بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة / مني مغربي أحمد

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات: لا يوجد

Valgus Osteotomy versus Arthroplasty for Ununited Femoral Neck Fractures: A Systematic Review

A Thesis

Submitted for Partial Fulfillment of
Master Degree in **Orthopedic Surgery**

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2022

سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to **ALLAH**, *the Most Kind and Most Merciful.*

I'd like to express my respectful thanks and profound gratitude to ***Prof. Dr. Sherif Mostafa Abd El Dayem,*** *Assistant Professor of orthopedic surgery, Faculty of Medicine - Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

I am also delighted to express my deepest gratitude and thanks to ***Ass. Prof. Dr. Ahmed Mohamed Mohsab,*** *Assistant Professor of Orthopedic Surgery, Faculty of Medicine - Ain Shams University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

I would like to express my hearty thanks to all my family for their support till this work was completed.

Last but not least my sincere thanks and appreciation to all patients participated in this study.

Ahmad Mohamed Mohaseb

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List of Abbreviations

Abb.	Full term
ABPs	*Angled blade plates*
AVN	*A vascular necrosis*
DCS	*Dynamic condylar screw*
DHS	*Dynamic hip screws*
FDA	*Food and Drug Administration*
LFCA	*Lateral femoral circumflex artery*
MFCA	*Medial femoral circumflex artery*
NOF	*Nonunion neck of femur*
PJI	*Prosthetic joint infection*
PRO	*Patient-reported outcome*
PROM	*Patient-reported outcome measure*
THA	*Total hip arthroplasty*

INTRODUCTION

Fractures of the neck of femur in young adults tend, unlike their counterparts in older people, to be a relatively higher energy injury and require timely and meticulous diagnosis and management. Anatomical reduction and stable internal fixation are essentials for achieving the goals of treatment in this young population allowing preservation of the femoral head while minimizing rates of non-union and osteonecrosis [(1).]

A delayed presentation of fracture of the femoral neck is one where there is a delay of 48 hours to 20 days between injury and diagnosis, whereas in a neglected fracture, this delay is in excess of 21 days. While all femoral neck fractures are life-changing injuries, the neglected fracture in a young adult below the age of 60 years is one of the most challenging to treat and arguably has the most at stake [(1)].

The main complications of such injuries are a vascular necrosis (AVN) of the femoral head and non-union of the fracture with reported average incidences of 15% for AVN and 12% for non-union [(1)].

The evidence on valgus intertrochanteric osteotomy for femoral neck nonunion is limited to retrospective series. Despite some variation in operative technique, the majority of authors report good-to-excellent outcomes with this procedure.Valgus intertrochanteric osteotomy is the treatment of choice for active

patients aged less than 50 years with a nonunion of a femoral neck fracture. This technique requires precise preoperative planning and intraoperative skill. Implant selection includes angled blade plates (ABPs), dynamic hip screws (DHS), and dynamic condylar screw (DCS) plates. Union rates approach 90% in most reported series. Patients should be warned of the risk of avascular necrosis, as well as the difficulty in performing revision arthroplasty in this setting [(2)].

Aim of the Work

The aim of this systematic review is to collate evidence from comparative studies to look for significant differences between valgas osteotomy & arthroplasty in non united femoral neck fractures in<50yr old patients in term of:

1. Blood loss.
2. Incidence of infection.
3. Incidence of reoperation.

REVIEW OF LITERATURE

Femoral Neck Fractures

Anatomical background:

The blood supply of the femoral head comes from three main sources; the medial femoral circumflex artery (MFCA), lateral femoral circumflex artery (LFCA) and the obturator artery. In the adult, the obturator artery provides little and variable amount of blood supply to the femoral head via the ligamentous teres. The LFCA gives rise to the inferior metaphysical artery by way of the ascending branch and provides the majority of the inferoanterior femoral head. The largest contributor to the femoral head, especially the superolateral aspect of the femoral head is the MFCA. The lateral epiphyseal artery complex comes from the MFCA and courses along the posterosuperior aspect of the femoral neck before supplying the femoral head. It is important to know and understand that these terminal branches supplying the femoral head are intra capsular. Thus, disruption or distortion due to fracture displacement of terminal branches to the femoral head plays a significant role in the development of osteonecrosis. Variables that have been hypothesized in contributing to femoral head osteonecrosis include vascular damage from the initial femoral neck fracture, the quality of reduction or fixation of the fracture (restoring flow to the distorted arteries) and the elevated intra capsular pressure (Figure 1) [(2)].

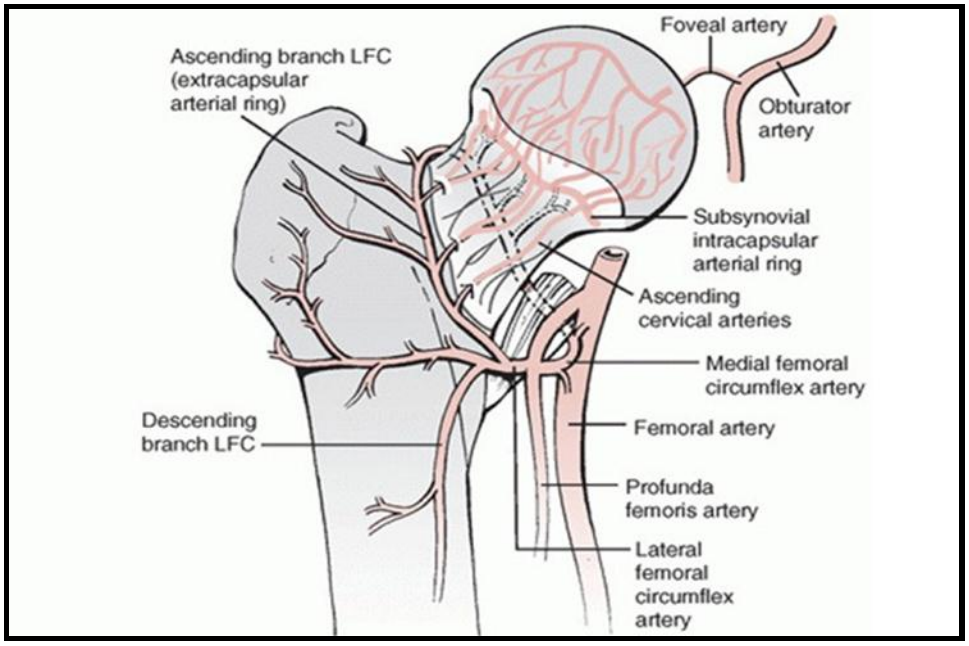

Figure (1): Blood supply of the neck of the femur. [(1)]

Mechanism of Injury

Fractures of the femoral neck can occur following both direct and indirect mechanisms [(1.2)]:

- **Indirect**

The proximal femur remains fixed by the capsule and iliofemoral ligaments when the leg rotates externally during a fall. The osteoporotic femoral neck buckles and fractures due to this abnormal stress [(1.2)].

- **Direct**

In younger patients, these fractures occur as a result of a direct blow to the greater trochanter, which transmits an axial force to the femoral neck. In the elderly patients, femoral neck fractures usually occur as a result of a fall from standing height. Poor bone density, multiple medical problems and propensity to fall are major risk factors for femoral neck fracture. In young adults, the mechanism of injury is often high-energy trauma, such as motor vehicle accident or fall from height. Fractures that occur in this normal bone density population require substantial axial load with the hip in an abducted position [1.2].

Classification of femoral neck fractures:

1-Garden's classification [2]:

Garden, in 1961, proposed a classification in which he divided sub capital fractures into four major types on the basis of the alignment of the trabecular in the femoral neck:

- Type I: Incomplete fracture - valgus impacted-non displaced
- Type II: Complete fracture - nondisplaced
- Type III: Complete fracture - partial displaced
- Type IV: Complete fracture - fully displaced

2-Pauwels' classification

Pauwels observed that the obliquity of the fracture line with the horizontal plane significantly affected the prognosis of the fracture. The angle formed by extending the fracture line upwards to meet an imaginary horizontal line drawn through the trans tubercular (iliac crest) plane on AP film is described as 'Pauwels' angle'. The higher the value of this angle, the greater is the instability of the fracture (Figure 2).

Type Pauwels' angle:

I. Less than 30 degrees

II. Between 30 and 50 degrees

III. More than 50 degrees.