



Relevance of bony architecture in mechanism of injury causing fracture neck of femur: an observational study of 50 patients in Govt.Vellore Medical College

Dr.A.Senthil Kumar M.S.OrthoD.Ortho, Prof..Dr.V.P.Mohan Gandhi
M.S.Ortho

*Associate Professor of Orthopedics, Govt Vellore Medical College.
Professor and HOD, Department of Orthopedics, Govt Vellore Medical College.*

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ABSTRACT: Bony architecture plays a significant role in fracture neck of femur. Trivial fall is sufficient to produce neck of femur if the bony architecture is poor. 50 patients of fracture neck of femur were selected for radiographic evaluation and history of mechanism of injury. The Neck shaft angle, Hip axis length, femoral neck width and Singh's index were determined and compared with the occurrence of fracture neck of femur. Trivial fall is sufficient to produce fracture neck of femur if the bony architecture is poor as assessed by above parameters.

I. INTRODUCTION

The occurrence of femoral neck fractures depends on mechanism of injury and quality of bone. Other risk factors such as visual impairment, mental state, urinary incontinence, parkinsonism, use of medications play role in femoral neck fractures. The quality of bone depends on both microarchitecture (trabeculae pattern and cortical thickness) and macro architecture (shape and geometry) of proximal femur.

II. MATERIAL AND METHODS:

50 patients were selected for study. The study was done in the period between January 2020 to April 2021, in Govt Vellore Medical College. The age group was between 40 to 70 yrs of age. There were 30 females and 20 males in the study group. Pathological neck of femur fractures and paediatric cases were excluded. Patients admitted with fracture neck of femur were taken x-ray pelvis with both hips – anteroposterior & lateral view & Frog lateral view of normal side. Four radiological measurements were done in all cases.

1.NECK SHAFT ANGLE (NSA) – Angle between longitudinal femoral shaft axis and femoral head-neck axis in measured. x-ray pelvis AP is taken

with internal rotation of 15° - 20° is taken to access the NSA.

2.FEMORAL NECK AXIS LENGTH (FNAL)- Distance from joint below the lateral aspect of greater trochanter through the femoral neck to the inner pelvic brim is referred as hip axis length (HAL). It's an indirect measure of length of the lever arm of femur. FNAL is HAL minus the pelvic portion.

3.FEMORAL NECK WIDTH- Mean of shortest chamber of the femoral neck in both AP and frog lateral view is calculated.

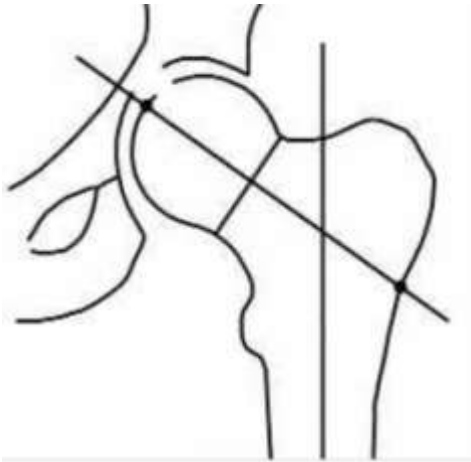
4.SINGHS INDEX- SINGHS index is calculated in all patients using visibility of trabeculae on radiography



Mechanism of injury:

Slip and fall in bathroom- 25, Accidental fall in steps -10, Fall on trochanter -5
Trauma -10, Total :50

Femoral neck axis length:



mechanism of injury helps us better understand the cause of fracture neck of femur and helps us to suggest ways to prevent it.

III. RESULTS

Total of 50 patients were included in the study. The results of various Radiological parameters are- The mean neck shaft angle in male was 132.5 and in females 129.6. The mean femoral neck axis length was 10.2 cm in male and 9.6cm in females. The mean femoral neck width was 3.8cms in males and 3.4cms in females. The Singh's index was 1 & 2 in 65% of cases, 3 &4 in 30% of cases and 5 &6 in 5% of cases.

IV. DISCUSSION

The quality of proximal femur depends on geometry of the neck and distribution of mass within the bone. Raid et al (1994) found that increased FNAL is associated with increased incidence rate of neck fractures.

The mechanism of femur neck fractures involves bending of the neck under the body weight. The strength of the bone at bending and torsion depends on the bone diameter.

The bending moment that breaks the femoral neck is a product of FNAL and the body weight. When the NSA is larger, FNAL is also longer and bending moment acting on femoral neck is greater and increases the incidence of femoral neck fractures. If the neck axis length is greater than 10.5 cms there is increased chance of femoral neck fracture.

At the same time, incidence is more with ageing due to osteoporosis which is measured radiologically using Singh's index. Patients with Singh's index 1, 2 had fracture neck of femur even with trivial fall.

V. CONCLUSION:

The incidence of femoral neck fractures is greater with increase of osteoporosis and frequency of falls in elderly age group. The knowledge of bony architecture and thorough history of