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AN AUDIT OF FRACTURE UNION IN SUBTROCHANTERIC FEMORAL FRACTURES FIXED WITH DYNAMIC CONDYLAR SCREW SYSTEM

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Abstract:

Objective: *To assess the fracture union rate in cases of subtrochanteric femoral fractures managed with dynamic condylar screw system.*

Material and methods: *This cross sectional study was conducted at Department of Orthopedic Surgery, Dera Ghazi Khan Teaching Hospital, DG Khan from May 2018 to November 2018 over the period of 6 months. Total 113 patients with closed subtrochanteric fractures (within the 1 week of fracture) either male or female having age from 20-70 years were selected for the study. Cases were managed with DCS and union of fracture was assessed at 8th week.*

Results: *This study consisted on 113 patients of subtrochanteric femoral fracture managed with dynamic condylar screw system. Union rate was assessed at 8th week. Mean age of the patients was 39.2 ± 14.93 years. Minimum age was 20 years and maximum age was 70 years. Out of 113 patients union was noted in 93 (82.3%) patients and non-union was seen in 20 (17.7%) patients.*

Conclusion: *This study concluded excellent fracture union rate in cases of subtrochanteric femoral fracture managed with dynamic condylar screw system. Males were more prominent than females. Most of the patients were young with higher union rate. Type B fracture was the most common type of fracture.*

Key words: *DCS (Dynamic condylar screw), DHS (Dynamic hip screw), Sub-trochanteric fracture, hip*

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INTRODUCTION:

The proximal femur includes the head, neck and the trochanters with the adjoining region.[1] Subtrochanteric fractures are femoral fractures where the fracture occurs below the lesser trochanter upto 5cm distally in the shaft of femur and these fractures have considerable challenge in management.[2]

These fractures occur typically in two age groups. In young and healthy individuals, the injury results from high-energy trauma, whereas in the elderly population, most of the fractures are osteoporotic, resulting from a fall. With the increase in the aging population, there is also considerable growth in the number of pathological fractures and fractures around hip prosthesis (periprosthetic fractures).[3-4] These fractures account for 10% to 34% of all hip fractures.[5-6]

Biomechanical studies have shown that femoral cortex in the postero-medial subtrochanteric region is subjected to highest stresses in the body as a result of high compressive and tensile forces in the medial cortex distal and lateral to the lesser trochanter respectively, internal fixation is difficult and risks a high failure rate.[7] Considering the biomechanical forces which lead displacement, open reduction and internal fixation is necessary.[7-8]

Conservative treatment gives only satisfactory results in 56% of patients as compared to70-80% for operative methods.[10] During the past 30 years, there has been a near-complete elimination of nonoperative treatment in adults and a corresponding increase in the operative treatment of subtrochanteric fractures.[11] There are two main types of devices to fix subtrochanteric fractures, inta-medullary devices and extra-medullary devices.[12] Intramedullary implants includes reconstruction nail, gamma nail, Russel taylor nails while extramedullary Implants commonly use includes A.O 95 angled condylar blade plate, A.O 95 degree dynamic condylar screws, Dynamic hip screws.[12] The A.O dynamic condylar screw provide strong fixation in the cancellous bone of the neck and head with considerable rotational stability. Intramedullary devices require less surgical exposure, enable early weight bearing, achieve better proximal fixation and exert less biomechanical stresses.[13]

However they are not suitable for subtrochanteric fractures with intertochanteric extension and are associated with technical difficulties in 63% of cases.[13] DHS and DCS are among the best fixation devices in the armamentarium for subtrochanteric fracture management.[14]

DCS is considered a very good device for subtrochanteric fracture because it has many advantages like easy insertion, firm fixation, more strength, and resistant to stress failure with less operative time. But its union rate is not determined in our local population before my study. So a study is planned to find out the frequency of union after subtrochanteric fracture by using DCS

OPERATIONAL DEFINITION

Subtrochanteric femoral fractures:

Subtrochanteric fractures are fractures that occur in a zone extending from the lesser trochanter to 5cm distal to the lesser trochanter assessed on anteroposterior (AP) radiographic view of femoral shaft.

Types of Subtrochanteric femoral fractures:

Type A = At level of lesser trochanter
Type B = <2.5 cm below lesser trochanter
Type C = 2.5-5cm below lesser trochanter

Union:

Union is defined as the renewal of continuity in a broken bone and is determined radiologically by loss of gap between fracture fragments upto 8th week.

This cross-sectional study was conducted at Department of Orthopedic Surgery, Dera Ghazi Khan Teaching Hospital, DG Khan from May 2018 to November 2018 over the period of 6 months. Total 113 patients with closed subtrochanteric fractures (within the 1 week of fracture) either male or female having age from 20-70 years were selected for the study. All cases with open fractures, with history of diabetes mellitus, with previous surgery and patients with osteoporosis were excluded from the study. Study was approved by ethical committee and written informed consent was taken from every patient.

After admission temporary skin traction was applied to relieve pain. To choose proper implant size and fracture geometry was assessed preoperative planning on X-rays and was operated on elective list. All the fractures were classified according to A.O classification. Union of fracture was assessed after 8 weeks and findings were entered on pre-designed performa along with demographic profile of the patients.

Collected data was entered in SPSS version 18 and analyzed. Mean and SD was calculated for numerical data and frequencies were calculated for categorical data.

RESULTS:

This study consisted on 113 patients of subtrochanteric femoral fracture managed with dynamic condylar screw system. Union rate was assessed at 8th week. Mean age of the patients was 39.2 ± 14.93 years. Minimum age was 20 years and maximum age was 70 years. out of 113 patients union was noted in 93 (82.3%) patients and non-union was seen in 20 (17.7%) patients. (Fig. 1)
Age distribution of selected patients was done and two groups were made, age group 20-45 years and age group 46-70 years. Age group 20-45 years was consisted on 79 (69.91%) patients and age group 46-70 years consisted on 34 (30.09%) patients. Union rate of fracture was observed in 70 (88.61%) patients and 23 (67.65%) patients respectively in age group 20-45 years and 46-70 years. Union rate of fracture was significantly associated with age groups with p value 0.0138. (Table 1)

Among the 113 patients, males were 68 (60.18%) and females were 45 (39.82%). Union of fracture was found in 56 (82.35%) male patients and 37 (82.22%) female patients. Union rate was insignificantly associated with gender with p value 1.000. (Table 2)

Patients were divided into two groups according duration of fracture i.e. 1-3 days and 4-7 days. Total 46 (40.71%) patients belonged to 1-3 days group while 67 (59.29%) patients were belonged to 4-7 days group. Union of fracture was observed in 43 (93.48%) patients and 50 (74.63%) patients respectively in 1-3 days group and 4-7 days group. Statistically significant association between union rate and duration of fracture was observed with p value 0.0116. (Table 3)

Total 20 (17.7%) belonged to type A fracture, 58 (51.33%) patient to type B while 35 (30.97%) belonged to type c fracture. Union was found in 7 (35%) patients, 55 (94.83%) patients and 31 (88.57%) patients respectively in Type A, B and C fracture. Union of fracture significantly associated with type of fracture with p value 0.000. (Table 4)

Fig. 1

Union rate

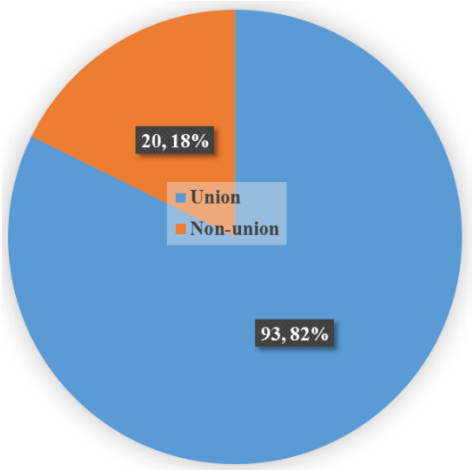

Table 1

Association of union rate with age group

Age Group	Union Rate		Total (%)	P value
	Yes (%)	No (%)		
20-45	70 (88.61%)	9 (11.39%)	79 (69.91%)	0.0138
46-70	23 (67.65%)	11 (32.35%)	34 (30.09%)	
Total	93 (82%)	20 (18%)	113	

Table 2

Association of union rate with gender

Gender	Union Rate		Total (%)	P value
	Yes (%)	No (%)		
Female	37 (82.22%)	8 (17.78%)	45 (39.82%)	1.0000

Male	56 (82.35%)	12 (17.65%)	68 (60.18%)	
Total	93	20	113	

Table 3
Association of union rate with duration of fracture

Duration of fracture	Union Rate		Total (%)	P value
	Yes (%)	No (%)		
1-3	43 (93.48%)	3 (6.52%)	46 (40.71%)	0.0116
4-7	50 (74.63%)	17 (25.37%)	67 (59.29%)	
Total	93	20	113	

Table 4
Association of union rate with type of fracture

Type of fracture	Union		Total (%)	P value
	Yes (%)	No (%)		
Type A	7 (35%)	13 (65%)	20 (17.7%)	0.000
Type B	55 (94.83%)	3 (5.17%)	58 (51.33%)	
Type C	31 (88.57%)	4 (11.43%)	35 (30.97%)	
Total	93	20	113	

DISCUSSION:

The characteristic anatomy, the biomechanical stress and forces acting at the subtrochanteric region makes it difficult to manage these fractures. Young patients usually sustain high energy trauma, which results in communited fractures whereas in older patients usually communited fractures are seen after minor fall.[15]

At present it is generally believed that all subtrochanteric fractures should be internally fixed to reduce the morbidity and mortality by early ambulation. Because of communition and high incidence of complications reported after surgical treatment surgeons are compelled to give a second thought regarding the selection of proper fixation device.[16] The most common current methods of fixation are blade plate systems, sliding nail plate systems and intramedullary devices.[17]

This study consisted on 113 patients of subtrochanteric femoral fracture managed with dynamic condylar screw system. Union rate was assessed at 8th week. Mean age of the patients was 39.2 ± 14.93 years. Minimum age was 20 years and maximum age was 70 years. out of 113 patients union was noted in 93 (82.3%) patients and non-union was seen in 20 (17.7%) patients.

Age distribution of selected patients was done and two groups were made, age group 20-45 years and age group 46-70 years. Age group 20-45 years was consisted on 79 (69.91%) patients and age group 46-70 years consisted on 34 (30.09%) patients. Union rate of fracture was observed in 70 (88.61%) patients and 23 (67.65%) patients respectively in age group 20-45 years and 46-70 years. Union rate of fracture was significantly associated with age groups with p value 0.0138.

Laghari et al[18] studied 48 cases of subtrochanteric femoral fracture. All the patients underwent operative treatment by fixation of DCS. Autogenous bone graft was done in 07 patients. The union rate in this series was (93.5%). Implant failure was observed in 03(6.25%) patients, 03 (6.25%) patients developed varus deformity and infection occurred in 02 (4.66 %). Findings of this study are in agreement with our findings. Rohilla et al,[19] found 100% union of fracture in cases of subtrochanteric femoral fractures treated by fixation with dynamic condylar screw system.

Similar (77%) findings were reported by Halwai et al[20] in their study. Kulkarni et al[21] reported fracture union rate as 90% in their study in cases of subtrochanteric femoral fractures treated by fixation with dynamic condylar screw system.

In another study by Mahmood et al,[22] Total 94 patients with subtrochanteric femoral fractures were managed with DCS. Mean age of the patients was 39.56±15.125 years and mean duration of fracture was 4.10±1.973 days. Thirty eight patients (40.4%) were male and 56 patients (59.6%) were female. Type A fracture was noted in 17(18.1%) patients

followed by type B 46(48.9%) and type C in 31(33%) patients. Among the 94 patients, union of fracture was noted in 75(79.8%). These findings are in agreement with our findings.

Khallaf et al[23] documented mean duration of union in 4 months in 46 patients (95.8%). Non-union was evident in 2 patients (4.2%). The male patients numbering 37 (78%) constituted the majority, compared to 11 female patients (22%). The mean age was 36 years (ranging from 24 to 78 years). Forty patients (83.3%) were under the age of 50 years and only 8 patients (16.7%) were older than 50 years.

In our study among the 113 patients, males were 68 (60.18%) and females were 45 (39.82%). Union of fracture was found in 56 (82.35%) male patients and 37 (82.22%) female patients. Union rate was insignificantly associated with gender with p value 1.000. This study shows preponderance of males over females. In one study by Laghari et al,[18] out of 48 cases with subtrochanteric femoral fractures, 60.42% patients were male and 39.58% patients were female which is comparable with our findings. In another study by Kumar Mishra et al,[24] out of 75 patients of subtrochanteric femoral fracture, male patients were 60 and female patients were 40

Total 20 (17.7%) belonged to type A fracture, 58 (51.33%) patient to type B while 35 (30.97%) belonged to type c fracture. Union was found in 7 (35%) patients, 55 (94.83%) patients and 31 (88.57%) patients respectively in Type A, B and C fracture. Union of fracture significantly associated with type of fracture with p value 0.000. Laghari et al,[18] reported type A fracture as 37.50%, type B fracture as 33.34% and type c fracture 29.16% which is comparable with findings of this study.

CONCLUSION:

This study concluded excellent fracture union rate in cases of subtrochanteric femoral fracture managed with dynamic condylar screw system. Males were more prominent than females. Most of the patients were young with higher union rate. Type B fracture was the most common type of fracture.

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