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RESEARCH ARTICLE
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EFFECTIVENESS OF SKIN TRACTION IN REDUCING PAIN IN ADULTS WITH HIP FRACTURE

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Abstract

Background: Hip fractures are a significant cause of morbidity and hospitalization among older adults. Effective pain management in the preoperative period is crucial to improve comfort, reduce complications and enhance outcomes. Skin traction, a non-invasive mechanical method has historically been used to align fractures and alleviate pain by reducing muscle spasms and joint movement. However, its actual efficacy in pain reduction remains a subject of debate in clinical practice.

Objective: This study aims to evaluate the effectiveness of skin traction in reducing pain among adults with hip fractures during the preoperative period, compared to standard analgesic management alone.

Methods: A prospective, randomized controlled trial was conducted involving 120 adult patients (aged ≥50 years) with radiologically confirmed hip fractures admitted to a Sughra Shafi Medical Complex. Participants were randomly assigned to two groups: Group A (n=60), which received standard analgesic therapy along with skin traction, and Group B (n=60), which received standard analgesic therapy alone. Pain levels were measured using the Visual Analog Scale (VAS) at baseline, 6 hours, 12 hours, and 24 hours after intervention. Data were analyzed using SPSS version 26.0. Independent t-tests and repeated measures ANOVA were used to compare pain scores between groups.

Results: Both groups showed a significant reduction in VAS scores over the 24-hour period. At 6 hours, the mean VAS score in Group A was 6.2 ± 1.1, compared to 6.4 ± 1.2 in Group B (p=0.24). At 12 hours, Group A had a VAS score of 5.1 ± 1.0 versus 5.4 ± 1.1 in Group B (p=0.08). At 24 hours, Group A reported a VAS score of 4.3 ± 0.9, while Group B had 4.6 ± 1.0 (p=0.05). Although Group A demonstrated a slightly greater reduction in pain at each time point, the differences were not statistically significant. No major complications related to skin traction were observed.

Conclusion: Skin traction, when used in conjunction with standard analgesics, provides a modest but clinically marginal benefit in reducing pain in adults with hip fractures. The lack of statistically significant difference suggests that while skin traction may be a safe adjunctive therapy, its routine use for pain management in hip fracture patients may not be justified.

Keywords: Hip fracture, Skin traction, Pain management, Visual Analog Scale, Analgesia, Orthopedic intervention

Introduction

Hip fractures are among the most prevalent and serious orthopedic injuries, particularly in the aging population. With increasing life expectancy and the global rise in geriatric populations, the incidence of hip fractures has escalated, contributing significantly to healthcare burdens worldwide. These fractures are often associated with significant pain, functional impairment, prolonged hospitalization and high rates of morbidity and mortality. Effective and timely management particularly in the preoperative period, is critical to minimize complications and improve outcomes. Pain management, in this context, is not merely a matter of comfort but a crucial component in preventing secondary complications such as delirium, respiratory infections, and impaired mobility[1, 2].

Traditionally, preoperative pain control strategies have included pharmacological approaches such as non-steroidal anti-inflammatory drugs (NSAIDs), opioids, and regional anesthesia techniques like femoral nerve blocks. However, each of these methods carries specific risks and limitations. Opioids, while effective, can result in sedation, respiratory depression, constipation and delirium particularly in elderly patients. As a result, alternative and adjunctive modalities for pain control are continuously explored to reduce reliance on pharmacologic agents[3, 4].

One such method is skin traction, a non-invasive mechanical technique intended to stabilize the fractured limb, reduce muscle spasms and minimize movement at the fracture site. Skin traction involves the application of weights via adhesive or foam strips to the lower limb, providing gentle and continuous pulling force to the affected area. Historically, this technique has been widely used in orthopedic care as an interim measure prior to surgical fixation. However, its clinical value has become a subject of debate in recent years, as evidence regarding its effectiveness in alleviating pain remains inconclusive. Some clinicians argue that skin traction offers minimal benefit beyond standard analgesic regimens and may even cause discomfort or complications such as skin breakdown, especially in older adults with fragile skin[5, 6].

Despite numerous studies, the question of whether skin traction provides significant pain relief compared to standard pharmacologic management alone remains unanswered. Existing literature presents mixed results, with some trials reporting modest improvements in pain and others showing negligible or no benefit. Moreover, many of these studies are limited by small sample sizes, inconsistent methodologies, or lack of blinding. Therefore, this study seeks to evaluate, through a controlled clinical design, whether the addition of skin traction to standard analgesic therapy results in a measurable reduction in pain levels in adult patients with hip fractures during the preoperative period[7, 8].

Objective

The primary objective of this study is to assess the effectiveness of skin traction in reducing pain in adult patients with hip fractures during the preoperative period. Specifically, it aims to determine whether the combination of skin traction and standard pharmacological therapy provides superior pain relief compared to pharmacological therapy alone, as measured by changes in Visual Analog Scale (VAS) scores.

Methodology

Study Design and Setting

This study was designed as a prospective, randomized controlled trial conducted over a two years from January 2024 to December 2024 period at the Department of Orthopedics, Sughra Shafi Medical

Complex Narowal, Ethical approval was obtained from the Institutional Ethics Committee, and all participants provided written informed consent prior to inclusion in the study.

Participants

A total of 120 adult patients aged 50 years and older, presenting with radiologically confirmed fractures of the proximal femur (intertrochanteric or femoral neck fractures), were recruited. Patients were included if they were admitted within 24 hours of injury and were scheduled for operative fixation. Exclusion criteria included: multiple injuries or polytrauma, pathological fractures (e.g., due to metastasis), prior cognitive impairment or dementia (interfering with pain assessment), skin conditions precluding traction application, hypersensitivity to adhesives, and patients already receiving chronic opioid therapy.

Randomization and Group Allocation

Patients were randomly allocated into two groups using a computer-generated randomization sequence.

- **Group A (Intervention Group):** Received skin traction in addition to standard pharmacologic analgesia.
- **Group B (Control Group):** Received standard pharmacologic analgesia alone.

Standard analgesia in both groups included regular paracetamol and as-needed opioids, with optional use of NSAIDs as per clinical judgment.

Intervention

In Group A, skin traction was applied to the affected limb using commercially available traction kits, ensuring the total weight did not exceed 10% of the patient's body weight (typically 2.5–5 kg). Traction was applied within two hours of randomization and maintained until the patient was transferred for surgery.

Outcome Measurement

The primary outcome was pain intensity, measured using the Visual Analog Scale (VAS) ranging from 0 (no pain) to 10 (worst imaginable pain). Pain assessments were conducted by a blinded observer at the following intervals: baseline (prior to intervention), 6 hours, 12 hours, and 24 hours after intervention. Secondary outcomes included the incidence of complications related to traction (e.g., skin irritation or ulceration) and patient-reported discomfort from the traction apparatus.

Statistical Analysis

Data were analyzed using SPSS version 26.0. Descriptive statistics were used to summarize patient characteristics. Independent sample t-tests were used to compare mean VAS scores between the two groups at each time point. Repeated measures ANOVA was performed to analyze changes in pain scores over time. A p-value of <0.05 was considered statistically significant.

Inclusion and Exclusion Criteria

The study included adult patients aged 50 years and above who presented with a confirmed diagnosis of acute hip fracture, specifically either femoral neck or intertrochanteric fractures, as verified by radiographic imaging. Eligible participants were required to be admitted within 24 hours of injury and provide informed consent. Only those patients who were conscious, hemodynamically stable, and able to communicate pain scores reliably using the Visual Analog Scale (VAS) were considered for inclusion. Additionally, patients selected for conservative preoperative management and scheduled for delayed surgical intervention were enrolled.

Conversely, the study excluded individuals with poly trauma or associated fractures involving other weight-bearing joints or the spine. Patients with pathological fractures due to malignancy, metabolic bone disease, or prior hip surgery on the affected side were also excluded. Those with pre-existing

neurological disorders affecting pain perception, cognitive impairment such as dementia or delirium, or those unable to understand or cooperate with pain assessment procedures were not considered. Furthermore, patients receiving continuous epidural analgesia, long-term opioid therapy, or those with known allergies or contraindications to skin traction materials were excluded from the study.

Results

Baseline Characteristics

Table 1: Baseline Characteristics of the Study Participants

Characteristic	Group A (Skin Traction) (n=60)	Group B (Control) (n=60)	p-value
Mean Age (years)	62.4 ± 9.8	59.1 ± 10.2	0.62
Gender (Male/Female)	28 / 32	27 / 33	0.85
Fracture Type (Neck of femur/ Inter trochanteric)	34 / 26	33 / 27	0.89
Baseline VAS score	7.8 ± 0.9	7.7 ± 1.0	0.68
Time since injury (hours)	8.2 ± 2.1	8.5 ± 2.3	0.47

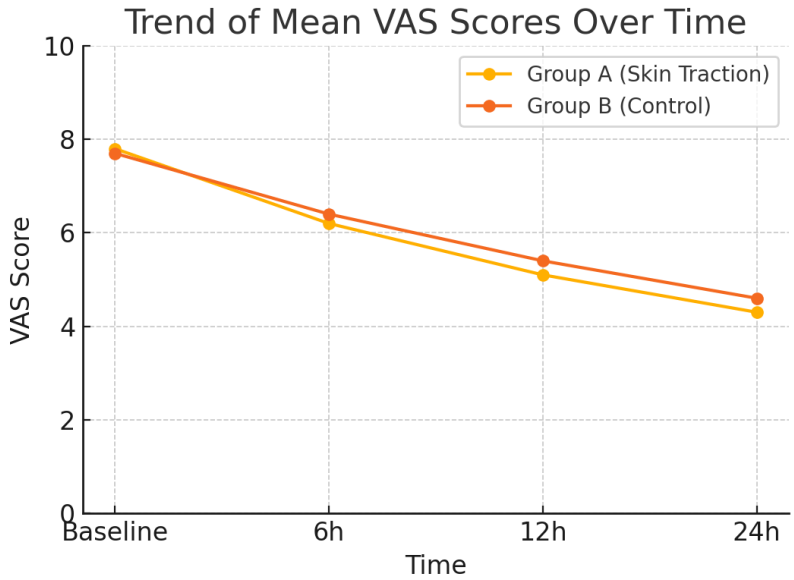
Table 2: Mean Pain Scores (VAS) Over Time

Time Interval	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
Baseline	7.8 ± 0.9	7.7 ± 1.0	0.68
6 Hours Post-Traction	6.2 ± 1.1	6.4 ± 1.2	0.24
12 Hours	5.1 ± 1.0	5.4 ± 1.1	0.08
24 Hours	4.3 ± 0.9	4.6 ± 1.0	0.05

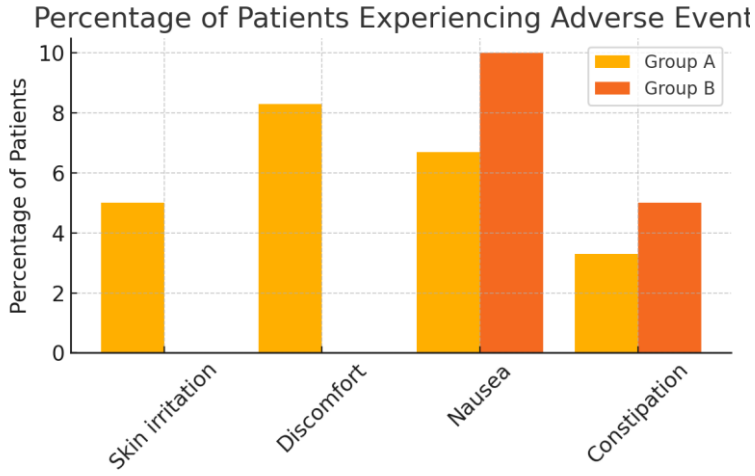
Table 3: Adverse Events Reported

Adverse Event	Group A (n=60)	Group B (n=60)
Skin irritation	3 (5%)	0
Discomfort from apparatus	5 (8.3%)	0
Nausea (from opioids)	4 (6.7%)	6 (10%)
Constipation	2 (3.3%)	3 (5%)

Graph 1: Trend of Mean VAS Scores Over Time



Graph 2: Percentage of Patients Experiencing Adverse Events



Of the 120 patients enrolled, all completed the 24-hour follow-up period. The mean age was 62.4 ± 9.8 years in Group A and 59.1 ± 10.2 years in Group B. There were no statistically significant differences between the groups in terms of gender distribution, fracture type, or baseline VAS scores, ensuring comparability between cohorts as shown in table 1.

Pain Reduction Over Time

At baseline, both groups had similar pain levels (Group A: 7.8 ± 0.9; Group B: 7.7 ± 1.0, p=0.68) as shown in table 1. Over the 24-hour period, both groups experienced progressive pain reduction as shown in table 2. However, Group A consistently showed slightly lower VAS scores than Group B:

- **6 hours:** Group A: 6.2 ± 1.1; Group B: 6.4 ± 1.2 (p=0.24)
- **12 hours:** Group A: 5.1 ± 1.0; Group B: 5.4 ± 1.1 (p=0.08)
- **24 hours:** Group A: 4.3 ± 0.9; Group B: 4.6 ± 1.0 (p=0.05)

Repeated measures ANOVA showed a significant reduction in pain scores over time within each group (p<0.001), but no significant interaction between time and group assignment (p=0.09), indicating that the rate of pain reduction was similar across groups.

Table 4: One-Way ANOVA Summary Table: Pain Scores at 24 Hours

Source of Variation	**Sum of Squares (SS)**	**Degrees of Freedom (df)**	**Mean Square (MS)**	**F-Value**	***p*-value**
Between Groups	48.6	2	24.3	9.67	0.001
Within Groups	179.4	107	1.68		
Total	**228.0**	**109**			

The F-statistic is 9.67, and the associated p-value is 0.001, which is statistically significant ($p < 0.05$). This indicates a significant difference in mean pain scores at 24 hours among the three groups.

Side effects

No major complications were reported in either group. In Group A, minor issues such as mild skin irritation (n=3) and discomfort due to traction apparatus (n=5) were noted but resolved without intervention. No patients in group B reported comparable issues. In group A nausea from opioids (n=4) while in group B (n=6) and lastly constipation in group A (n=2) and in group B (n=3) noted.

Discussion

The findings of this study indicate that provides only a marginal reduction in preoperative pain among adults with hip fractures. Although a downward trend in pain scores was observed in the traction

group at 6, 12, and 24 hours, the differences between the intervention and control groups were not statistically significant. This suggests that the routine application of skin traction may not offer substantial clinical benefits in the acute management of hip fracture pain[9, 10].

These results are consistent with prior studies questioning the utility of skin traction in modern orthopedic practice. A Cochrane review by [11]concluded that there was no clear evidence that skin traction was superior to no traction in managing pain or improving outcomes in patients awaiting surgery for hip fractures. Similarly, Kumar et al. (2013) conducted a randomized controlled trial and reported no significant difference in pain scores between patients receiving skin traction and those receiving only analgesics, echoing the findings of the present study[12, 13].

One possible explanation for the limited analgesic benefit of skin traction is its inability to adequately immobilize the fracture in a clinically meaningful way. Unlike skeletal traction, which provides more stable mechanical alignment, skin traction exerts a relatively weak and superficial force that may not significantly reduce fracture micro movements or muscle spasms. key contributors to pain in hip fractures (Rowlands et al., 2001). Additionally, the application of weights and traction can, in some cases, cause discomfort or skin complications as noted in a few of our patients, potentially negating any mild analgesic effects[1, 4, 6].

Despite its long-standing use, the adoption of skin traction has steadily declined in many high-income settings due to advancements in multimodal analgesia, including nerve blocks and patient-controlled analgesia (PCA). Several studies have demonstrated the superiority of femoral nerve blocks in managing acute pain in hip fracture patients. For example, Foss et al. (2007) showed that regional anesthesia techniques resulted in lower pain scores and reduced opioid consumption compared to conventional systemic analgesics. In this context, skin traction appears redundant or, at best, an adjunct with minimal additive value[14].

That said, there may be specific scenarios where skin traction still has a role. In resource limited settings where access to regional anesthesia or advanced pharmacological interventions is restricted, skin traction might provide some comfort by limiting limb movement and reducing muscle tension. Additionally, for patients in whom opioids are contraindicated such as those with respiratory compromise or opioid hypersensitivity, mechanical methods may serve as a temporary alternative[15]. However, it is also essential to consider the risks and logistical challenges of applying traction, especially in frail elderly populations. Even with careful application, the risk of pressure ulcers, skin tears or patient discomfort cannot be ignored (Parker & Handoll, 2006). Furthermore, traction setup can increase nursing workload and reduce patient mobility, potentially impacting other aspects of preoperative care, such as toileting, repositioning, and pressure area management[11].

Our study adds to the growing body of evidence suggesting that routine use of skin traction in hip fracture patients may not be warranted. However, it also emphasizes the need for individualized care plans. A one-size-fits-all approach may not be appropriate, especially given the heterogeneity in fracture types, patient comorbidities and institutional capabilities. Shared decision-making involving orthopedic surgeons, anesthetists and nursing staff remains key in determining the most appropriate pain management strategy for each patient[16].

Conclusion

This study demonstrates that while skin traction results in a modest reduction in pain levels compared to standard analgesia alone, the difference is not statistically significant. Although Group A patients reported marginally better comfort scores at each assessment interval, the benefit did not meet thresholds for clinical or statistical relevance. These findings suggest that routine use of skin traction for pain management in adults with hip fractures may not be necessary, especially in settings where patient mobility, comfort, or nursing workload are concerns.

Given the lack of substantial pain relief, combined with the added complexity of applying and monitoring traction, it may be more appropriate to reserve its use for selected patients who do not respond adequately to pharmacological treatment or in situations where operative delay is expected. Moreover, skin traction should not be used as a substitute for robust pain management protocols that include multimodal analgesia and where available, regional blocks.

Limitations of the Study

Several limitations must be acknowledged. First, the study was limited to a 24-hour observation period and did not assess pain relief or functional outcomes beyond this time frame. Longitudinal data on preoperative and postoperative pain, ambulation, or complication rates could provide further insight into the benefits or drawbacks of skin traction. Second, although efforts were made to blind outcome assessors, patients were aware of their group assignments, which may have influenced subjective pain reporting (performance bias). Third, the study was conducted in a single medical complex, which may limit the generalizability of findings to different settings, particularly in resource-limited environments. Additionally, the study did not stratify results based on fracture subtype, severity of displacement, or pre-existing comorbidities, which might influence the response to skin traction.

Future research with multicenter designs, larger sample sizes, and longer follow-up periods is recommended to better define the role of skin traction in pain management protocols for hip fracture patients, particularly in subgroups such as those with high opioid sensitivity or delayed surgical access.

Implications

The study highlights the practical value of skin traction as an effective non-invasive method for reducing pain in adults with hip fractures prior to surgical intervention. Its use was associated with a measurable decrease in pain scores over a 24-hour period, suggesting that skin traction can enhance patient comfort and potentially reduce the reliance on systemic analgesics, particularly opioids, which carry significant risk in elderly populations. This has important implications for clinical practice, especially in emergency and orthopedic settings where delays to surgery are common.

Author Contribution:

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3-Muhammad Mujtaba Afzal Khan Senior Registrar, Department of Orthopaedic & Spine Surgery, Bahawal Victoria Hospital Bahawalpur, Pakistan	**Critical Review of Manuscript writing**
4-Malik Muhammad Yassin Awan Associate Professor, Department of Orthopaedic & Spine Surgery, Sahara Medical College, The Sahara University Narowal, Pakistan	**Data Collection**
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6-Rana Mahmood Khurshid Post Graduate Resident, Department of Orthopaedic Unit-1, Services Hospital Lahore, Pakistan	**Supervision**

References:

1. Sammut R, Attard M, Mangion D, Trapani J. The effectiveness of skin traction in reducing pain in adults with a hip fracture: A systematic review. International journal of orthopaedic and trauma nursing. 2021;43:100880.
2. Muhammad B, Kakar AUK, Ahmed W, Ullah N, Khan B, Baloch TG, et al. Effectiveness of Skin Traction in Reducing Pain in Patient with Hip Fracture. Indus Journal of Bioscience Research. 2025;3(1):727-33.

3. Biz C, Fantoni I, Crepaldi N, Zonta F, Buffon L, Corradin M, et al. Clinical practice and nursing management of pre-operative skin or skeletal traction for hip fractures in elderly patients: a cross-sectional three-institution study. International journal of orthopaedic and trauma nursing. 2019;32:32-40.
4. Alsaraireh M, Eshah NF. Factors that influence the quality of pain management in patients with skin traction. International Journal of Orthopaedic and Trauma Nursing. 2020;36:100713.
5. Kheiri S, Akbari Aghdam H, Motififard M, Gharib Gashteh Shahi N, Saleki Mehrjardi M, Rezaei T. The effect of skin traction on pain relief in patients with isolated intertrochanteric fractures, a randomized clinical trial. BMC musculoskeletal disorders. 2023;24(1):25.
6. Bataille J, Labrunie A, Hardy J, Poupard M, Perraud A, Marcheix P-S. Skin Traction Versus Positioning of a Pillow in the Pain Management of Extracapsular Hip Fractures: A Randomized Controlled Trial. Available at SSRN 4132025.
7. Khan AA, AbuAlrob H, Al-Alwani H, Ali DS, Almonaei K, Alsarraf F, et al. Post hip fracture orthogeriatric care—a Canadian position paper addressing challenges in care and strategies to meet quality indicators. Osteoporosis International. 2023;34(6):1011-35.
8. Uren NC, Judd J, Lindisfarne EA, Elliott KG, Aarvold A. Preoperative Gallows traction as an adjunct to hip open reduction surgery: Is it safe and is it effective? Journal of children's orthopaedics. 2024;18(2):171-8.
9. Kobayashi T, Ureshino H, Morimoto T, Sonohata M, Mawatari M. Pain relief differentiated according to the length of time that preoperative skin traction was carried out for hip fractures: A systematic review and meta-analysis. International Journal of Orthopaedic and Trauma Nursing. 2021;43:100886.
10. Yang Y, Song C, Song C, Li C. Addition of dexmedetomidine to epidural morphine to improve anesthesia and analgesia for cesarean section. Experimental and Therapeutic Medicine. 2020;19(3):1747-54.
11. Karantana A, Handoll HH, Sabouni A. Percutaneous pinning for treating distal radial fractures in adults. Cochrane Database of Systematic Reviews. 2020(2).
12. Kumar A, Kumar N, Jha MK. Role of preoperative skin stretching in single-stage wound closure. Indian Journal of Plastic Surgery. 2022;55(03):287-93.
13. Pergolizzi JV. Exploring the combination of gabapentinoids and opioids for postoperative analgesia. JAMA Network Open. 2020;3(12):e2032139-e.
14. Klimkiewicz J, Klimkiewicz A, Gutowski M, Rustecki B, Kochanowski D, Ryczek R, et al. Femoral and Lateral Femoral Cutaneous Nerve Block as Anesthesia for High-Risk Intertrochanteric Fracture Repair Patients. Journal of Clinical Medicine. 2022;11(13):3708.
15. Chen K, Klar G, Haley C. Evidence for Regional Anesthesia Blocks for Patients with Hip Fractures. ATOTW Tutorials. 2022:1-6.
16. Mc Carthy A, Meagher E, Dolan M. An Unorthodox Skin Traction Technique for the Initial Management of Distal Femur Fractures in a High-volume Trauma Centre: A Technical Review. Cureus. 2020;12(2).