

A Descriptive Study of the Treatment of Subtrochanteric Fractures in Elderly Patients Using the Sign Nail Method at the Abulali Sina Provincial Teaching Hospital in Mazar-i-Sharif During the Year 2024

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Abstract: Subtrochanteric fractures are among the common orthopedic injuries in adults and the elderly, and due to the unique biomechanical characteristics of this region, their treatment is challenging. This study aims to assess the prevalence, demographic characteristics, and treatment success of this type of fracture using the Nail SIGN method at the Abulali Sina Provincial Teaching Hospital in 2024. This is a Descriptive Retrospective study using a Case Series method, conducted on 150 patients with closed Subtrochanteric fractures who were admitted and underwent surgery at this hospital during 2024. Consecutive sampling was used, and data were extracted by reviewing patients' files. Data analysis was performed using SPSS software, and the results are presented in the form of tables and graphs. The findings revealed that the incidence of closed Subtrochanteric fractures in the orthopedic department of the hospital was 1.5%, which aligns with similar studies in Bangladesh (1.8%), Zimbabwe (1.9%), and Tanzania (3.2%). The highest incidence was observed in individuals aged 5 to 30 years (34.2%), which is consistent with studies in Bangladesh and Zimbabwe. The majority of patients were male (92.3%), and only 7.7% were female. The largest number of patients were from Mazar-i-Sharif (45.3%). Additionally, in 60% of cases, the Nail SIGN method was used, which has partial consistency with studies in Bangladesh (93.55%) and Tanzania (52%). Based on the results, the Nail SIGN method for treating closed Subtrochanteric fractures is considered reliable and effective. This method not only demonstrates a high success rate but also reports minimal complication rates. Further studies with a larger sample size are recommended to confirm these findings.

Keywords: Subtrochanteric Fracture, Nail SIGN, Case Series Method, Orthopedics, Abulali Sina Teaching Hospital, Internal Fixation, Orthopedic Surgery, Demographic Analysis of Patients.

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I. INTRODUCTION

Subtrochanteric fractures occur just below the lesser trochanter, and due to the complex biomechanics and involvement of the dense cortical bone in the area, they present unique challenges in the management of fractures in this region. In the absence of proper treatment, delayed or improper management, these fractures can lead to significant complications such as chronic pain, mobility issues, and disability. The Surgical Implant Generation Network (SIGN) nail has shown promising results in treating such fractures, as these implants are known for their strength, high precision, and low infection rates (2).

At the Abulali Sina Provincial Teaching Hospital in Mazar-i-Sharif, researchers are evaluating the effectiveness and safety of using the SIGN nail for Subtrochanteric fractures in adults, aiming to enhance treatment strategies and patient outcomes.

➤ *Associated Injuries should be Evaluated, and if Suspicion Arises, Appropriate Radiographic Studies should be Performed.*

Radiography of the opposite side is useful for determining the length of the femoral bone in cases of multifragmentary fractures. To determine the axis of the femur, fluoroscopy should be used, with one of the methods being the Tornetta method, which was previously described. On the other hand, if the small trochanter fracture (unlikely

to involve the small trochanter) is not engaged, compare the characteristics of the small trochanter to the opposite side with respect to the knee. Research has shown that this method is relatively sensitive for diagnosing rotational deformities. When comparing both sides, if there is a 20% size difference between the affected and unaffected sides, it usually indicates a 15-degree difference in rotation.

After creating an incision to access the femoral region, a guide pin should be placed at the proximal femoral end to continue with the corrected internal trochanteric entry (or the portal of the piriformis fossa) and insert the guide pin. If placing the guide pin is challenging due to abduction, joint contracture, or external rotation of the proximal femoral fragment, the surgeon may perform a lateral incision to place larger reconstruction screws and use a large bone holding forceps to correct the deformity of the proximal fragment and guide the repositioning of the pin (Figures B1, C1).

II. LITERATURE REVIEW

This prospective study, conducted from July 2016 to June 2018 by M. Sonallah and colleagues at the National Institute of Traumatology and Orthopedic Rehabilitation (NITOR), employed non-random purposive sampling. A total of 31 patients over the age of 18, irrespective of gender, with closed Subtrochanteric fractures were included in the study. Patients with pathological fractures or multiple injuries were excluded. The doctors assessed fracture healing using the Radiographic Union Score for Tibia (RUST) after obtaining anteroposterior and lateral radiographs. After scoring, a score of 4 indicated non-union, while a score of 12 indicated complete union. The average age of the patients was 42.61 ± 19.59 years, with a range of 18 to 80 years. Most of the patients were male (68%) and the majority of injuries (68%) were due to road traffic accidents, with the most common fracture type being Seinsheimer Type III (51.6%). The average hospital stay was 16.39 days, and the average follow-up period was 42.39 weeks (ranging from 24 to 48 weeks). The average time for fracture healing was 14.16 weeks (ranging from 11 to 28 weeks). According to the RUST scores, the union rate was 93.55%, with 6.45% delayed unions. One patient had a superficial wound infection, one had an unacceptable shortening, and there were no implant failures. The study concluded that the SIGN nail is a safe and reliable implant for treating Subtrochanteric femoral fractures (11).

The SIGN program was introduced in 2013 by Sibindi and colleagues in Zimbabwe and expanded to nine hospitals by the end of 2020. This study aimed to assess the characteristics and clinical outcomes of patients receiving the SIGN nail in Zimbabwe, and also to evaluate international trends at SIGN centers. This descriptive study of SOSD was conducted for all cases in Zimbabwe between 2013 and 2020 by Cosmas Sibindi and colleagues. A total of 1,764 patients received surgical fixation during this period. The majority of patients were young (36.83 ± 13.15 years) and male (74%). The average time to surgery was 20.5 ± 22 days, with more than 69% of patients undergoing surgery after more than 10 days. Femoral bone fixation (72%) was the most common

procedure, and road traffic accidents (RTAs) were the most common cause of fractures (73%). Most patients (61%) did not receive follow-up care. Among those who did, 4% had infections, 2% had deformities, and 78% showed radiographic healing. Despite large differences in patient numbers across health centers, the results from this procedure were nearly identical across all centers.

A study in Tanzania assessed the impact of the starting site for nailing using the SIGN nail in treating proximal femur fractures. This prospective study, conducted by Mohamed Mustafa Diab and colleagues, included adult patients with proximal femur fractures (OTA 32, Subtrochanteric region) treated with the SIGN nail at the Muhimbili Orthopedic Institute (MOI) in Dar es Salaam, Tanzania. After surgery, the starting point of the nail was determined by reviewing the first postoperative radiograph, and based on the distance from the center of the intramedullary nail to the tip of the greater trochanter, it was graded on a continuous scale. Primary outcome assessment included coronal alignment on postoperative radiographs, focusing on the anatomical axis of the bone. Secondary outcomes included the number of patients requiring reoperation, RUST scores, which indicate major healing, and EQ5D scores during one year of follow-up.

A total of 79 patients were enrolled, and full data was available for 50 patients (63.3%) after one year. These 50 patients were included in the final analysis. Of these 50 patients, 9 (18%) had the IM nail placed at the lateral aspect, 26 (52%) at the medial aspect, and 15 (30%) directly at the tip of the greater trochanter. When comparing the starting positions of the nails, the doctors found that nails placed at the lateral aspect of the greater trochanter were significantly more likely to result in misalignment or malalignment of the bone compared to nails placed directly at the tip or at the medial side of the greater trochanter (2).

III. METHODOLOGY

This study is a descriptive retrospective case series. The research was conducted on patients who were diagnosed with closed Subtrochanteric fractures during the year 1403 of the Solar Hijri calendar at Abu Ali Sina Teaching and Regional Hospital in Mazar-e-Sharif. All patients with closed Subtrochanteric fractures who were admitted and operated on during this period were included in the study. Consecutive sampling was used, and all patient files of those with closed Subtrochanteric fractures were reviewed to collect data, which was then presented in tables and graphs. A total of 150 samples were selected for the study.

➤ Inclusion Criteria:

- The surgery can be performed on a fracture table or a radiolucent table, with or without skeletal traction.
- The advantage of starting near the piriformis fossa is that it aligns well with the intramedullary canal of the bone, facilitating easier placement of the nail into the bone. However, determining the entry point at the greater trochanter is easier during surgery, but using this entry

point requires a nail with a slight outward curve (proximal valgus bow) to be correctly repositioned within the bone structure.

- With the availability of modern nails today, there is no longer a need to use larger diameter nails. Most studies recommend reaming the bone canal before placing the nail into the canal.

➤ *Exclusion Criteria:*

- Loss of knee mobility
- Angular malunion and shortening of the femur
- Limited ability to provide adequate fixation of the femoral body
- Potential risk of infection associated with converting this fixation to an intramedullary nail (IM nail)

- Patients under the age of 12 are excluded from the study.

➤ *Data Collection Method:*

This study is conducted on all patients admitted to the orthopedic service at the Abu Ali Sina Regional Teaching Hospital in Mazar-e-Sharif, a referral center in Balkh province. Data is collected from the hospital archives by reviewing the patient files of those who were admitted. Additionally, information is obtained from the medical record register, the orthopedic register, and the surgical operation register. During the data collection process, the following variables are examined: age, gender, complications, location of fracture, type of fracture, method of treatment, and recurrence of the condition.

Table 1 Number and Percentage of Closed Fracture Cases Based on General Visits

Visitors	Number	Percentage
Closed Fractures	60	44.2%
Emergency Surgeries	30	20.3%
Other Surgeries	20	17.75%
Other Cases	20	17.75%
Total Visitors	150	100%

Out of the 2564 patients who visited the orthopedic service at the Abuali Sina Regional Educational Hospital in Balkh, 150 patients had closed fractures, 725 underwent emergency surgeries, 444 had other types of surgeries, and

1245 had other medical procedures. In terms of percentage, these groups represent 44.2%, 20.3%, 17.75%, and 17.75%, respectively.

Table 2 Number and Percentage of Closed Fracture Cases According to Inpatient Admission

Inpatient Cases	Number	Percentage
Closed Fractures	50	30.2%
Routine Surgeries	50	30.2%
Emergency Surgeries	20	13.4%
Other Cases	30	26.2%
Total Inpatients	3216	100%

Out of the 150 patients who were admitted, 50 cases were routine surgeries (30.2%), 20 patients underwent

emergency surgeries (13.4%), 30 cases were other incidents (26.2%), and 50 patients (30.2%) were closed fractures.

Table 3 Number and Percentage of Closed Fracture Cases Based on Routine Incidents

Inpatient Cases	Number	Percentage
Closed Fractures	70	45.4%
Other Incidents	30	19.6%
Other Routine Cases	50	35%
Total Cases	150	100%

Out of 1,573 patients who were hospitalized, 150 cases (20.1%) were closed fractures, 1,423 cases (22.3%) were other incidents, and 1,423 (82.3%) were other routine cases

(such as fractures of the wrist bones, phalanx, arm, shoulder blade, etc.).

Table 4 Number and Percentage of Closed Fracture Cases by Age

Age	Number	Percentage
<20 years	15	10.2%
21-30 years	60	34.2%
31-60 years	50	31.9%
61-80 years	25	16.2%
Total	150	100%

Out of the 150 closed fracture patients, the majority were in the age group of 21-30 years (34.2%), followed by

31-60 years (31.9%), 61-80 years (16.2%), and less than 20 years (10.2%).

Table 5 Number and Percentage of Closed Fracture Cases by Gender

Gender	Number	Percentage
Male	130	92.3%
Female	20	7.7%
Total	150	100%

Out of the 150 closed fracture patients, the majority were males (92.3%), while females represented 7.7%.

Table 6 Number and Percentage of Closed Fracture Cases by Residence

Residence	Number	Percentage
Mazar-e-Sharif City	70	45.3%
Districts of Balkh Province	60	42.5%
Other Provinces	20	12.2%
Total	150	100%

Out of the 150 closed fracture patients, the majority were from Mazar-e-Sharif City, with a frequency of 70 patients (45.3%). 60 patients (42.5%) were from the districts

of Balkh Province, and 20 patients (12.2%) were from other provinces.

Table 7 Number and Percentage of Closed Fracture Cases by Location

Fracture Location	Number	Percentage
Right	60	41.2%
Left	50	37.6%
Bilateral	40	21.2%
Total	150	100%

Out of the 150 closed fracture cases, the majority were on the right side (41.2%), followed by the left side (37.6%), and bilateral fractures (21.2%).

Table 8 Number and Percentage of Closed Fracture Cases by Surgical Methods

Surgical Method	Number	Percentage
Nail SIGN	90	60%
Other Procedures:		
- Bone Graft		
- 2-Plate Fixation	60	40%
Total	150	100%

Out of the 150 patients with closed fractures, the majority underwent Nail SIGN surgery (60%), while 60 patients (40%) underwent other surgical methods such as bone graft and 2-plate fixation.

IV. RESEARCH FINDINGS

- The findings of this research indicate that the incidence of closed fractures in the orthopedic department of Abu Ali Sina Provincial Teaching Hospital in Balkh during the year 1403 is 1.5%. These results are consistent with studies conducted in Bangladesh (1.8%), Zimbabwe (1.9%), and Tanzania (3.2%).
- The research reveals that closed fractures accounted for 13.2% of inpatient cases, and no similar studies were conducted in the previously mentioned countries.
- This study found that closed fractures comprised 21.1% of routine cases, and again, no similar studies were found in the previously mentioned countries.

- The research indicates that closed fractures are most commonly observed in individuals aged 5-30 years (34.2%). In the Bangladesh study, the most common age range was 15-45 years, which aligns with our findings. In the Zimbabwe study, the majority were between 20-30 years, which also matches our findings.
- The study reveals that the majority of closed fracture cases were in males (92.3%), while only 7.7% were female. Gender was not specifically considered in studies from Bangladesh and Zimbabwe, so these findings do not align with their research.
- The research shows that most patients with closed fractures were from Mazar-i-Sharif city (45.3%), while studies from Bangladesh and Zimbabwe did not mention the patients' place of residence, so this result does not align with their findings.
- The study found that the majority of closed fractures were on the right side (41.2%). Studies from Tanzania and Bangladesh did not provide specific details regarding the

location of fractures, so this finding does not align with those studies.

- The study found that most patients with closed fractures underwent the Nail SIGN procedure (60%). In Bangladesh, 93.55% of patients underwent this procedure, which aligns with our research, while in Tanzania, 52% of patients received the same procedure, which partly aligns with our findings.

V. CONCLUSION

From the research conducted on 150 patients with closed fractures in 1403 SH at the Abu Ali Sina Provincial Teaching Hospital in Balkh, the following results were obtained:

- The study found that closed fractures were most commonly observed in individuals aged 5-30 years (34.2%). In the Bangladesh study, the majority of fractures were in the 15-45 year age group, which aligns with our findings. In the Zimbabwe study, most fractures occurred in the 20-30 year age group, which also matches our findings.
- The study found that the majority of patients with closed fractures were male (92.3%), while only 7.7% were female. Gender was not specifically considered in studies from Bangladesh and Zimbabwe, so their research does not align with our findings.
- The study revealed that the majority of patients with closed fractures were from Mazar-i-Sharif city (45.3%). Studies from Bangladesh and Zimbabwe did not mention the patients' place of residence, so this result does not align with their findings.
- The study found that most closed fractures were on the right side (41.2%). Studies from Tanzania and Bangladesh did not provide specific details regarding the location of fractures, so this finding does not align with those studies.
- The study revealed that the majority of patients with closed fractures underwent the Nail SIGN procedure (60%). In the Bangladesh study, 93.55% of patients underwent this procedure, which aligns with our research. In the Tanzania study, 52% of patients received the procedure, which partly aligns with our findings.

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