

Gamma Nail Fixation in Intertrochanteric Fractures: Pros and Cons

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Abstract:

Background: Intertrochanteric fractures are common proximal femoral fractures in elderly patients, and their incidence is increasing. The aim of this study was to evaluate the advantages and pitfalls of Gamma nail (GN) fixation in these fractures. **Methods:** A prospective cross-sectional analytical study was carried out on 50 patients (30 men and 20 women, aged 45–80 years) with stable or unstable intertrochanteric fractures treated with a Gamma nail at Al-Ramadi Teaching Hospital, Al-Anbar, Iraq, between 1 July 2023 and 1 March 2024. Patients were followed up clinically and radiologically for at least three months. **Results:** The 66–70-year age group was the most affected. More than half of the patients had no comorbidity. Simple trauma was the commonest mechanism of injury (76%), and the left side was affected more often than the right. Most operations lasted less than one hour, fewer than five gauzes were used in 70% of cases, and fewer than 50 fluoroscopic shots were needed in 72%. Weight bearing began within three weeks in 84% of patients. Cut-through of the lag screw and varus malunion each occurred in 2% of patients, all with comorbidities, and no avascular necrosis was observed. **Conclusion:** Gamma nail fixation is a minimally invasive method with short operating time, little blood loss and early weight bearing, which makes it an appropriate treatment for elderly patients with intertrochanteric fractures.

Keywords: Intertrochanteric fracture; Gamma nail; intramedullary fixation; proximal femur; elderly patients; weight bearing; complications.

Introduction

Intertrochanteric fractures are the most prevalent extracapsular fractures of the proximal femur and occur mostly in elderly, particularly osteoporotic, women. The worldwide incidence of hip fractures is high and rising [1], and a considerable proportion of elderly patients die within a year of injury. Intertrochanteric fractures have traditionally been classified into stable and unstable types [2]. To reduce mortality and morbidity, effective treatment is required. Internal fixation, the most frequent surgical option, provides rapid pain relief, early mobilisation and early weight bearing [3], and locking intramedullary nails have been used successfully for unstable fracture patterns [4].

However, extramedullary fixation devices such as plates and sliding hip screws have several limitations, as shown by experience with proximal femoral locking plates [5]:

- persistent pain and discomfort;
- insufficient stability to allow early weight bearing in more complex fractures;
- technical difficulty in young patients with high cancellous bone density.

Intramedullary fixation with the Gamma nail is now widely regarded as an effective therapeutic approach for intertrochanteric fractures [6], although revision surgery after Gamma nail fixation has also

been described [7]. The Gamma nail is an intramedullary device combining a proximal femoral nail with a lag screw inserted into the femoral head, and in North America a marked shift from plate to nail fixation has been documented [8].

The Gamma nail technique requires a smaller incision, which is associated with a lower risk of infection, bleeding and damage to the surrounding soft tissues than earlier methods, and large database analyses have compared its short-term outcomes with those of extramedullary implants [9]. In addition, in more than 80% of patients, weight bearing improved during the first week, with excellent outcomes in a similar proportion of cases [10].

Complications related to Gamma nails include secondary displacement, hematoma formation, non-union, infection and cut-out of the lag screw, the risk of which depends on correct lag-screw placement [11]. Nevertheless, the nail remains one of the best treatments for intertrochanteric fractures, and meta-analyses have compared it extensively with the sliding hip screw [12].

Because intertrochanteric fractures are common in the elderly and carry a high risk of immobility and pulmonary complications, a fixation method that allows early mobilisation is essential. The Gamma nail has shown advantages over other fixation techniques mainly because of its short operating time, minimal blood loss and early weight bearing [13], and the integrity of the lateral trochanteric wall has been identified as a key element in the reconstruction of unstable fractures [14].

The aim of this study was to demonstrate the benefits of Gamma nail fixation in intertrochanteric fractures, to identify its pitfalls and to suggest how these can be avoided.

Materials and Methods

This prospective cross-sectional analytical study included 50 patients with intertrochanteric fractures of the femur treated between 1 July 2023 and 1 March 2024 at Al-Ramadi Teaching Hospital, Al-Anbar Governorate, Iraq. There were 30 men and 20 women aged 45 to 80 years. Both stable and unstable intertrochanteric fractures were treated with Gamma nail fixation. Inclusion required a follow-up of at least three months with clinical and radiological evaluation. A structured questionnaire was used to record the cause of injury, side of the fracture, comorbidities, duration of the operation, number of gauzes used, number of intra-operative fluoroscopic (C-arm) shots, follow-up period and time to weight bearing.

During follow-up, the following complications were recorded:

- delayed union and non-union;
- malunion (varus or valgus);
- cut-through of the lag screw;
- superficial and deep infection;
- avascular necrosis of the femoral head.

Data were analysed descriptively and are presented as frequencies and percentages in tables and figures.

Results and Discussion

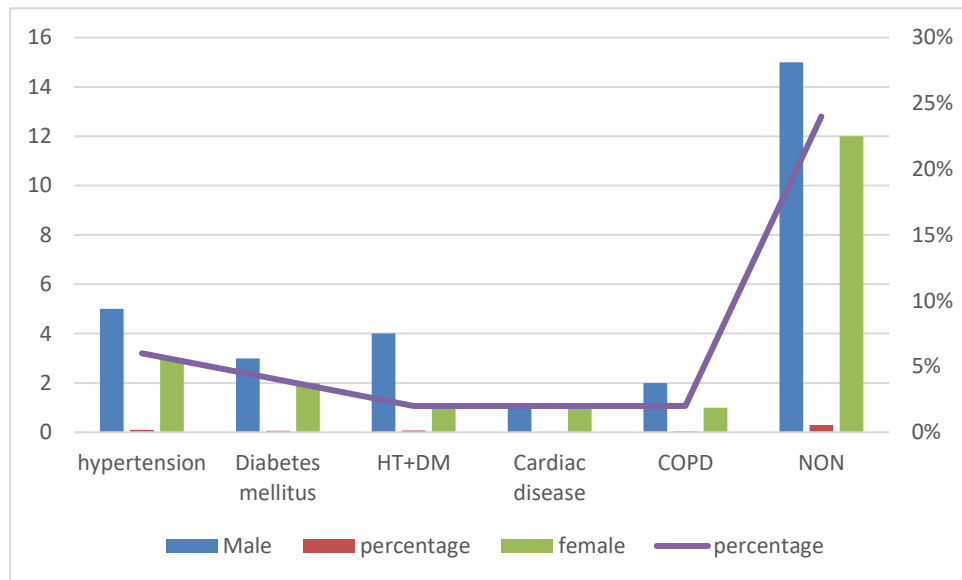
Results

A total of 50 patients with intertrochanteric fractures underwent internal fixation with a Gamma nail. The age and sex distribution is shown in Table 1: the most affected age group was 66–70 years (12 patients, 24%), and the estimated mean age was approximately 65 years.

Table 1. Age and sex distribution of patients with intertrochanteric fracture (n = 50)

Age	Male	Percentage	female	Percentage
45 – 50	2	4%	1	2%
51 – 55	2	4%	2	4%
56 – 60	5	10%	3	6%
61 – 65	5	10%	3	6%
66 – 70	7	14%	5	10%
71-75	6	12%	4	8%
76 – 80	3	6%	2	4%

More than half of the patients had no comorbidity; hypertension was present in 10% of men and 6% of women (Fig. 1). Simple trauma was the commonest mechanism of injury (76%), followed by falls from height and road traffic accidents (Fig. 2). The left side was affected more often than the right (Fig. 3).

**Figure 1.** Distribution of comorbidities by sex in patients with intertrochanteric fracture

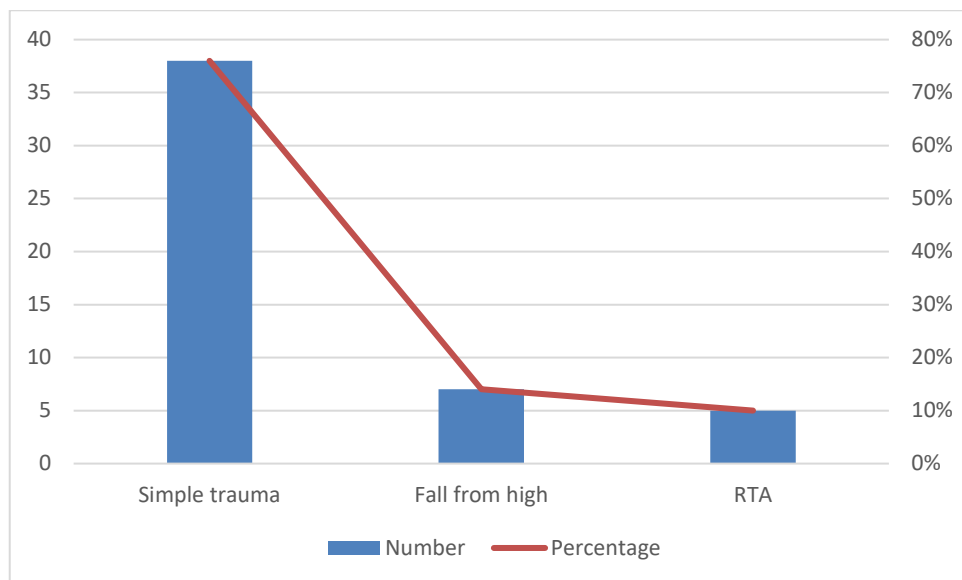


Figure 2. Mechanism of injury

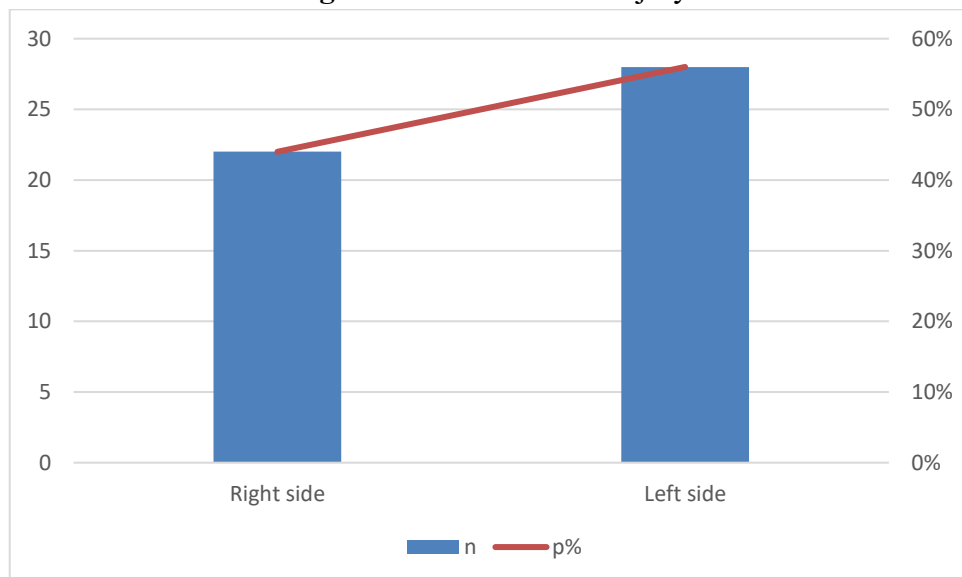


Figure 3. Side of fracture

Most operations lasted less than one hour (Fig. 4). Fewer than five gauzes were used in 70% of operations, fewer than 50 fluoroscopic shots were needed in 72%, and 66% of patients were followed up for less than eight months. Weight bearing started within three weeks in 84% of patients (Table 2).

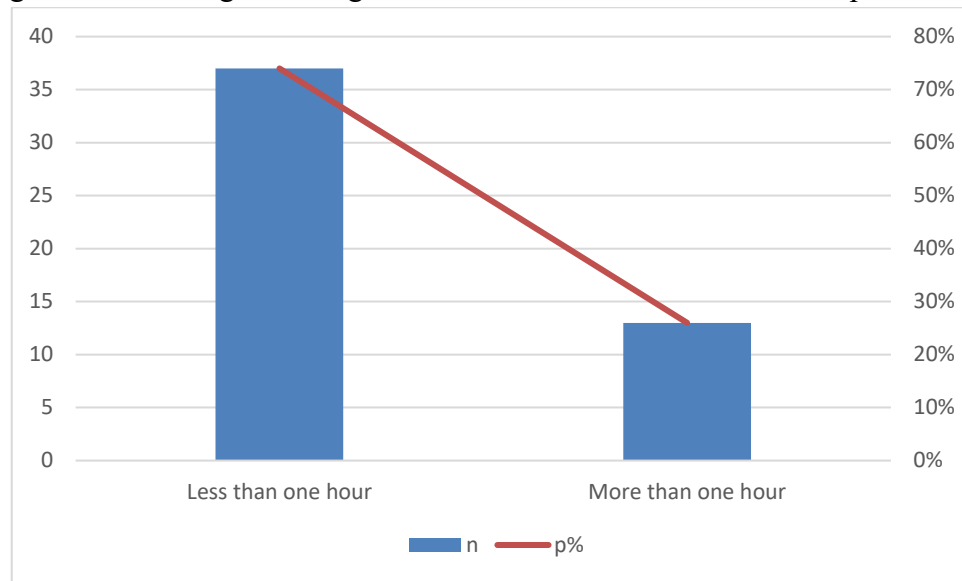


Figure 4. Duration of operation

Table 2. Operative parameters, follow-up and time to weight bearing

Number of gauzes	<5	35	70%
	>5	15	30%
Number of fluoroscopic shots	Less than 50	36	72%
	More than 50	14	28%
Follow up	Less than eight months	33	66%
	More than eight months	17	34%
Early Weight-bearing	Less than three weeks	42	84%
	More than three weeks	8	16%

No association was found between non-union and comorbidity. Cut-through of the lag screw and varus malunion each occurred in 2% of patients, all of whom had comorbidities. No avascular necrosis of the femoral head was observed (Fig. 5).

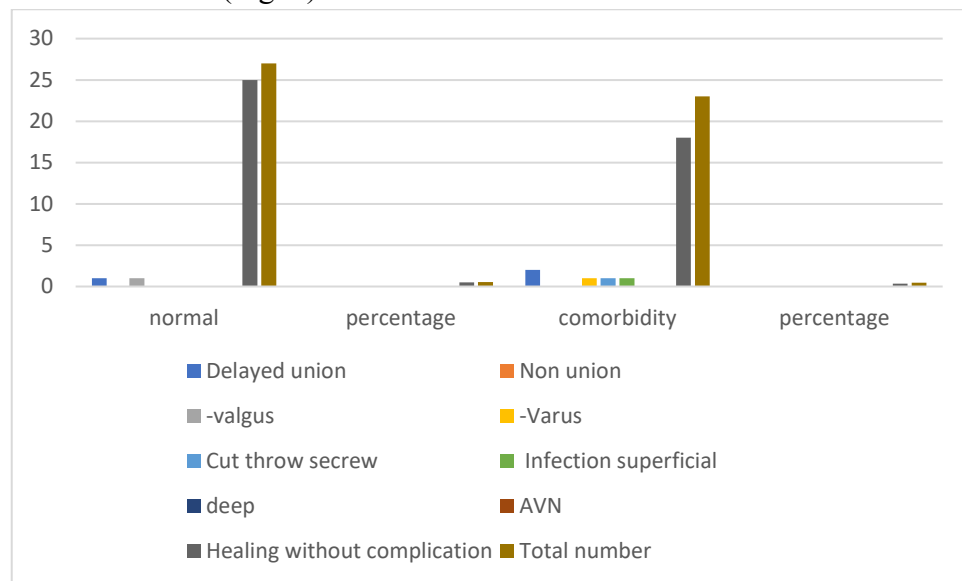


Figure 5. Complications in patients with and without comorbidity

Discussion

This study evaluated the advantages and disadvantages of intramedullary fixation with the Gamma nail in patients with intertrochanteric fractures of the femur. The 66–70-year age group predominated, in agreement with reports that unstable pertrochanteric fractures mainly affect the elderly [15]. More than 50% of the patients had no comorbidities, while hypertension was present in about 10% of men and 6% of women. Simple trauma was the most common mechanism of fracture (76%), and the left side was affected more often than the right. The main advantage of Gamma nail fixation in this series was early weight bearing, achieved in 84% of patients within three weeks.

In most cases the operation lasted less than one hour, and fewer than five gauzes were used in about 70% of cases. No relation was found between non-union and comorbidity, whereas cut-through of the lag screw and varus malunion each occurred in 2% of patients with comorbidities. Because most patients were elderly with a higher risk of chronic disease, comorbidity may have contributed to these complications; correct lag-screw positioning and tip–apex distance are essential to prevent cut-out. No avascular necrosis was observed.

Comparative studies of the dynamic hip screw (DHS) and the Gamma nail have likewise found that these fractures are common among the elderly, mostly after simple trauma, and that the Gamma nail is superior to the DHS in shorter operation time, less blood loss and earlier weight bearing [16], although implant choice should be guided by fracture stability [17].

In a larger published series of 33 men and 88 women, with a mean age of 66 years in men and 78 years in women, blood loss was 148 mL and the mean operating time 41 minutes; by the end of the first week, 83.4% of patients were bearing weight. An undeniable strength of the method over other open and closed treatments is that fracture instability did not affect the return to weight bearing. Superficial and deep infections occurred in 2.4% of patients.

In that series, varus displacement without shortening occurred in 11.5% of cases, and there were 14 cases of varus malunion. No femoral head avascular necrosis was reported; however, because most

patients were elderly and were not followed up after fracture healing, the follow-up was too short to exclude this complication.

Another study of intramedullary fixation in 61 patients found the fracture more common among men than women and on the left side than on the right, and walking ability was restored in 80% of patients [18].

Overall, the operative parameters, complications and morbidity observed in the present study were comparable with those reported in previous research. The main limitations of this study are its small sample, single-centre design, descriptive analysis and relatively short follow-up.

Conclusion

Among the available methods of fixation for intertrochanteric fractures, this study focused on the Gamma nail. Although Gamma nail fixation is not without challenges, it can be performed in nearly all situations without additional materials or opening the fracture site. Because of its mechanical stability, it usually allows early weight bearing, which makes it particularly suitable for elderly patients. Careful lag-screw placement and attention to comorbidities are recommended to minimise cut-through and malunion.

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