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ORIGINAL ARTICLE

Frequency of Surgical Outcome of Patients Who Underwent Basicervical Femur Fractures Treatment with Dynamic Hip Screw Combiner with Derotation Hip Screw at Teritay Care Hospital, Karachi

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ABSTRACT

Background: A basicervical fracture occurs when the femoral neck breaks below its intertrochanteric connection[1]. It's between a femoral neck fracture, treated with cancellous screws, and an intertrochanteric fracture, treated with sliding screws[2]. Previous studies revealed basicervical fractures might be treated with the DHS like intertrochanteric fractures. Basicervical fractures are less stable than intertrochanteric fractures [3,4], hence the DHS alone may not lead to a good functional outcome [5]. A basal femoral neck fracture is one type of femoral fracture.

Objective: To determine the frequency of surgical outcome of patients who underwent basicervical femur fractures treatment with dynamic hip screw combined with derotation hip screw at Tertiary Care Hospital, Karachi.

Study Design: Descriptive Case study.

Setting: This study was conducted at Department of Orthopaedic Surgery, Jinnah Postgraduate Medical Centre, Karachi, Pakistan.

Duration: Six months after the approval of synopsis from August 23, 2019 to February 22, 2020.

Methodology: JPMC in Karachi treated all included patients. Participants consented after learning about the study's methods, risks, and benefits. The wound was shaved and dressed the night before surgery. The patient's arms and legs were tied to the traction foot component using a fracture table. Image intensifiers were employed to verify the closed reduction. Straight cut from the greater trochanter down the thigh. Using an angle guide, a threaded guide pin was placed into the femoral head. Non-absorbable sutures closed the wound. Incision closed with suction drainage. All obtained data was kept in a performa and evaluated electronically for research.

Results: Mean ± SD of age was 51.3±7.16 years. In distribution of gender, 67 (64.4%) were male while 37 (35.6%) were female. Surgical outcome was divided into two parts i.e. functional and radiological outcome. In Functional outcome 17 (16.35%) were having excellent hip score, 38 (36.55%) having good score, 22 (21.15%) having fair score while 27 (25.95%) having poor score. In radiological outcomes 33 (31.75%) had fracture reduction, 51 (49.02%) had fracture fixation, 20 (19.23%) had fracture union.

Practical Implication: This study will help to determine the patient's surgical outcomes on implying the dynamic hip screw combined with derotation hip screw, in treating basicervical femur fractures.

Conclusion: It is to be concluded that DHS may allow better restoration of functional and radiological outcomes for the treatment of basicervical femur fractures in well selected patients that meet the indications for surgery whenever the technical competence and facilities exist.

Keywords: Basicervical Femur Fractures, Dynamic Hip Screw, Derotation Hip Screw, Fracture, Hip Fracture

INTRODUCTION

Hip fractures that occur near the base of the neck of the proximal femur are known as basicervical fractures[1]. The pain from a fracture might be substantial. When looking at the proximal femur, the basicervical region of the femoral neck is the area that lies next to or along the intertrochanteric line and passes across the base of the femoral neck where it joins the intertrochanteric region[2, 3]. Also called the basicervical region of the femoral head, this area is located on the proximal end of the thighbone.[4] The position of this fracture places it between the femoral neck fracture and the intertrochanteric fracture. By contrast, intertrochanteric fractures tend to heal more steadily than basicervical fractures do biomechanically. Basicervical fractures are more likely to result in a poor functional outcome [5] because to the higher fracture angle and, consequently, varus moment. Because of where these breaks are, osteonecrosis is also suspected to be more common. Keeping the femoral head intact is of utmost importance to orthopedic surgeons, especially as patients age. In contrast, there is currently no agreement on how best to treat fractures of this type.

The results of studies and the published literature in this sector are inconsistent[6]. It is challenging to surgically treat femoral neck fractures because the treatment plan needs to take into consideration so many variables, such as the patient's age, activity level, fracture type, and bone density. One can choose from hemiarthroplasty, a total hip replacement, a hemiarthroplasty with dynamic hip screws (DHS), or multiple cannulated screw (MCS) osteosynthesis[7]. In terms of position, this fracture falls somewhere in between the femoral neck fracture, which is typically treated by inserting a number of cancellous screws, and the intertrochanteric fracture, which is typically treated by inserting a sliding screw device [8,9]. Previous studies have shown that basicervical fractures can benefit from the same treatment as intertrochanteric fractures with the dynamic hip screw (DHS) [10].

For the dynamic hip screw or sliding screw fixation [11], you'll need a lag screw, a side plate, and cortical screws to attach the side plate to the proximal femoral shaft. Patient is placed on their side for lag screw insertion into femoral head. However, the femoral head's rotational instability could be exacerbated by the lag screw itself if its insertion were to occur. This may raise the danger of aseptic necrosis and non-union. Vijayvargiya et al. [12] concluded that the radiological outcome (good reduction 100%, sufficient fracture repair 83.8%, and fracture union 89.1%) was favorable, and that the functional outcome on the Harris hip score (excellent 32.4%, good 59.5, fair 5.4%, and bad 2.7%) was favorable as well. This study aims to quantify the proportion of patients who recover well after treatment for basicervical femur fractures using a dynamic hip screw in tandem with a derotation hip screw. Given the scarcity of locally gathered data, this is noteworthy.

Although derotation screws are used regularly with DHS, there is little information available on how they work. Early detection, shorter hospital stays, higher patient outcomes, and financial and mental benefits to the patient would all arise from this being the standard of care.

MATERIAL & METHODS

The Orthopaedic Surgery Department of the Jinnah Postgraduate Medical Centre in Karachi served as the site of this descriptive

study. The trial lasted from August 23, 2019 (after approval of the protocol summary) until February 22, 2020. A total of 104 patients were chosen as the sample size. A Harris Hip score of 32.4% (16), a margin of error of 9%, and a confidence level of 95% can be used to estimate the frequency. Utilizing the statistical software of WHO, this sample size was determined. This data was collected by non-random, sequential sampling.

Data Collection: The College of Physicians and Surgeons of Pakistan gave its clearance for the conduct of this study. The Orthopedics Department at JPMC in Karachi screened patients who volunteered to participate and sought care there for eligibility. Before beginning the study, institutional review board approval was requested. Each participant filled out a consent form in the local language of Urdu and gave a brief medical history. Before the surgeries, general anesthesia was administered to the patients. The night before surgery, the injured region was carefully dressed in sterility and shaved. The patient was placed supine on a fracture table, and the arms and legs of the patient were tied to the traction foot component. An image intensifier was utilized to confirm the closed reduction's accuracy.

A straight cut was made from the greater trochanter down the full length of the thigh. Using an angle guide, a threaded guide pin was inserted at the femoral head's subcapital level. Around 13 mm higher and parallel to the first pin, a second pin was placed. This gave the fracture temporary rotational stability by preventing the head-neck fragment from rotating while the hole was being drilled or the screw was being placed. The plate was fastened to the shaft using a screw. The second guide pin was then given a DRS, which was made up of a washer and a cannulated cancellous screw of the proper length. To properly close the incision, non-absorbable sutures were used in many layers. The incision was closed after suction drainage was inserted.

The day after surgery, patients were instructed to sit up in bed. Exercises to strengthen the quadriceps and improve hip and knee range of motion might start the day following surgery as long as they didn't cause too much discomfort. After radiography indicated the development of a callus, the patient started putting additional weight on the leg. Two months after the surgery, the researcher and his mentor reevaluated whether the surgical outcome had adhered to the operational description. Some of the quantitative factors entered into performa were age, surgery time, and hospital stay; additional qualitative variables were gender, type II diabetes, high blood pressure, smoking behaviors, family background, educational attainment, occupation, and surgical outcome.

Data Analysis: With SPSS 16 for Windows, data analysis was carried out. The mean and standard deviation for demographic and clinical characteristics were calculated using statistics. Frequencies and percentages were used to assess quantitative traits such gender, type II diabetes, blood pressure, smoking behaviors, family income, education level, and occupation. Patients were divided into groups based on their age, gender, type II diabetes, hypertension, smoking status, occupation, socioeconomic standing, and length of surgery to account for effect modifiers. The stratification was followed by a chi-square test, with a p-value of 0.05 considered to show statistical significance.

RESULTS

In this study 104 patients were included to determine the frequency of surgical outcome of patients who underwent basicervical femur fracture treatment with dynamic hip screw combined with derotation hip screw at tertiary care hospital and the results were analyzed as: Mean ± SD of age was 51.3±7.16 with C.I (49.92...52.69) years. Mean ± SD of duration of surgery was 55.4±7.5 with C.I (53.94….56.85) minutes. Mean ± SD of length of hospital stay 3.6±1.9 with C.I (3.23...3.96) days. In distribution of gender, 67 (64.4%) were male while 37 (35.6%) were female. Diabetes mellitus was documented in 45 (43.3%) patients. Hypertension was noted in 39 (37.5%) patients. Hypertension was noted in 39 (37.5%) patients. In distribution of employment, 65 (62.5%) were employed while 39 (37.5%) were unemployed.

Socioeconomic status showed that 20 (19.25%) belonged to lower class, 22 (21.15%) had lower middle income, 35 (33.65%) had middle income class, 9 (8.65%) had upper middle income and 18 (17.30%) had upper income. Surgical outcome was divided into two parts i.e. functional and radiological outcome. In Functional outcome, 17 (16.35%) had excellent hip score, 38 (36.55%) had good score, 22 (21.15%) had fair score while 27 (25.95%) had poor score. In radiological outcomes, 33 (31.75%) had fracture reduction, 51 (49.02%) had fracture fixation, 20 (19.23%) had fracture union. Stratification of age group, gender, duration of surgery, diabetes mellitus type II, hypertension, socioeconomic status, occupational status and smoking status were done with respect to surgical outcomes in order to found significant difference.

Table 1

Descriptive Statistics	Mean	SD	CI	Minimum	Maximum	Range
Age	51.3 years	7.16	49.92.5 2.69	20	60	40
Surgery	55.4 minutes	7.5	53.94.5 6.85	45	120	75
Hospital Stay	3.6 days	1.9	3.23.3. 96	2	7	5

Table 2

Surgical Outcome			
Functional Outcome		Radiological Outcome	
Excellent	17 (16.35%)	Fracture reduction	33 (31.75%)
Good	38 (36.55%)	Fracture fixation	51 (49.02%)
Fair	22 (21.15%)	Fracture union	20 (19.23%)
poor	27 (25.95%)		

Table 3

Stratification of	Surgical outcome						
	Fractional Outcome				Radiological Outcome		
Age Group [In Years]	Excellent	Good	Fair	Poor	Fracture Reduction	Fracture Fixation	Fracture Union
20-50	12(11.8%)	21(20.6%)	10 (9.8%)	19(18.6%)	21(20.2%)	30(28.8%)	11 (10.6%)
>50	5 (4.9%)	17(16.7%)	12(11.8%)	8 (7.8%)	12(11.5%)	21(20.2%)	9 (8.7%)
P-Value	0.364				0.814		
Duration Of Surgery [In Minutes]							
45-60	13(12.5%)	23(22.1%)	14(13.5%)	22(21.2%)	25(24.0%)	34(32.7%)	13 (12.5%)
>60	4 (3.8%)	15(14.4%)	8 (7.7%)	5 (4.8%)	8 (7.7%)	17(16.3%)	7 (6.7%)
P-Value	0.262				0.611		
Gender							
Male	10 (9.6%)	26(25.0%)	11(10.6%)	20(19.2%)	23(22.1%)	38(36.5%)	6 (5.8%)
Female	7 (6.7%)	12(11.5%)	11(10.6%)	7 (6.7%)	10 (9.6%)	13(12.5%)	14 (13.5%)
Pvalue	0.309				0.002		
Diabetes Mellitus Type II							
Diabetic	8(7.7%)	22(21.2%)	9(8.7%)	6(5.8%)	13(12.5%)	25(24.0%)	7(6.7%)
Non-Diabetic	9(8.7%)	16(15.4%)	13(12.5%)	21(20.2%)	20(19.2%)	26(25.0%)	13(12.5%)
P-Value	0.040				0.485		
Hypertension							
Hypertensive	6 (5.8%)	19(18.3%)	10 (9.6%)	4 (3.8%)	9 (8.7%)	22(21.2%)	8 (7.7%)

Non-Hypertensive	11(10.6%)	19(18.3%)	12(11.5%)	23(22.1%)	24(23.1%)	29(27.9%)	12 (11.5%)
P-Value	0.028				0.330		
Smoking Status							
Smoker	5 (4.8%)	15(14.4%)	6 (5.8%)	5 (4.8%)	8 (7.7%)	20(19.2%)	3 (2.9%)
Non-Smoker	12(11.5%)	23(22.1%)	16(15.4%)	22(21.2%)	25(24.0%)	31(29.8%)	17 (16.3%)
Pvalue	0.333				0.093		
Occupational Status							
Employed	13(12.5%)	25(24.0%)	15(14.4%)	12(11.5%)	26(25.0%)	29(27.9%)	4 (3.8%)
Unemployed	4 (3.8%)	13(12.5%)	7 (6.7%)	15(14.4%)	7 (6.7%)	22(21.2%)	16 (15.4%)
P-Value	0.130				0.0001		
Socioeconomic Status							
Lower	4 (3.8%)	8 (7.7%)	2 (1.9%)	6 (5.8%)	5 (4.8%)	11(10.6%)	4 (3.8%)
Lower Middle	3 (2.9%)	7 (6.7%)	5 (4.8%)	7 (6.7%)	4 (3.8%)	14(13.5%)	4 (3.8%)
Middle	6 (5.8%)	13(12.5%)	9 (8.7%)	7 (6.7%)	12(11.5%)	19(18.3%)	4 (3.8%)
Upper Middle	1 (1.0%)	4 (3.8%)	2 (1.9%)	2 (1.9%)	4 (3.8%)	3(2.9%)	2 (1.9%)
Upper	3 (2.9%)	6 (5.8%)	4 (3.8%)	5 (4.8%)	8 (7.7%)	4 (3.8%)	6 (5.8%)
P-Value	0.992				0.236		

DISCUSSION

If "basiservical fracture" is misdiagnosed, complications may arise. The photo's quality and projections make classification difficult. Anteroposterior radiographs often obscure a basicervical fracture line. The lateral projection shows the break line and, likely, the last fragment of the collum at the cervicle-trochanteric junction. Anteroposterior and lateral projections will show a trochanteric fracture. Inaccurate fracture categorization may be due to a lack of knowledge regarding basicervical fractures.

A basicervical hip fracture's optimum treatment is debatable [13]. Surgical procedures were varied. This trial also had problems requiring additional surgery. This hip fracture needs attention. Biomechanically, basicervical and trochanteric fractures are related. Broken bone treatment depends on how it shattered.

Standard metal implants can't fix these fractures. A simple device can boost the implant's biomechanical ability. Most classification systems don't define basicervical fractures. The basicervical head-neck fragment shared characteristics with AO types A2.1, A2.2, and A2.3, which correspond to unstable Jensen types 3, 4, and 5 [14]. Jensen linked the head-neck split to fracture instability. Trochanteric fracture and rotational instability weren't mentioned. Neck fractures were rotationally unstable [15]. Ball-and-socket joints rotate. An unstable trochanteric fracture is like a fractured neck.

If the simulator's head-neck doesn't have a long inferior cortical extension, give it AO type A1.1. Radiographs showed head-neck fragment and trochanters. Real-world and simulated basicervical fractures have axial and rotational instability. We took therapeutically-relevant breaks. DHS was used for extracapsular femoral neck fractures. The lag screw may shift the femoral head when inserted. This could cause nonunion and aseptic necrosis [16].

We put a second pin to guide the surgeon during the procedure. The DHS compression screw does not inhibit the femoral head-neck fragment from rotating as well as other screws or pins. Jensen's sliding screw plate failed to reduce fractures in 11%, 56%, 61%, and 78% of cases. Biomechanical factors enhance fracture healing [17].

DHS may affect hip function, according to studies. Fracture compression may shorten the femoral neck. Extreme impaction shortens an unstable trochanteric fracture. Several publications address a trochanteric stabilizing plate, valgus osteotomy, and sealing fractures. We rarely saw excessive femoral neck shortening[15].

Consider the average distance traveled, 5.5 mm. Mattsson et al. [18] found that sliding less than 6.7 mm didn't affect mobility. High fracture angle caused shear force but proximal fragment inferior translation wasn't excessive. Overall, length decreased by 2 mm (range 0–15 mm). Pajarinen et al. reported that DHS shortened patients' femoral shafts by 4.7 mm (range: 0-25 mm). The DRS is connected to the femoral head's subchondral bone. Simulations suggest the DRS can regulate neighboring fragment translation. [19]

The DRS went through the femoral head from behind. Putting DHS in the middle and partially threading DRS will fix this. There was discussion of patients who had sustained basicervical femur fractures. This study investigated 104 adult cases of closed basicervical femur fractures. Our study included mid-20s to mid-60s-olds. Males and females participated equally (64.4 percent males, 35.6 percent females). Sexes were equal. In another study, 56 (58%) men and 40 (42%) women were 18-70. Saarenpaa I, et al. studied 11 men (36.67%) and 19 women (63.33%) Our study participants fell frequently. [20]

Weak protective reflexes, less muscle and fat to act as shock absorbers, and osteoporosis or osteomalacia create this disorder. Stays averaged 3.6 days. Postoperative complications such as infection, bed sores, uncontrolled medical conditions, etc. required longer hospital stays. Combining DHS with derotation screws may lessen danger. The participants' mean age was 51.37.16. Schwartsmann CR, et al. discovered 5314. Hu SJ et al. reported a 47.8-year-old average. [21,22]

This study's surgery lasted 55.47.5 minutes. High blood pressure affected 39 (37.5%) and diabetes 45 (43.3%). Only 29.8% of survey participants smoked cigarettes. 39 patients (37.5%) were unemployed, compared to 65 (62.5%). Recent research respondents were 19.25% economically disadvantaged, 22% middle-class, 35% upper-middle class, 9% upper-middle class, and 18% affluent. [23]

Our examination included functional and radiological outcomes. 38 (36.55%) of those studied had favorable functional outcomes, 22 (21.15%) had neutral outcomes, and 27 (24.95%) had negative outcomes. We reduced 33 (31.75%) fractures, fixed 51 (49.02%), and healed 20. (19.23 percent). Western research were affected by how far a patient could walk without help and how much the hip joint moved, while Indian studies were affected by squatting and sitting cross-legged. 6-month results were evaluated using the modified Harris hip grading method. Before treatment, most patients were working. Osteosynthesis with DHS, Derotation screws, and CC screws help prevent arthroplasty failure. [23-24]

Patients whose screws backed out after internal fixation were more likely to suffer hip or thigh pain and walk with a limp, recommending total joint replacement or hemiarthroplasty if osteosynthesis failed. Other research supports our findings, which we got without considering parallel screw placement or screw quantity. Internal fixing requires advance planning and careful operation. [25]

CONCLUSION

It is to be concluded that DHS may allow better restoration of functional and radiological outcomes for the treatment of basicervical femur fractures in well selected patients that meet the indications for surgery whenever the technical competence and facilities exist. Future prospective, there is a need to conduct randomized studies using large sample size with multiple study centers in Pakistan are needed to confirm the findings of the present study.

REFERENCES

1. Caviglia HA, Osorio PQ, Comando D. Classification and diagnosis of intracapsular fractures of the proximal femur. Clin Orthop Relat Res. 2002;399:17-27.

2. Liporace F, Gaines R, Collinge C, Haidukewych GJ. Results of internal fixation of Pauwels type-3 vertical fracture neck of femur. J Bone Joint Surg Am. 2008;90(8):1654-59.
3. Liporace F, Gaines R, Collinge C, Haidukewych GJ. Results of internal fixation of Pauwels type-3 vertical fracture neck of femur. J Bone Joint Surg Am. 2008; 90(8):1654-59.
4. Pajarinen J, Lindahl J, Michelsson O. Pertrochanteric femoral fractures treated with a dynamic hip screw or a proximal femoral nail: a randomized study comparing postoperative rehabilitation. J Bone Joint Surg 2005;87-B:76–81.
5. Sidhu AS, Walia JPS, Brar BS, Mann HS, Punia S. A comparative study of 60 cases of intracapsular fracture neck femur treated with multiple cannulated screws and dynamic hip screw Pb. Journal of Orthopaedics, 2012;13(1):49-52.
6. Blair B, Koval KJ, Kummer F, Zuckerman JD. Basicervical fractures of the proximal femur. A biomechanical study of 3 internal fixation techniques. Clin Orthop Relat Res. 1994 (306):256-63.
7. Clark DW, Ribbans WJ. Treatment of unstable intertrochanteric fractures of the femur: a prospective trial comparing anatomical reduction and valgus osteotomy. Injury. 1990;21(2):84-8.
8. DeLee JC. Fractures and dislocations of the hip. In: Rockwood and Green's fracture in adults, 4th ed. Lippincott-Raven, Philadelphia 1996.
9. Deneka DA, Simonian PT, Stankewich CJ, Eckert D, Chapman JR, Tencer AF. Biomechanical comparison of internal fixation techniques for the treatment of unstable basicervical femoral neck fractures. J Orthop Trauma. 1997;11(5):337-43.
10. Giannoudis PV, Schneider E. Principles of fixation of osteoporotic fractures. J Bone Jt Surg. 2006;88(10):1272-8.
11. Jensen JS. Classification of trochanteric fractures. Acta Orthop Scand. 1980;51(1-6):803- 10.
12. Kyle RF. Fractures of the proximal part of the femur. J Bone Jt Surg. 1994;76(6):924-50.
13. Ly TV, Swiontkowski MF. Management of femoral neck fractures in young adults. Indian J Orthop. 2008;42(1):3.
14. Madsen JE, Næss L, Aune AK, Alho A, Ekeland A, Strømsøe K. Dynamic hip screw with trochanteric stabilizing plate in the treatment of unstable proximal femoral fractures: a comparative study with the Gamma nail and compression hip screw. J Orthop Trauma. 1998;12(4):241-8.
15. Russel TA. Fractures of hip and pelvis: in crenshaw ah (ed): Campbell's Operat Orthop. 1992:895-987.
16. Strömqvist BJ, Hansson LI, Nilsson LT, Thorngren KG. Hook-pin fixation in femoral neck fractures. A two-year follow-up study of 300 cases. Clin Orthop Relat Res. 1987 (218):58- 62.
17. Wilson JN. Injuries of the hip. In: Watson-Jones JN (ed) Fractures and joint injuries. Churchill Livingstone, Edinburgh, 1982: pp 935, 957–8. 84
18. Mattsson P, Alberts A, Dahlberg G, Sohlman M, Hyldahl HC, Larsson S. Resorbable cement for the augmentation of internally-fixed unstable trochanteric fractures: a prospective, randomised multicentre study. J Bone Jt Surg. 2005;87(9):1203-9.
19. Pajarinen J, Lindahl J, Michelsson O, Savolainen V, Hirvensalo E. Pertrochanteric femoral fractures treated with a dynamic hip screw or a proximal femoral nail: a randomised study comparing post-operative rehabilitation. J Bone Jt Surg. 2005;87(1):76-81.
20. Saarenpää I, Partanen J, Jalovaara P. Basicervical fracture–a rare type of hip fracture. Arch Orthop Trauma Surg. 2002;122(2):69-72.
21. Schwartsmann CR, Jacobus LS, Spinelli LD, Boschin LC, Gonçalves RZ, Yépez AK, et al. Dynamic hip screw for the treatment of femoral neck fractures: a prospective study with 96 patients. ISRN Orthop. 2014;2014.
22. Hu SJ, Yu GR, Zhang SM. Surgical treatment of basicervical intertrochanteric fractures of the proximal femur with cephalomeduallary hip nails. Orthop Surg. 2013;5(2):124-9.
23. Hoeksma HL, Van den Ende CH, Ronday HK, Heering A, Breedveld FC, Dekker J. Comparison of the responsiveness of the Harris Hip Score with generic measures for hip function in osteoarthritis of the hip. Ann Rheum Dis. 2003;62(10):935-8.
24. Toh EM, Sahni V, Acharya A, Denton JS. Management of intracapsular femoral neck fractures in the elderly; is it time to rethink our strategy? Injury. 2004;35(2):125-9.
25. Gurusamy K, Parker MJ, Rowlands TK. The complications of displaced intracapsular fractures of the hip: the effect of screw positioning and angulation on fracture healing. J Bone Jt Surg. 2005;87(5):632-4.