

COMPARISON OF THE ROLE OF EARLY VERSUS DELAYED FIXATION OF INTRACAPSULAR FEMORAL NECK FRACTURE IN YOUNG POPULATION IN TERMS OF AVASCULAR NECROSIS OF THE FEMORAL HEAD

Muhammad Shoaib Khan¹, Muhammad Younas Khan², Ahsan Sajjad², Hanif Ullah³, Syed Dil Bagh Ali Shah⁴, Farwa Shoaib⁵

¹Department of Orthopedics, Khyber Teaching Hospital, Peshawar - Pakistan

²Department of Orthopedics, Khyber Teaching Hospital, Peshawar - Pakistan

³District Specialist Lakki Marwat Hospital, - Pakistan

⁴Department of Orthopedics, Khyber Teaching Hospital, Peshawar - Pakistan

⁵Medical Student 4th Year MBBS, Kabir Medical College, Peshawar - Pakistan

ABSTRACT

Objective: To compare the role of early versus delayed fixation of intracapsular fracture of the femoral neck in young population in terms of Avascular Necrosis (AVN) of Femoral Head.

Material and Methods: This quasi-experimental study was conducted in Peshawar from January 2020 till June 2021 at the Khyber Teaching hospital and all patients with age 18 to 60 years who had the neck of femur fracture were included who presented within one week of fracture. Group 1 consisted of the early fixation group (fixated within 24 hours) while group 2 consisted of the late fixation group (those who fixated after 24 hours). The development of AVN was assessed on follow-up X-ray at 6 weeks, 3 months, and 6 months. Data was analyzed using SPSS. Mean and standard deviation was used for quantitative data. Frequency and percentages were used for qualitative data. A p-value of ≤ 0.05 was taken as significant. Shapiro Wilk's test was done to find the normality of the data.

Results: The mean age of the 64 included patients was 52 ± 5 years. The male to female ratio was 1:1.5. A total of 34 patients belonged to group 2 while 30 to group 1. In group 2, 11 patients experienced osteonecrosis of the femoral head. While in group 1, 9 patients experienced osteonecrosis of the femoral head. No significant effect of time delay on the chances of developing osteonecrosis of the femoral head was noted in group 2 even after a delay of 24 hours with a p-value of 0.201.

Conclusion: We conclude that there is no significant difference in the outcome of femoral neck fractures whether it was fixed early or late.

Key Words: Neck of femur fracture, Garden classification, Avascular necrosis of the femoral head.

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INTRODUCTION

Fractures of the neck of the femur can be described as the current "Orthopedic epidemic" due to its large number of emergencies in orthopedic wards¹. Younger patients have a small proportion of these fractures i.e. up to 3% of

all hip fractures². In aged patients, the preferred method of treatment is hip replacement, either hemiarthroplasty or total hip replacement³. In young patients, under 60 years of age, the heads are being preserved, by early fracture fixation as the treatment of choice^{4, 5}. Avascular necrosis (AVN) of the femoral head and non-union of the neck of the femur are the common complications of fractures fixation, but it also includes other complications i.e. neurovascular compromise, osteoarthritis of the hip, limb shortening, varus or valgus deformity of the femoral head, deep vein thrombosis and wound infection can also occur⁶. In patients under 60 years of age, the fractures are less common and we don't have much evidence to support any treatment method^{4, 5}. In younger patients, the head should be preserved and hip replacement should be the last option, keeping in

Correspondence

Dr. Syed Dil Bagh Ali Shah

Assistant Professor

Department of Orthopedics, Khyber Teaching Hospital, Peshawar - Pakistan

Email: drdilbagh@gmail.com

Cell: +92-312-6914030

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view their increased level of activities⁷. Furthermore, there are increased chances of complications of fractures at the neck of femur fixation, especially non-union and (AVN) of the femoral head i.e. 35% and 45% respectively^{4, 8, 9}. Currently, in literature, there are conflicting views regarding the ideal time of fractures fixation. This study aims to compare the role of early and delayed fixation in femoral neck fracture in the young population about AVN.

MATERIAL AND METHODS

This quasi-experimental study on 64 patients was conducted in the Khyber teaching hospital from January 2020 till June 2021. The inclusion criteria were patients from 18 to 60 years of age presenting up to 1 week of neck of femur fracture. The exclusion criteria was open and pathological fractures or ipsilateral fracture neck and shaft of the femur. The patients were non-randomly divided based on their time of arrival after the initial injury to the time of fixation. The early group with a history of the initial trauma and time of fixation within 24 hours and the late group with the history of initial trauma and time of fixation more than 24 hours. The method of fixation was 2 or 3 cannulated screws depending on the neck size, under image intensifier on a fracture table, through lateral approach after close or open reduction under spinal or general anesthesia. The follow-up protocol was 6 weeks, 3 months, and 6 months in which the (AVN) of the femoral head was diagnosed by X-ray anteroposterior and lateral view and clinically. The time of fixation was correlated with the occurrence of AVN of the femoral head using SPSS.

RESULTS

A total of 64 patients were included with ages ranging from 18-60 and a mean of 52 ± 5 years. The basic demographics of the study are discussed in table 1. A total of 34 patients were included in group 2 while 30 to the group 1. Eleven patients of group 2 experienced AVN of the femoral head. While in group 1, 9 experienced osteonecrosis of the femoral head. The chances of developing osteonecrosis of the femoral head were not significantly related to time delay and a p-value of 0.201 was calculated using the chi-square test as discussed in Table 2.

DISCUSSION

AVN of the femoral head is an unpredictable and serious complication developed after the displaced intracapsular neck of femur fractures. Due to disruption in the blood supply of the femoral head. And it is also thought that AVN of the femoral head is more common in the neck of the femur fractures with delayed time of fixation, in patients under 60 years of age i.e. 16% to 86%^{4, 8-11}. In

Table 1: Basic Demographics of the Study

Frequencies and percentages for age		
Age Groups	Frequencies	Percentages
18-30 years	12	18.75%
31-40 years	13	20.31%
41-50 years	21	32.81%
51-60 years	18	28.12%
Mean and SD for Age		52 $\pm$ 5 years
Frequencies and percentages for gender		
Gender Groups	Frequencies	Percentages
Male	21	32.81%
Female	43	67.19%
Male to Female Ratio		1:2
Frequencies and percentages developing AVN		
Avn Status	Frequencies	Percentages
Present	20	31%
Absent	44	69%

Table 2: Comparison between early and late fixation group

Chance of developing AVN between early and late fixation group		
Fixation time	Frequencies of developing AVN	P-value (Chi-square)
Early Group 1	9	0.385
Late Group 2	11	0.201

younger patients, there is a high incidence of non-union and AVN of the femoral head^{9, 11}. The AVN of the femoral head can lead to the collapse of the femoral head followed by osteoarthritis which then needs other surgical procedures¹². In literature, the union rate in the neck of femur fractures is 70% and a failure rate is 30% in young patients. It means the initial trauma which leads to displacement of fracture is the main reason for the disruption of vascular supply to the femoral head and followed by osteonecrosis of the femoral head. The time duration from injury to fixation of neck of femur fractures is usually considered as an important factor¹³ but there is no clear evidence of complications between the time of injury to fixation, as reported in other series^{8, 11, 14}. Probably it is the severity of trauma at the time of initial injury which leads to damage to the blood supply of the femoral head and early reduction and fixation having no effect on this and its complications. For example, Jain et al concluded that there are high chances of postoperative complications with fracture fixation done after 12 hours of injury¹⁵, while Karaeminogullari et al, encountered no difference between time to fixation and (AVN) of the femoral head¹⁶. In our studies, we found that the time to fixation of neck of femur fracture had no significant

role in the development of AVN of the femoral head.

In fracture neck of the femur, the degree of displacement is the main risk factor leading to a high risk of (AVN) of the femoral head. Gerber et al have noted that urgent open reduction and fixation will not prevent (AVN) of the femoral head in displaced fractures and they didn't recommend the immediate aspiration or decompression and fixation, because the results were the same whether to be operated on day 1 or after 2 days¹⁷. Anatomical reduction and stable internal fixation of fractures of the neck of the femur decrease the chances of AVN of the femoral head and therefore it is considered as standard goal of therapy. There is no association between delay time to fixation and AVN of the femoral head in young patients¹². In another study by Karaeminogullari et al, there is no difference in the frequency of AVN of the femoral head and nonunion rates in the neck of femur fractures in patients who were fixed before or after 12 hours of injury¹⁶ which also coincides with our study. This study also shows AVN of the femoral head and nonunion were 15.5 % and 25 % before 12 hours after injury vs 14% and 27% after 12 hours of injury¹⁶ which is consistence with our study. In another study, there was no difference in frequency of osteonecrosis of femoral head fixed either before or after 24 hours of injury 25% and 20% respectively⁸. Upadhyay et al also found no difference in osteonecrosis of femoral head or malunion in patients even fixed after 48 hours of injury¹¹. We suggest that fixation of femoral neck fracture can be fixed even up to more than 24 hours after encountering the initial trauma with no significant chances of developing AVN.

CONCLUSION

Our study concludes that there is no significant difference in the outcome of femoral neck fractures whether it was fixed early or late. Delay in treatment i.e., fixation of the femoral head after the initial trauma has been found to have no significant role in AVN of femoral neck fracture and the fixation can be delayed up to more than 24 hours with no significant chances of developing AVN of the femoral head.

REFERENCES

1. Wood PR, Mahoney PF, Cooper J. Trauma and orthopedic surgery in clinical practice: Springer Science & Business Media; 2008.
2. Ly TV, Swiontkowski MF. Management of femoral neck fractures in young adults. Indian journal of orthopaedics. 2008;42(1):3-12.
3. Kannan A, Kancherla R, McMahon S, Hawdon G, Soral A, Malhotra R. Arthroplasty options in femoral-neck fracture: answers from the national registries. International orthopaedics. 2012;36(1):1-8.
4. Protzman RR, Burkhalter WE. Femoral-neck fractures in young adults. The Journal of bone and joint surgery American volume. 1976;58(5):689-95.
5. Robinson C, McQueen M, Christie J. Hip fractures in adults younger than 50 years of age. Epidemiology and results. Clinical orthopaedics and related research. 1995(312):238-46.
6. Kregor PJ. The effect of femoral neck fractures on femoral head blood flow. Orthopedics. 1996;19(12):1031-6; quiz 7-8.
7. Cuckler JM, Tamarapalli JR. An algorithm for the management of femoral neck fractures. Orthopedics. 1994;17(9):789-92.
8. Haidukewych GJ, Rothwell WS, Jacofsky DJ, Torchia ME, Berry DJ. Operative treatment of femoral neck fractures in patients between the ages of fifteen and fifty years. The Journal of bone and joint surgery American volume. 2004;86(8):1711-6.
9. Swiontkowski MF, Winkquist RA, Hansen ST, Jr. Fractures of the femoral neck in patients between the ages of twelve and forty-nine years. The Journal of bone and joint surgery American volume. 1984;66(6):837-46.
10. Braun W, Rüter A, Wiedemann M, Kissing F. [Femoral head preserving therapy in medial femoral neck fractures. A clinical study of the effects of treatment method on the outcome]. Der Unfallchirurg. 1991;94(6):325-30.
11. Upadhyay A, Jain P, Mishra P, Maini L, Gautum VK, Dhaon BK. Delayed internal fixation of fractures of the neck of the femur in young adults. A prospective, randomised study comparing closed and open reduction. The Journal of bone and joint surgery British volume. 2004;86(7):1035-40.
12. Razik F, Alexopoulos AS, El-Osta B, Connolly MJ, Brown A, Hassan S, et al. Time to internal fixation of femoral neck fractures in patients under sixty years--does this matter in the development of osteonecrosis of femoral head? International orthopaedics. 2012;36(10):2127-32.
13. G. H, R. S, K. D, W. MD. Does delay to theatre for medical reasons affect the peri-operative mortality in patients with a fracture of the hip? The Journal of bone and joint surgery British volume. 2010;92-B(6):835-41.
14. Damany DS, Parker MJ, Chojnowski A. Complications after intracapsular hip fractures in young adults. A meta-analysis of 18 published studies involving 564 fractures. Injury. 2005;36(1):131-41.
15. Jain R, Koo M, Kreder HJ, Schemitsch EH, Davey JR, Mahomed NN. Comparison of early and delayed fixation of subcapital hip fractures in patients sixty years of age or less. The Journal of bone and joint surgery American

volume. 2002;84(9):1605-12.

16. Karaeminogullari O, Demirors H, Atabek M, Tuncay C, Tandogan R, Ozalay M. Avascular necrosis and nonunion after osteosynthesis of femoral neck fractures: effect of fracture displacement and time to surgery. *Advances in therapy*. 2004;21(5):335-42.
17. Gerber C, Strehle J, Ganz R. The treatment of fractures of the femoral neck. *Clinical orthopaedics and related research*. 1993(292):77-86.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Khan MS: Concept/ Idea, Literature, review, Drafting & Final Review

Khan MY: Concept/ Idea, Analysis & Interpretation of Data, References

Sajjad A: Manuscript Writing, Literature review, Analysis & Interpretation of Data

Ullah H: Concept/idea, Data Collection

Shah SDBA: Concept/idea, Literature review, Drafting & Final Review

Shoaib F: Concept/idea, Literature review

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.