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## RESEARCH ABSTRACT

**Title:** A Comparison of Various Methods of Fixation in Pauwels' III Femoral Neck Fractures.

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**INTRODUCTION:** Femoral neck fractures in younger patients usually occurs as a result of a high energy injury. Of these injuries, approximately 73% are a vertical transcervical fracture of the Pauwels' III variety. It is suggested that treatment include early accurate reduction with rigid internal fixation to preserve the femoral head. The purpose of this study was to compare the strength of various forms of fixation in identically prepared synthetic femurs.

**Methods:** Twenty-four Sawbones composite femurs were prepared with identical Pauwels' III osteotomies at 70° to the horizontal. These were divided into 6 groups and fixed using either a 135° DHS (Dynamic Hip Screw), a 135° DHS with a 7.0mm screw, a 150° DHS, a 150° DHS with a 7.0mm screw, 3 parallel screws and 2 crossed screws. Specimens were repetitively cycled and loaded to displacement on an MTS machine. Initial stiffness and load to displacement were determined. Results were compared to the selections of members of the Orthopaedic Trauma Association (OTA) via mail survey.

**Results:** Initial stiffness of the 150° DHS with the 7.0 mm screw was significantly greater than all other constructs. At 2 mm of displacement there was no significant difference in any group. At 5mm of displacement, the 150° DHS with a 7.0 mm screw was significantly stronger than all other groups except the 135° DHS with a 7.0 mm screw. At 7mm of displacement, the 150° DHS with the 7.0 mm screw was significantly stronger than all other groups. The majority of OTA survey respondents, 49%, chose 3 parallel screws ( $p < 0.05$ ).

**Conclusion:** Femoral neck fractures in young adults can have disastrous outcomes with a risk of avascular necrosis, late segmental collapse and nonunion necessitating revision surgery or prosthetic replacement. Results of this experiment demonstrate that fixation with a 150° DHS with the addition of a cancellous screw was the stiffest and strongest construct in a Pauwels' III femoral neck fracture. This is significantly different than the method of fixation chosen by the majority of Orthopaedic traumatologists.

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