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RESEARCH ARTICLE
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PATHOLOGICAL SUBTROCHANTERIC FRACTURES TREATED WITH CONVENTIONAL INTERLOCKING NAIL: AN OUTCOME BASE CLINICAL STUDY AT BSMMU

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Abstract

Background: Pathological subtrochanteric fractures are difficult to treat due to poor bone quality and systemic malignancy. Although cephalomedullary nails are preferred, conventional interlocking nails remain widely used in resource-limited settings. This study evaluates outcomes of pathological subtrochanteric fractures treated with conventional interlocking nails at a tertiary hospital.

Methods: A prospective Interventional study was conducted at Bangabandhu Sheikh Mujib Medical University (BSMMU) between January 2018 and December 2020. Adult patients with pathological subtrochanteric fractures treated by conventional femoral interlocking nail were included. Demographics, etiology, radiological union, complications, and MSTS functional score were analyzed.

Results: Thirty-two patients were included (mean age 59.1 ± 11.9 years). Metastatic carcinoma accounted for 56%, multiple myeloma 22%, and benign lesions 13%. Radiological union occurred in 63% of patients at a mean of 23 weeks. MSTS improved from 34% preoperative to 73% at final follow-up ($p<0.01$). Two implant failures and one superficial infection occurred.

Conclusion: Conventional interlocking nails offer acceptable stability, pain relief, and functional improvement for pathological subtrochanteric fractures when advanced implants are unavailable. They remain a viable option in resource-limited centers such as BSMMU.

Keywords: pathological fracture, subtrochanteric region, interlocking nail, BSMMU, metastasis.

Introduction

A pathological fracture is a bone break that occurs at a site of pre-existing bone weakness caused by an underlying disease process. The force involved is usually minimal or trivial, meaning it would not typically fracture a healthy, normal bone.

The key distinguishing feature is that the fracture is not primarily due to trauma, but is the result of a pre-existing pathological condition that has compromised the bone's structural integrity.

Pathological subtrochanteric fractures, secondary to metastatic carcinoma, myeloma, or benign lytic lesions, present a complex surgical challenge due to the high tensile stresses in this region and the compromised structural integrity of the diseased bone. Cephalomedullary nailing is widely advocated as the modern standard, offering biomechanical advantages for these unstable fractures. However, in resource-constrained settings such as many centers in Bangladesh, including Bangabandhu Sheikh Mujib Medical University (BSMMU), conventional interlocking femoral nails remain frequently employed due to limitations in cost and implant availability. Despite their widespread use, there is a paucity of published data specifically evaluating the efficacy and outcomes of conventional interlocking nailing in the setting of pathological bone. This study aimed to assess the clinical, radiological, and functional results of patients with pathological subtrochanteric fractures managed with conventional interlocking nails at BSMMU over a two-year period from 2018 to 2020.

Methods

Study Design and Setting

Prospective Interventional study
Department of Orthopaedic Surgery
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January 2018 – December 2020

Inclusion Criteria

- Age ≥18 years
- Pathological subtrochanteric fracture (5 cm below LT to proximal isthmus)
- Treated with conventional femoral interlocking nail
- Minimum follow-up 6 months

Exclusion Criteria

- Primary malignant tumors needing wide resection
- Periprosthetic fractures
- Lost to follow-up

Data Collected

- Demographics
- Etiology of pathology
- Operative details
- Radiological union
- MSTS functional score
- Complications

Surgical Technique

Antegrade nailing using standard interlocking femoral nail (10–12 mm), proximal and distal locking as required.

Outcome Measures

- **Radiological union:** bridging callus in ≥3 cortices
- **Functional outcome:** MSTS score
- **Complications:** implant failure, infection, disease progression

Picture: 1 Sub trochanteric Pathological Fracture treated with Interlocking Nail

Results

Table 1: Demographic Characteristics (n = 32)

Variable	**Value**
Mean age (years)	59.1 ± 11.9
Sex (Male/Female)	20 / 12
Side involved (Right/Left)	18 / 14
Etiology	
– Metastatic carcinoma	18 (56%)
– Multiple myeloma	7 (22%)
– Benign lytic lesions	4 (13%)
– Osteoporosis	3 (9%)
Mean follow-up	14.7 months

Table 2: Operative and Radiological Outcomes

Outcome Variable	**Result**
Mean operative time	90 ± 18 minutes
Mean blood loss	230 ± 55 mL
Weight-bearing	Partial WB from day 2
Radiological union	20/32 (63%)
Mean time to union	23 ± 6 weeks
Non-union	5 (16%) (stable until death/last follow-up)
Implant failure	2 (6.2%)
Superficial infection	1 (3.1%)
Systemic disease progression	7 (metastatic group)

Table 3: Functional Outcomes (MSTS Score)

Time Point	Mean MSTS (%)
Preoperative	34 ± 11
3 months	60 ± 14
Final follow-up	73 ± 12 ($p<0.01$)

Discussion

This study demonstrates that conventional interlocking nailing provides a viable and effective surgical option for pathological subtrochanteric fractures in a resource-limited setting, yielding significant functional recovery despite a challenging patient profile. The mean age of 59.1 years reflects a cohort with active neoplastic disease, primarily metastatic carcinoma (56%) and multiple myeloma (22%). The predominance of these diagnoses underscores the aggressive nature of the underlying pathology, which inherently impacts bone healing and patient survival [1].

The operative parameters, with a mean operative time of 90 minutes and acceptable blood loss, confirm the technical efficiency of the procedure. The protocol of early partial weight-bearing, facilitated by the implant's intrinsic stability, was crucial for patient mobilization and aligns with goals of palliative fracture care. The radiological union rate of 63% at a mean of 23 weeks is modest but contextual. This rate is notably lower than expected for traumatic subtrochanteric fractures, a finding directly attributable to the compromised biological environment of pathological bone and the frequent systemic progression of disease [2]. The 16% non-union rate, where constructs remained mechanically stable without pain, represents a clinically acceptable outcome in a palliative context, achieving the primary goal of durable skeletal stabilization.

Implant failure occurred in 6.2% of cases, a rate that warrants careful consideration. These failures likely result from a combination of the high mechanical stresses in the subtrochanteric region and the inability of the diseased bone to share load, leading to stress concentration at the implant. While cephalomedullary nails offer a biomechanical advantage by sharing load along the femoral neck, our findings suggest that with careful surgical technique and appropriate post-operative management, conventional nails can provide sufficient stability for a significant period [3].

The most salient outcome is the significant functional improvement, with the mean MSTS score rising from 34% preoperatively to 73% at final follow-up ($p<0.01$). This dramatic gain validates the intervention's primary palliative objective: pain relief, restoration of mobility, and preservation of independence. The one superficial infection was managed successfully, indicating an acceptable complication profile.

The principal limitation of this technique remains its dependence on the structural integrity of the femoral head and neck, which can be compromised by proximal disease progression, as observed in seven patients. This highlights the critical importance of thorough pre-operative imaging to assess proximal femoral involvement.

In conclusion, conventional interlocking nailing provides reliable palliation for pathological subtrochanteric fractures, offering significant and sustained functional improvement with a manageable complication rate. While not the biomechanical ideal, it represents a pragmatic and effective solution in environments where advanced implants are constrained by cost and availability. The decision for its use must be guided by careful patient selection, with meticulous attention to pre-operative planning and post-operative rehabilitation.

Conclusion

Conventional interlocking nails provide effective stabilization and reliable functional outcomes in pathological subtrochanteric fractures. They serve as a valuable alternative when cephalomedullary nails are unavailable, as in many developing countries and high-volume public hospitals like BSMMU.

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