Mid-Term Results of Different Fixation Methods in Stable Intertrochanteric Fractures

Abstract

Introduction: Intertrochanteric fractures are among the most common hip fractures, especially in the elderly population. DHS and PFNA, remain the main fixation methods for these fractures. This study compares the long-term results of these methods in fractures classified as OTA/AO A1 & A2.1.

Materials & Methods: A retrospective cohort study was conducted. 154 patients treated with DHS, PFNA, within 10 years in a teaching hospital were studied. Outcomes, such as infection, reoperation rate, and mortality were assessed based on age and sex in different subgroups.

Results & Discussion: Analysis of the 154 patients revealed no significant differences in infection rates, need for reoperation, or 5-year mortality between DHS and PFNA methods. However, women and patients older than 70 years treated with DHS showed a higher need for reoperation.

Conclusion: Except for women and individuals over 70 years old who had higher reoperation rates with DHS, no significant difference was observed between the two groups.

Keywords: Intertrochanteric fractures, Fracture fixation, Internal fixators.

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Introduction

Intertrochanteric fractures are among the most common types of hip fractures, particularly in elderly individuals, and are often associated with osteoporosis. The primary goal of treating these fractures is to achieve stable fixation and early mobilization of the patient to prevent subsequent complications[1].

Globally, it is estimated that these fractures affect approximately 18% of women and 6% of men, with a projected incidence of 4.5 million cases annually by 2050[2].

Currently, two fixation methods, extramedullary and intramedullary,are commonly used for treatment[3]. The fracture pattern and its stability are critical factors in selecting the appropriate device. For instance, the use of the Proximal Femoral Nail Antirotation (PFNA) has demonstrated significantly better outcomes in fractures classified as OTA/AO 31A2.2, A2.3, and A3. Conversely, the use of Dynamic Hip Screw (DHS) in unstable fractures associated with osteoporosis has been linked to a failure rate exceeding 50%, making it less recommended[4].

Although the biomechanical advantages of PFNA, such as reduced hip-to-implant distance and a shorter lever arm, are well-documented, many studies report comparable functional outcomes between PFNA and DHS[5].

Given the unclear superiority of long-term outcomes between DHS and PFNA in stable fractures (OTA/AO A1 & A2.1), along with the cost differences between the two methods and their implications for health economics, especially considering the rising incidence of these fractures, this study aims to evaluate certain long-term outcomes of these treatment methods.

Materials & Methods

Study Design

This study is a retrospective cohort designed to examine the outcomes of two surgical methods, DHS and PFNA, in patients with intertrochanteric fractures classified as OTA/AO A1 & A2.1. In this study, the medical records of hospitalized patients from 2011 to 2021 in Shahid Madani Hospital, Karaj, were reviewed, and the required information was collected through chart review and telephone interviews.

Sample Selection and Data Collection

Inclusion Criteria: Patients over 18 years old with intertrochanteric fractures (classified according to the study criteria) treated with DHS or PFNA.
Exclusion Criteria: Patients with associated fractures or those who underwent surgery more than twice.
Demographic information (age, gender, and underlying diseases) and surgical outcome data (need for revision surgery, time from fracture to surgery, time to death, and surgery-related complications) were collected.

Methods of Analysis:

The data were analyzed using SPSS version 22. Statistical methods included:

- Chi-square test and T-test for data analysis.
- Kaplan-Meier analysis for comparing time-related outcomes between the two groups.

Results

A total of 154 patients participated in the study, including 99 women (64.39%) and 55 men (34.61%).

Age Distribution:

The median age was 70 years in the DHS group and 71.5 years in the PFNA group.
There was no statistically significant difference in age between the two groups.

Gender Distribution:

No statistically significant difference was observed in the gender distribution (men and women) between the two groups.

Key Variables:

For the variables under investigation including the need for revision surgery, 5-year survival rate, postoperative infection rate, time from fracture to surgery, and time to revision surgery, no statistically significant difference was observed between the DHS and PFNA groups (P-value > 0.05) (Figure 1 and Table 1).

Significant Findings:

Among female patients and individuals over 70 years old who underwent surgery using the DHS method, a statistically significant difference was observed in the rate of revision surgery (P-value < 0.05) (Figure 2 and Table 2).

Table 1: Comparative Outcomes Between PFNA and DHS

Outcome Variable	P-value	PFNA	DHS
Reoperation	0.118	96.11% (74)-NO	89.62% (69)-NO
		3.89% (3) - Yes	10.38% (8) - Yes
5-Year Mortality	0.626	59.75% (46) - No	55.85% (43) - No
		40.25% (31) - Yes	44.15% (34) - Yes
Infection	0.731	93.51% (72) - No	94.80% (73) - No
		6.49% (5) - Yes	5.20% (4) - Yes
Time to Reoperation	0.461	18 days	23 days
Time from Surgery to Death	0.376	120 days	278 days

Note: Values in parentheses indicate the range or number of cases

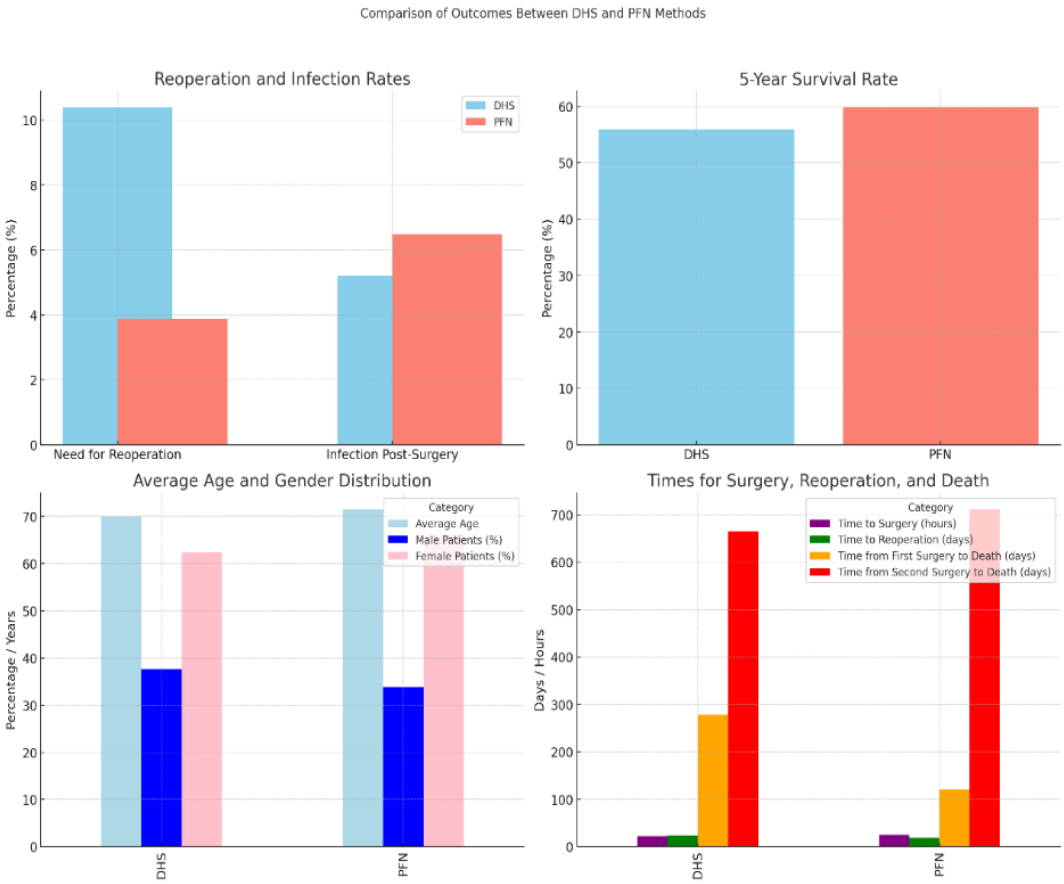

Figure 1: Comparison of outcomes between DHS and PFN methods

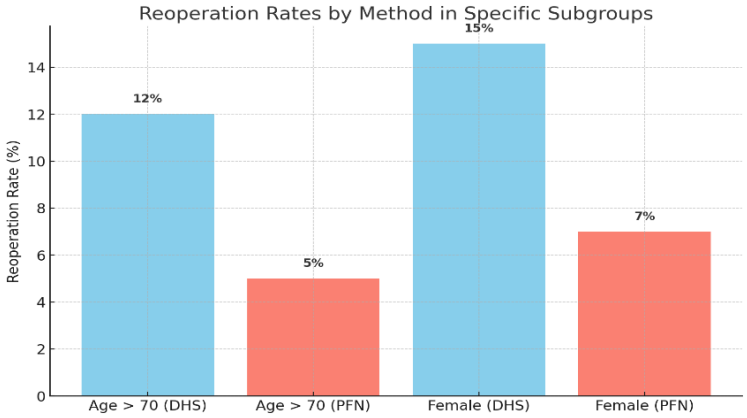

Figure 2: Reoperation rates by fixation method in specific subgroups

Table 2: Comparison of Outcomes Based on Various Factors

Variable		Comparison of infection	Comparison of 5-Year Mortality	Comparison of reoperation
Gender	Male	0.129	0.792	0.913
	Female	0.634	0.633	0.041
Age	<50 years	-	0.151	0.236
	50-70 years	0.965	0.711	0.981
	>70 years	0.584	0.516	0.022
Time from fx to surgery	Less than 12 hours	0.335	0.725	-

Discussion

In the present study, we compared two surgical methods, DHS and PFNA, in patients with intertrochanteric fractures. Our analysis revealed no significant differences between the two methods in terms of postoperative infection, the need for reoperation, and 5-year mortality rates. Furthermore, the effects of gender, age, and the time interval between fracture occurrence and surgery on the outcomes of DHS and PFNA were examined. It was found that female patients and those older than 70 years treated with DHS had a higher likelihood of requiring reoperation compared to PFNA.

In a study conducted by Daljinder Singh et al. in 2021 on 30 patients with intertrochanteric fractures classified as A1 and A2, no differences were observed between DHS and PFNA in terms of fracture union, mortality, and postoperative complications. However, PFNA demonstrated superior outcomes regarding blood loss, Harris hip scores, and early weight-bearing[6].

Similarly, in a study by H. Li et al. in 2018, involving 80 patients with intertrochanteric fractures and osteoporosis treated with DHS and PFNA, the PFNA group showed better results in terms of pain, Harris hip scores, bone mineral density, 10-meter walking speed, fracture union, and deep vein thrombosis rates[7].

In a 2023 meta-analysis by Peijun Dai, postoperative infection rates were assessed in 1,574 patients treated with PFNA and 1,584 patients treated with DHS. It was found that PFNA significantly reduced postoperative infection rates[8].

Additionally, in a 2017 study by Xianshang Zeng et al., patients with stable intertrochanteric fractures who previously underwent DHS or PFNA and later required conversion to total hip arthroplasty due to fixation failure were analyzed. While no differences were observed in Harris scores after arthroplasty, patients who had been treated with DHS experienced higher intraoperative complications, such as periprosthetic fractures[9].

In the study by Fu-Chun Zhang et al. in 2020, the impact of bone substitutes in patients with intertrochanteric fractures treated with DHS was investigated. Patients who underwent surgery with DHS combined with bone substitutes had better outcomes in terms of varus collapse, limb shortening, and the ability to perform outdoor activities compared to those treated with DHS alone[10].

Conclusion

This study compared the outcomes of DHS and PFNA in patients with intertrochanteric femoral fractures classified as OTA/AO A1 & A2.1. A total of 154 patients were evaluated between 2011 and 2021 in terms of postoperative infection, the need for reoperation, and 5-year mortality rates. The results indicated no significant differences between the two methods, except for female patients and those older than 70 years, who had a higher rate of reoperation with DHS.

Recommendations

It is recommended to conduct larger-scale clinical trials to further clarify the outcomes associated with these two treatment methods.

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