



ORIGINAL ARTICLE

Randomized prospective study on the influence distal block and Gamma 3 nail on the treatment of intertrochanteric fractures of femur[☆]



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Received 8 March 2014; accepted 18 June 2014

KEYWORDS

Gamma nail;
Locking;
Fracture;
Intertrochanteric;
Cut-out

Abstract

Objective: The purpose of this study is to assess the need to lock the Gamma 3 nail (Stryker, Mahwah, New Jersey, USA) distally for intertrochanteric fractures of femur 31-A1 and 31-A2 of the AO.

Materials and methods: Details were recorded on a sample of 177 patients with intertrochanteric femoral fractures treated in our hospital by a standard Gamma nail between June 2011 and January 2013. A prospective study was conducted by randomizing patients by year of birth, even numbers with, or odd numbers without, and distal locking, forming two groups of 90 and 87 fractures, respectively.

Results: The patients treated with a distal locking nail had an increased incidence of medical complications, a lower incidence of biomechanical complications, and an increase in the fracture collapse compared with the control group, with statistical significance ($P < 0.05$). It is also observed in the group that distal locking increased transfusion requirement and a higher death rate, with statistically significant differences ($P < 0.05$), but this significance disappears when adjusting for other patient-related characteristics.

Conclusions: Based on the results found in this work, the use of distal locking screw in the Gamma 3 nails should be restricted to unstable trochanteric fractures after reduction where additional stability to the intramedullary nail is required, and may decrease the risk of complications from use.

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[☆] Please cite this article as: López-Vega M, Gil-Monzó ER, Rodrigo-Pérez JL, López-Valenciano J, Salanova-Paris RH, Peralta-Nieto J, et al. Randomized prospective study on the influence distal block and Gamma 3 nail on the treatment of intertrochanteric fractures of femur. Rev Esp Cir Ortop Traumatol. 2015;59:26–35.

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PALABRAS CLAVE

Clavo Gamma;
Bloqueo;
Fractura;
Pertrocantérea;
Cut-out

Estudio prospectivo aleatorizado sobre la influencia del bloqueo distal del clavo Gamma 3 en el tratamiento de las fracturas pertrocantéreas de fémur

Resumen

Objetivo: El propósito de este estudio es valorar la necesidad de bloquear distalmente los clavos Gamma 3 (Stryker. Mahwah, New Jersey. USA) en fracturas pertrocantéreas de fémur 31-A1 y 31-A2 de la AO.

Material y métodos: Desde junio de 2011 hasta enero de 2013 se recoge una muestra formada por 177 pacientes con fractura pertrocantérea de fémur tratados en nuestro centro mediante osteosíntesis con clavo Gamma 3 estándar. Es un estudio prospectivo y aleatorizado según el año de nacimiento de cada paciente, par con bloqueo o impar sin bloqueo distal del clavo, formando dos grupos de 90 y 87 fracturas respectivamente.

Resultados: En los pacientes intervenidos mediante clavo con bloqueo distal se observó una mayor incidencia de complicaciones médicas, una menor incidencia de complicaciones biomecánicas y un aumento en el colapso del foco de fractura en comparación con el grupo control, siendo estas diferencias estadísticamente significativas ($p < 0,05$). También se observa en el grupo con bloqueo distal un mayor requerimiento transfusional y una mayor tasa de éxitos presentando diferencias estadísticamente significativas ($p < 0,05$), sin embargo esta significación desaparece al ajustar los resultados por otras características relacionadas con los pacientes.

Conclusiones: Basándonos en los resultados hallados en este trabajo, el uso del tornillo de bloqueo distal en los clavos Gamma 3 debe restringirse a fracturas pertrocantéreas inestables tras reducción donde se requiera una estabilidad adicional al clavo intramedular, pudiendo así disminuir el riesgo de complicaciones derivadas de su uso.

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Introduction

Intertrochanteric femoral fractures account for about 55% of fractures in the proximal segment of the femur and their incidence has increased in recent years due to gradual population aging. These pathologies have become commonplace in Traumatology and Orthopedic Surgery Services like ours, with an annual mean of 196 interventions (range: 168–243) of these type of fractures during the period between 2005 and 2013.

Intramedullary nailing is the first line of treatment in these fractures, as it offers a shorter surgery time, less aggression on soft tissues and considerable stability due to its reduced lever arm compared to sliding plate-screw systems, thus enabling early mobility and load in most cases.^{1–5} Intramedullary devices have evolved in order to reduce complications, improve results and facilitate surgical techniques.⁶ One example is the Gamma 3 nail (Stryker, Mahwah, New Jersey, USA), which, unlike its predecessor, the trochanteric Gamma nail (TGN), presents a valgus of 4°, reduced transversal diameter (11 mm) and shorter length (180 mm), thereby offering a more anatomical design which simplifies its use.³

The complications associated to intramedullary osteosyntheses with this type of nails have been well documented since they began to be used in the 70s. One such source of complications is the placement of distal blocking screws, which account for 10–13% of the total depending on the series,^{2,7} especially in cases of screws with diameters of 6 mm or more.^{6,8} The complications described include intra- and postoperative diaphyseal femoral fractures

caused by a weakening of the cortices and excessive rigidity in the tip of the nail,^{1,6,8–12} irritation of the *fascia lata* at the site of insertion,¹³ nonunion with femoral malrotation, implant tears (due to increased stress caused by the neutralization of loads on the fracture focus in nails with distal blocking or by notches on the orifices of the nail for the blocking screw during its introduction which decrease the resistance of the implant by 50–80%),^{2,10,13,14} malposition of the blocking screw,⁶ stress-shielding phenomena^{11,15} and aneurisms of the femoral artery.^{16,17} According to some published works, such as the biomechanical studies by Rosenblum et al. and Mahomed et al.¹⁰ distal blocking increases the tension at the tip of the nail, where all the loads are transmitted when standing, and may increase the risk of collapse of the fracture, stress-shielding phenomena and cut-out effects, due to an excessive rigidity of the assembly.^{2,6,10,11,14,15}

According to the technical datasheet, implantation of a nail with distal block is indicated in cases of unstable fractures where rotational stability is required or when there is a considerable difference between the diameter of the nail and the femoral medullar cavity. Unstable intertrochanteric fractures are those which present comminution of a large posteromedial fragment, an inverse oblique fracture pattern and those in which a correct reduction of the calcaneal or medial cortical cannot be achieved.¹⁸

However, literature in this respect is scarce and there are many different opinions regarding application. Some authors implant Gamma nails with a distal block systematically^{3,6,7,19,20} or do not specify their use,^{2,6,11,12,21} so most series are very heterogeneous and include intertrochanteric and subtrocantérea femoral fractures.

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