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FRACTURE NECK OF FEMUR;
AVASCULAR NECROSIS WITH CANNULATED SCREWS

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ABSTRACT… Fracture neck of femur is a devastating injury. One of its main complications is avascular necrosis (AVN) of the femoral head. For the fixation of femoral neck fractures, cannulated screws are now universally used. The aim of the study was to determine the frequency of avascular necrosis in fracture neck of femur fixed with cannulated screws. **Study Design:** Descriptive cross sectional study. **Setting:** Orthopedic unit of Ayub Teaching Hospital Abbottabad. **Period:** 7th March, 2011 to 6th September, 2011. **Material and Methods**: Recruiting 113 patients of either gender between 15 to 60 years of age with fracture neck of femur who were fixed with cannulated screws. The data was entered and analyzed with the help of SPSS 10.**Results:** There were 113 patients with an overall mean age of 43.51 years ± 11.94SD. Maximum number of patients was 56 (49.50%) from the age group of 46 to 60 years. Avascular necrosis was noted in 23 (20.35%) cases. The maximum number of patients with avascular necrosis was 13 (56.52%) belonging to the age group of 15 to 25. **Conclusion:** Avascular necrosis was high in younger ages in displaced fractures of neck of femur treated with cannulated screws.

Key words: Neck of femur fracture, Avascular Necrosis, Cannulated Screw.

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INTRODUCTION

Femoral neck fractures in physiologically young adults, which often result from high-energy trauma, are less common than intracapsular femoral neck fractures in elderly patients. Due to its precarious blood supply, chances of avascular necrosis are high.[1,2] So it is a medical, social & economic challenge for orthopedic surgeons & society. It has been labeled as an unsolved fracture.[3] Fractures of the femoral neck are increasing at an exponential rate as a result of the longevity of the general population.[2]

Fracture NOF can be treated in a number of ways depending on physiologic age & activity level of patient & on displacement of fracture.[2] Impacted & undisplaced fractures (Garden types I & II) are treated by internal fixation with Cannulated/ Cancellous screw or a compression screw with a side plate. Displaced fractures (Garden types III & IV) are treated by closed/open reduction & internal fixation below age of 65 years. In patients with pre-existing hip lesions, total hip replacement (THR) is offered.[4] In cases of neglected fracture NOF in young adults (<60 years), bone grafting with internal fixation is a reliable method with good long term functional outcomes.[5] Urgent fracture reduction is necessary to minimize the risk of avascular necrosis, and the gold standard is internal fixation through cannulated screw.[6]

Cannulated screws are now universally used for the fixation of femoral neck fractures.[6] Patients with less than 60 years of age with fracture NOF is treated by closed/open reduction & cannulated screws fixation. There is minimal blood loss, less operative time & decreased chances of avascular necrosis compared with compression screw & side plate.[7] Two screws fixation appears to be adequate.[8]

While managing fracture neck of femur in patients

with less than 60 years of age, it is important that the head of femur should be preserved as well as to achieve union and prevent avascular necrosis. This study will help in determining the trend of avascular necrosis in fracture neck of femur fixed with cannulated screws. The results of this study will be used to make standard ward and surgical guidelines in case if the frequency of AVN is found to be significantly high. The results of this study will also be disseminated to other orthopedic surgeons to aware them about the frequency of avascular necrosis and recommendations will be given regarding modification of surgical technique.

OBJECTIVE

The objective of this study was to determine the frequency of AVN in fracture Neck of Femur fixed with cannulated screws.

MATERIAL AND METHODS

This descriptive cross sectional study was carried out at orthopedic unit, Ayub Teaching Hospital, Abbottabad during 6 months from 7th March 2011 to 6th September 2011. The sample size was 113 and the sampling technique was consecutive non-probability. The inclusion criteria adopted was; patients, aged 15-60 years, presenting with fracture neck of femur within two weeks of injury of either gender. Patients with hip arthritis, pathological fracture and severe osteoporosis diagnosed on x-rays were excluded from the study.

All the patients attending the outpatient department and accident and emergency department of the Ayub Teaching Hospital Abbottabad with fracture neck of femur providing informed consent and meeting inclusion criteria were included in the study. Fracture neck of femur was defined as when there was a break in the continuity of the cortices of femoral neck anywhere from subcapital to basicervical area seen on X-Rays of the affected hip. Variables like age and gender were noted. The diagnosis and degree of displacement of fracture neck of femur was established by taking history, doing physical examination, taking proper images like x-rays of the involved hip; Antero-posterior views with foot internally rotated and lateral views. Preoperative laboratory investigations were arranged. After putting the patient in supine position under spinal anesthesia, fracture was manipulated and reduced anatomically under C-arm control by closed method. After cleaning and draping, a small incision was given. Three guide wires were passed with the control in anterior, posterior and inferiorly in an inverted triangle fashion, through the shaft to the neck and head of femur. In some cases two guide wires were passed superiorly and inferiorly. Cannulated screws were used to fix the fracture in compression mode. Post-operative analgesia and antibiotics were given for 3 to 5 days as in the protocol. The rehabilitation program was started on first post-operative day by advising the patient about isometric exercises of the limb and non-weight bearing for 6 to 8 weeks. The patients were followed up after three months to evaluate for (avascular necrosis) AVN through bone scan. AVN was defined as dead femoral head in fracture neck of femur fixed with cannulated screws which will be diagnosed on x-rays as increased radio-opacity and crescent sign; and by bone scan after three months as a photopenic (cold) area surrounded by hot area. Patient's telephonic contacts and addresses were taken to ensure follow-up. The data was recorded on the proforma. Exclusion criteria were strictly followed to control confounders and bias in the study results.

The data was analyzed in SPSS version 10 for windows. Mean ± Standard deviation was calculated for quantitative variables like age. Frequency and percentages were calculated for categorical variables like gender and avascular necrosis. AVN was stratified among age and gender to see the effect modification. All the results were presented in the form of tables and graphs.

RESULTS

The total number of patients was 113 presenting with neck of femur fracture. There were 85 (75.22%) males and 28 (24.78%) females. The male to female ratio was 3.03:1. The mean age of male patients was 42.18 years ± 12.72SD and female was 37.92 years ± 13.02SD with an overall mean age of 41.13 years ± 13.02SD.

The total number of patients presenting with avascular necrosis of head of femur in neck of femur fracture was 23 (20.35%). The maximum number of patients with avascular necrosis was 07 (30.43%) belonging to the age group of 15 to 25 years followed by 26 to 35 years who were 06 (26.09%). Other detail according to age wise distribution of avascular necrosis is shown in Table-I.

Age of Patient	Avascular Necrosis n (%)
15-25 years n=15	7 (30.43%)
26-35 years n=20	6 (26.09%)
36-45 years n=29	5 (21.74%)
46-60 years n=49	5 (21.74%)

Table-I. Age wise distribution of avascular necrosis of head of femur in neck of femur fracture

According to gender wise, avascular necrosis of head of femur was noted in 14 (60.87%) males and 9 (39.13%) females (Table-II).

Male	14(60.87%)
Female	9 (39.13%)

Table-II. gender wise distribution of avascular necrosis in neck offemur fracture

According to Garden classification maximum frequency of avascular necrosis of head of femur was observed in type IV which was 14 (60.87%). Other detail is shown in Table-III.

Type of fracture		Avascular Necrosis
Garden I (Incomplete, undisplaced fracture) (6.19%)	**N=7**	0 (0%)
Garden II (Complete, undisplaced fracture)	**N=20 (17.70%)**	3 (13.04%)
Garden III (Complete, partially displaced fracture)	**N=50 (44.25%)**	6 (26.09%)
Garden IV (fully displaced fracture)	**N=36 (31.86%)**	14 (60.87%)

Table-III. Frequency of avascular necrosis in patients with neck of femur fracture according to garden classification

DISCUSSIONS

Intracapsular neck of femur fractures is a devastating injury and its treatment and results have remained a great challenge for orthopedic surgeons. The incidence of such fractures is increasing in the modern world due to high energy trauma associated with road traffic accidents.[07]Nonunion and avascular necrosis of the femoral head or a combination of both is the main complication following fractures of the femoral neck.

The reason is a combination of unfavorable biomechanical and vascular conditions caused by the fracture itself, ignoring general contraindications, poor reduction and inadequate internal fixation. Usually there is shortening in the fracture, which limits the indication for simple refixation, the least radical operation.[9]

In our study the mean age of the patients was 41.13 years. Most of the patients were male (75.22%) presented with neck of femur fracture as compared to females (24.78%) with male to female ratio of 3.03:1, this is because males are more involved in outside home activities while females stay at home most of the time and they sustain less injuries. This is also noted in another local study where there were eighteen males (72%) and seven females (28%) with M: F ratio of 3.5:1.[02] But on the other hand in a retrospective review by Lu HD et al, there was female predominance with femoral neck fractures treated with cannulated compression screws and there were 44 males and 52 females with 21 to 88 years old and the average age was 56.3 years.[10]

Majority of the patients (43.36%) in our study were from the age group of 46 to 60 years followed by the age group of 36 to 45 years (25.66%) and age group of 26 to 35 years (17.70%). These age groups are involved more in daily routine activities in our setup hence affected more than the younger age group of 15 to 25 years who were 13.27%. This is also in accordance to Nizamiet al.[02]

An important part of rationale for prompt treatment of the fracture neck of femur is preservation of the

blood supply to the femoral head which is critical for a satisfactory long term result. The fracture is regarded as a vascular injury to the bone's blood supply.[11]The degree of vascular compromise is thought to directly correlate with the displacement of the fracture which affects fracture union and leading to complications. Hence intracapsular fracture neck of femur is regarded as an orthopedic emergency and needs to be reduced with rigid internal fixation which is believed to improve the circulation of femoral head and prevent the non-union and avascular necrosis.[07]
The cannulated screws can be inserted relatively simply and atraumatically compared to other methods.[12] Internal fixation with cannulated cancellous screws after good anatomical reduction is the optimum method of treating intracapsular fractures as it has the advantages of decreased blood loss and operative time, lower transfusion requirements and decreased length of hospital stay.[13]

In our study avascular necrosis was observed in 23 (20.35%) patients treated for neck of femur fracture with cannulated screws. Avascular necrosis was observed more in the age group of 15 to 25 years followed by 26 to 35 years age group. The rate of avascular necrosis in our study is similar to the local and international studies.

Nizami et al also reported 12%avascular necrosis in neck of femur fractures treated with cannulatedscrews.[02]

Karaeminogullari et al studied Twenty-eight patients with 30 femoral neck fractures who underwent internal fixation and completed a minimum of 2 years follow-up. These patients were retrospectively analyzed. The rate of avascular necrosis was 12.5%.[14]

In a retrospective study, Lu HD et al reported AVN in 11 (11.56%) cases.[10]

Huang et al reported avascular necrosis of the femoral head in 21 (17.2%) cases.[15]

According to Sahu et al, avascular necrosis occurred in 13 (26%) patients treated with AO cannulated screws for fractures neck of femur.[16]

In a study conducted by Sahu[17], AVN occurred in 19.36% of patients treated with cannulated screws for fracture neck of femur. In this study displaced fractures were found to be associated with high rates of AVN.

The degree of vascular compromise is thought to directly correlate with the displacement of the fracture leading to complications.[07]

In our study, we also correlated our results to find the causes of AVN. AVN was more in patients who were having displaced fracture, those who were fixed delayed (more than 48hours after sustaining fracture) and those who started early weight bearing and did not followed the instructions as advised. Displaced fractures in our study were observed in 86(76.11%) patients, and out of these 20 (23.25%) patients developed AVN. Our findings are according to Nizamiet al[02], Huang et al[15], Sahu et al[16] and Sahu et al[17].

CONCLUSIONS

From the results of this study, it is concluded that avascular necrosis was high in displaced fractures of neck of femur treated with cannulated screws. Also frequency of avascular necrosis was high in younger age group. It is recommended that displaced fractures of neck of femur must be properly anatomically reduced while fixing them with cannulated screws to reduce frequency of avascular necrosis.

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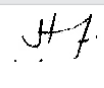
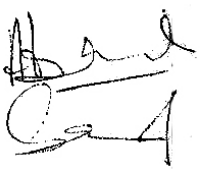
AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Hanif Ullah Khan	Sample collection, literature review & review of the whole article	
2	Dr. Abdul Waheed Jan	Formulation of graph & tables alongwith other computer work	
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