

# VALGUSING INTERTROCHANTERIC OSTEOTOMY FOR THE TREATMENT OF FEMORAL NECK NON-UNIONS: REPORT OF 32 CASES

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## ABSTRACT

**Purpose:** The purpose of the present study was to review the results of femoral neck non-unions treatment with valgus-ing intertrochanteric osteotomy. **Methods:** Between 1988 and 2003 we treated thirty two femoral neck non-unions with valgus-ing osteotomy and fixation. The mean follow-up time was 9.8 years and the mean age was 41.7 years. **Results:** Twenty eight (87.4%) of the thirty two valgus-ing osteotomies evolved

to femoral neck union, while four cases (12.6%) evolved to total hip arthroplasty. Eight cases evolved to partial osteonecrosis. **Conclusions:** The valgus-ing intertrochanteric osteotomy for treating femoral neck non-unions achieved consolidation in 87.4% (28/32). However, only 56.2% (18/32) achieved full recovery of hip function.

**Keywords** – Femoral neck fractures; Osteotomies; Pseudoarthrosis.

## INTRODUCTION

Nonunion with avascular necrosis of the femoral head are the main complications of femoral neck fracture.

Without a doubt, consolidation of the nonunion with preservation of the femoral head is the biological alternative that offers the best long-term outcome if the patient is young. However, if the patient is elderly, above 65 years of age, based on consensus in the literature, total hip arthroplasty may offer a more promising result because it eliminates the two main complications of the biological alternative at the same time: recurrence of nonunion and aseptic necrosis of the femoral head.

The objective of this study is to evaluate the consolidation of valgus osteotomy for the nonunion of the femoral neck.

## METHODS

From January 1988 until October 2003, 32 cases of nonunion of the femoral neck were treated with valgus-ing osteotomy and fixation at the Orthopedics and

Traumatology Clinic, Santa Casa de Porto Alegre, RS, 20 of whom were male and 12 of whom were female. The youngest patient was 18 years old and the oldest was 66. The average age was 41.7 years. Follow-up was 9.8 years (1-15 years).

Fractures were initially classified as Garden I (zero), Garden II (zero), Garden III (14 cases), and Garden IV (18 cases).

In relation to the initial treatment, nine cases arrived at the hospital without any treatment. The other 23 cases were initially fixed with screws (13), DHS (7), one with three Steinmann wires, and two with an angled laminar plate (AO).

The average time from the fracture to the osteotomy, that is, the time of nonunion was 6.5 months (3.5-12 months).

The decision to perform the osteotomy was based only on radiological criterion (head sphericity). In only three cases was MRI performed. In all images there were signs of partial necrosis, which were not considered a contraindication for osteotomy.

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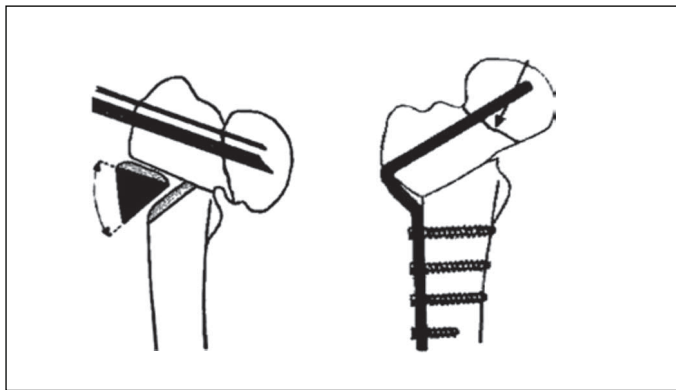
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The technique used for osteotomy was described by Pauwels in 1935<sup>(1)</sup> with lateral wedge resection from 30° to 50° and fixation of the osteotomy (Figure 1). After osteotomy, when fixating it, we used the following materials: McLaughlin plate (1), AO plate (10), AO plate + anti-rotation screw (4), DCS (1), DHS 150° (2), and DHS 130° (14).

After osteotomy, support was only allowed after 90 days. From then, progressive partial support with crutches was allowed until consolidation.

The mechanical changes promoted by the osteotomy were evaluated and measured. The average abductor moment of the osteotomy side was 64.8 mm (54-75 mm). That of the contralateral side (normal) was 73.7 mm (63-92 mm).



**Figure 1** – Intertrochanteric osteotomy technique described by Pauwels<sup>(2)</sup>.

Therefore, on average, there was a decrease of 8.9 mm. There was a 12.1% decrease of the abductor moment.

The mean femoral offset after osteotomy was 24.9 mm (13-36 mm). The contralateral (normal) side was 45.5 mm (32-58 mm). Therefore, there was a 20.6 mm average decrease in femoral offset. The percentage decrease was 45.3%.

The average cervico-diaphyseal angle of the normal side was 131.5° (120°-145°). The average post-osteotomy angle was 144.4° (130°-152°). So there was a valgization average of 12.9 mm. The average valgization percentage compared with the normal side was 9.8%.

## RESULTS

Of the 32 cases, four nonunions progressed to total hip replacement. Twenty-eight osteotomies consolidated. In 27 cases, consolidation was achieved after one

osteotomy. One case developed into consolidation after a new osteotomy and exchange of new synthesis material.

The 28 consolidated osteotomies were evaluated for avascular necrosis according to the Inoue classification. Twenty cases were considered without necrosis. Five cases were found in stage two (abnormal or irregular density with slight flattening). Two cases were found in stage three (irregular density with segmental collapse). One case with 14 years of evolution was considered stage four (osteoarthritis with deformity of the head), but until this assessment total hip arthroplasty had not been required.

Patients were evaluated by the method of D'Aubigné et al.<sup>(2)</sup>. Of the 28 cases, 18 were considered to have 17 and 18 points. The remaining 10 cases had 15 or 16 points. None of the patients needed to use any support (cane or crutch), but eight exhibited mild claudication at the time of evaluation. No patient complained in relation to the ipsilateral knee.

## DISCUSSION

The fracture of the femoral neck has been described as the fracture without a solution<sup>(3)</sup>.

Despite advances in the surgical technique and the quality and design of the synthesis material employed, avascular necrosis of the femoral head and nonunion remain the major complications of the fracture.

Despite the goal of treatment of nonunion being to preserve the head through consolidation of the fracture, the choice of optimal treatment depends largely on the patient's age, the sphericity and congruency of the femoral head, the quality of the existing bone, and the experience of the orthopedist.

The problem besides being biological is fundamentally biomechanical as shown by Pauwels<sup>(1)</sup>. For the treatment of nonunion, he described a valgus intertrochanteric osteotomy that converts shear forces into forces of compression and attains consolidation.

Arthroplasty is generally indicated in patients over 60 years<sup>(4-6)</sup>, but the physiological age should be considered more than chronological age.

Marti et al.<sup>(7)</sup> indicate valgus osteotomy in patients up to 70 years of age.

The isolated presence of avascular necrosis without collapse of the head is not a contraindication to grafting or osteotomies. Several satisfactory results have been published in the literature<sup>(4,5,7-10)</sup>.

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