

Optimizing Fixation Strategies for Femoral Neck Fractures in the Elderly: A Study of Osteosynthesis in the Sixth and Seventh Decades

Sidhartha Sohan¹, Sandeep Anand², C. K. Das³

¹Senior Resident, Department of Orthopaedics, Government Medical College, and Hospital, Purnea, Bihar, India

²Senior Resident, Department of Orthopaedics, Government Medical College, and Hospital, Purnea, Bihar, India

³Associate professor and HOD, Department of Orthopaedics, Government Medical College, and Hospital, Purnea, Bihar, India

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Corresponding Author: Dr. Sandeep Anand

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Abstract:

Background: Femoral neck fractures are a major reason for illness and death in elderly people, mainly in those between the ages of 60 and 79. Trying to find the best way to handle fixation is difficult in this group.

Aim: The present work sought to observe patient outcomes after osteosynthesis for fractures of the femoral neck in the elderly, covering healing, problems, and progress of daily living.

Methodology: The present study was a prospective descriptive observational study conducted in the Department of Orthopaedics, Government Medical College, and Hospital, Purnea, Bihar, India for one year. In the study, 100 patients over the age of 60 to 79 had their fixation done with cannulated cancellous screws, dynamic hip screws or locking plates. For one year, the recovery and outcomes of patients were recorded to check for unions, problems and Harris Hip Scores.

Results: Fractures in 90% of cases united and it took an average of 15.8 weeks for union to occur. Avascular necrosis took place in 8% of patients and approximately 10% of the cases did not heal properly. At this point, most of the patients reported having good to excellent functional outcomes.

Conclusion: All in all, treating femoral neck fractures in elderly patients aged 60–79 years by osteosynthesis is acceptable. A fracture treatment plan matched to the fracture and the person's bone condition can lead to good results for those who are still active.

Keywords: Femoral Neck Fracture, Osteosynthesis, Elderly Patients, Fixation Methods, Functional Outcome.

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Introduction

Broken femoral necks are serious and happen very often to older adults. People with these diseases have more health problems, are likely to lose their independence and die sooner, most often in the periods from 60 to 69 and 70 to 79 years of age [1,2]. Higher numbers of fractures worldwide are mainly because of an increase in older people and their improved life expectancy. Experts predict that over 6 million hip fractures will take place every year by the year 2050 and a large fraction of them are predicted for India, whose aging population is on the rise [3, 4]. Taking care of such fractures in older people is very challenging for doctors. There is a great diversity among the elderly aged 60 to 70, as they can be very active and healthy or may have lost much of their physical strength [5]. This means that treatment has to fit each patient by restoring their movement, lessening possible health issues, and maintaining a good quality of life. Osteosynthesis and arthroplasty are both methods with pros and cons, so clinicians are still

discussing the issue. Even though arthroplasty is commonly preferred for persons over 80 due to the weak bone, younger elderly (60s and 70s) may receive significant benefits from procedures that solve the problem jointly.

There are many uses for osteosynthesis in this patient group. It is a less harsh procedure, saves the patient's natural femoral head, minimizes issues with prostheses, and may lead to improved results for active people [6]. Some of the approaches are using multiple cancellous screws, dynamic hip screws and anatomical locking plate systems to ensure more secure fixation in weak bones. Nonetheless, how well the fixation works depends on several variables, for example, the type of fracture, the condition of the bone, the kind of implant used, the method of surgery and adherence to post-surgical treatment instructions.

The quality of bones plays an essential role in how well surgery achieves fixation outcomes in elderly people. At the sixth decade and beyond, the weakening of bones and the structure can lead to issues such as loss of fixation, non-union and avascular necrosis of the femoral head [7]. In addition, fractures to the femoral neck involving Garden types III or IV are believed to be more difficult structurally, based on studies that show a greater chance of them breaking under load [8]. Because of these issues, doctors are becoming more interested in finding ways to better secure surgically fixed joints and stimulate biological healing in elderly patients able to undergo joint-preserving procedures.

Developments in implants, surgery and care during the operation have brought more attention to osteosynthesis as a helpful treatment for certain patients in their sixties and seventies [9]. Studies show that when fixed correctly and the right candidate is selected, internal fixation can allow patients to return to normal activities as well as arthroplasty and at the same time preserve their natural structure [10]. Unfortunately, when fixation fails and salvage arthroplasty is done, the results are not what would be expected and expenses are greater. So, it is very important to determine the factors influencing fixation outcomes in younger patients. Widespread knowledge of this issue is mostly lacking when it comes to finding the most effective treatment for seniors aged 60–79. While most research does include both young and old patients, most studies center on the oldest patients which decreases the worth of their findings for this large and active group of elderly people [25,26]. Besides, former evaluations relied on standard methods, omitting the chance to test newer implants that could provide better results in low bone density [11].

In this context, the aim of the study is to assess the results of osteosynthesis for femoral neck fractures in adults aged 60 to 79, especially to find what influences the success of fixing these fractures. Examining the healing process, potential warnings and how people function after each method allows this research to provide advice doctors can apply when treating elderly patients. Summing up, optimizing how patient's hips are stabilized might improve their mobility, maintain their independence and improve their quality of life.

Methodology

Study Design: The present study was a prospective descriptive observational study conducted in the Department of Orthopaedics, Government Medical College and Hospital, Purnea, Bihar, India for one year.

Sample Size: A total of 100 patients, aged 60 to 79 years, presenting with femoral neck fractures and meeting the eligibility criteria were enrolled consecutively during the study period.

Inclusion Criteria

- Patients aged 60–79 years with unilateral femoral neck fracture sustained within the previous 2 weeks.
- Patients selected for osteosynthesis fixation after clinical and radiological evaluation.
- Patients providing written informed consent for participation and follow-up.

Exclusion Criteria

- Pathological fractures due to malignancy.
- Polytrauma patients with multiple major injuries.
- Patients selected for primary arthroplasty instead of fixation.
- Severe cognitive impairment or contraindications to surgery.
- Patients who were non-ambulatory prior to injury.

Procedures: Every patient was assessed clinically and through imaging in detail, giving their demographic details, comorbidities, degree of movement before injury and the type of fracture using the Garden and Pauwels systems. Testing for bone density was done when it was possible. All the surgeries were carried out by skilled surgeons using either spinal or general anesthetic care. First, closed reduction was tried; if that did not work, open reduction was done. Treatment was chosen through CCS, DHS or locking plate according to what the fracture pattern and bone quality suggested. Fluoroscopy was applied during surgery to see the placement of the implants. After the surgery, patients were given blood clot prevention treatment for 3 to 4 weeks, antibiotics for 3 to 5 days, pain control and encouraged to get up as soon as possible. Patients were checked at 6 weeks, 3 months, 6 months, and 12 months to look at healing, issues that could occur and their results after surgery.

Statistical Analysis: Information about each variable was entered in Microsoft Excel and I analyzed it using SPSS version 27. The numbers for age, time to union and Harris Hip Score were reported as mean values with standard deviation or as median values with interquartile ranges. Data involving fixation type and the number of complications were shown as both frequencies and percentages. Data analysis between different groups used Chi-square, Fisher's exact test for categories, t-test for data with one continuous variable and ANOVA for data with many continuous variables. The researchers regarded results with p-values less than 0.05 to be statistically significant.

Result

Table 1 displays the characteristics of both the demographic and the clinical information of the patients in the study. Males between the ages of 60 and

64 made up 35% of cases and those between 65 and 69 made up 38% which reveals that most patients were in the beginning of their elderly phase. An 18% share of people was between 70 and 74 years of age and only 9% fell into the 75–79 age group. Women accounted for 58%, while men accounted for 42% which indicates the condition is reported more

commonly by females. Prior to their accident, the majority of these patients (72%) were independently mobile, however, almost a third (28%) needed help, demonstrating that even before these accidents, many elderly were not living a completely independent life.

Table 1: Demographic and Clinical Profile of Patients

Parameter	No. of Patients	Percentage (%)
Age group (years)		
60–64	35	35
65–69	38	38
70–74	18	18
75–79	9	9
Gender		
Male	42	42
Female	58	58
Pre-injury mobility		
Independent	72	72
Assisted	28	28

Table 2 explains the types of fractures and the methods surgeons use to treat them. There were 38% of Type III fractures, while Type IV came in second at 30%. There were 20% Type II fractures, making them the second most common and the least common were Type I fractures which accounted for 12% of the cases. Accordingly, a majority of patients experienced moderate to severe types of fractures (III and IV) and generally require tougher treatment. Many of the surgeons selected cannulated cancellous screws for fixation since they were used in

about half the cases due to how minimally invasive and reliable they are for some fractures. Dynamic hip screws were used to treat 38% of patients, showing that these can be helpful for displaced or unstable fractures. Test results revealed that in 16% of cases, locking plates were selected, possibly for tough fractures or situations where more secure fixation was needed. This means that the surgery is done in a way that fits the severity and type of the fracture.

Table 2: Fracture Classification and Fixation Methods

Parameter	No. of Patients	Percentage (%)
Garden Fracture Type		
I	12	12
II	20	20
III	38	38
IV	30	30
Fixation Method Used		
Cannulated cancellous screws	46	46
Dynamic hip screw	38	38
Locking plate	16	16

Table 3 offers details on the results of fracture healing, how many days it took until union and the nature of the postoperative complications in the patients. A very high percentage of patients managed to heal successfully, proving the suitability of the fixation methods. However, 10% did not have a union which emphasizes that these patients might need extra treatment or have concerns that could affect healing. The average time for a person to union was around 15.8 weeks and the standard deviation was 3.2 weeks which means that healing varied somewhat for patients. Out of all the problems described,

avascular necrosis (AVN) was the most prevalent, striking 8% of patients, mainly because it is very likely after a femoral neck fracture due to limited blood flow. About 5% of patients experienced implant failure which might be because of excess stress or poor attachment at the implant site. A low rate of infection occurred in 3% of patients which demonstrates how well the surgery and postoperative care were carried out. While the outcome was good for most patients, 7% were reoperated on since they had complications or the treatment failed at first.

Table 3: Fracture Union, Time to Union, and Complications

Outcome	No. of Patients	Percentage (%)
Fracture Union		
Achieved	90	90
Non-union	10	10
Mean Time to Union (weeks)	15.8 ± 3.2	—
Complications		
Avascular necrosis (AVN)	8	8
Implant failure	5	5
Infection	3	3
Reoperation required	7	7

Table 4 illustrates the outcomes of patients after a year based on their Harris Hip Scores. Surprisingly, more than a third of patients evaluated achieved an excellent outcome which means their hip function and movement was both optimal. Thirty-two percent of patients ended up in the good group with positive outcomes, as their scores ranged from 80 to 89.

There were fair results in 20% of those treated which means some ongoing difficulties, while 10% had very poor outcomes, suggesting they had trouble with daily activities. In general, more than 70% of the patients achieved a good or excellent recovery of hip mobility after one year.

Table 4: Functional Outcome at 12 Months (Harris Hip Score)

Harris Hip Score Category	No. of Patients	Percentage (%)
Excellent (≥ 90)	38	38
Good (80–89)	32	32
Fair (70–79)	20	20
Poor (< 70)	10	10

Discussion

The aim of this study was to review and perfect the surgical methods used for fixing femoral neck fractures in elderly patients rising from 60 to 79 years old. It was seen that around 90% of the patients' fractures were united and almost 70% achieved good to excellent results on the Harris Hip Score at the one-year mark. This research suggests that osteosynthesis can be successfully used in treating specifically chosen elderly patients with this problem Meinberg EG, et al. 2018 [21]. The study found that women and that age 60 to 69 accounted for most patients which match the global trend of higher fractures caused by osteoporosis in postmenopausal women. Also, Dhanwal et al. [12] noted that the rate of hip fractures in elderly Indian women is increasing. According to this study and the findings by Gjertsen et al. [13], more than two-thirds of elderly patients' unstable fractures are treated surgically.

In most studies, the union rate has been close to 90% which is similar to the rate we found in our courses. As demonstrated by Florschutz et al. [14], with state-of-the-art tools, careful surgical practice and suitable patient choice, elderly people can enjoy union rates between 85% and 92%. In addition, according to Lagergren J et al. [4], using internal fixation in patients with minimal or good fracture reduction can result in almost 90% unions. We observed that the rate of avascular necrosis was 8%, comparable to other studies and the rate of non-union remained low at 10% for our cohort. A review by Lu-Yao et al.

concluded that AVN affected about 7 to 12 percent of patients and the rate of non-union went up to 15 percent in elderly individuals. They tend to depend a lot on the way the bone is displaced, the quality of reduction and the state of the bone [17]. In the course of our study, carefully performing reduction and applying fixation during surgery helped achieve good healing results. Cannulated cancellous screws were chosen most often (46%), showing great results among patients with stable fractures. This proves the point made by Slobogean et al. [18] who advised placing multiple screws for treating minimally displaced femoral neck fractures. For osteoporotic or unstable fractures, we found that almost 38% of surgeons preferred dynamic hip screws and roughly 16% prefer locking plates which agrees with Deneka DA et al.'s conclusion that other methods may give better stability to weak bones.

Most of the patients did well, as 70% reached excellent to ideal scores on the Harris Hip Scale at 12 months according to Ma HH, et al. 2019 [20], elderly patients who underwent internal fixation and suffered less-serious postoperative problems could regain much of their former abilities. Additionally, studies carried out by Rogmark and Lagergren J [5–15] report that choosing osteosynthesis instead of primary hip replacement might be better for active elderly people in the long run. Our research shows that choosing a fixation strategy that fits the patient's fracture, bone strength and how active they are is very important. Following guidelines and consultant opinions, today's clinical practice scores higher for

selective fixation than standard uniform fixation, Ma HH, et al. 2019 [20]. Because this is a single-center trial, the findings may not apply to a larger population and the observations were followed for a short time. Following up for a longer time period would help diagnose problems such as AVN progression or gradual wear of the implant. Our research, therefore, adds more data to the evidence that optimized fixation achieves good treatment outcomes in children.

To sum up, this research proves that using osteosynthesis is still a suitable and successful method for treating femoral neck fractures in elderly patients aged 60–79 years. With the right choices and execution, this treatment can lead to good results in how much it reduces one's pain and returns function.

Conclusion

This work emphasizes that osteosynthesis could be a good option for senior patients with femoral neck fractures. If the surgeon is selective with patients and uses the best surgical technique, over 90% of hip operations in elderly people result in both good unions and satisfactory activity. Most of the patients in the study recovered well over time, indicating that treating the joint is important in people with sufficient health and strength. Different fixation techniques affected the outcomes of the treatment. For fractures that remained stable, using cannulated cancellous screws gave the best results. On the other hand, dynamic hip screws and locking plates were useful for bone fractures that were too weak or unstable. This demonstrates that a general approach won't work and each case deserves customizations. In addition, the low chances of problems like avascular necrosis (8%) and non-union (10%) indicate that using modern methods of osteosynthesis makes sense for carefully selected seniors. The study reinforces the idea currently supported by evidence that trying to preserve the original femoral head in mobile seniors is very beneficial. Osteosynthesis is a safe option when it is done carefully, since it helps the hip stay as functional as possible and there is no need for artificial implants. Patients in these two decades tend to stay active and benefit a lot from this procedure. Even so, the results can be encouraging due to the study's issues, including being conducted only at one center and having one-year follow-up. Being tested in larger groups and with a longer follow-up could confirm these findings and allow doctors to improve fracture fixation methods. Still, this research adds important evidence for using optimized treatments to deal with femoral neck fractures in the younger elderly.

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