

**A STUDY OF NECK FEMUR FRACTURES IN PATIENTS TREATED BY CHS ALONE
AND PATIENTS TREATED BY CHS WITH QUADRATUS FEMORIS MUSCLE
PEDICLE BONE GRAFTING IN PATNA, BIHAR**

Dr. Chandan Shekhar, MBBS , DIPLOMA, DNB

Kumar Hospital and Research Institute, Khemnichak, Patna, Bihar 27.

ABSTRACT

Introduction: In patients less than 60 years of age, even with displaced femoral neck fractures, head preservation using early closed reduction and internal fixation (CRIF) with multiple annulated hip screws (CHS) is one of the accepted methods of treatment. Though union rate is improved, vascular impairment of the head following this fracture, resulting in osteonecrosis, remains as an unsolved problem.

Aims: The incidence rate of osteonecrosis, whether they are same across groups, or higher in one of the groups and the incidence rate of union and non-union, whether they are same across groups, or higher in one of the groups.

Materials and Methods: The present study was a Case-control/ Retrospective study study. This Study was conducted from June 2020 to June 2022 at Department of orthopaedic, kumar hospital and research institute, Khemnichak, patna, Bihar 27.

Result: In CHS + bone graft Group, 35 (77.8%) patients were Excellent Final MHSS, 8 (17.8%) patients were Good Final MHSS and 2 (4.4%) patient were Poor Final MHSS Grading.

Conclusion: From the discussion submitted above it is clearly evident that till date we could not give a satisfactory treatment to our patients of displaced femoral neck fractures and this is more relevant for younger patients of less than 60 years of age for whom we cannot advise THA.

Keywords: Pediatrics, pathology, femoral neck fractures and hip fractures.

INTRODUCTION

In patients less than 60 years of age, even with displaced femoral neck fractures, head preservation using early closed reduction and internal fixation (CRIF) with multiple annulated hip screws (CHS) is one of the accepted methods of treatment. Though union rate is improved, vascular impairment of the head following this fracture, resulting in osteonecrosis, remains as an unsolved problem. Improved results regarding union and lesser incidence of osteonecrosis are obtainable when quadrates femoris muscle pedicle graft is applied after open reduction and internal fixation (ORIF). In fresh fractures of femoral neck, closed reduction internal fixation and addition of quadrates femoris muscle pedicle bone grafting is the procedure likely to prevent development of osteonecrosis. In young patients osteonecrosis is likely to lead to severe morbidity and the best way to tackle it, is by prevention. Till date there is no conclusive method to identify the fractures leading to osteonecrosis and to prevent it. It is hypothesized that addition of a vascularized quadrates femoris muscle pedicle graft after CRIF in fresh fractures may prevent osteonecrosis even in displaced fractures than when CRIF done alone. In early operated

cases within 48 hours, this method also gives us a chance of decompression of intracapsular haematoma and likely to increase femoral head perfusion.

Fracture of the neck of femur is a challenging injury to manage. It is one of the more common injuries presenting to the emergency room and is likely to remain so, in the near future. It is often a fracture of fragility due to osteoporosis in the elderly, though in the younger age group, it usually results from high-energy trauma sustained in a road crash. Internal fixation remains the treatment of choice for these fractures in all age groups, more so in displaced fractures in the younger patients, where preservation of the femoral head is the priority. However, the optimal timing for surgical fixation of these fractures is still open to debate. It is advocated that fracture reduction and fixation should be performed as a surgical emergency to restore the precarious blood supply to the femoral head and prevent complications such as non-union and avascular necrosis, the incidence of these complications being 10-20% and 10-30% respectively^{1,2,3,4}. Non-union and avascular necrosis predisposes to future degenerative arthritis of the hip joint involved. Revision surgery or conversion surgery to hip replacement is reported to be between 20-36%.

The management of femoral neck fractures especially the displaced ones in young adults is one of the most challenging tasks for orthopedic surgeons. Femoral neck fractures are relatively rare in young patients which often result from high-energy trauma. The main complication of femoral neck fracture in young adults is avascular necrosis, with the incidence of 15% (range 0e67%). Accurate reduction and firm fixation are vital for optimal results. However, owing to the breakdown of blood supply because of great violence, meronecrobiosis and collapse of the femoral head are commonly seen clinically described a successful case by using quadrates femoris muscle pedicle bone graft combining with screw fixation to treat this kind of fracture in 1964. Later, some scholars reported that the transplantation of quadratus femoris muscle pedicle bone to the proximal femoral head fragment could increase the blood supply of the femoral head when intracapsular fracture took place. But other scholars opposed this operation and believed that it might increase the risk of complications. Meyers et al.⁵ pointed out that this operation would prolong the operative time by at least half an hour and required better surgical skill and assistance. In addition, the surgeon will disturb the normal blood circulation of the medical circumflex femoral artery, which is the primary intraosseous vessels of the femoral head.

MATERIALS AND METHODS

STUDY SETTING:

The study is institution based, conducted at the June 2020 to June 2022 at Department of orthopaedic, kumar hospital and research institute, Khemnichak, patna, Bihar 27.

STUDY SAMPLE:

A random sample of 90 patients subjected to certain inclusion criteria mentioned below who were admitted in Medical College & Hospital for total hip arthroplasty procedure for unilateral hip pathology from urban, semi urban and rural population.

STUDY PERIOD-

From June 2019 to June 2021

STUDY DESIGN:

Case-control/ Retrospective study.

INCLUSION CRITERIA:

- All patients >18yrs and <60years
- Fracture treated with 48hrs of injury
- No open reduction
- Garden Type 3 and 4 fracture
- Singh's Osteoporotic index 4, 5, 6

EXCLUSION CRITERIA:

1. Patients with pre-existing disease of hip joint.
2. Medically unfit from anaesthetic point of view
3. Clinically estimated life expectancy less than 5 years. Like those with severe co-morbidities like metastatic diseases, moribund patients limited to bed, very poor general health
4. Non consent and withdrawal from study.

RESULT AND DISCUSSION

Morbidity resulting from impairment of vascular supply as a consequence of fracture is very often evident in displaced fractures of the femoral neck. As we know the three sources of blood supply to the femoral head are capsular vessels, intramedullary vessels and a contribution from ligamentum teres.⁶ In the adult most important source of supply to the femoral head comes from the capsular vessels. Within the capsule these are known as retinacular vessels and are of four types - anterior, medial, lateral and posterior. The lateral retinacular vessel, a branch of medial femoral circumflex artery, is the main source of supply and it courses along the postero superior aspect of the femoral neck to supply the femoral head. In displaced fracture of the femoral neck these vessels are kinked and compromised and some additional vascular supply which might reach the head via medullary bone in the neck are totally cut off.

This retrospective study was conducted in an urban Medical College of eastern India. Ninety consecutive patients, 45 from each group, Group1(CRIF alone), Group 2 (CRIF and MPBG) who satisfied our inclusion criteria and operated in the period from October 2009 to December 4 2016 were finally evaluated. Evaluation was done by two other surgeons who were not involved in the operation. Though retrospective, the permission of the Ethical Committee was duly obtained for conducting the study. Consecutive Ninety (Male=63, Female=27) patients of fresh displaced (Garden type III and type IV) femoral neck fracture were included in this study. The

average age of the patients was 42.6 years (range=21 to 60 years). All of them had identical demographic features. All patients were operated within 48 hours of injury.

We found that In CHS + bone graft Group, 10 (22.2%) patients were 21-30 years old, 19 (42.2%) patients were 31-40years old and 16 (35.6%) patients were 41-50 years old. In CHS alone Group, 6 (13.3%) patients were 21-30 years old, 17 (37.8%) patients were 31-40years old, 16 (35.6%) patients were 41-50 years old and 6 (13.3%) patients were 51-60 years old. This was not statistically significant ($p=0.0684$).

It was found that in CHS + bone graft Group, 11 (24.4%) patients were Female and 34 (75.6%) patients were Male. In CHS alone Group, 16 (35.6%) patients were Female and 29 (64.4%) patients were Male. This was not statistically significant ($p=0.2500$).

Our study showed that in CHS + bone graft Group, 19 (42.2%) patients had **Presentation Time** Day 1 and 26 (57.8%) patients had **Presentation Time** Day 2. In CHS alone Group, 21 (46.7%) patients had **Presentation Time** Day 1 and 24 (53.3%) patients had **Presentation Time** Day 2. This was not statistically significant ($p=0.6713$).

Swiontkowski MF et al ⁷(1984) found that one of the remaining seven patients had sustained the fracture while running, and in the other six the fracture was associated with a metabolic disorder. Eight patients had a Garden Stage-II fracture; twelve, Stage-III; and seven, Stage-IV.

Sugano NO et al ⁸(1996) found that two fractures were Garden stage I, 12 stage II, and three stage III. They performed internal fixation under radiological control at a mean of five days (2 to 15) after injury using a titanium cannulated cancellous screw or a titanium compression hip screw.

Konishiike T et al ⁹(1999) showed that in all of the control group and in those patients who had un-displaced fractures (Garden stages I and II), perfusion of the femoral head was considered to be at the same level as on the unaffected side. In patients with displaced fractures (Garden stages III and IV) almost all the femoral heads on the fractured side were impaired or totally avascular, although some had the same level of perfusion as the unaffected side. They conclude that dynamic MRI, a new non-invasive imaging technique, is useful for evaluating the perfusion of the femoral head.

Cho MR et al ¹⁰(2007) observed that the fractures were classified according to Garden and included 11 type I, 5 type II, 17 type III, and 11 type IV. The average delay between injury and surgery was 52 hours (≤ 24 hours, 26; ≥ 24 hours, 18; range 7 to 504 hours).

In all cases where bleeding stopped before 5 minutes osteonecrosis developed and in one case where bleeding continued osteonecrosis still developed. So obviously 100% predictability and clue for prevention is missing. Recently post-operative Bone SPECT/CT¹¹ started to be done after two weeks and if cold defects were found follow up SPECT/CT were done two to ten months later. Three out of eight patients of Garden type III fracture and six out of six patients of Garden type IV fracture developed osteonecrosis. In another recent study it was shown that 22.6% of patients with displaced femoral neck fracture developed osteonecrosis and operation within 24 hours did not alter the outcome.

CONCLUSION

From the discussion submitted above it is clearly evident that till date we could not give a satisfactory treatment to our patients of displaced femoral neck fractures and this is more relevant for younger patients of less than 60 years of age for whom we cannot advise THA. If we fail to prevent osteonecrosis in them, they are likely to suffer morbidity for the rest of their life. The journey of the present author in quest of optimum solution for femoral neck fractures in young patients began 25 years back. Only occasionally in physiologically fit and working male patients who were personally long familiar and very close, this reporting surgeon extended the age bar to 65 years and beyond because he believes there is no substitute for a nicely united femoral neck with spherical head which escapes osteonecrosis. Nowadays THA has become the accepted method of treatment for patients more than 60 years of age, largely because design of prosthesis has improved and availability of ideal operation theatres for joint replacement surgery has substantially increased. In the literature we find continuous search for early detection of avascular necrosis in the post-operative period, but by that time we have lost the opportunity of prevention. We all know prevention is better than cure, and if we add 25 minutes more to the duration of the operative procedure, we are most likely to safeguard the return of our 24 younger patients back to normalcy for the rest of their life. With not much complexity in the procedure an average orthopaedic surgeon will be able to perform this operation.

In the end the evidence-based conclusion of the study may once again be highlighted as that the addition of quadratus femoris muscle pedicle bone graft will bring new ray of hope to the life of younger patients of displaced femoral neck fracture by minimizing to the extent of naught the possibility of the incidence of osteonecrosis.

REFERENCES

1. Cserhati P, Kazar G, Manninger J. Non-operative or operative treatment for undisplaced femoral neck fractures: a comparative study of 122 non-operative and 125 operatively treated cases. *Injury*. 1996;27:583–588. [PubMed] [Google Scholar]
2. Haidukewych GJ, Rothwell WS, Jacofsky DJ. Operative treatment of femoral neck fractures in patients between the ages of fifteen and fifty years. *J Bone Joint Surg Am*. 2004;86:1711–1716. [PubMed] [Google Scholar]
3. Rogmark C, Flensburg L, Fredin H. Undisplaced femoral neck fractures – no problems? A consecutive study of 224 patients treated with internal fixation. *Injury*. 2009;40:274–276. [PubMed] [Google Scholar]
4. Angelini M, McKee MD, Waddell JP. Salvage of failed hip fracture fixation. *J Orthop Trauma*. 2009;23:472–478. [PubMed] [Google Scholar]
5. Meyers MH, Harvey Jr JP, Moore TM. Delayed treatment of subcapital and transcervical fractures of the neck of the femur with internal fixation and muscle pedicle bone graft. *Orthop Clin North Am*. 1974;5:743e756.
6. Rockwood and Green: Fractures in adults, seventh edition, volume 2: 2010; p. 1569

7. Swiontkowski MF, Winqvist RA, Hansen J.: Fractures of the femoral neck in patients between the ages of twelve and forty nine years. J Bone Joint Surg. Am, 1984;66:837-846
8. Sugano N, Masuhara K, Nakamura N, et al: MRI of early osteonecrosis of femoral head after transcervical fracture J Bone Joint Surg, 1996; 78: pp.253-57
9. T Konishiike, E. Makihata et al: Acute fracture of the neck of the femur. An assessment of perfusion of the head by dynamic MRI J Bone Joint Surg (Br) 1999; 81-B: pp.596-99
10. Cho, Myung-Rae et al: A Predictive Method for Subsequent Avascular Necrosis of Femoral Head (AVNFH) by Observation of Bleeding From the Cannulated Screw Used for Fixation of Intracapsular Femoral Neck Fractures Journal of Orthopaedic Trauma, 2007; 21(3): pp.158-64
11. Sangwon Han, Minyoung Oh. : Risk Stratification for Avascular Necrosis of the Femoral Head After Internal Fixation of Femoral Neck Fractures by Post Operative Bone SPECT/CT, Nuclear Medicine and Molecular Imaging 2017,51: pp.49-57

Table: Association between Pre-operative Complications': Group

GROUP			
Pre-operative complication's	CHS + bone graft	CHS alone	TOTAL
Nil	24	22	46
Row %	52.2	47.8	100.0
Col %	75.0	59.5	66.7
Poor diabetic control	5	7	12
Row %	41.7	58.3	100.0
Col %	15.6	18.9	17.4
Technical Difficulty	3	8	11
Row %	27.3	72.7	100.0
Col %	9.4	21.6	15.9
TOTAL	32	37	69
Row %	46.4	53.6	100.0
Col %	100.0	100.0	100.0

Chi-square value: 2.3430; p-value: 0.3099;

**Table: Distribution of mean RUSH score at 6 month (Radiological union score of hip) :
Group**

		Number	Mean	SD	Minimum	Maximum	Median	p-value
RUSH score at 6 month (Radiological union score of hip)	CHS + bone graft	45	26.5333	2.7436	11.0000	29.0000	28.0000	0.1627
	CHS alone	45	25.4667	4.2778	10.0000	28.0000	27.0000	