



ORIGINAL RESEARCH PAPER

Orthopaedics

OUTCOMES OF FEMUR FRACTURE TREATMENT IN CHILDREN AND ADOLESCENTS USING TENS NAIL: A FOLLOW-UP STUDY

KEY WORDS:

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ABSTRACT

Background: Femur fractures are among the most common orthopaedic injuries in children, presenting unique challenges in treatment due to the potential impact on growth and mobility. This study evaluates the clinical and radiological outcomes of femur fractures treated with a Titanium Elastic Nail (TENS) in a paediatric population. **Methods:** A total of 54 patients (ages 5-18) treated for femur fractures with TENS nails were prospectively followed. Evaluations included clinical assessments based on Flynn's criteria [1], pain levels measured with the Visual Analog Scale (VAS) [2], and radiological assessments via X-rays at 1, 3, and 6 months post-operation [3]. **Results:** At the 6-month follow-up, 53 patients demonstrated successful bone union, with 1 case of delayed union [4]. Functional outcomes were classified as excellent in 48 patients (88.9%), good in 4 patients (7.4%), and fair in 2 patients (3.7%) [1]. The mean VAS score significantly decreased from 8.2 pre-operatively to 1.6 at 6 months [2]. **Conclusion:** TENS nails represent an effective treatment modality for femur fractures in children and adolescents, exhibiting high rates of union and favorable functional outcomes [5]. This study underscores the importance of timely intervention and appropriate surgical techniques in managing paediatric femur fractures [6].

INTRODUCTION

Femur fractures in children and adolescents present a major concern due to their potential to affect long-term mobility and bone growth [7]. The femur is the largest bone in the body, and fractures can result from various trauma mechanisms, including falls, sports injuries, and vehicular accidents [8]. While conservative treatment methods such as casting and traction have been historically used, they often lead to prolonged recovery times and complications in fracture alignment [9].

Titanium Elastic Nailing (TENS) has gained popularity as a minimally invasive surgical option that provides stable internal fixation while preserving bone growth potential [10]. Several studies have supported the efficacy of TENS in improving healing times, reducing complications, and allowing early mobilization [11]. This study examines the effectiveness of TENS in treating paediatric femur fractures by assessing pain levels, healing outcomes, and functional recovery.

MATERIALS AND METHODS

Study Design

This was a prospective observational study conducted over 24 months in a tertiary care hospital. A total of 54 paediatric patients who underwent TENS nailing for femur fractures were enrolled in the study.

Inclusion Criteria

- Children aged 5-18 years.
- Closed femur fractures requiring surgical fixation.
- Patients with isolated femoral shaft fractures.
- Parental consent for surgical intervention obtained.

Exclusion Criteria

- Open fractures with significant soft tissue damage.
- Pathological fractures from malignancies or metabolic bone diseases.
- Polytrauma patients requiring alternative fixation methods.
- Prior surgical interventions on the affected limb.

Surgical Technique

Under general anesthesia, closed reduction of the femur fracture was performed. Two titanium elastic nails were inserted retrograde through small incisions at the distal femur. Proper alignment and stabilization were confirmed intraoperatively with fluoroscopy. Post-operatively, partial weight-bearing was encouraged as tolerated, with full weight-bearing permitted upon sufficient healing.

RESULTS

Demographics

The cohort consisted of 54 patients (32 males, 22 females), with a mean age of 12.5 years [12]. The distribution of patients by age group was as follows:

Age Group	Number of Patients	Percentage (%)
5-10 years	18	33.3
11-14 years	26	48.1
15-18 years	10	18.6

Mechanism of Injury

Analysis of the mechanism of injury revealed that falls were the most common cause, accounting for 59.3% of cases [13]. Other causes included sports injuries (22.2%) and road traffic accidents (18.5%) [14].

Mechanism of Injury	Number of Cases	Percentage (%)
Falls	32	59.3
Sports Injuries	12	22.2
Road Traffic Accidents	10	18.5

Functional Outcomes (Flynn's Criteria)

Outcomes assessed using Flynn's criteria showed a distribution of results as follows:

Flynn's Criteria	Number of Patients	Percentage (%)
Excellent	48	88.9
Good	4	7.4
Fair	2	3.7

This distribution indicates a highly favorable functional outcome, reflecting the effectiveness of TENS nails in managing paediatric femur fractures [15].

VAS Scores

The mean VAS scores demonstrated significant improvement over the follow-up period [16]:

Time Point	Mean VAS Score
Pre-operative	8.2
1 Month	5.4
3 Months	2.8
6 Months	1.6

DISCUSSION

This study highlights the efficacy of TENS in treating paediatric femur fractures. The high rates of union (98.1%) and excellent functional outcomes (88.9%) reinforce the reliability of this method [17]. Compared to traditional conservative methods, TENS allows early mobilization and reduces hospital stay durations [18].

Pain management was effective, as indicated by the reduction in VAS scores from 8.2 pre-operatively to 1.6 at 6 months, suggesting a significant improvement in patient comfort [19]. However, minor complications such as pain at the nail insertion site and irritation due to hardware prominence were observed in a few cases [20].

Given the high success rates and minimal complications associated with TENS, it remains a preferred choice for femur fractures in children and adolescents. Future research with larger sample sizes and long-term follow-ups is needed to further validate these findings.

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