Extramedullary versus intramedullary bone fixation Treatment of peritrochanteric fractures

A Systematic review and meta-analysis for partial fulfillment for the master degree in Orthopaedic Surgery.

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List of Abbreviations

Abb.	Full term
AO/OTA	Arbeitsgemeinschaft für Osteosynthesefragen, Orthopaedic trauma association
CI	Confidence interval
DHS	Dynamic Hip score
IFFs	Intertrochanteric femoral fractures
PFN	Proximal femoral nail
P-value	Probability value
RR	Relative risk
SE	Standard error
SMD	Standard mean difference
T-value	Test of significant value

Abstract

In the last few decades the rate of peritrochanteric fractures has been increased because of increased rate of high velocity trauma accident and bone rarefaction due to osteoporosis in old age. DHS and PFN are the gold standard treatments used in treatment of these fractures. Nineteen studies are identified for analysis from 2007 to 2017 that met our points of comparison.

In our study we compare between DHS and PFN regarding patient reported functional follow up and complications.

INTRODUCTION

Half of hip fractures in the elderly are intertrochacnteric fractures, more than 50% of this fractures are unstable [1,2]. Fractures of intertrochanteric region are more common than femoral neck since it has a thinner cortical bone and it occurs more commonly in elderly due to decrease bone density in old age[3]. Trochanteric fractures surgery aims to early recovery and prevention of further complications. The most common system used for classification of intertrochanteric fractures is AO system [4]. AO classifications divide intertrochanteric fractures into four types: stable trochanteric (Type A1), unstable trochanteric (Type A2), fractures at the lesser trochanter (Type A3) and subtrochanteric fractures. In the last few decades dynamic hip screws was the gold standard in fixation of trochanteric fractures [5]. But in unstable fracture higher rates of failures nearing 23% have been reported when using dynamic hip screws [6].

On other hand intramedullary nailing system has theoretical clinically and mechanical advantages than dynamic hip screw [7]. Most authors depends on nailing system on treatment of unstable trochanteric fractures as its provides higher stability in this conditions [8,9,10]. But numerous complications reported from intramedullary nailing system such as intraoperative intertrochantric fractures, difficultly in targeting the cephalic screw, postoperative fractures at the

distal end of the nail and tendinuous lesions of the abductors muscles due to large metaphyseal diameter of the nail [11].

Instability of the dynamic hip screw in unstable inter trochantric fractures was the major complication and plate insertion by extended approach [8,9].

AIM OF THE WORK

The aim of this systematic review and Meta analysis is the critical appraisal of the studies that compare extramedullary to intramedullary bone fixation treatment of peri trochanteric fracture, the main focus being on number of cases, patient characteristics, patients reported functional follow up and complications.

REVIEW OF LITERATURE

Anatomy:

The femur structure is relatively complex, with bows and twists that disfigure its basically tubular structure. The head of the femur considerably over hangs the femoral shaft. This occurs because the neck makes an oblique angle with the shaft of the femur with an average of range 125-140°. There is considerable variability in both the neck-shaft angle and neck length. The femoral neck extends from the center of the femoral head medially and proximally so that the center of the femoral head is at the same level of the tip of the greater trochanter. The effect of the overhanging femoral head and neck is to lateralize the abductors, which attach to the greater trochanter from the center of rotation (center of the femoral head) [(12)].

The coronal plane of the femur is generally referred to the posterior distal femoral condyles. When oriented in this plane, it can be seen that the proximal femur, including the femoral head and neck are rotated anteriorly. This is commonly referenced to as femoral head-neck anteversion. However, it is really a combination of a torsional change in the intertrochanteric part of the femur and a further anteversion of the femoral neck based upon this torsion. The sum of this change is that the adult femoral head and neck are in a plane 10-15°anteriorly oriented to the coronal plane. The proximal end of the femur consists of head, neck, greater trochanter, Lesser tochanter and intertrochantric crest [(12)].

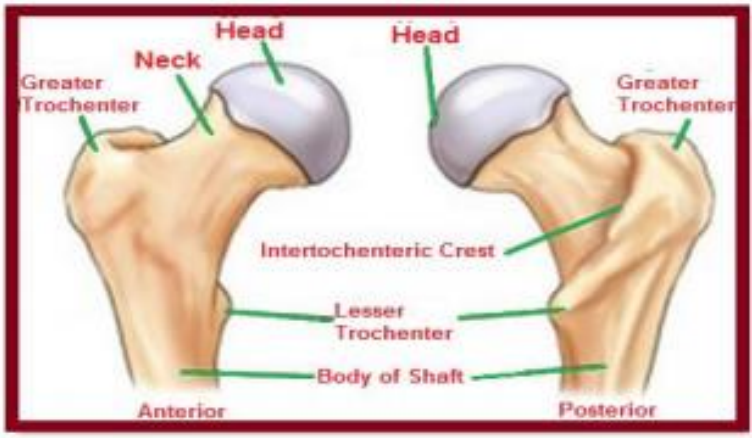

Figure (1): Anatomy of proximal femur [12].

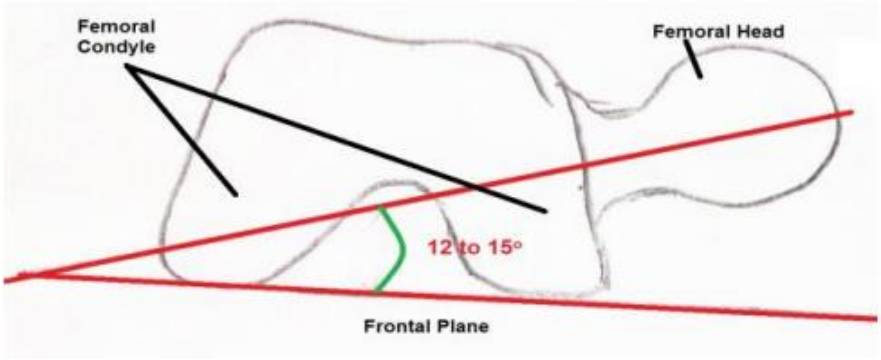

Figure (2): Femoral neck anteversion [12].

Head:

The head of the femur forms around more than half of sphere and its directed upward, medially and slightly forward to articulate with the acetabulum. The head is intracapsular and it's encircled by an acetabular labrum [12].

Neck:

It connects the head with the shaft of the femur which forms an angle between 125°-140° and it's about 5 cm in long.

In females the angle is less due to wider pelvis. Generally this unique arrangement facilities a wider range of movement to the hip joint. The anterior surface of the neck is completely intracapsular while the posterior surface only a little more than the medial half of the neck is intracapsular. The mark of the connection between the Neck and shaft anteriorly is the intertrochantric line while posteriorly it is marked by a rough edge called intertrochanteric crest [(12)].

Greater Trochanter:

Greater trochanter lies at the upper part of the junction between the neck and the shaft of the femur and it has a quadrangular shape. It projects upward and medially at its postero-superior portion which gives attachment near its anterior tip to the glutes minimus [(12)].

Lesser Trochanter:

Lesser trochanter lies at the lower part of the junction between the neck and the shaft and it's projected backwards and medially [(12)].

Intertrochanteric line:

It's the line that marks the junction between the neck and the shaft of the femur anteriorly. It connects with the greater trochanter above and to the lesser trochanter below. It gives attachment to ilio femoral ligament and the highest fibers of vastus lateralis arises from its upper end and the highest fibers of vastus medialis aries from its lower end [(12)].