LUPINE PUBLISHERS

ISSN: 2638-6003

Orthopedics and Sports Medicine: Open Access Journal

DOI: 10.32474/OSMOAJ.2020.03.000164

Research Article

Management of Femoral Neck Fracture Treated with Dynamic Hip Screw and Bone Grafting

Muhammad Shabir[1], Muhammad Inam[1]*, Asim Naeeem[1], Mian Amjad Ali[1], Hafeez Ullah Afridi[2] and Feroz Shah[3]

[1]*Department of Orthopedic and Trauma, Medical Teaching Institute Lady Reading Hospital Peshawar Khyber Pakhtoonkhwa, Pakistan*

[2]*Department of Orthopedic, Civil Hospital Jamrud District Khyber, Khyber Pakhtoonkhwa, Pakistan*

[3]*Department of Orthopedic, Tehsil Headquarter Hospital Samarbagh District Dir, Khyber Pakhtoonkhwa, Pakistan*

***Corresponding author:** Department of Orthopedic and Trauma, Medical Teaching Institute Lady Reading Hospital Peshawar Khyber Pakhtoonkhwa, Pakistan

Received: January 10, 2020 **Published:** January 23, 2020

Abstract

Objective: To evaluate the outcome of fracture neck of femur treated with dynamic hip screw and bone graft in term of union.

Material and Methods: This Descriptive case series study was carried out in the Orthopaedics Department, Lady Reading Hospital Peshawar from June 2018 to December 2018 on 153 patients of age 50 and above. Patient were put on traction table and closed reduction of the fracture was done with the help of image intensifier. Lateral transgluteal incision (Hardinges incision) was given. Dynamic Hip Screw was done on inferiomedial guide wire while only drilling was done to make a 9mm wide hole on the superiorly placed guide wire and Bone grafts taken from same side iliac crest was placed in it. Wound was closed in layers and antiseptic dressing was done. Follow up was done with serial x-rays (AP & lateral views) regularly every 4 weeks till fracture union & nonunion at 3rd months was declared using Radiological Union Score for Hip.

Results: In this study mean age was 41.9 years with SD ± 11.72. Seventy-two percent patients were male while 28% patients were female. Moreover 85% patients had fracture union while15% patients no fracture union.

Conclusion: Our study concludes that frequency of fracture union was 85% in fracture neck of femur treated with dynamic hip screw and bone graft.

Keywords: Fracture Neck of Femur; Dynamic Hip Screw; Bone Graft; Union

Introduction

Fracture of neck of femur is most common injury in adults [1]. In old age it occurs as a low energy trauma while in young individuals it is due to high energy [2]. Management of this fracture has been changing from time to time. With the better understanding of importance of proper reduction, vascularity of the neck of femur and improvement in fixation devices(implants) the results become better and better [3]. Anatomical features which needs consideration are; Fracture is inside the joint capsule and bathed by synovial fluids that interferes with healing, Retinicular arteries supplying the neck and head run close to bone and prone to injury, as the bone is anatomically and functionally important for the sharing force so proper reduction and fixation is almost always necessary for the union [4]. Management of displaced fracture are challenging and no single procedure available or practiced is universally applicable and operator choose what is best for the patient at that time. Treatment varies according to the age, level, displacement and duration of the fracture but internal fixation for younger than 50 years and hemiarthroplasty and total hip replacement can be used for patient older than 60 years [5]. The age between 50 and 60 years are called grey zone in which most orthopedic surgeon choose Dynamic hip screws (DHS) for internal fixation or arthroplasty. Various studies show that DHS is more stable in the treatment of unstable neck of femur fracture (NOF) [6,7]. Some surgeons had used autogenous bone grafting with considerable success. As there are no firm guidelines do deal with fracture NOF in adults and many hip preserving procedures are then adopted like proximal femoral osteotomy or bone grafting or both to prevent the complications like avascular necrosis and non-union [8-10]. One study shows that there is 73.6% union rate with bone graft and DHS. The purpose

of this study is to evaluate the healing process of fractured NOF treated with DHS and autogenous Bone grafts. There is no local data available for the above aforementioned procedure while the incidence of fracture and complications seems far more as stability and healing chances of the fractures depends especially on age and general conditions. This study will help us in identifying cheapest and most effective way to treat them. To evaluate the outcome of fracture neck of femur treated with dynamic hip screw and bone graft in term of union.

Material and Method

This Descriptive case series study was done in Orthopaedics Department, Lady Reading Hospital Peshawar from June 2018 to December 2018 on 153 with 95% confidence interval with 7% marginal error taking rate of union in displaced femoral neck fracture after dynamic hip screw fixation as 73.6% based on previous study [11] using WHO sample size calculator. Patients having age between 50 to 80 years of either sex with Garden type III and IV NOF fractures confirmed on plain radiograph were included in the study while Pathological fractures confirmed on plan radiograph showing osteolytic metastases and Diagnosed cases of diabetes mellitus, stroke, patients Oral contraceptive pills and steroid user post Radiation patients were excluded from the study. Patients with Garden type III and IV fractures of neck of femur on true AP/Lateral view x-ray of the involved hip joint was admitted through emergency after fulfilling the inclusion & exclusion criteria. Informed written consent was obtained. Detail history, examination and routine investigations like were done pre-operatively. Packed cell RBC(blood) was arranged for patient. Prophylactic antibiotics (cefoperazone and sulbactum 2gm) were given at the induction of anesthesia. Patient was put on traction table and closed reduction of the fracture was done with the help of image intensifier. Lateral transgluteal incision (Hardinges incision) was given. Fracture site was reached and secured by passing two guide wires one inferiomedially and one superiorly and parallel to the one another. Dynamic Hip Screw(DHS) was done on inferiomedial guide wire while only drilling was done to make a 9mm wide hole on the superiorly placed guide wire and Bone grafts taken from same side iliac crest was placed in it. Wound was closed in layers and antiseptic dressing was done. Patient was immobilized for 3 to 6 weeks depending upon the stability of fixation. Follow up was done with serial x-rays (AP & lateral views) regularly every 4 weeks till fracture union & nonunion at 3rd months was declared using Radiological Union Score for Hip. All the data including, age, gender, type of fracture, union and non-union were noted on a pre-designed Performa. Data was entered and analyzed by using SPSS version 22.0.

Results

In this study age distribution among 153 patients was analyzed as 64(42%) patients were in age range 50-60 years, 51(33%) patients were in age range 61-70 years, 38(25%) patients were in age range 71-80 years. Mean age was 41.9 years with SD ± 11.72. Gender distribution among 153 patients was analyzed as 110(72%) patients were male while 43(28%) patients were female. Duration of operation among 153 patients was analyzed as 104(68%) patients had duration of operation ≤72 hour while 49(32%) patients had duration of >72 hour. Mean duration of operation was 72 hours with SD ± 2.47 (Table 1). Duration of union among 153 patients was analyzed as 43(28%) patients had duration of union ≤ 24 weeks while 110(72%) patients had duration of union >24 weeks Mean duration of union was 27 weeks with SD ± 8.56 (Table 2). Status of side among 153 patients was analyzed as 83(54%) patients had fracture neck of femur on left side while 70(46%) patients had fracture neck of femur on right side. Status of type of neck fracture among 153 patients was analyzed as 92(60%) patients had type III neck of femur while 61(40%) patients had type IV neck of femur. Fracture union among 153 patients was analyzed as 130(85%) patients had fracture union while 23(15%) patients no fracture union (Table 3). Stratification of fracture union with respect to age, gender, side and type of fracture (garden classification) is given in (Tables 4-7).

Table 1: Mean duration of operation was 72 hours with SD ± 2.47.

Duration of Operation (n=153)		
Duration of Operation	**Frequency**	**Percentage**
≤ 72 hour	104	68%
> 72 hour	49	32%
Total	153	100%

Table 2: Mean duration of time to union was 27 weeks with SD ± 8.56.

Duration of Time to Union (n=153)		
Time to Union	**Frequency**	**Percentage**
≤ 24 weeks	43	28%
> 24 weeks	110	72%
Total	153	100%

Table 3: Fracture Union (n=153).

Fracture Union (n=153)		
Fracture Union	**Frequency**	**Percentage**
Yes	130	85%
No	23	15%
Total	153	100%

Table 4: Chi square test was applied in which P value was 0.9602.

Stratification of Fracture Union W.R.T Age Distribution (n=153)				
Fracture Union	**50-60 years**	**61-70 years**	**71-80 years**	**Total**
Yes	55	43	32	130
No	9	8	6	23
Total	64	51	38	153

Table 5: Chi square test was applied in which P value was 0.7873.

Stratification of Fracture Union W.R.T Gender (n=153)			
Fracture Union	**Male**	**Female**	**Total**
Yes	94	36	130
No	16	7	23
Total	110	43	153

Table 6: Chi square test was applied in which P value was 0.8123.

Stratification of Fracture Union W.R.T Side Distribution (n=153)			
Fracture Union	**Left**	**Right**	**Total**
Yes	70	60	130
No	13	10	23
Total	83	70	153

Table 7: Chi square test was applied in which P value was 0.9374.

Stratification of Fracture Union with Respect to Type of Neck Fracture (n=153)			
Fracture Union	**Type III**	**Type IV**	**Total**
Yes	78	52	130
No	14	9	23
Total	92	61	153

Discussion

Fracture of neck of femur is most common injury in adult [1]. In old age it occurs as a low energy trauma while in young individuals it is due to high energy [2]. Management of this fracture has been changing from time to time. With the better understanding of importance of proper reduction, vascularity of the neck of femur and improvement in fixation devices the results become from better and best [2]. Schwartsmann CR et al. [12] evaluated a series of 53 patients with dislocated femoral neck fractures treated with DHS. There were 38 (71.7%) males and 15 (28.3%) females. According to Garden's classification, 21 (39.6%) fractures were classified as type III and 32 (60.4%) were considered totally dislocated, Garden IV. Fracture healing was achieved in 39 patients (73.6%). Thirteen cases of avascular necrosis were observed (24.6%) while in our study union occurred in 85% patients and rest has nonunion and osteonecrosis of head. Makki et al. [13] showed no benefit in union rate or osteonecrosis in fractures treated with DHS alone or with DHS with a derotational screw. Furthermore, Razik et al. [14] evaluated 92 young patients and he found that DHS supplemented with derotational screw had significantly less osteonecrosis for Garden III and IV fractures. In our study, only 11 fractures were fixed with derotational screw. Four patients developed osteonecrosis (4/11 - 36.3%) of the hip. In 42 fractures without screw, 9 developed necrosis (9/42), 21.4%. This difference does not have statistical significance (p = 0.87). Avascular necrosis of the femoral head remains one of the greatest concerns in the young patient with femoral neck fractures. The incidence has been documented and ranges from 12% until 86% [14]. In worst series published by Protzmann et al. [15] showed that 22 patients under the age of 40 years has head necrosis of 86%. In our study, 13 fractures developed osteonecrosis (13/53) 24.6%. Another controversial issue is the timing of surgery. Some authors advocate the early surgery and suggest that prompt reduction can produce an "unkinking" of the proximal femoral vessels, thus leading to intra-capsular decompression, restoring the blood flow to the femoral head and minimizing the risk of necrosis [16-19].Other studies confirm that early surgery may decrease the rate of femoral head osteonecrosis. On the contrary, several studies reported no difference in the rate of osteonecrosis with more than a 24-h delay or even more than one week [20, 21].

Butt MF et al. [22] in their historical paper, describes long-term follow up of 1503 fractures. No significant difference was found in necrosis delaying the operation up to one week. Analyzing the avascular necrosis in our 53 patients, we could not identify statistical significant differences for surgical intervention before and after 72hours. In 30 cases, when surgery occurs before 3 days, the rate of osteonecrosis was 20.0% (6/30). When compare it to the delayed fixation group, the rate increase to 30.4% (7/23). The consensus for time surgery is still matter of debate. Roshan A et al. [23] retrospectively, analyzed 92 fractures and found no difference in rates of osteonecrosis when comparing treatment within 6 hours post-injury and delayed treatment of 48 hours post injury. They concluded that the rate of osteonecrosis was related to the type of fixation. The conflicting results in the literature are indicative of the wide amount of variance in these studies. Another topic of discussion is how the initial fracture displacement can induce a necrosis. The most useful classification was proposed by Conn KS [24], in which he divided the fracture into non displaced (Garden I and II) or displaced (Garden III and IV). In our study, all 53 fractures were considered displaced. When we consider the femoral fracture like Garden III, we found (14.2%) of avascular necrosis (3/21). When we consider a complete dislocated fracture, the rate rise doubled (31.2%) (10/32), which is not statically significant ($p > 0.05$). Conn and Parker [25] had studied 375 non-displaced fractured and observed necrosis in 4% (15/375) while Yih-Shiunn et al. [26] studied 84 cases of non-displaced fractures and found frequency of about 10% (8/84) and Majernícek M et al. [27] found 14% (3/22). This complication is more frequent in displaced fractures. In an extensive meta-analysis, Harper WM et al. [21] record 19% of cases with necrosis after 48 months, Holmberg S et al. [22] observed 13.4% (9/64) after a minimum of 5 years of follow-up. Manninger J et al. [23] found 27% (14/51), and Nikopoulos et al. [28] found 39.4% (15/38) after a mean follow up of 4.7 years. Schwartsmann et al. [19] presented 19% (16/83) using DHS while Razik et al. [15] described 16.2% (11/92) of avascular necrosis in displaced fracture using the DHS.

Conclusion

Despite controversies in the management of fracture neck of femur still there are promising result with fixation and grafting. Our study concludes that frequency of fracture union was 85% in fracture neck of femur treated with dynamic hip screw and bone graft.

References

1. Cananle ST, Beaty J, Weinlein JC (2017) Fracture and dislocation of the hip. In: Campbells Operative Orthopaedics. (12th Eds.), Philadelphia, Pennsylvania, Elsevier: Elsevier 2817-2829.
2. Singh S, Kumar S, Kumar S (2014) Long term results of fresh femoral neck fractures treated by cancellous screw and fibular autograft. J Orthop Rheumatol 1(3): 20.
3. Sevitt S, Thompson RG (1965) Distribution and anastomosis of arteries supplying the head of the femur. J Bone Joint Surg (Br) 47: 560-573.

4. Sandhu HS (2005) Management of fracture neck of femur. Indian J Orthop 39(2): 130-136.
5. Jain H, Garg S, Yadav S, Sultania S (2017) Functional outcome of old fracture neck of femur treated by double angle DHS with valgus osteotomy with fibular grafting 4(9): 1974-1977.
6. Deneka DA, Simonian PT, Stankewich CJ, Eckert D, Chapman JR, et al. (1997) Biomechanical comparison of internal fixation techniques for the treatment of unstable basicervical femoral neck fractures. J Orthop Trauma 11(5): 337-343.
7. Krastman P, van den Bent RP, Krijnen P, Schipper IB (2006) Two cannulated hip screws for femoral neck fractures: treatment of choice or asking for trouble? Arch Orthop Trauma Surg 126(5): 297-303.
8. Lee YS, Chen SH, Tsuang YH, Huang HL, Lo TY, et al. (2008) Internal fixation of undisplaced femoral neck fractures in the elderly: a retrospective comparison of fixation methods. J Trauma 64(1):155-162.
9. Estrada LS, Volgas DA, Stannard JP, Alonso JE (2002) Fixation failure in femoral neck fractures. Clin Orthop Relat Res 399: 110-118.
10. Jain AK, Mukunth R, Srivastava A (2015) Treatment of neglected femoral neck fracture. Indian J Orthop 49: 17-27.
11. Raaymakers EL, Marti RK (2008) Nonunion of the femoral neck: possibilities and limitations of the various treatment modalities. Indian J Orthop 42: 13-21.
12. Schwartsmann CR, Lammerhirt HM, Spinelli L de F, Ungaretti Neto A da S (2018) Treatment of displaced femoral neck fractures in young patients with DHS and its association to osteonecrosis. Revista Brasileira de Ortopedia (english edition) 53(1): 82-87.
13. Makki D, Mohamed AM, Gadiyar R, Patterson M (2013) Addition of an anti-rotation screw to the dynamic hip screw for femoral neck fractures Orthopedics. Indian J Orthop 36(7) : 865-868.
14. Razik F, Alexopoulos AS, El Osta B, Connolly MJ, Brown A, et al. (2012) Time to internal fixation of femoral neck fractures in patients under sixty years – does this matter in the development of osteonecrosis of femoral head? Int Orthop 36(10): 2127-2132.
15. Gardner S, Weaver MJ, Jerabek S, Rodriguez E, Vrahas M, et al. (2014) Predictors of early failure in young patients with displaced femoral neck fractures. J Orthop 12(2): 75-80.
16. Protzman RR, Burkhalter WE (1976) Femoral-neck fractures in young adults. J Bone Joint Surg Am 58 (5): 689-695.
17. Askin SR, Bryan RS (1976) Femoral neck fractures in young adults. Clin Orthop Relat Res 114: 259-226.
18. Strömqvist B, Nilsson LT, Egund N, Thorngren KG, Wingstrand H (1988) Intracapsular pressures in undisplaced fractures of the femoral neck. J Bone Joint Surg Br 70(2): 192-194.
19. Harper WM, Barnes MR, Gregg PJ (1991) Femoral head blood flow in femoral neck fractures. An analysis using intra-osseous pressure measurement. J Bone Joint Surg Br 73(1): 73-75.
20. Holmberg S, Dalen N (1987) Intracapsular pressure and caput circulation in nondisplaced femoral neck fractures. Clin Orthop Relat Res 219: 124-126
21. Manninger J, Kazar G, Fekete G, Nagy E, Zolczer L, et al. (1985) Avoidance of avascular necrosis of the femoral head, following fractures of the femoral neck, by early reduction and internal fixation. Injury 16(7): 437-448.
22. Beck M, Siebenrock KA, Affolter B, Nötzli H, Parvizi J, et al. (2004) Increased intraarticular pressure reduces blood flow to the femoral head. Clin Orthop Relat Res 424: 149-152.
23. Butt MF, Dhar SA, Gani NU, Farooq M, Mir MR, et al. (2008) Delayed fixation of displaced femoral neck fractures in younger adults. Injury 39(2): 238-243.
24. Roshan A, Ram S (2006) Early return to function in young adults with neglected femoral neck fractures. Clin Orthop Relat Res 447: 152-157.
25. Conn KS, Parker MJ (2004) Undisplaced intracapsular hip fractures: results of internal fixation in 375 patients. Clin Orthop Relat Res 421: 249-254.
26. Yih Shiunn L, Chien Rae H, Wen Yun L (2007) Surgical treatment of undisplaced femoral neck fractures in the elderly. Int Orthop 31(5): 677-682.
27. Majernícek M, Dungl P, Kolman J, Malkus T, Vaculík J (2009) Osteosynthesis of intracapsular femoral neck fractures by dynamic hip screw (DHS) fixation. Acta Chir Orthop Traumatol Cech 76(4): 319-325.
28. Nikolopoulos KE, Papadakis SA, Kateros KT, Themistocleous GS, Vlamis JA, et al. (2003) Long-term outcome of patients with avascular necrosis, after internal fixation of femoral neck fractures. Injury 34(7): 525-528.

DOI: 10.32474/OSMOAJ.2020.03.000164