Cannulated screws fixation is usually the method of choice for NOF fracture specially in younger patients

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ABSTRACT

Objective: To determine the radiological outcome of cannulated hip screws fixation in nondisplaced femoral neck fractures.

Methods: This is a cross sectional study conducted between March 2011 to March 2016 at Orthopedic Surgery Department, Liaquat National Hospital, Karachi. Total 251 patients with nondisplaced femur neck fracture with Garden variety classification type I & II were indulged. All patients underwent cannulated screws fixation. Post-operative hip radiographs and MRI were analyzed for non-union and avascular necrosis. Calculation of descriptive statistics performed. Chi-square test was applied.

Results: Study comprises 106 males and 56 females. Mean age was 37.98±8.02 years. Mean span of fracture 3.64±1.59 days. Mean hospital stay was 8.49±0.87 days. Nonunion was observed in 12.4% patients and avascular necrosis was observed in 6.0% cases. Significant association of non-union was observed with age and duration of fracture. While avascular necrosis was observed with hospital stay.

Conclusion: Neck of femur fracture fixation through cannulated hip screws remains a valid option with postoperative complications less than 15%.

Keywords: Outcome, cannulated hip screws fixation, nondisplaced femur neck fractures

INTRODUCTION

One of the challenging trauma to manage is the broken femur neck, which comprises half of nearly the hip fractures [1, 2]. In older patients, usually minimal or moderate energy trauma is enough for causing fracture neck of femur however in younger age group high energy trauma is the reason behind [3]. There are many treatments for broken femur neck. They vary as per age of the patient and fracture pattern [4, 5]. To treat non-displaced femoral neck fractures multiple cannulated screws have been commonly used [4, 6]. Avascular necrosis is a common complication following these fractures due to distinguished arterial nutrition of the femoral head [3, 6]. If these fractures are stabilized internally using cannulated screws, frequency of avascular necrosis and non-union for undisplaced fractures are low [7]. Swiontkowski [8] shows best results with fixing the femur neck with CHS.

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The patients of impacted and non-displaced femur neck fracture with cannulated screws were intervened in one of the studies which found 13 (81.25%) patients were at ease by the good outcome of management. Among them 12.5% patients come up with non-union & only 6.25% developed avascular necrosis [7].

To determine the outcome of cannulated hip screws, present study was being conducted in which un displaced femur neck fracture for < 7 days with Garden type I and II. This will prove to be helpful in management of non-displaced femoral neck fractures. The main purpose of the study was the evaluation of the results with the use of cannulated hip screws in the management of nondisplaced broken femur neck and also frequency of convolutions like avascular necrosis and non-union in order to compare differences from other regions.

METHODS

A cross-sectional study done among 251 patients visited Department of Orthopedics, Liaquat National Hospital Karachi aged between 25 to 50 years of either gender. Data was collected through proforma from March 2011 to March 2016. Patient of either gender with age 25-50 years and with nondisplaced fracture

neck of femur for < 7 days with Garden classification variety type I & II were indulged while patient with displaced fracture confirmed on X-rays.

Patient demographics, history and radiologic findings taken by the principal investigator. All patients were underwent cannulated screw fixation for fracture under supervision of senior orthopedic consultant of minimum 5 years experience. Patient follow-up done on 2nd week, 6th week and at 3 months post surgery. Post-operative hip radiographs were analyzed for non-union and MRI for avascular necrosis that were diagnosed and noted on predesigned proforma after 3 months. X-rays which failed to show the fracture gap obliteration after 3 months were labelled non-union and MRI (Ficat and Alert Classification) was use to establish AVN at 3 months. The effect modifiers and biasness were controlled by strictly following the inclusion and exclusion criteria of study.

Statistics

Data interpreted by operating on SPSS version 21. Standard deviation and mean were computed for frequency. Stratification done with regards to qualitative variables to see the impact of these rectifiers on study groups by applying chi square test and Fisher's exact test. Significant P-value was considered less than 0.05.

RESULTS

251 patients with either gender and age of 25 to 50 were incorporated for the research to evaluate the outcome of cannulated hip screws fixation in nondisplaced femur neck fractures.

Out of 251 patients, 160 were male and 91 were female. The mean age of patients was 37.98±8.02 years, mean duration of fracture was 3.64±1.59 days and mean hospital stay was 8.49±0.87 days. Most of patients were found with type-II garden classification. In our study non union was found in 31(12.4%) and avascular necrosis in 15(6%) of patients. Detailed characteristics are presented in Table-1.

We found significant association of Non Union with age (p=0.001) and duration of fracture (p=0.000). Considerable association found for garden classification (p=0.001) with avascular necrosis. Detailed results of association of non union and avascular necrosis are presented in Table-2 and Table-3 respectively.

Table-1: Patients Characterstics

		n (%)
Age(years)		37.98±8.02
Duration of Fracture(days)		3.64±1.59
Hospital Stay(days)		8.49±0.87
Gender		
Male		160(63.7)
Female		91(36.3)
Garden classification		
Type-I		103(41)
Type-II		148(59)
Non Union		
Yes		31(12.4%)
No		220(87.6%)
Avascular necrosis		
Yes		15(6%)
No		236(94%)
Mean±SD		

Table-2: Association of Non Union

	n(%)		
	Yes (n=31)	**No (n=220)**	**P-Value**
Gender			
Male	22(70.9)	138(62.7)	0.372
Female	9(29.1)	82(37.3)	
Age Group			
≤35 years	5(16.1)	102(46.4)	0.001
>35 years	26(83.9)	118(53.6)	
Duration of fracture			
≤3 days	30(96.8)	90(40.9)	0.000
>3 days	1(3.2)	130(59.1)	

Hospital stay			
≤8 days	18(58.1)	111(50.4)	0.427
>8 days	13(41.9)	109(49.6)	
Garden Classification			
Type-I	16(51.6)	87(39.6)	0.201
Type-II	15(48.4)	113(51.4)	
Chi-square tested.			
≤0.05 P-value considered as significant.			

Table-3: Association of Avascular necrosis

	n(%)		P-Value
	Yes (n=15)	**No (n=236)**	
Gender			
Male	8(53.3)	152(64.4)	0.387
Female	7(46.7)	84(35.6%)	
Age Group			
≤35 years	8(53.3)	99(41.9)	0.387
>35 years	7(46.7)	137(58.1)	
Duration of fracture			
≤3 days	8(53.3)	95(40.3)	0.318
>3 days	7(46.7)	141(59.7)	
Hospital stay			
≤8 days	10(66.7)	110(46.6)	0.132
>8 days	5(33.3)	126(53.4)	
Garden Classification			
Type-I	14(93.3)	115(48.7)	0.001
Type-II	1(6.7)	121(51.3)	
Chi-square tested.			
≤0.05 P-value considered as significant.			

DISCUSSION

Protecting and safeguarding the blood supply to the femur head while doing the intervention providing accurate reduction and absolute stability is the standard and preferred management option in femur neck fracrure for younger people [9]. At the same time complications risk are high associated with femur neck fractures usually resulting from trauma with high intensity [9, 10]. Neck of femur fracture when encountered, complications like avascular necrosis and non-union frequently occurs because of certain reasons; blood circulation characterstics and absence periosteum cambium layer of femur neck [11].

Fixation through cannulated hip screws for neck of femur fracture shows failure rates of 5-30% approximately [12- 14], and another surgery is required mostly for these failed cases. Many factors affecting the results of treatment which need to be understood . Few authors have reported following important and crucial factors that affect treatment results; the movement degree of a fracture, reduction perfection, fixation interne location, grade of pulverization of cortical bone posteriorly, and elapsed time from injury to the operative intervention [15, 16].

Orthopaedic surgeons routinely encounter femur neck fracture which remain a challenging task in their clinical practice. Management of these fractures is still a debatable point over the years. Broadly if we study,

the treatment option or mode widely accepted is fixing internally the fracture through open or close methods in lesser age group and people without arthritic findings in the hip joint. The primary and ultimate goal or focus of fixing this fractured neck is to obtain the accurate reduction for re-establishing dubious circulation to the proximal femur, in the young population and avoiding post operative convolutions such as non union and avascular necrosis. Two or more usually 3 standard cannulated screws of 7.3mm cancellous type placed inside as "3 point principle" through which able to provide stable fixation under surgical expertise and that is how we did all fixations of neck of femur fractures in our study. It is stated and emphasized that neck of femur fracture is a fracture of necessity and its intervention should be considered as early as possible in emergency so to retrieve dubious circulation to the femur head & avoid convolutions like non-union and AVN, the happening of these convolutions are 10-20% and 10-30% respectively [17-20].

Non-union and AVN like complications make hip liable to degenerative arthritic changes. Between 20-36% revision hip surgery and hip replacement is reported [21, 22]. Our study can be compared to Khoo study [23] in which taking everything into account, the percentage of avascular necrosis was 16.98%, which is also quite similar and equivalent with most of the past reported collected and printed information (range from 10%-30%) [17-20].

Avascular necrosis proceed to sequential crumbling of the femur head which leads to future degenerative hip arthritis, making the need of revision or hip replacement essential. Past researches highlighted altered points with respect to the connection between ages of patient to percentage of avascular necrosis. The orthodox faith that there is low frequency of AVN with advancing age, as stated by Graham [24], Barnes [25] and Luizou [26]. In contrast, Shih & Wang [27], formulated that there was no noteworthy link between patient age and the frequency of AVN occurring in future life. Our study analysis is nearly matching with the inference of Shih, Wang & Khoo [23] as there was no noteworthy link or relation between frequency of AVN and age.

Risk of AVN seems to get reduced if timely and perfectly fix the neck in less than 6 hours duration [28]. Jain delineated that timely fracture reduction was noticed to be the only involving component, while other authors have stated no collation in late or early intervention [29]. We acknowledged in our study that 6.0% cases of avascular necrosis when the fixation performed within 6 hours but the incidence chances are more with the creeping time up in comparison to Khoo study [23] in which cases of AVN was missing when the fracture was timely intervened but the prevalence shoots as the time keep on increasing. But due to limited cases this is not statistically important and significant. So therefore, still it can be concluded that neck of femur fracture is a surgical emergency and timely intervention and fracture stabilization should be the ultimate goal under consideration.

Regarding the blood circulation to the femur head major part originates from the lateral and medial femoral circumflex arteries with lesser participation from the obturator vessels [30, 31]. The circumflex vessels have its origin from superficial femoral artery and encircling the trochanteric region before giving branch in proximity to the femur head. In our study there was no notable connection between fracture location to occurrence of avascular necrosis, which is similar to Khoo study [23]. We perceive that femur neck fractures had 6.0% possibility of having avascular necrosis in comparison to a 37.5% possibility of having avascular necrosis in Khoo study [23], 11.11% incidence of AVN in transcervical fractures.

Accuracy of fracture absolute stability is one of the most important steps in fixing femur neck fractures through percuatneous cannulated hip screw. Using the Garden Alignment Index accurate fracture reduction can be assessed. This index indicate the angle of compression trabeculae on anteroposterior image parallel to the vertical axis of femur shaft and compression trabeculae angle on the lateral image parallel to femur shaft. A usual roentgenogram of the hip, on anteroposterior view, angle should be 160° and 180° angle on lateral. Accurate fixation is elucidate as a angle lying in range of 155°-180° on AP and lateral images. It is invariably believe that peril of AVN is on higher side substantially if the alignment index is more than the range that is accepted, specifically if there is a valgus reduction of greater than 20°[32].

Asnis & Wanek-Sgaglione [33] reported percentage of avascular necrosis of 20% in non displaced fractures, Garden type II in their study. We postulate that the fate of femur head in terms of avacular necrosis in future is directly proportional with the initial force succour at the upper 1/3rd of femur during the traumatic incident. The circulation of the hip could have been discontinued from the very first injury,

there by the accuracy of reduction did not impact the frequency of avascular AVN. Favero KJ & Tooke [34], Protzman and Burkhalter [35] also having homogenous views in their researches.

CONCLUSION

Patients intervened with standard fixation through CHS for non displaced femur neck fractures manifest percentage of convolutions not greater than 15%, so it perceives to be a valid tool for treating neck of femur fractures specially in younger population.

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