral nail antirotation can be labelled as implant of choice for unstable intertrochanteric fractures AO/OTA 31A2, 31A3, with fruitful clinical and radiological outcomes, and with fewer complications. Hip Harris score was good to excellent in 86% of the patients.

Conflict of interest: Nil

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