Fixation of unstable femoral neck fractures in adults

A systematic review of literature

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Abstract

We conducted this systematic review to evaluate the effectiveness of methods used in fixation of unstable femoral neck fracture in adults and compare the results of fixation by DHS ,cannulated screws ,DCS ,cephalomedullary nail , primary valgus intertrochantric osteotomy fixed by broad DCP.,Targon femoral neck device and medial buttress plate augmentation of cannulated screws fixation.

Methods: We conducted our study by searching Medline and PubMed for studies about fixation of unstable femoral neck fractures in adults and we found twelve papers about different methods of fixation which met our inclusion and exclusion criteria.

Our specific outcome measures were Achieved union and complications of different methods of fixation of unstable femoral neck fractures in adults.

Results: that Targon femoral neck system achieved the best union rates , despite high rates of complications.followed by primary valgus osteotomy and also achieved lower complication rate from other methods of fixation.

Conclusion: management of unstable femoral neck fracture in adults by Targon femoral neck system achieved the highest union rate than other methods of fixation but,primary valgus osteotomy is a very good method but it's technically demanding and has different complications

Key words:

Unstable femoral neck fractures , pauwel's III, young adults ,primary valgus osteotomy .

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Introduction

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Clinical aspect on femoral neck fractures

Femoral neck fractures in younger individuals usually result from high-energy trauma. A common injury pattern in this population is a transcervical vertical fracture extending toward the medial calcar and/or lesser trochanter. This vertical "fracture line" is best seen on an anteroposterior (AP) radiograph of the hip or pelvis and has been proposed to roughly approximate sagitally oriented fracture surfaces. Surgical repair of this unstable fracture is indicated, but no standard for operative internal fixation has been clinically proven to be superior at treating this injury pattern. The injury is affected by strong displacement forces across the hip that frequently lead to failure of fixation and malunion, with overall complication rates ranging from 20% to 86%. [1-2]

The significance of the high shear angle femoral neck fracture was recognized by Pauwels in the 1930, resulting in his classification scheme that categorizes the injury according to its "vertical" fracture angle: type 1, less than 30 degrees of Pauwels' angle , type 2:between 30-70º,type 3 >70º. [3]

A common clinical picture of femoral neck fracture patients is non ambulatory patient on presentation with shortening and external rotation in the lower limb ¸

this is in displaced fractures . patient with non displaced or stress fracture typically lacks the deformity pattern and may be able to weight bear but the main complaint becomes groin pain .[4]

An accurate history is important in patients with femoral neck fractures especially in older individuals giving history of loss of consciousness¸ prior syncopal episodes¸ medical history¸ chest pain¸ prior hip pain (pathological fracture) and pre injury ambulatory status is very important in detection the method of treatment.[4]

Radiographic evaluation of femoral neck fracture depends on:

- X ray imaging :(fig 1)

Injury and immediate postfixation AP radiographs must be assessed to determine the femoral neck fracture morphology.The pauwels angle is determined by comparing the fracture line with a line horizontal (perpendicular) to the femoral shaft. The pauwels angle is then confirmed by comparison with

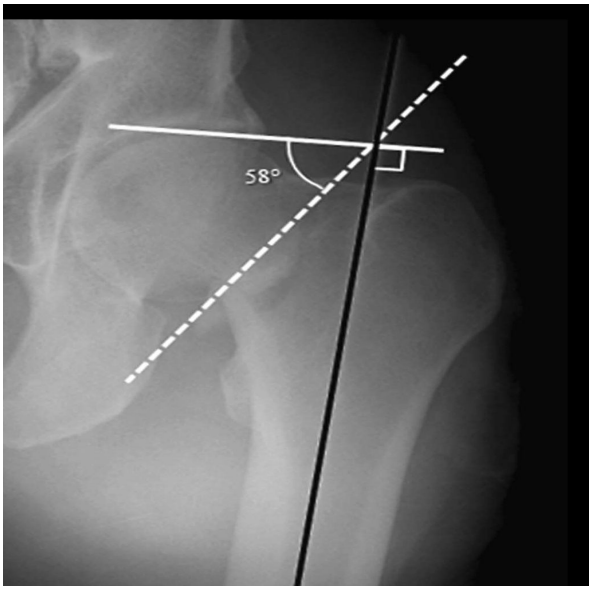

Figure 1: AP radiograph of a patient measuring 58° dotted line represents fracture line, white line is a horizontal line perpendicular to femoral shaft , black line represents the femoral shaft [5]:

postfixation radiographs and 2-dimensional coronal CT.[5]Frog lateral view of the hip is contraindicated.[4]

CT imaging :

The vertical fracture angle is assessed on coronal CT as the angle between fracture line and a line perpendicular to the intramedullary canal (fig 1) and measured on axial CT as the angle between fracture angle and head neck axis (Fig.2). [5]

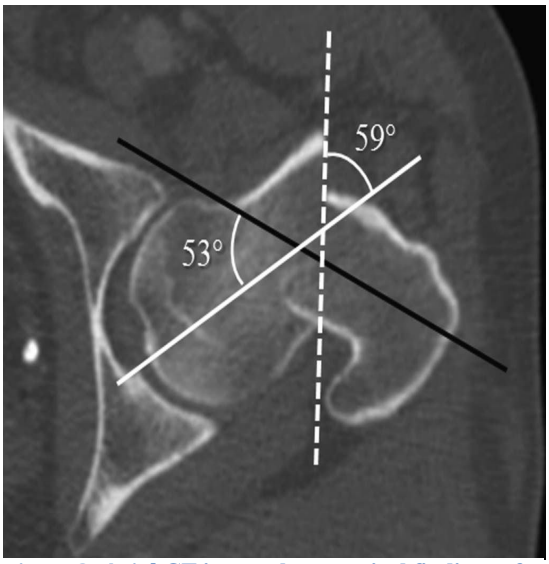

Figure 2: Axial:CT image shows typical findings of -59 degrees obliquity of neck fracture (dotted white line) relative to the HNA (solid white line) and 53 degrees external rotation deformities[5]

The presence and characteristics of comminution, including location [ie, the quadrant in which it was centered (eg,inferior or posterior or both)], fragmentation (single vs. multiple fragments), and extent (minor vs. major, with major being defined as measuring .1.5 cm in any

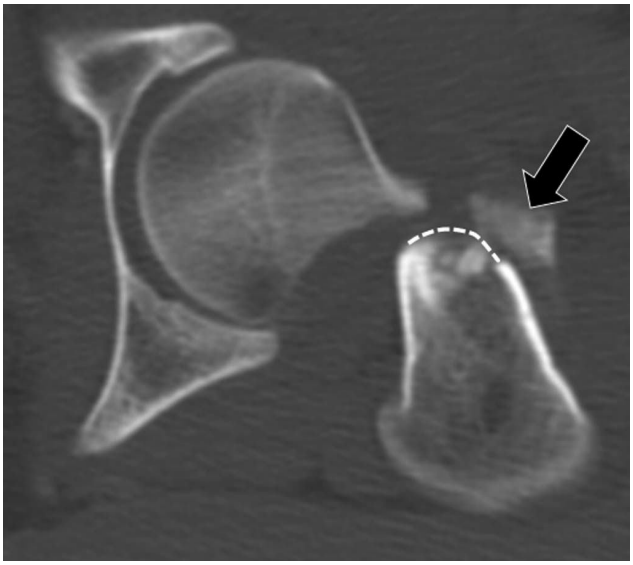

Figure 3 : Axial CT demonstrates inferior comminution (black arrow) and inferior extent of fracture along anteromedial femoral neck with calcar deficiency (white dotted line).[5]

dimension), are assessed on 2-dimensional and 3-dimensional CT imaging (Fig.3.).[5]

MRI imaging:

Is currently the imaging study of choice in non displaced or occult fractures when plain x ray is not evident .[4]

Pauwel classification of femoral neck fracture [3]

This is based on the angle of fracture from horizontal plane (fig 4)

Type 1: < 30 º

Type 2 : 31-70º

Type 3 : > 70º (vertical fracture pattern)

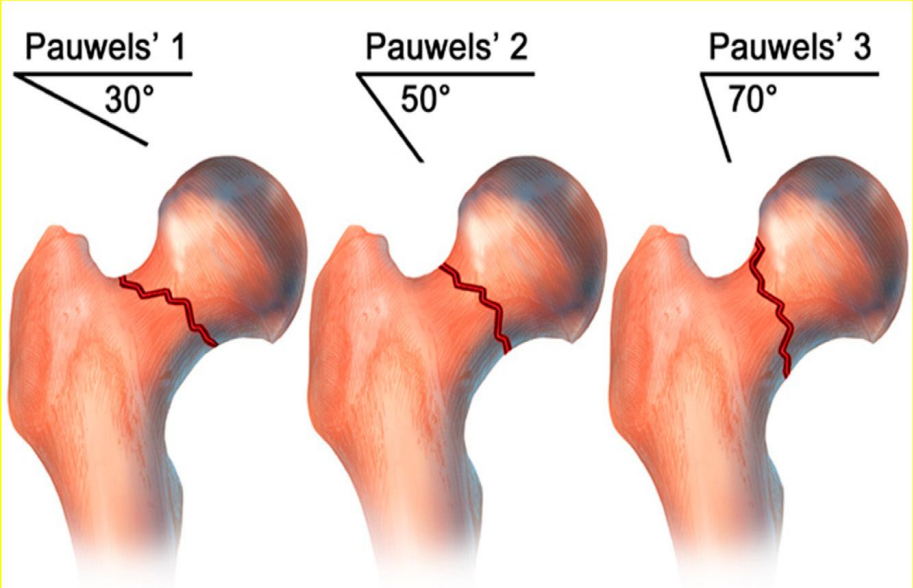

Figure 4: Pauwel classification of femoral neck fracture [6]

There is also Garden classification of femoral neck fracture[4] (fig.5)

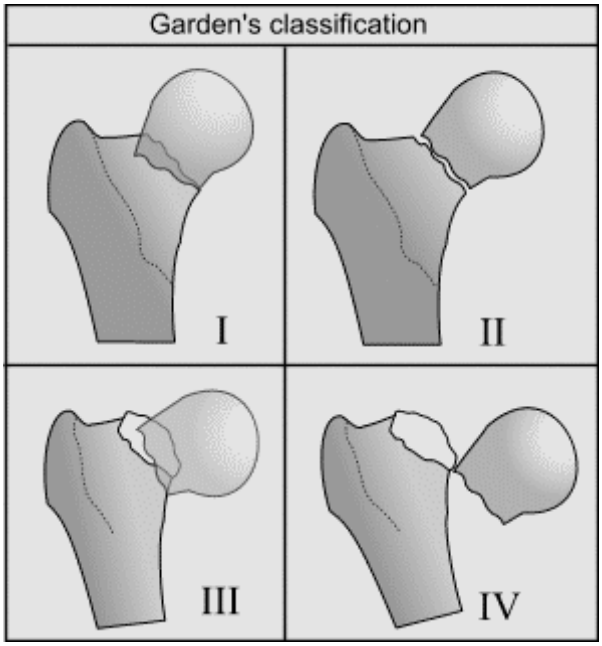

Figure 5: **Garden classification of femoral neck fracture**[7]

Type 1 : incomplete / valgus impacted.

Type 2 : complete and non displaced on AP and lateral views.

Type 3 : complete with partial displacement

Trabecular pattern of femoral head does not line up with that of acetabulum

Type 4 : completely displaced Trabecular pattern of the head assumes a parallel orientation with that of the acetabulum.

Treatment :

Aim of treatment :

1-to minimize patient discomfort.

2-restore hip function.

3-allow rapid mobilization by early anatomic reduction and internal fixation.