fortune Journals

Research Article

JOURNAL OF ORTHOPAEDICS AND SPORTS MEDICINE

ISSN: 2688-5115



Functional Outcome of Biological Graft Versus Fiber Wire in Acromioclavicular Joint Dislocation: A Comparative Study

Dr. Vipin Kumar Raghuwanshi[1], Dr. Sandeep Bhinde[2*], Dr. Shubham Nagdev[3], Dr. Abhishek Dhoke[4], Dr. Vinayak Mani Dwivedi[5]

Abstract

Introduction: Acromioclavicular (AC) joint dislocation is a common shoulder injury, particularly among athletes and individuals engaged in physical labor. The injury often requires surgical intervention to restore joint stability and function. Two popular surgical options are the use of biological grafts and synthetic materials such as Fiber Wire for AC joint reconstruction. This comparative study aims to evaluate the efficacy, safety, and functional outcomes of biological grafts versus fiber wire in the treatment of AC joint dislocations.

Materials and Methods: This study included a sample of 32 patients diagnosed with AC joint dislocation, divided into two groups: those treated with biological grafts and those treated with fiber wire. Patients were randomly assigned to each group and followed for a period of 12 months post-surgery. Clinical evaluations were performed using the Constant-Murley Score. Radiographic assessments were conducted to measure joint stability and alignment. Complications, such as infections and redislocations, were recorded.

Results: The study found that patients treated with biological grafts demonstrated slightly better joint stability and fewer complications compared to those treated with fiber wire. The Constant Murley indicated that the biological graft group achieved superior functional outcomes, with statistically significant differences ($p < 0.05$).

Conclusion: Both biological grafts and fiber wire provide viable options for AC joint dislocation repair, each with distinct advantages. Biological grafts offer better long-term stability and functional outcomes, making them preferable for patients prioritizing joint integrity and performance. Further research with larger sample sizes and longer follow-up periods is necessary to substantiate these findings and optimize treatment protocols.

Keywords: Acromioclavicular joint (AC joint); Biological graft; Fiber wire; Athletes; Constant-Murley Score; Shoulder

Introduction

The acromioclavicular (AC) joint, a vital articulation between the clavicle (collarbone) and the acromion process (scapular projection), plays a crucial role in shoulder girdle stability and function. Disruption of this joint, known as acromioclavicular joint dislocation, represents a prevalent injury within the spectrum of shoulder girdle trauma, accounting for 9% to 12% of all such occurrences [1]. The most common etiology is direct trauma to the AC joint or lateral trauma providing an axial load on the joint space. AC dislocations

Affiliation:

[1]Senior Resident, Department of Orthopaedics, Dr. Laxminarayan Panday, Govt Medical College, Ratlam, Madhya Pradesh, India

[2]Associate Professor, Department of Orthopaedics, RD. Gardi Medical College, Ujjain, Madhya Pradesh, India

[3]Senior Resident, Department of Orthopaedics, RD. Gardi Medical College, Ujjain, Madhya Pradesh, India

[4]Senior Resident, Department of Orthopaedics, Shyam Shah Medical College, Rewa, Madhya Pradesh, India

[5]Senior Resident, Department of Orthopaedics, MGM Medical College, Indore, Madhya Pradesh, India

***Corresponding Author:**

Dr. Sandeep Bhinde, Associate Professor, Department of Orthopaedics, RD Gardi Medical College, Ujjain, Surasa, Madhya Pradesh, India.

Citation: Vipin Kumar Raghuwanshi, Sandeep Bhinde, Shubham Nagdev, Abhishek Dhoke, Vinayak Mani Dwivedi. Functional Outcome of Biological Graft Versus Fiber Wire in Acromioclavicular Joint Dislocation: A Comparative Study. Journal of Orthopedics and Sports Medicine. 7 (2025): 328-336.

Received: June 24, 2025
Accepted: July 01, 2025
Published: July 08, 2025

Dr. Raghuwanshi VK, et al., J Ortho Sports Med 2025
DOI:10.26502/josm.511500211

are distinct from "shoulder dislocations," which refer to glenohumeral joint dislocations [2]. These dislocations typically arise from direct blows to the shoulder or falls onto an outstretched arm with the arm positioned inwards (adducted) [3]. AC joint dislocations are more prevalent in men than women, and they can affect individuals of any age and activity level [4]. AC joints are especially prevalent in the younger population participating in contact sports, representing 15%, 20%, and 41% of shoulder injuries in hockey, skiing, and American football, respectively [5].

The cornerstone of effective treatment hinges on accurately classifying the injury severity. The widely employed Rockwood classification system categorizes acromioclavicular dislocations into six distinct types (I-VI) based on the degree of ligamentous disruption [6]. Rockwood types I and II, characterized by minimal ligamentous damage, are managed conservatively through conservative techniques like using an ice pack, immobilization with a sling for several weeks, and physical therapy, taking anti-inflammatory over-the-counter drugs. Whereas in the Rockwood types III to VI, encompassing more severe ligamentous injuries with significant joint instability, often necessitate surgical intervention [7].

Surgical management for acromioclavicular joint dislocations encompasses a diverse array of techniques, broadly classified into four categories: Fixation with Hardware—This approach involves utilizing screws, Kirschner wires (K-wires), or a combination of both to directly secure the AC and/or coracoclavicular (CC) ligaments [8], or suture button or anchor fixation [9]. Also, in cases involving substantial ligamentous avulsion, reconstruction may be performed using autografts (tissue harvested from the patient) or allografts (donor tissue) to recreate the disrupted ligaments [10].

Evaluating the success of any treatment strategy for acromioclavicular joint dislocations necessitates using validated outcome measures. The Constant-Murley score (CMS) is a widely utilized and reliable tool for comprehensively assessing patient function and recovery following this injury. This study employed the CMS score as the primary outcome measure to assess patient function and recovery following each surgical approach. It evaluates four domains: pain, activities of daily living, range of motion, and strength.

Despite the existence of various surgical techniques, the optimal approach for managing acromioclavicular joint dislocations, particularly for Rockwood type III injuries, remains a subject of ongoing debate. While some surgeons advocate for conservative management for this type, others favor a surgical approach to achieve enhanced stability and potentially improve long-term outcomes [13].

This study aimed to contribute to the ongoing debate regarding the optimal surgical management of Rockwood type III acromioclavicular joint dislocations by comparing two prevalent surgical techniques: biological graft fixation and suture button fixation. By comparing the CMS scores between these two groups, the study sought to determine which technique yields superior patient outcomes regarding pain reduction, daily living function, range of motion, and strength. Secondary outcome measures were also evaluated, including radiographic assessment of joint stability, patient satisfaction scores, and complication rates associated with each surgical method. This study offered high-quality data to discuss the most effective surgical approach for managing Rockwood type III acromioclavicular joint dislocations.

Methods and Materials

The proposed study was conducted after approval by the research guide and institutional ethics committee and is anticipated to be completed within one year. The study was conducted at the Department of Orthopaedics at R D Gardi Medical College, Ujjain.

Selection Criteria:

a. Inclusion Criteria

- Adult patients with Rockwood types III, IV, V, and VI of acromioclavicular joint dislocation.
- Age >18 years and <65 years.
- Patients who have given consent
- Acromioclavicular joint dislocation duration: <3 months.

b. Exclusion Criteria

- Patients with Rockwood type I or II acromioclavicular joint dislocation
- Age <18 years and >65 years.
- Patients with comorbidities.
- Patient who refuses surgical treatment.
- Acromioclavicular joint dislocation duration >3 months.

Methodology:

The study was conducted at R D Gardi Medical College, Ujjain, upon approval by the ethical committee within the Department of Orthopaedics on patients with complaints of pain in the shoulder region by using a self-administered knowledge questionnaire after obtaining permission from concerned authorities in the department to conduct the main study.

Sample size calculation

All statistical analyses were conducted using suitable statistical software. Quantitative data was analyzed using

Citation: Vipin Kumar Raghuwanshi, Sandeep Bhinde, Shubham Nagdev, Abhishek Dhoke, Vinayak Mani Dwivedi. Functional Outcome of Biological Graft Versus Fiber Wire in Acromioclavicular Joint Dislocation: A Comparative Study. Journal of Orthopedics and Sports Medicine. 7 (2025): 328-336.

frequency distribution, measures of central tendency and dispersion, and graphical representation. Qualitative data was analyzed using frequency distribution, percentage calculations, and diagrammatic representations. A comparison of quantitative variables was done using both parametric and non-parametric tests.

Surgical technique

Surgery was performed under general anesthesia.

Position: Beech Chair Position (Figure 1-6)

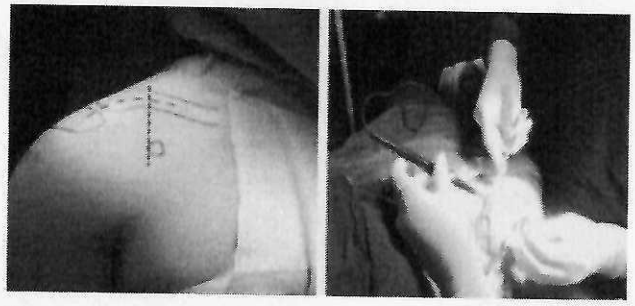


Figure 1: A vertical incision measuring 5 centimeters made from the tip of Coracoid process to lateral end of clavicle.

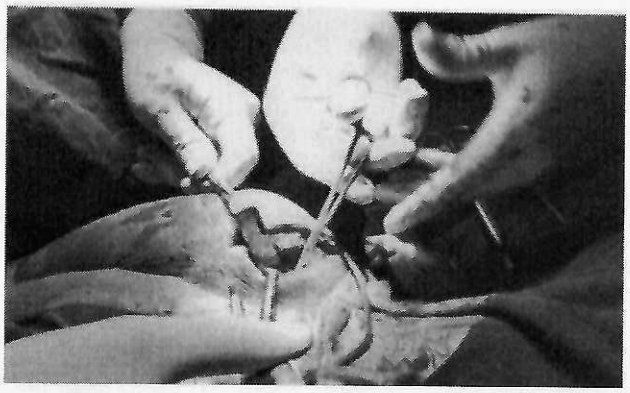


Figure 2: Skin and subcutaneous tissue incised and retracted.



Figure 3: Exposure of the clavicle achieved by detaching the trapezius and deltoid muscles from their attachments.

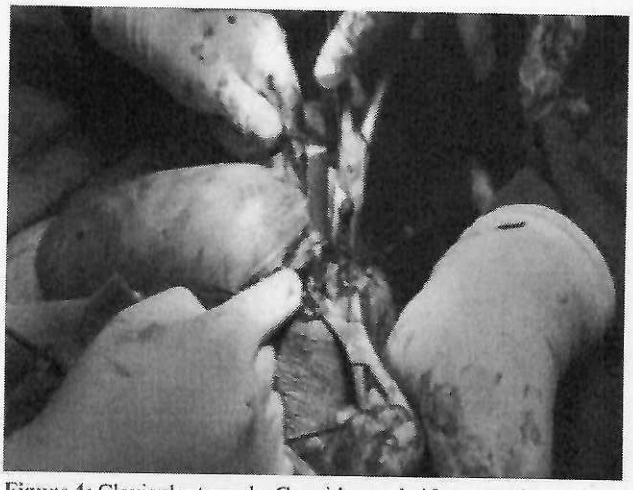


Figure 4: Clavicular tunnels: Conoid tunnel: 45mm medial to lateral end of clavicle (posteromedial). Trapezoid tunnel: 30 mm medial to lateral end of clavicle (anteriolateral). 1cm of lateral end clavicle osteotomy done.

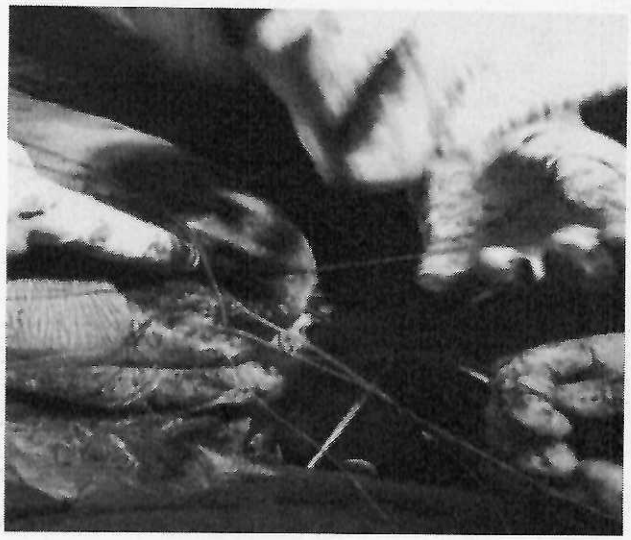


Figure 5: A longitudinal split is made to access the coracoid process. Subsequently, a fibre wire is passed around the coracoid process and shuttled through pre-drilled tunnels in the clavicle.

Wound closure and cleaning and dressing done.

Surgical procedure is same in reconstruction with biological graft. In it tendon graft is used in place of fiber wire to reconstruct acromioclavicular joint.

Steps for graft harvest and preparation:

1. Graft Harvest – A small incision is made near hamstring insertion (Figure 7,8).

Tendon is taken with the help of tendon stripper.

A case of biological reconstruction (Figure 9-13):

A case of fiber wire reconstruction (Figure 14-18):

Dr. Raghuwanshi VK, et al., J Ortho Sports Med 2025
DOI:10.26502/josm.511500211

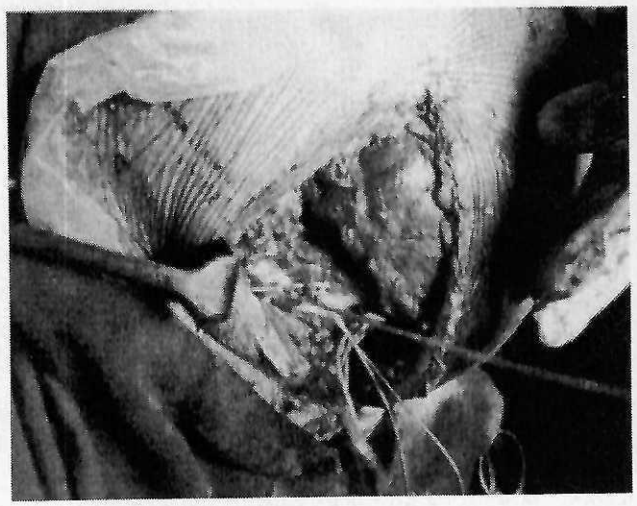


Figure 6: Reduction tried and secured with endobutton.



Figure 7: Tendon is taken with the help of tendon stripper.

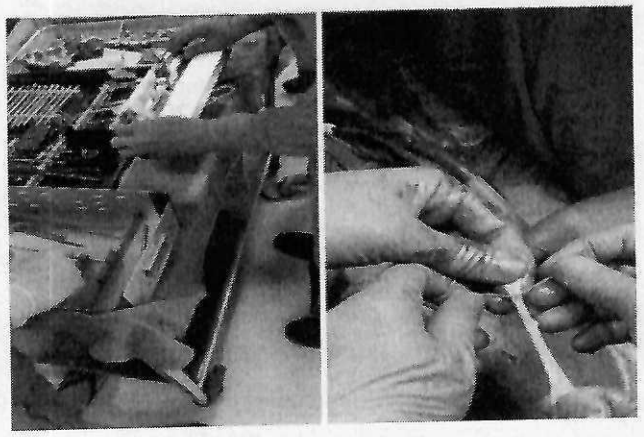


Figure 8: Graft preparation.

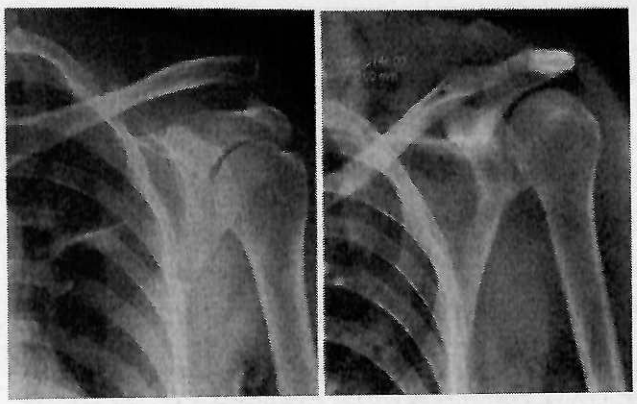


Figure 9: Pre op X-ray Post op X-ray.

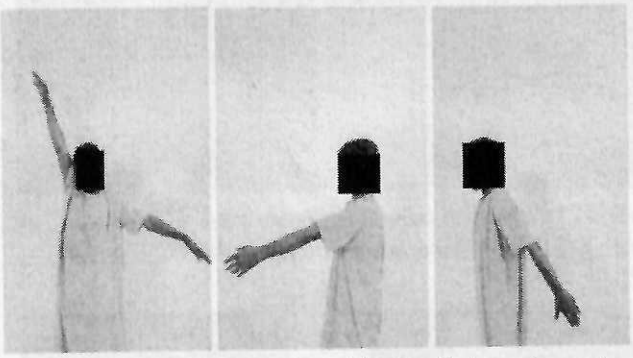


Figure 10: Pre-op range of motion: Abduction, flexion and extension respectively.

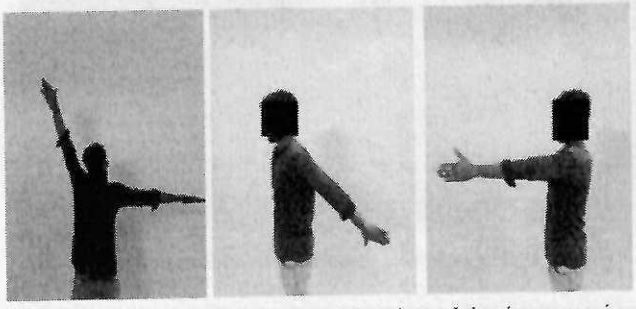


Figure 11: Post-op range of motion (6 weeks): Abduction, extension and flexion respectively.



Figure 12: Post-op range of motion (6 months): Extension, flexion and abduction respectively.

Citation: Vipin Kumar Raghuwanshi, Sandeep Bhinde, Shubham Nagdev, Abhishek Dhoke, Vinayak Mani Dwivedi. Functional Outcome of Biological Graft Versus Fiber Wire in Acromioclavicular Joint Dislocation: A Comparative Study. Journal of Orthopedics and Sports Medicine. 7 (2025): 328-336.

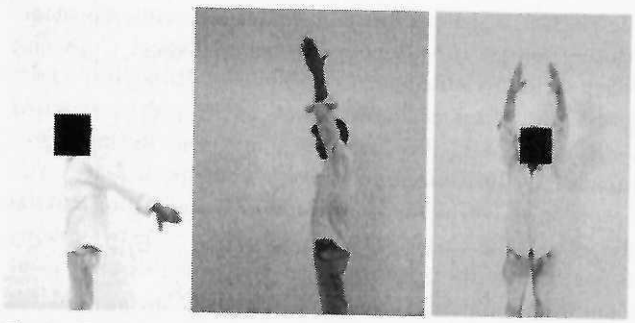


Figure 13: Post-op range of motion (12 months): Extension, flexion and abduction respectively.

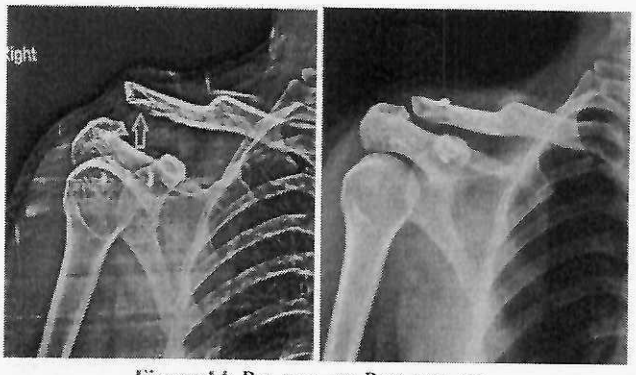


Figure 14: Pre-op x-ray Post-op x-ray.

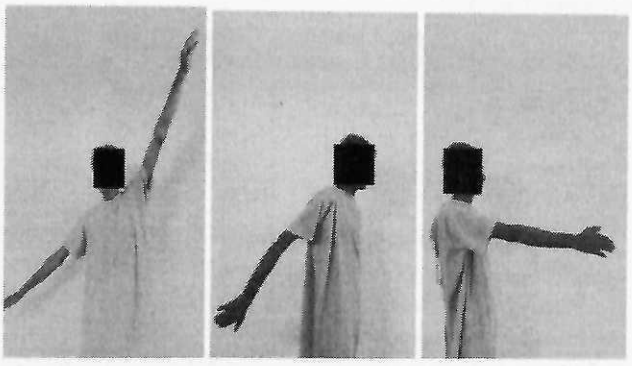


Figure 15: Pre-op range of motion: Abduction, flexion and extension respectively.

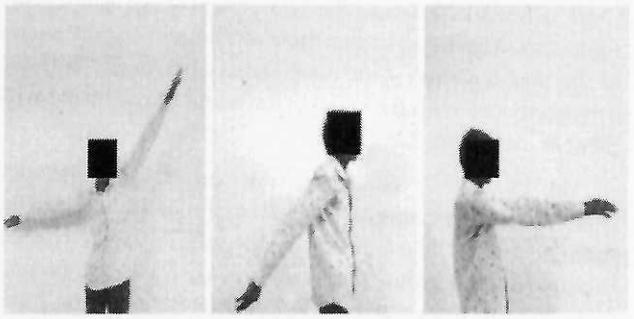


Figure 16: Post-op range of motion (6 weeks): Abduction, extension and flexion respectively.

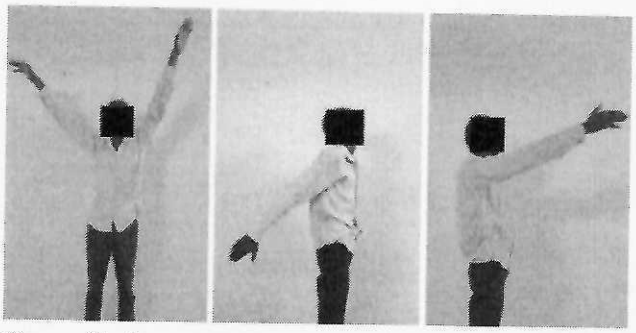


Figure 17: Post-op range of motion (6 months): Abduction, extension and flexion respectively.



Figure 18: Post-op range of motion (12 months): Abduction, extension and flexion respectively

Results

Present study, most frequently occurring age is 25 years. The standard deviation of 7.749 years reflects moderate variability in the ages within the sample. The ages range from a minimum of 21 years to a maximum of 48 years (Table 1-4; Figure 19 and 20).

Table 1: Age distribution of the cases.

Age group	N	%
<=30 years	15	46.9%
31 - 40 years	10	31.3%
>41 years	7	21.9%
Total	32	100.0%

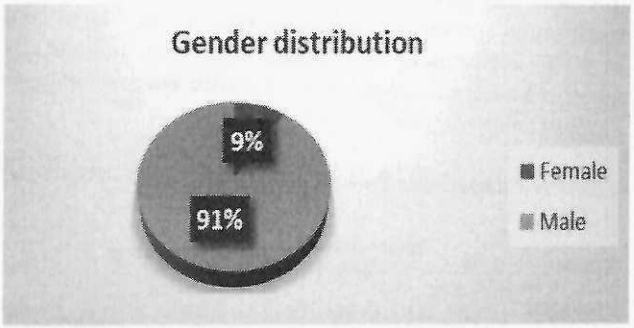


Figure 19: Gender distribution of the cases.

Citation: Vipin Kumar Raghuwanshi, Sandeep Bhinde, Shubham Nagdev, Abhishek Dhoke, Vinayak Mani Dwivedi. Functional Outcome of Biological Graft Versus Fiber Wire in Acromioclavicular Joint Dislocation: A Comparative Study. Journal of Orthopedics and Sports Medicine. 7 (2025): 328-336.

Table 2: Side affected of the cases.

Side affected	N	%
Left	12	37.5%
Right	20	62.5%
Total	32	100.0%

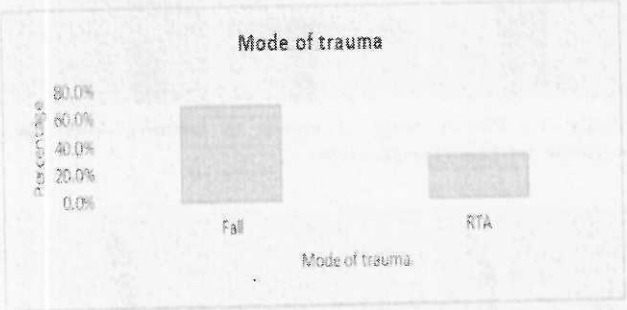


Figure 20: Mode of trauma.

Table 3: Complications.

Complications	N	%
None	29	90.6%
Subluxation	2	6.3%
superficial infection	1	3.1%
Total	32	100.0%

Table 4: Cross tabulation between complication and study group.

		Group				p
		Biological graft		Fibre wire		
Complications	None	14	87.5%	15	93.8%	0.596
	Subluxation	1	6.3%	1	6.3%	
	superficial infection	1	6.3%	0	0.0%	

The data compares the occurrence of complications between the Biological Graft and Fiber Wire treatment groups. Among those with no complications, 87.5% received Biological Graft and 93.8% received Fiber Wire. Subluxation occurred in 6.3% of cases in both groups. Superficial infection was reported in 6.3% of cases in the Biological Graft group and none in the Fibre Wire group. The p-value of 0.596 indicates no statistically significant difference in the distribution of complications between the two treatment groups (Table 5).

Table 5: Comparison of mean pre-operative CMS according to groups.

Group	N	Mean pre op CMS	Std. Deviation	t	p
Biological graft	16	35.56	5.416	-.294	.771
Fiber wire	16	36.13	5.402		

The Table 5 compares the mean pre-operative Constant-Murley Scores (CMS) between the Biological Graft and Fiber Wire treatment groups. For the Biological Graft group, the mean pre-op CMS is 35.56 with a standard deviation of 5.416. For the Fiber Wire group, the mean pre-op CMS is 36.13 with a standard deviation of 5.402. The t-value is -0.294, and the p-value is 0.771, indicating that the difference in the mean pre-op CMS between the two groups is not statistically significant. This suggests that there is no significant difference in the pre-operative functional status of patients between the Biological Graft and Fiber Wire groups (Table 6, Figure 21).

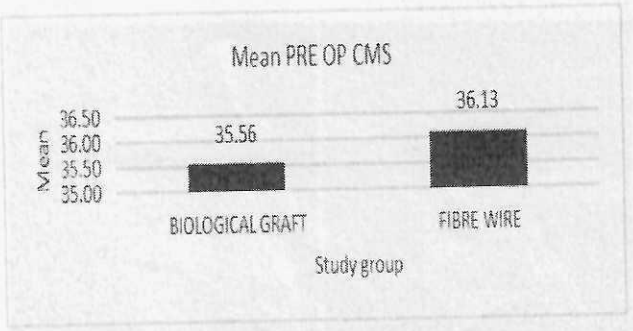


Figure 21: Mean PRE OP CMS.

Table 6: Comparison of mean post-operative CMS at 6 weeks according to groups.

Group	N	Mean post op CMS 6 weeks	Std. Deviation	t	p
Biological graft	16	63.00	4.412	.523	.605
Fiber wire	16	62.25	3.661		

The Table 6 compares the mean post-operative Constant-Murley Scores (CMS) at 6 weeks between the Biological Graft and Fiber Wire treatment groups. For the Biological Graft group, the mean post-op CMS at 6 weeks is 63.00 with a standard deviation of 4.412. For the Fiber Wire group, the mean post-op CMS at 6 weeks is 62.25 with a standard deviation of 3.661. The t-value is 0.523, and the p-value is 0.605, indicating that the difference in the mean post-op CMS at 6 weeks between the two groups is not statistically significant. This suggests that there is no significant difference in the post-operative functional status at 6 weeks between patients treated with Biological Grafts and those treated with Fiber Wire (Figure 22).

The Table 7 compares the mean post-operative **Constant-Murley Scores** (CMS)[14] at 6 months between the Biological Graft and Fibre Wire treatment groups. For the Biological Graft group, the mean post-op CMS at 6 months is 91.06 with a standard deviation of 6.787. For the Fibre Wire group, the mean post-op CMS at 6 months is 85.94

fortune Journals
Dr. Raghuwanshi VK, et al., J Ortho Sports Med 2025
DOI:10.26502/josm.511500211
Volume 7 • Issue 3 | 334

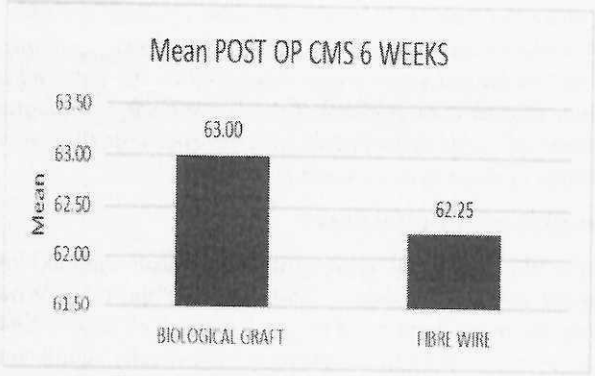


Figure 22: Mean Post OP CMS 6 weeks.

Table 7: Comparison of mean post-operative CMS 6 month according to groups.

Group	N	Mean post op CMS 6 months	Std. Deviation	t	p
Biological graft	16	91.06	6.787	2.107	.044
Fibre wire	16	85.94	6.971		

with a standard deviation of 6.971. The t-value is 2.107, and the p-value is 0.044, indicating that the difference in the mean post-op CMS at 6 months between the two groups is statistically significant. This suggests that patients treated with Biological Grafts have a significantly better functional status at 6 months post-operation compared to those treated with Fiber Wire (Figure 23).

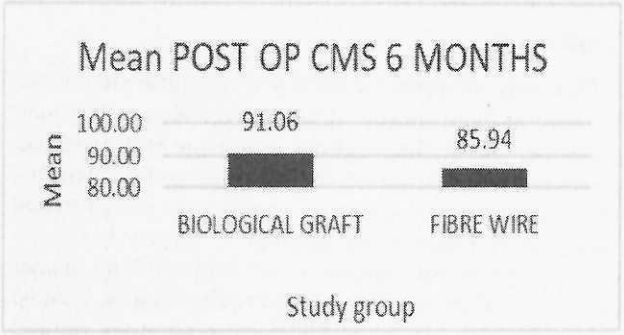


Figure 23: Mean Post OP CMS 6 months.

Table 8: Comparison of mean post-operative CMS 12 month according to groups.

Group	N	Mean POST OP CMS12 MONTHS	Std. Deviation	t	p
BIOLOGICAL GRAFT	16	95.25	2.543	3.258	.003
FIBRE WIRE	16	92.50	2.221		

The Table 8 compares the mean post-operative Constant-Murley Scores (CMS) at 12 months between the Biological Graft and Fiber Wire treatment groups. For the Biological Graft group, the mean post-op CMS at 12 months is 95.25 with a standard deviation of 2.543. For the Fiber Wire group, the mean post-op CMS at 12 months is 92.50 with a standard deviation of 2.221. The t-value is 3.258, and the p-value is 0.003, indicating that the difference in the mean post-op CMS at 12 months between the two groups is statistically significant. This suggests that patients treated with Biological Grafts have a significantly better functional status at 12 months post-operation compared to those treated with Fiber Wire.

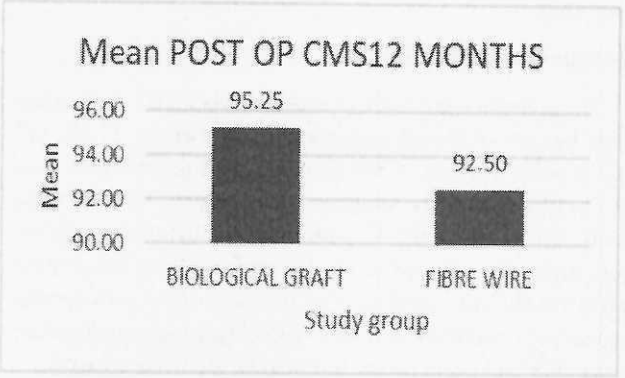


Figure 24: Mean Post OP CMS 12 months.

Discussion

Acromioclavicular (AC) dislocation involves the complete loss of articular contact. It is considered chronic when it occurs after conservative management or unsuccessful surgical treatment [11]. This study compares the use of biological graft and fiber wire in the treatment of acromioclavicular joint dislocation.

Age and Gender:

In our study, the mean age of the patients was 25 ± 7.749 years, ranging from 21 to 48 years. A significant proportion, 46.9% (15 cases), were ≤30 years old, 31.3% (10 cases) were aged 31-40 years, and 21.9% (7 cases) were ≥41 years. The sex distribution was predominantly male, constituting 90.6% (29 cases), while females accounted for 9.4% (3 cases). Similar to our study, **Jingwei et al.** evaluated the clinical outcomes of using suture anchors for acromioclavicular joint dislocation. They reported a mean participant age of 27.7 years (range: 19-55 years), with a predominance of male participants (24 males) compared to female patients (4 females) [15]. In their prospective study, **Fauci et al. [11]** reported a mean patient age of 35 ± 3.2 years, with a predominance of male patients (male-to-female ratio of 25 to 15). The analytical cross-sectional study conducted by **Mardani-Kivi et al.** reported that the participants' mean age was 32.6 ± 11.8 years, predominantly male participants

Dr. Raghuwanshi VK, et al., J Ortho Sports Med 2025
DOI:10.26502/josm.511500211

(35 males and 4 females). Our study's predominantly male cohort (90.6%) with a mean age of 25 ± 7.749 years aligns with similar findings from Jingwei et al., Fauci et al., and Mardani-Kivi et al., all of whom reported male predominance and comparable age ranges.

Among those 30 years or younger, 43.8% received biological grafts, while 50.0% received Fiber Wire. In the 31- to 40-year age group, 37.5% received biological grafts and 25.0% received Fiber Wire. For individuals over 41 years, 18.8% received biological grafts and 25.0% received fiber wire (p=0.737). Among females, 6.3% received biological grafts, while 12.5% received fiber wire. Among males, 93.8% received biological grafts, and 87.5% received fiber wire (p=0.544).

Occupation & Addiction:

The patients were 9.4% (3 cases) drivers, 28.1% (9 cases) were farmers, 6.3% (2 cases) were housewives, 37.5% (12 cases) were laborers, 6.3% (2 cases) had private jobs, and 12.5% (4 cases) were students. With respect to **addiction, in** our study, out of the 32 participants, most of the patients were primarily addicted to alcohol and smoking, accounting for 34.4% (11 cases) and 31.3% (10 cases) of the participants, respectively. Additionally, 15.6% (5 cases) had no addiction, while 18.8% (6 cases) were found to be chewing tobacco.

Side affected & Mode of trauma:

Regarding the affected side, 62.5% (20 cases) were on the right side, while 37.5% (12 cases) were on the left side. The data regarding the mode of trauma among the 32 cases shows that 68.8% (22 cases) were caused by falls, while 31.3% (10 cases) were due to road traffic accidents (RTA).

Grade of Dislocation:

The grade of dislocation data shows that Grade 4 and Grade 5 dislocations are the most common, each accounting for 34.4% of the cases. Grade 3 dislocations account for 12.5%, and Grade 6 dislocations make up 18.8% (p-value = 0.98).

Complications:

90.6% of the cases had no complications; among those with no complications, 87.5% received biological grafts and 93.8% received fiber wire. Subluxation occurred in 6.3% of cases in both groups. Superficial infection was reported in 6.3% of cases in the biological graft group and zero in the FiberWire group. p-value = 0.446 indicates no statistically significant difference in the distribution of complications between the two treatment groups.

Duration of Surgery:

For the biological graft group, the mean duration of surgery is 91.8 mins ± 19.2 mins. For the Fibre Wire group, the mean duration is 78 mins ± 4.8 mins (p-value = 0.007). Indicating the mean duration of surgery is significantly longer for the biological graft group compared to the FiberWire group. Jingwei et al. performed the suture anchor technique to treat AC joint dislocations and reported that the mean duration of surgery was 78 min ± 16.74.

Duration of Hospital Stay:

For the biological graft group, the mean duration of hospital stay is 6.38 days ± 3.50 days. For the Fiber Wire group, the mean duration of hospital stay is 5.69 days ± 2.94 days (p-value = 0.552), indicating no statistically significant difference in the mean duration of hospital stay between the two treatment groups.

Pre-& post-operative CMS scores:

Preoperatively, the biological graft group had the mean pre-op CMS as 35.56 ± 5.416, and the Fiber Wire group had the mean pre-op CMS as 36.13 ± 5.402 (p-value = 0.771 NS). Post-operatively, the mean CMS at 6 weeks for biological graft was noted as 63.00 ± 4.412. For the Fiber Wire group, the mean post-op CMS at 6 weeks was 62.25 ± 3.661 (p-value = 0.605 NS). The mean CMS at 6 months for biological graft was 91.06 ± 6.787. For the Fiber Wire group, the mean CMS at 6 months is 85.94 ± 6.971 (p-value = 0.044). The mean CMS at 12 months for biological graft was 95.25 ± 2.543. For the Fiber Wire group, the mean CMS at 12 months is 92.50 ± 2.221 (p-value = 0.003). Jingwei et al. reported the average CMS score as 96.3 ± 1.73, and out of a total of 26 patients, 8 patients showed full scores. Similarly, Mardani-Kivi et al. reported that the mean Constant score at 12 months was 91±1 in the Ethibond suture group and 92±1 in the semitendinosus autograft group (p>0.05).

Conclusion

This study compares the efficacy of biological graft versus fiber wire in the treatment of acromioclavicular (AC) joint dislocation. Our findings indicate that while both treatment options are effective across different age groups, genders, and occupations, the biological graft group demonstrated a significantly longer mean duration of surgery but better long-term functional outcomes, as evidenced by higher postoperative CMS scores at six and twelve months. Despite the longer surgical time, the biological graft group showed better results in terms of shoulder function.

Additionally, the study highlighted that most patients in both treatment groups experienced no complications, with a minimal incidence of subluxation and superficial infections. The comparison of hospital stay duration between the two groups revealed no significant difference, further supporting the overall comparability of the two treatments in terms of patient recovery. Overall, while both biological graft and fiber wire are viable options for AC joint dislocation, the

Citation: Vipin Kumar Raghuwanshi, Sandeep Bhinde, Shubham Nagdev, Abhishek Dhoke, Vinayak Mani Dwivedi. Functional Outcome of Biological Graft Versus Fiber Wire in Acromioclavicular Joint Dislocation: A Comparative Study. Journal of Orthopedics and Sports Medicine. 7 (2025): 328-336.

biological graft may offer enhanced long-term functional outcomes, making it a preferable choice.

References

1. Liu T, Bao FL, Jiang T, et al. Acromioclavicular Joint Separation: Repair Through Suture Anchors for Coracoclavicular Ligament and Nonabsorbable Suture Fixation for Acromioclavicular Joint. Orthop Surg 12 (2020): 1362-71.

2. Wong M, Kiel J. Anatomy, Shoulder and Upper Limb, Acromioclavicular Joint. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing (2025).

3. Hu F, Han S, Liu F, et al. A modified single-endobutton technique combined with a nice knot for treatment of Rockwood type III or V acromioclavicular joint dislocation. BMC Musculoskelet Disord 23 (2022): 15.

4. Constant CR, Gerber C, Emery RJH, et al. A review of the Constant score: modifications and guidelines for its use. J Shoulder Elbow Surg 17 (2008): 355-61.

5. Rios CG, Mazzocca AD. Acromioclavicular joint problems in athletes and new methods of management. Clin Sports Med 27 (2008): 763-88.

6. Wu W, Yuan X. The Graphic Derivation Process of Lagrange Multiplier Method. Open J Soc Sci 11 (2023): 527-32.

7. Bosworth BM. Acromioclavicular Dislocation: End-Results of Screw Suspension Treatment. Ann Surg 127 (1948): 98-111.

8. Neviaser JS. Acromioclavicular dislocation treated by transference of the coracoacromial ligament. AMA Arch Surg 64 (1952): 292-7.

9. Bakalim G, Wilppula E. Surgical or conservative treatment of total dislocation of the acromioclavicular joint. Acta Chir Scand 141 (1975): 43-7.

10. Katznelson A, Nerubay J, Oliver S, et al. Dynamic repair of acromioclavicular dislocation. Acta Orthop Scand 46 (1975): 199-204.

11. Fauci F, Merolla G, Paladini P, et al. Surgical treatment of chronic acromioclavicular dislocation with biologic graft vs. synthetic ligament: a prospective randomized comparative study. J Orthop Traumatol Off J Ital Soc Orthop Traumatol 14 (2013): 283-90.

12. Dalos D, Huber G, Wichern Y, et al. Acromioclavicular joint suture button repair leads to coracoclavicular tunnel widening. Knee Surg Sports Traumatol Arthrosc Off J ESSKA 31 (2023): 161-8.

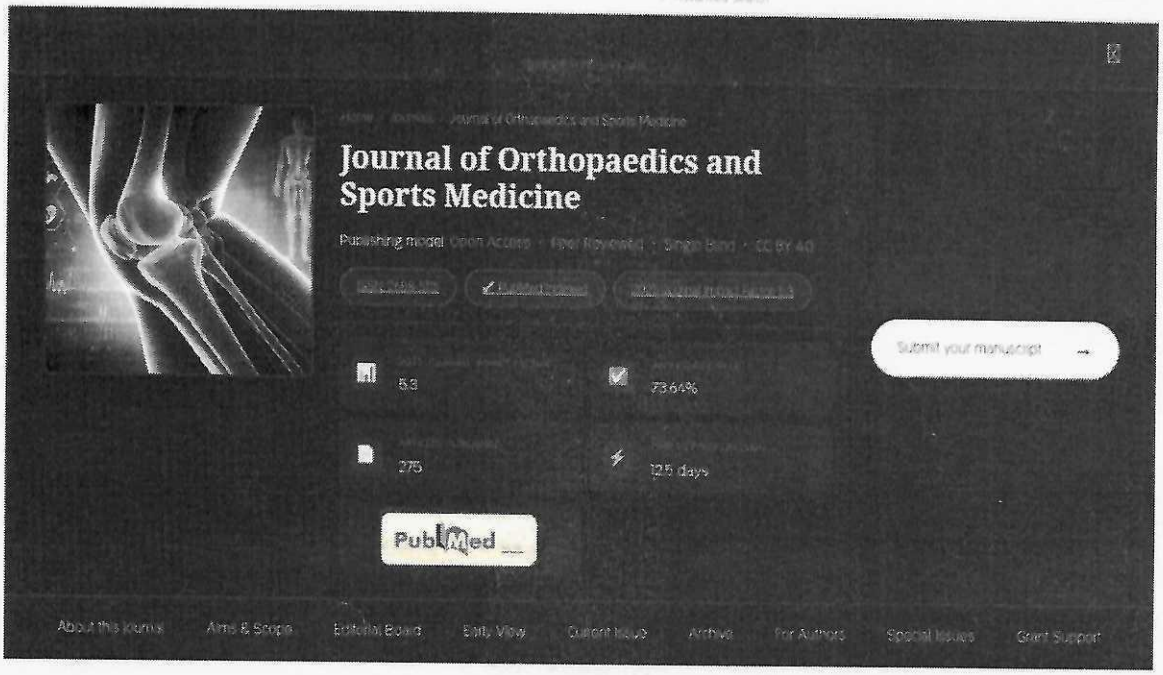
13. Meeder PJ, Wentzensen A, Weise K. Surgical repair of complete acromioclavicular separation (Tossy III) by tension wire bending and suture of the ligaments (author's transl.). Langenbecks Arch Chir 350 (1980): 169-73.

14. Constant–Murley Score: systematic review and standardized evaluation in different shoulder pathologies—PMC [Internet] (2025).

15. Zhang JW, Li M, He XF, et al. Operative treatment of acromioclavicular joint dislocation: a new technique with suture anchors. Chin J Traumatol Zhonghua Chuang Shang Za Zhi 17 (2014): 187-92.

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license 4.0

Citation: Vipin Kumar Raghuwanshi, Sandeep Bhinde, Shubham Nagdev, Abhishek Dhoke, Vinayak Mani Dwivedi. Functional Outcome of Biological Graft Versus Fiber Wire in Acromioclavicular Joint Dislocation: A Comparative Study. Journal of Orthopedics and Sports Medicine. 7 (2025): 328-336.



10.26502/josm.511500211

Functional Outcome of Biological Graft Versus Fiber Wire in Acromioclavicular Joint Dislocation: A Comparative Study

Dr. Vipin Kumar Raghuwanshi[1], Dr. Sandeep Bhinde[2*], Dr. Shubham Nagdev[3], Dr. Abhishek Dhoke[4], Dr. Vinayak Mani Dawani[5]

[1]Senior Resident, Department of Orthopaedics, Dr. Laxminarayan Pandey, Govt Medical College, Rewa, Madhya Pradesh, India

[2]Associate Professor, Department of Orthopaedics, RD Gardi Medical College, Ujjain, Madhya Pradesh, India

[3]Senior Resident, Department of Orthopaedics, RD Gardi Medical College, Ujjain, Madhya Pradesh, India

[4]Senior Resident, Department of Orthopaedics, Shyam Shah Medical College, Rewa, Madhya Pradesh, India

[5]Senior Resident, Department of Orthopaedics, MGM Medical College, Indore, Madhya Pradesh, India

*Corresponding Author: Dr. Sandeep Bhinde, Associate Professor, Department of Orthopaedics, RD Gardi Medical College, Ujjain, Surasa, Madhya Pradesh, India

Received: 24 June 2025; Accepted: 01 July 2025; Published: 08 July 2025

Citation:

Vipin Kumar Raghuwanshi, Sandeep Bhinde, Shubham Nagdev, Abhishek Dhoke, Vinayak Mani Dawani. Functional Outcome of Biological Graft Versus Fiber Wire in Acromioclavicular Joint Dislocation: A Comparative Study. Journal of Orthopedics and Sports Medicine 7 (2025): 328-334.

Abstract

Introduction: Acromioclavicular (AC) joint dislocation is a common shoulder injury, particularly among athletes and individuals engaged in physical labor. The injury often requires surgical intervention to restore joint stability and function. Two popular surgical options are the use of biological grafts and synthetic materials such as Fiber Wire for AC joint reconstruction. This comparative study aims to evaluate the efficacy, safety, and functional outcomes of biological grafts versus fiber wire in the treatment of AC joint dislocations.

Materials and Methods: This study included a sample of 32 patients diagnosed with AC joint dislocation, divided into two groups: those treated with

Open Access Policy

Journal of Orthopaedics and Sports Medicine follows an open access publishing model. Published articles are freely available online, allowing orthopaedic surgeons, sports medicine specialists, clinicians, physiotherapists, rehabilitation professionals, researchers, students, academicians, and healthcare professionals worldwide to read, share, and use scientific knowledge without subscription barriers.

Open access publication supports wider dissemination of research in orthopaedics, sports medicine, trauma care, joint surgery, spine care, arthroscopy, rehabilitation, injury prevention, regenerative medicine, biomechanics, and musculoskeletal health.

Articles are published under the Creative Commons Attribution License, supporting responsible reuse and wider dissemination of scientific knowledge according to the journal's publication policy.

Indexing, Abstracting & Discoverability

The journal is indexed and discoverable through scholarly and academic platforms, including PubMed, PMC, Google Scholar, Semantic Scholar, CrossRef, WorldCat, ResearchGate, Academic Keys, DRJI, Academia.edu, OpenAIRE, Scribd, Baidu Scholar, and other academic discovery services.

Published articles receive online visibility through DOI based citation linking, academic indexing platforms, article level metadata, and search engine discoverability. This helps readers find research related to orthopaedics, sports medicine, trauma care, fracture management, arthroplasty, arthroscopy, spine surgery, sports injuries, rehabilitation, biomechanics, and musculoskeletal disorders.

Manuscript Submission & Peer Review

> Manuscripts are submitted through the Open Journal Systems platform and handled through a transparent editorial workflow. The review process focuses on originality, scientific quality, clinical relevance, methodological clarity, ethical reporting, surgical or rehabilitation value, and contribution to orthopaedics, sports medicine, and musculoskeletal care.

- ✓ Online manuscript submission through OJS
- ✓ Initial editorial screening for scope and quality
- ✓ Plagiarism assessment
- ✓ Scientific and ethical screening
- ✓ Peer review by subject experts
- ✓ Evaluation for clinical relevance and originality
- ✓ Transparent editorial communication
- ✓ Author-friendly manuscript tracking
- ✓ Publication of accepted articles in open access format

Why Publish in Journal of Orthopaedics and Sports Medicine?

Focused orthopaedics and sports medicine scope:
Covers orthopaedic surgery, sports injuries, arthroplasty, arthroscopy, trauma, spine care, pediatric orthopaedics, regenerative medicine, rehabilitation, biomechanics, and musculoskeletal research.

PubMed and PMC visibility
The journal is discoverable through PubMed, PMC, and other academic discovery platforms, supporting wider visibility for orthopaedics and sports medicine research.

Ruxmaniben Deepchand Gardi Medical College
Unit of Ujjain Charitable Trust Hospital & Research Centre

INSTITUTIONAL ETHICS COMMITTEE- R.D.GARDI MEDICAL COLLEGE, UJJAIN
(Approved under rule 122DD Drugs and Cosmetics Rule 1945, Central Drug Standard Control Organization (CDSCO), India Registration number - ECR/1030/Inst/MP/2018/RR-21)
(Registered with Biomedical and Health research with the National Ethics Committee Registry for Biomedical and Health Research (NECRBHR), Department of Health Research, India)

Name of the Ethics Committee: IEC-RDGMC IEC Ref. No- PG/ORTHOPAEDICS/50

Title of the Research Project Proposal: **"Clinical and function outcome of philos plating in proximal humerus fracture"**

Principal Investigator: **Dr. Abhishek Dhoke**

Department: **Orthopaedics**

FOR OFFICIAL USE

The following item [√] have been received and reviewed in connection with the above study to be conducted by the above investigator.

[√] Patient Information Sheet

[√] Study Protocol / Synopsis

[x] Summary of Change Document (in case of a revision)

[√] Patient Information Consent Form

And have been [√]

[√] **Approved (subjected to acceptance of conditions laid by the IEC-RDGMC on Page no. 2)**

[×] Rejected (identify item and specify reasons below or in accompanying letter)

Comments: Applicant is advised to communicate Ethics Committee about any amendment(s), if done, in the protocol & progress of work every 3 months or earlier as per the project duration.

Date of Approval: 16/08/2022

Secretary
Institutional Ethics Committee
R D Gardi Medical College
Ujjain, Madhya Pradesh, India

Dr.Ashish Pathak

Secretary

Institutional Ethics Committee

R D Gardi Medical College, Ujjain

21

Ruxmaniben Deepchand Gardi Medical College

Unit of Ujjain Charitable Trust Hospital & Research Centre

INSTITUTIONAL ETHICS COMMITTEE-R.D.GARDI MEDICAL COLLEGE, UJJAIN

Conditions for undertaking research in the R.D. Gardi Medical College, Ujjain

1. A duly signed written valid informed consent of all the study participants will be taken by the researcher and participant information sheet will be provided to the study participants.
2. Certificate of trial registry will be submitted before data collection to the institutional ethics committee in case of any clinical trial issued by appropriate authorities.
3. All the expenses incurred in the study including screening /diagnosis/treatment /any procedure/documentation will be responsibility of the researcher and study participants will not bear any expenses.
4. In case of funded research work, ethics committee will not be responsible for settling disputes between the researcher and the funding agency.
5. Principal investigator is whole sole responsible for the research work from planning to publication. All the legal disputes will be settled by the principal investigator, their guides and head of the department of the concerned department.
6. The ethics committee approval is based on the version of the research proposal/synopsis submitted to the ethics committee. If any part of research is changed/ concealed then ethical committee's approval will not be applicable.
7. Principal investigator will regularly maintain research documentation and will produce the same if demanded by the ethics committee. Principal investigator is supposed to submit progress of the research work to the ethics committee 3 times during the total duration of the research work.
8. Approval by institutional Ethics committee (IEC) is mandatory before starting data collection. Researcher will maintain confidentiality of patient's identity and records.
9. If any incidental diagnosis or untoward effect of any procedure is identified by the researcher it will be reported within 24 hours to the IEC and appropriate care and or compensation will be provided to the study participants. The responsibility to provide care and or compensation lies jointly with the researchers and the institution.
10. Any of the research tools used in the research are not copyrighted anywhere or if copyrighted and used then written permission is taken from the appropriate agency/authority and informed to the ethics committee.
11. Yearly follow-up of this approved study will be done by ethics committee.

NO PLAGIARISM IS ACCEPTED

I Dr. Abhishek Dhoke Department of Orthopaedics accept all the conditions. Mentioned above and declare that If any plagiarism/copyright violation/violation of ethics committee's conditions is reported anytime during and or after the study, that will result in automatic cancellation of the ethical approval by the institutional ethics committee of R.D. Gardi Medical College, Ujjain.

Name of Principal Investigator Dr. Abhishek Dhoke signature Adhoke date 30/8/22

Volume 7 • Issue 3 | 406

fortune Journals

JOURNAL OF ORTHOPAEDICS AND SPORTS MEDICINE

ISSN: 2688-5115



Research Article

A Comparative Study of Functional and Clinical Outcome of Proximal Humerus Fracture Treated with PHILOS Plate

Dr. Abhishek Dhoke[1], Dr. Sandeep Bhinde[2*], Dr. Vinayak Mani Dwivedi[3], Dr. Shubham Nagdev[4], Dr. Vipin Kumar Raghuwanshi[5]

Abstract

Introduction: Proximal humerus fractures (PHFs) are the predominant form of humeral fractures, encompassing a spectrum of injuries affecting the articulating surface, greater tuberosity, lesser tuberosity, or the surgical neck of the humerus. PHFs account for approximately 10% of fractures in patients aged over 65 years. The third most prevalent type of osteoporotic fractures are PHFs, with a lifetime risk of 13% for women aged 50 years and above.

Materials and Methods: As per study criteria 40 patients with fracture of shoulder was included in this study. After admission of patients a detailed, careful history was taken to know the mechanism of injury. Patient was assessed clinically to evaluate general condition; vitals were recorded and examination of fracture site was done. Radiological assessment was done and fracture was classified and preoperative routine haematological investigation was done.

Result: According to NEER's classification of fractures, 14 (34.41%) cases had two-part fractures, 19 (46.3%) cases had three-part fractures and 8 (19.5%) cases had four-part fractures. Excellent results (score > 89) were noticed in 27 (65.85%) of the instances, good results (scoring 80-89) in 10 (24.39%) and fair results (score 7079) in 4 (9.75%)

Discussion and Conclusion: After a mean follow up of 12 months, the mean Constant score was 88.90 ± 7.31 we recommend the use of the PHILOS plate as a surgical alternative in the management of displaced proximal humeral fractures.

Keywords: Proximal humerus fracture; PHILOS plating; Osteoporotic fractures; Arthroplasty; Osteonecrosis

Introduction

Proximal humerus fractures (PHFs) are the predominant form of humeral fractures, encompassing a spectrum of injuries affecting the articulating surface, greater tuberosity, lesser tuberosity, or the surgical neck of the humerus [1]. PHFs account for approximately 10% of fractures in patients aged over 65 years [2,3]. The third most prevalent type of osteoporotic fractures are PHFs, with a lifetime risk of 13% for women aged 50 years and above [4,5]. Many treatment methods are available for these types of fractures such as locking plates, arthroplasty, cabling, and nailing [6]. Elderly patients with osteoporotic bone mostly benefit from arthroplasty, whereas younger patients are mainly treated through closed reduction and internal fixation with intramedullary nailing or open reduction and plate osteosynthesis to achieve

Affiliation:

[1]Senior Resident, Department of Orthopaedics, Shyam Shah Medical College, Rewa, Madhya Pradesh, India

[2]Associate Professor, Department of Orthopaedics, RD Gardi Medical College, Ujjain, Madhya Pradesh, India

[3]Senior Resident, Department of Orthopaedics, MGM Medical College, Indore, Madhya Pradesh, India

[4]Senior Resident, Department of Orthopaedics, RD Gardi Medical College, Ujjain, Madhya Pradesh, India

[5]Senior Resident, Department of Orthopaedics, Dr. Laxminarayan Panday, Govt Medical College, Ratlam, Madhya Pradesh, India

***Corresponding Author:**

Dr. Sandeep Bhinde, Associate Professor, Department of orthopaedics, R.D Gardi Medical College M.P. India.

Citation: Abhishek Dhoke, Sandeep Bhinde, Vinayak mani Dwivedi, Shubham Nagdev, Vipin Raghuvanshi, Vivek Singh. A Comparative Study of Functional and Clinical Outcome of Proximal Humerus Fracture Treated with PHILOS Plate. Journal of Orthopedics and Sports Medicine. 7 (2025): 406-411.

Received: June 26, 2025
Accepted: July 24, 2025
Published: August 11, 2025

satisfactory function [7-11]. However, these modalities are associated with various complications such as implant failure, non or malunion, and osteonecrosis of the humeral head [6]. The PHILOS implant, with its anatomically analogous design, is the preferred choice for treating PHFs, as it facilitates angled stabilization and enhances the pull-out strength of osteoporotic bone, thereby improving its ability to withstand physiological loads [12]. This prospective study evaluated the effectiveness of the PHILOS plate in the surgical fixation of two, three- and four-part proximal humeral fractures.

Material and Method

Place and time of study: The study was conducted at the Department of Orthopaedics at R.D. Gardi Medical College, Ujjain. This study was completed within two years after receiving approval from the ethics committee.

Type of study: This is a prospective observational study.
Ethics: Approval from the institutional ethics committee was taken before start of the study. Written informed consent was obtained from all patients before enrolling them for the study.
Selection of patients

The patients admitted in the department of orthopaedics with displaced fracture of the proximal humerus were enrolled for this study as per the following exclusion and inclusion criteria.

Inclusion criteria

1. Displaced proximal humerus fracture by
2. Neer's classification.
3. Patients older than 18 years of age with proximal humerus fracture.
4. Patients willing for surgery.

Exclusion criteria

1. Non-displaced proximal humerus fracture.
2. Severely comminuted, open fractures and valgus impacted fractures.
3. A previous fracture to the proximal humerus, or patients presenting more than three weeks after the injury.
4. Pathological fracture from primary or metastatic tumours and skeletally immature patients.

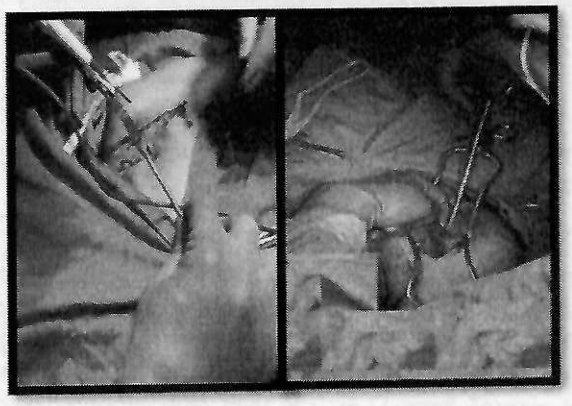
Method

As per study criteria, 40 patients with fracture of shoulder was included in this study. After admission of patients a detailed, careful history was taken to know the mechanism of injury. Patient was assessed clinically to evaluate general condition, vitals were recorded and examination of fracture site was done. Radiological assessment was done and fracture was classified and preoperative routine haematological investigation was done.

Surgical procedure

Deltopectoral approach used in all cases. Patient was placed in a supine position employing a deltopectoral approach. Locate the deltopectoral groove. "Initiate the incision just medial to the coracoid at the clavicle and extend it distally along the deltopectoral groove to the deltoid insertion, spanning approximately 15 cm. Develop skin flaps to expose the deep fascia. Use blunt scissors to open the fascia over the deltopectoral groove, ensuring to locate the cephalic vein. Bluntly develop the avascular interval between the deltoid and pectoralis major muscles. The vein can be ligated or retracted with the deltoid. For broader exposure, transecting the muscle origins from the coracoid can be considered. The osseous attachments of the rotator cuff are frequently displaced and require identification and retraction using sharp hook retractors. In cases of fracture-dislocation, reduction of the humeral head is achieved through closed manipulation without opening the joint capsule. K-wires were utilized for preliminary reduction, which was confirmed in both orthogonal views. The PHILOS plate was positioned 5-8 mm posterior to the bicipital groove and 2-4 mm distal to the greater tuberosity. Using the woodpecker technique, the plate was first fastened to the distal fragment, and screws were inserted into the head. An immediate check x-ray was obtained to evaluate the alignment of the bones and confirm that the reduction was ideal. Wound closure with drain beneath the deltoid muscle. Closure of anteromedial raphe, the subcutaneous tissues, and the skin. At the end of surgical procedure sterile dressings applied. No cast or splint was applied. Immediate post-operative x rays were taken in both AP and Lateral views. The patient was followed follow-up for1 year after surgery and the constant score was used for functional assessment higher the score better was the outcome (Figure 1-9).

Intra OP Images



Incision Deltopectoral groove

Figure 1: Shoulder Anterior (Deltopectoral) Approach.

Citation: Abhishek Dhoke, Sandeep Bhinde, Vinayak mani Dwivedi, Shubham Nagdev, Vipin Raghuvanshi, Vivek Singh. A Comparative Study of Functional and Clinical Outcome of Proximal Humerus Fracture Treated with PHILOS Plate. Journal of Orthopedics and Sports Medicine. 7 (2025): 406-411.

fortune journals
Dr. Dhoke A, et al., J Ortho Sports Med 2025
DOI:10.26502/josm.511500221
Volume 7 • Issue 3 | 408

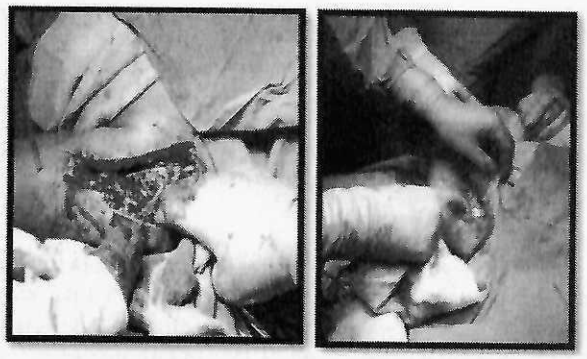


Figure 2: Philos plate fixation.

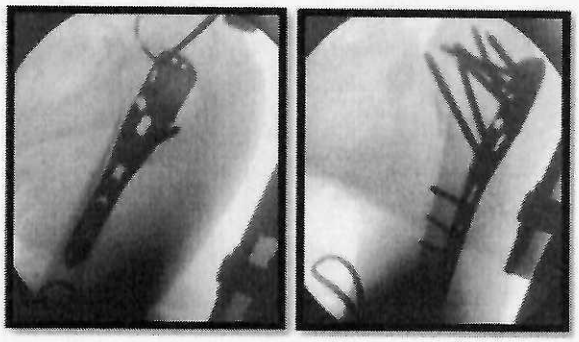


Figure 3: C- arm images.

Case 1:

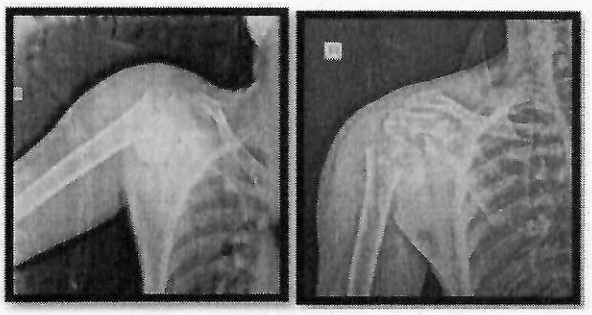


Figure 4: Pre OP x-ray.

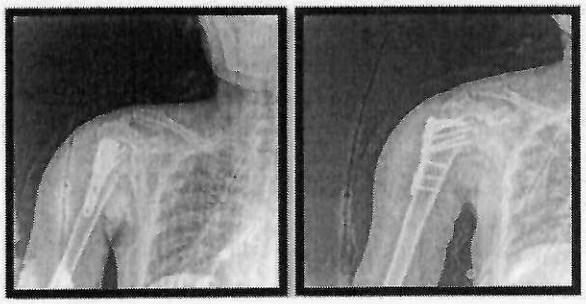


Figure 5: Post OP x-ray

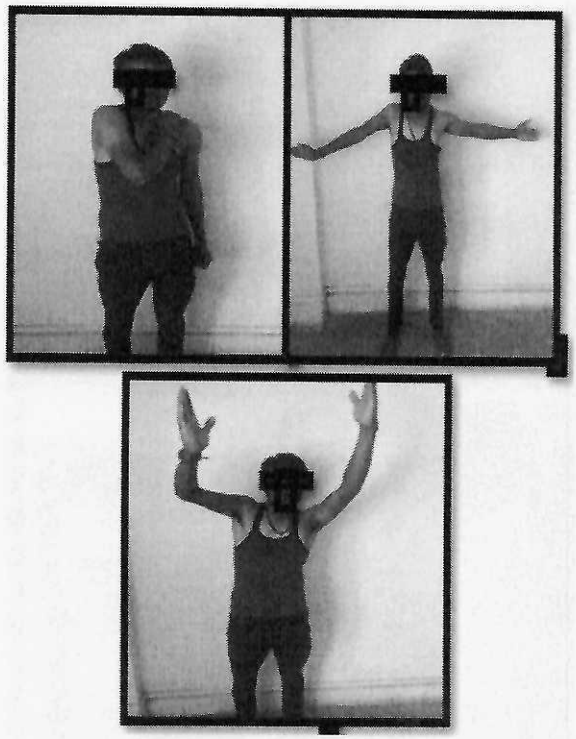


Figure 6: Follow up after 12 months.

Case 2:

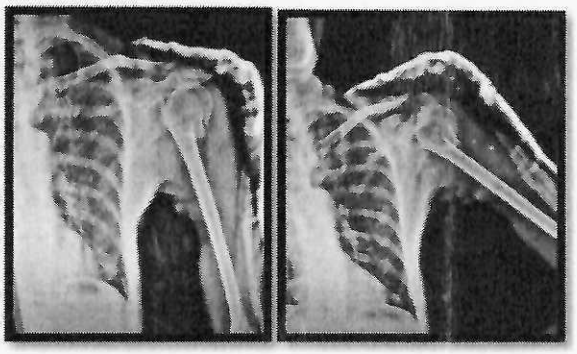


Figure 7: Pre OP x-ray

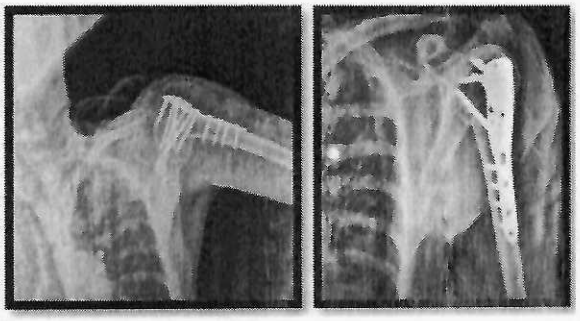


Figure 8: Post OP x-ray.

Citation: Abhishek Dhoke, Sandeep Bhinde, Vinayak mani Dwivedi, Shubham Nagdev, Vipin Raghuvanshi, Vivek Singh. A Comparative Study of Functional and Clinical Outcome of Proximal Humerus Fracture Treated with PHILOS Plate. Journal of Orthopedics and Sports Medicine. 7 (2025): 406-411.

Dr. Dhoke A, et al., J Ortho Sports Med 2025
DOI:10.26502/josm.511500221

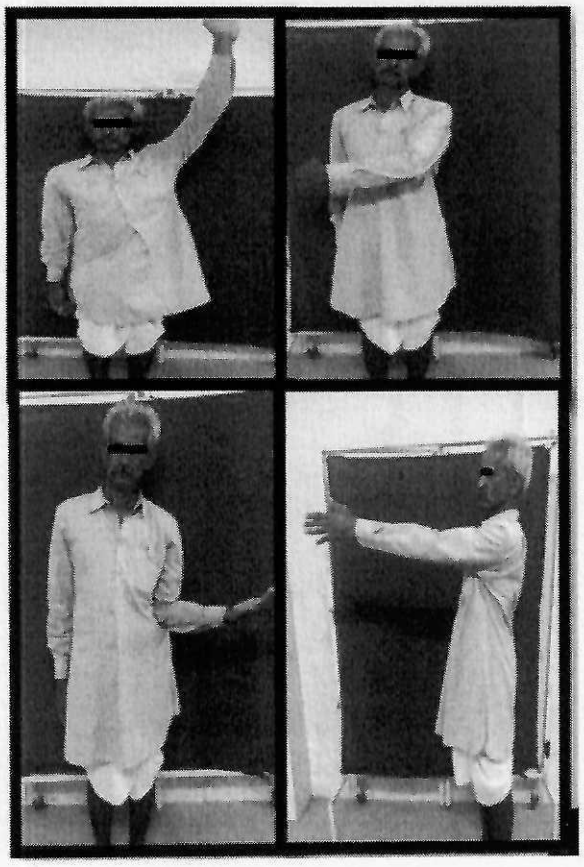


Figure 9: Follow up after 12 months.

Result

Table 1 represents the study subjects according to type of fracture, it was observed that a majority 46.3% study subjects had 3 part fracture followed by 34.1% having 2 part fracture and lastly only 19.5% had 4 part fracture.

Table 1: Distribution of study subjects according to Type of fracture.

Type of fracture	Number	Percentage
2 part	14	34.1
3 part	19	46.3
4 part	8	19.5
Total	**41**	**100.0**

Table 2 compares the overall CMS score among the study subjects at 3 months, 6 months and 12 months, it was observed that there was a significant difference in the overall CMS score at different time period. On comparing, pair wise it was observed that there was a significant increase in the CMS score from 3 months to 6 months, 3 months to 6 months as well as from 6 months to 12 months.

Table 2: Comparison of overall CMS Scores at 3, 6 and 12 months.

CMS score at	Mean	SD	Test statistic value	p-value*
months	74.66	3.94	59.663	<0.001(s)
months	84.2	5.52		
months	88.9	7.31		

Table 3 represents the study subjects according to months, outcome; it was observed that a majority 65.85% study subjects were in the excellent outcome closely followed by 24.39 % in good outcome lastly 9.75% in fair outcome.

Table 3: Distribution of study subjects according to outcome.

Outcome	Frequency	Percentage (%)
Excellent	27	65.85
Good	10	24.39
Fair	4	9.75
Total	**41**	**100.00**

Table 04 represents the study subject according to complication; it was observed that a majority 87.8% study subjects had no complications *Friedman's test however, 12.2% had some complication.

Table 4: Represents the study subjects according to complications,

Complications	No.	Percentage
Yes	5	12.2
No	36	87.8
Total	41	100.0

Discussion

In present study the mean age was 61.10 ± 8.01 at different time period. On comparing, pair wise, years. Of the total 41 cases of proximal humerus it was observed that there was a significant fractures. Out of 41 cases, 25(61.0%) were males increase in the CMS score from 3 months to 6 and 16(39.0%) were females. Patients suffering months, from 3 months to 12 months as well as from proximal humerus fractures arrived at our from 6 months to 12 months. Centres as they were part of motor vehicle injuries 27 (65.9%). this was followed by fall from height 14 (34.1%). According to NEER's classification of fractures, 14 (34.41%) cases had two-part fractures,19 (46.3%) cases had three-part fractures and 8 (19.5%) cases had four-part fractures. Excellent results (score > 89) were noticed in 27 (65.85%) of the instances, good results (scoring 80-89) in 10 (24.39%) and fair results (score 70-79) in 4 (9.75%). After a mean follow up of 12 the mean Constant score was 88.90± 7.31. In 86.8 % of cases, follow-up showed no complication, Shoulder stiffness was the most lastly 9.75% in fair outcome. frequent consequences, followed by

Citation: Abhishek Dhoke, Sandeep Bhinde, Vinayak mani Dwivedi, Shubham Nagdev, Vipin Raghuvanshi, Vivek Singh. A Comparative Study of Functional and Clinical Outcome of Proximal Humerus Fracture Treated with PHILOS Plate. Journal of Orthopedics and Sports Medicine. 7 (2025): 406-411.

fortune Journals
Dr. Dhoke A, et al., J Ortho Sports Med 2025
DOI:10.26502/josm.511500221

persistant pain, screw back out, wound dehiscence. results are comparable with those reported for the PHILOS plate. Ethiraj et al. [13] showed that mean forty patients was 46.8 (2070), with a female: male ratio of 1:2.3 [14].

In this study mean age of patients were 60.32±9.34 years. There was female predominance [13]. The majority of patients were injured as a result of a traffic collision (70%), followed by a fall from a height (17.5%) and other reasons (12.5 %) [14]. Road traffic accident 26(65%) was a most common mode of injury, followed by fall from height 10 (25%) and trivial fall 4(10%) [15]. According to NEER's classification of fractures, 14 (56.33%) cases had two-part fractures,19 (36.33%) cases had threepart fractures and 8 (19.5%) cases had four-part fractures [19]. According to NEER's classification of fractures, 46.88% (n=15) cases had two-part fractures, 37.49% (n=12) cases had three part fractures and 9.38% (n=3) cases had four-part fractures whereas 6.25% (n=2) cases. Frankhauser et al. [16] evaluated 29 proximal humeral fractures in 28 patients treated with the Locking Proximal Humerus Plate (LPHP). The mean Constant Murley score was 74.6 after 12 months [17]. In a series of 20 consecutive patients showed favourable early results with surgical treatment of proximal humeral fractures using the PHILOS plate. After a mean follow up of 16 months, the mean Constant score was 76.1. Hente et al. [18] studied 31 patients with displaced 3- and 4-part fractures of the proximal humerus treated with the PHILOS plate. After a mean follow-up of 18.5 months, the mean Constant score was 76 [14]. The constant score was excellent in 20 (50%) patients; it was good in 18(45%) patients and fair in 2(5%) patients. The mean of the constant score was 88.64± 8.42, maximum value was 100 and minimum value was 72 [19]. According to NEER's classification of fractures, 6.25% of cases in our study showed fracture dislocation, whereas 46.88% of cases had two-part fractures, 37.49% had three-part fractures, and 9.38% had four-part fractures. The mean Constant-Murley score at the end of the follow-up period in this study was 85.8 [20]. Of 28 fractures, 20 (71.4%) healed in good anatomical position. At the end of the follow up period, the mean Constant Murley score was 57.9±21.7, and the mean adjusted Constant-Murley score was 67.5±23.6. The results were excellent or good in 16 patients (57.1%), moderate in one patient (3.6%), and poor in 11 patients (39.3%) [13]. The functional outcome was excellent in 2 patients (5%), good in 22 patients (55%), fair in 7 patients (17.5%), and poor in 9 patients (22.5%). The Constant mean score achieved was 68.75±14.03. Mootha et al. [2021] regarding complications of surgery, postoperative infection was found in 2(5%) patients, stiffness of the shoulder was present in 2(5%) patients, one patient developed malunion and Osteonecrosis was present in one patient. Egol et al. [21] studied a cohort of 51 patients treated with PHILOS® plates, reporting that 24% of patients experienced postoperative complications. The most frequent complications observed were screw penetration (16%), osteonecrosis (3.9%), nonunion (3.9%), and infection (2.0%).

Conclusion

PHILOS plate offers the advantage of providing a high degree of angular and axial stability. The convergent and divergent arrangement of the locking screws engaging in the humeral head prevents pull out and failure of fixation. It facilitates early mobilization, yielding excellent radiographic and functional results that enable patients to regain good shoulder function and return to work sooner. Considering these factors, we recommend the use of the PHILOS plate as a surgical alternative in the management of displaced proximal humeral fractures.

References

1. Butler MW. Chapter 10 - Common Shoulder Diagnoses. In: Cooper C, editor. Fundamentals of Hand Therapy. Saint Louis: Mosby (2007): 150-82.
2. Baron JA, Karagas M, Barrett J, et al. Basic epidemiology of fractures of the upper and lower limb among Americans over 65 years of age. Epidemiology 7 (1996): 612-8.
3. Kim SH, Robert M, Szabo RA. Epidemiology of Humerus Fractures in the United States: Nationwide Emergency Department Sample. Arthritis Care & Research 64 (2008): 407-14.
4. Launonen AP, Vesa Lepola A, Saranko T, Flinkkilä M, Laitinen VM. Epidemiology of Proximal Humerus Fractures. Archives of Osteoporosis 10 (2015).
5. Johnell O, Kanis J. Epidemiology of Osteoporotic Fractures. Osteoporosis International: A Journal Established as Result of Cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA. Osteoporosis International: A Journal Established as Result of Cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA 16 (2005): S3-7.
6. Südkamp N, Bayer J, Hepp P, et al. Open reduction and internal fixation of proximal humeral fractures with use of the locking proximal humerus plate. J Bone Joint Surg Am 91 (2009): 1320-8.
7. Neer CSII. Displaced proximal humeral fractures: PART II. Treatment of three- Part and Four-Part Displacement. J Bone Joint Surg Am 52 (1970): 1090.
8. Hauschild O, Konrad G, Audige L, et al. Operative versus non-operative treatment for two-part surgical neck fractures of the proximal humerus. Arch Orthop Trauma Surg 133 (2013): 1385-93.

Citation: Abhishek Dhoke, Sandeep Bhinde, Vinayak mani Dwivedi, Shubham Nagdev, Vipin Raghuvanshi, Vivek Singh. A Comparative Study of Functional and Clinical Outcome of Proximal Humerus Fracture Treated with PHILOS Plate. Journal of Orthopedics and Sports Medicine. 7 (2025): 406-411.

Dr. Dhoke A, et al., J Ortho Sports Med 2025
DOI:10.26502/josm.511500221

9. Olerud P, Ahrengart L, Ponzer S, et al. Internal fixation versus nonoperative treatment of displaced 3-part proximal humeral fractures in elderly patients: a randomized controlled trial. J Shoulder Elbow Surg 20 (2011): 747-55.

10. Lanting B, MacDermid J, Drosdowech D, et al. Proximal humeral fractures: A systematic review of treatment modalities. J Shoulder Elbow Surg 17 (2008): 42-54.

11. Plath JE, Kerschbaum C, Seebauer T, et al. Locking nail versus locking plate for proximal humeral fracture fixation in an elderly population: a prospective randomised controlled trial. BMC Musculoskelet Disord [Internet] 20 (2019).

12. Gurnani S, Pisal T, Phalak MO, et al. Assessment of surgical outcome in three- and four-part proximal humerus fracture treated with proximal humerus internal locking system (PHILOS) plate versus Neer's prosthesis in elderly patients. Cureus [Internet] 14 (2022).

13. Ethiraj P, Venkataraman S, S J K, et al. Does Proximal Humerus Interlocking System (PHILOS) Plating Provide a Good Functional Outcome in Proximal Humerus Fractures?. Cureus 14 (2022): e26474.

14. Dr. Aditya Krishna Mootha, Dr. KV Ramana Kumar, Dr. B Saisaran Kumar, et al. A prospective study of outcome of fracture of proximal humerus treated with PHILOS plating. Int J Orthop Sci 7 (2021): 109-112. Clinical Orthopaedics www.orthoresearchjournal.com 2 (2018): 125-128.

15. Fankhauser F, Boldin C, Schippinger G, et al. A new locking plate for unstable fractures of the proximal humerus. Clin Orthop Relat Res 430 (2005): 176-81.

16. Koukakis A, Apostolou CD, Taneja T, et al. Fixation of proximal humerus fractures using the PHILOS plate:

17. early experience. Clin Orthop Relat Res 442 (2006): 115-20.

18. Hente R, Kampshoff J, Kinner B, et al. Treatment of dislocated 3- and 4-part fractures of the proximal humerus with an angle-stabilizing fixation plate. [Article in German] Unfallchirurg 107 (2004): 769-82.

19. Jhamnani R, Dhanda M, Surana A. Study of Functional Outcome and Postoperative Complications Among Proximal Humerus Fracture Patients Treated With Proximal Humerus Internal Locking System (PHILOS) Plating. Cureus 15 (2023): e42411.

20. Emanuel V. Geiger MD. Department of Trauma, Hand and Reconstructive Surgery, Johann Wolfgang Goethe-University Frankfurt/Main, Theodor-Stern-Kai 7, D-60590 Frankfurt/Main, Germany.

21. Egol KA, Ong CC, Walsh M, et al. Early complication of proximal humerus fractures treated with locked plates, J Orthop trauma 22 (2008): 159-64.

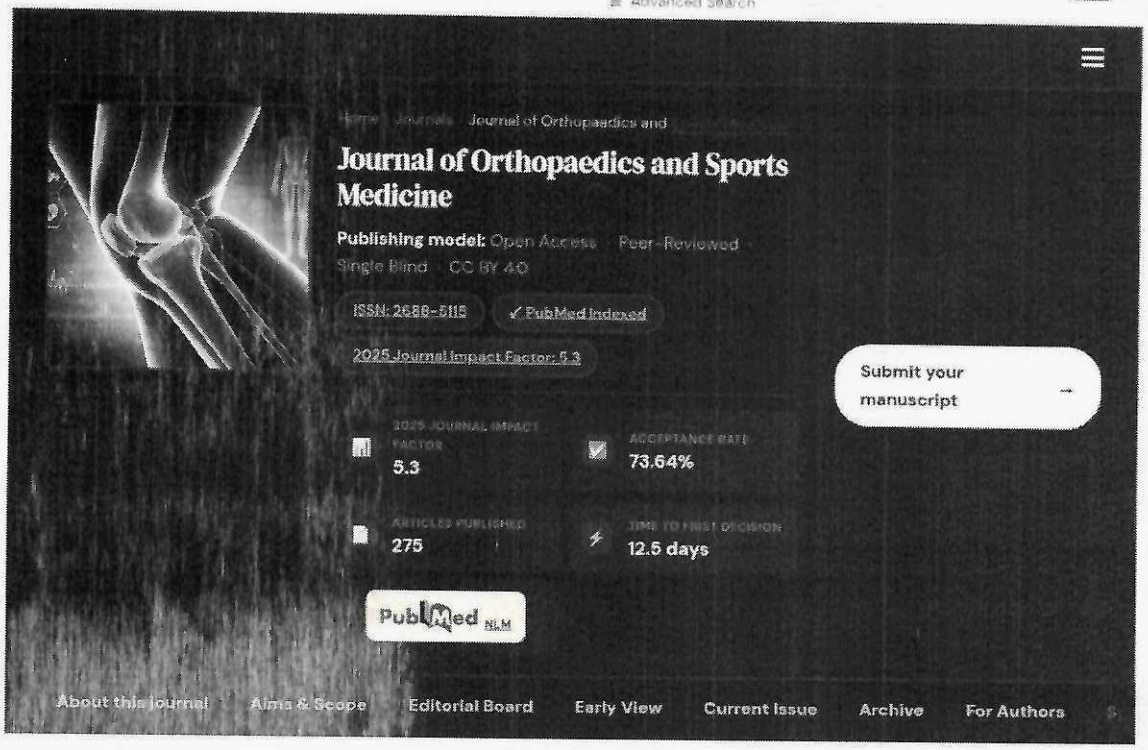
This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license 4.0

Citation: Abhishek Dhoke, Sandeep Bhinde, Vinayak mani Dwivedi, Shubham Nagdev, Vipin Raghuvanshi, Vivek Singh. A Comparative Study of Functional and Clinical Outcome of Proximal Humerus Fracture Treated with PHILOS Plate. Journal of Orthopedics and Sports Medicine. 7 (2025): 406-411.

fortune Journals

Search articles, journ

Advanced Search



Research Article · India · 548 Views

10.26502/joam.511500121

A Comparative Study of Functional and Clinical Outcome of Proximal Humerus Fracture Treated with PHILOS Plate

Authors: Dr. Abhishek Dhoke, Dr. Sandeep Bhinde, Dr. Vinayak Mani Dwivedi, Dr. Shubham Nagdev, Dr. Vipin Kumar Raghuwanshi

Published	Volume	Issue	Pages	License	Access
August 11, 2025	7	3	406-411	CC BY 4.0	Open Access

PDF · Full Text

Abstract

Introduction: Proximal humerus fractures (PHFs) are the predominant form of humeral fractures, encompassing a spectrum of injuries affecting the articulating surface, greater tuberosity, lesser tuberosity, or the surgical neck of the humerus. PHFs account for approximately 10% of fractures in patients aged over 65 years. The third most prevalent type of **osteoporotic fractures** are PHFs, with a lifetime risk of 13% for women aged 50 years and above.

Materials and Methods: As per study criteria 40 patients with fracture of shoulder was included in this study. After admission of patients a detailed, careful history was taken to know the mechanism of injury. Patient was assessed clinically to evaluate general condition, vitals were recorded and examination of fracture site was done. **Radiological assessment** was done and fracture was classified and preoperative routine haematological investigation was done.

Result: According to NEER's classification of fractures, 14 (34.41%) cases had two-part fractures, 19 (46.3%) cases had three-part fractures and 8 (19.5%) cases had four-part fractures. Excellent results (score > 89) were noticed in 27 (65.85%) of the instances, good results (scoring 80-89) in 10 (24.39%) and fair results (score 7079) in 4 (9.75%).

Discussion and Conclusion: After a mean follow up of 12 months, the mean Constant score was 88.90 ± 7.31 we recommend the use of the PHILOS plate as a surgical alternative in the management of displaced proximal humeral fractures.

Keywords

Proximal humerus fracture · PHILOS plating · Osteoporotic fractures · Arthroplasty · Osteonecrosis

Open Access Policy

Journal of Orthopaedics and Sports Medicine follows an open access publishing model. Published articles are freely available online, allowing orthopaedic surgeons, sports medicine specialists, clinicians, physiotherapists, rehabilitation professionals, researchers, students, academicians, and healthcare professionals worldwide to read, share, and use scientific knowledge without subscription barriers.

Open access publication supports wider dissemination of research in orthopaedics, sports medicine, trauma care, joint surgery, spine care, arthroscopy, rehabilitation, injury prevention, regenerative medicine, biomechanics, and musculoskeletal health.

Articles are published under the Creative Commons Attribution License, supporting responsible reuse and wider dissemination of scientific knowledge according to the journal's publication policy.

Indexing, Abstracting & Discoverability

The journal is indexed and discoverable through scholarly and academic platforms, including PubMed, PMC, Google Scholar, Semantic Scholar, CrossRef, WorldCat, ResearchGate, Academic Keys, DRJI, Academia.edu, OpenAIRE, Scribd, Baidu Scholar, and other academic discovery services.

Published articles receive online visibility through DOI-based citation linking, academic indexing platforms, article-level metadata, and search engine discoverability. This helps readers find research related to orthopaedics, sports medicine, trauma care, fracture management, arthroplasty, arthroscopy, spine surgery, sports injuries, rehabilitation, biomechanics, and musculoskeletal disorders.

Manuscript Submission & Peer Review

> Manuscripts are submitted through the Open Journal Systems platform and handled through a transparent editorial workflow. The review process focuses on originality, scientific quality, clinical relevance, methodological clarity, ethical reporting, surgical or rehabilitation value, and contribution to orthopaedics, sports medicine, and musculoskeletal care.

- ✓ Online manuscript submission through OJS
- ✓ Initial editorial screening for scope and quality
- ✓ Plagiarism assessment
- ✓ Scientific and ethical screening
- ✓ Peer review by subject experts
- ✓ Evaluation for clinical relevance and originality
- ✓ Transparent editorial communication
- ✓ Author-friendly manuscript tracking
- ✓ Publication of accepted articles in open-access format

Why Publish in Journal of Orthopaedics and Sports Medicine?

Focused orthopaedics and sports medicine scope

Covers orthopaedic surgery, sports injuries, arthroplasty, arthroscopy, trauma, spine care, pediatric orthopaedics, regenerative medicine, rehabilitation, biomechanics, and musculoskeletal research.

PubMed and PMC visibility

The journal is discoverable through PubMed, PMC, and other academic discovery platforms, supporting wider visibility for orthopaedics and sports medicine research.

Ruxmaniben Deepchand Gardi Medical College
Unit of Ujjain Charitable Trust Hospital & Research Centre

INSTITUTIONAL ETHICS COMMITTEE- R.D.GARDI MEDICAL COLLEGE, UJJAIN
(Approved under rule 122DD Drugs and Cosmetics Rule 1945, Central Drug Standard Control Organization (CDSCO), India Registration number - ECR/1030/Inst/MP/2018/RR-21)
(Registered with Biomedical and Health research with the National Ethics Committee Registry for Biomedical and Health Research (NECRBHR), Department of Health Research, India)

Name of the Ethics Committee: IEC-RDGMC IEC Ref. No- PG/ORTHOPAEDICS/51

Title of the Research Project Proposal: **"Cemented versus uncemented bipolar hemiarthroplasty for femoral neck fractures in the elderly"**

Principal Investigator: **Dr. Shubham Nagdev**

Department: **Orthopaedics**

FOR OFFICIAL USE

The following item [√] have been received and reviewed in connection with the above study to be conducted by the above investigator.

[√] Patient Information Sheet

[√] Study Protocol / Synopsis

[x] Summary of Change Document (in case of a revision)

[√] Patient Information Consent Form

And have been [√]

[√] **Approved (subjected to acceptance of conditions laid by the IEC-RDGMC on Page no. 2)**

[×] Rejected (identify item and specify reasons below or in accompanying letter)

Comments: Applicant is advised to communicate Ethics Committee about any amendment(s), if done, in the protocol & progress of work every 3 months or earlier as per the project duration.

Date of Approval: 16/08/2022

Secretary
Institutional Ethics Committee
R D Gardi Medical College
Ujjain, Madhya Pradesh, India

Dr.Ashish Pathak

Secretary

Institutional Ethics Committee

R D Gardi Medical College, Ujjain

31

Ruxmaniben Deepchand Gardi Medical College
Unit of Ujjain Charitable Trust Hospital & Research Centre

INSTITUTIONAL ETHICS COMMITTEE-R.D.GARDI MEDICAL COLLEGE, UJJAIN

Conditions for undertaking research in the R.D. Gardi Medical College, Ujjain

1. A duly signed written valid informed consent of all the study participants will be taken by the researcher and participant information sheet will be provided to the study participants.
2. Certificate of trial registry will be submitted before data collection to the institutional ethics committee in case of any clinical trial issued by appropriate authorities.
3. All the expenses incurred in the study including screening /diagnosis/treatment /any procedure/documentation will be responsibility of the researcher and study participants will not bear any expenses.
4. In case of funded research work, ethics committee will not be responsible for settling disputes between the researcher and the funding agency.
5. Principal investigator is whole sole responsible for the research work from planning to publication. All the legal disputes will be settled by the principal investigator, their guides and head of the department of the concerned department.
6. The ethics committee approval is based on the version of the research proposal/synopsis submitted to the ethics committee. If any part of research is changed/ concealed then ethical committee's approval will not be applicable.
7. Principal investigator will regularly maintain research documentation and will produce the same if demanded by the ethics committee. Principal investigator is supposed to submit progress of the research work to the ethics committee 3 times during the total duration of the research work.
8. Approval by institutional Ethics committee (IEC) is mandatory before starting data collection. Researcher will maintain confidentiality of patient's identity and records.
9. If any incidental diagnosis or untoward effect of any procedure is identified by the researcher it will be reported within 24 hours to the IEC and appropriate care and or compensation will be provided to the study participants. The responsibility to provide care and or compensation lies jointly with the researchers and the institution.
10. Any of the research tools used in the research are not copyrighted anywhere or if copyrighted and used then written permission is taken from the appropriate agency/authority and informed to the ethics committee.
11. Yearly follow-up of this approved study will be done by ethics committee.

NO PLAGIARISM IS ACCEPTED

I Dr. SHUBHAM NAGDEV Department of ORTHOPAEDICS accept all the conditions Mentioned above and declare that If any plagiarism/copyright violation/violation of ethics committee's conditions is reported anytime during and or after the study, that will result in automatic cancellation of the ethical approval by the institutional ethics committee of R.D. Gardi Medical College, Ujjain.

Name of Principal Investigator SHUBHAM NAGDEV Signature _____ date 29/6/21

(International Print/Online Journal)

SJIF IMPACT FACTOR: 6.829
PUBMED-National Library of Medicine ID-101739732

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume 8, Issue 3 , Page No: 442-451
May-June 2025

IJMSCR

Cemented Versus Uncemented Bipolar Hemiarthopasty For Femoral Neck Fractures In Elderly

Dr. Shubham Nagdev[1], Dr. Sandeep Bhinde[2], Dr. Vipin Kumar Raghuwanshi[3], Dr. Vivek Singh[4],Dr. Abhishek Dhoke[5]

[1,3,5]Senior Resident, [2]Associate Professor, [4]Professor & Head,
Department of orthopaedics,
[1,2,3,4]R.D Gardi Medical College, Ujjain, M.P., India
[5]Shyam Shah Medical college , Rewa, M.P., India

***Corresponding Author:**
Dr. Sandeep Bhinde
Associate Professor, Department of Orthopaedics
R.D Gardi Medical College, Ujjain, M.P., India

Type of Publication: Original Research Paper
Conflicts of Interest: Nil

Abstract

Introduction: Femoral neck fracture in the elderly represent a significant clinical concern, often requiring surgical intervention to enhance mobility and manage pain. Bipolar hemiarthroplasty is a prevalent surgical approach for addressing these fractures, and it can be performed with either cemented or uncemented fixation methods. This study aims to assess and compare the clinical outcomes, functional recovery, and complication rate between cemented and uncemented bipolar hemiarthroplasties in elderly patients.

Material and methods: Prospective comparative review was conducted involving 44 elderly patients who had undergone Bipolar hemiarthroplasty for femoral neck fracture. the participants were categorized into two groups viz cemented or uncemented. 22 patients treated with cemented Bipolar hemiarthroplasty, while the remaining 22 underwent uncemented Bipolar hemiarthroplasty. Key metrics such as surgical duration, blood loss during surgery, intraoperative complication, mobilization, postoperative complications, and functional recovery (measured using the Harris Hip Score), were analyzed over a 6 -month follow – up period.

Results: Both cemented and uncemented Bipolar hemiarthroplasties resulted in notable improvements in hip function and pain management. Cemented group had better results in term of hospital stay, early mobilization, and functional outcome as evaluated by Harris Hip Score. The uncemented group demonstrated advantages in terms of shorter surgical times and reduced intraoperative blood loss compared to cemented group. Rates of postoperative complication, including infections and dislocation, were similar across both groups.

Conclusion: Both cemented and uncemented Bipolar hemiarthroplasties are effective in treating femoral neck fracture in the elderly, offering substantial pain relief and functional improvement. The cemented approach showed a slight benefit in terms of operational efficiency. The selection of fixation technique should be guided by individual patients' factors, such as bone quality and surgical preferences.

Keywords:

Introduction

Femoral neck fractures are prevalent among elderly patients (aged 65 years and above). It presents significant challenges in the elderly population, including heightened mortality rates, diminished mobility, and increased healthcare expenditure. 1.2 Proximal femoral fractures in younger individuals are primarily associated with high-energy trauma, disproportionately in the elderly often resulting from

low-energy falls. In elderly patients, factors such as advanced age, female gender, lower BMI, osteoporosis, longer thigh length, and reduced average circumference are risk factors.(1) Hemiarthroplasty, with or without bone cement, is a commonly utilized surgical

approach for treating femoral neck fractures in elderly patients. Unipolar hemiarthroplasty and bipolar hemiarthroplasty are the two options for surgical management(2). In clinical practice, bipolar hemiarthroplasty is often favored over unipolar hemiarthroplasty due to its ability to improve intra-articular mobility and reduce relative movement between the prosthesis and acetabular cartilage and subchondral bone, potentially leading to increased longevity of the prosthesis. Despite the benefits of bipolar hemiarthroplasty, debate persists regarding the optimal choice between cemented and uncemented techniques for elderly patients. (3)Cemented bipolar hemiarthroplasty offers enhanced implant fixation, reduced implant-related complications, and improved functional outcomes. Uncemented bipolar hemiarthroplasty offers several advantages over its cemented counterpart. Notably, it is associated with shorter operation durations and reduced blood loss, thereby avoiding bone cement implantation syndrome (BCIS)8. The purpose of this study is to evaluate the clinical and functional outcomes of elderly patients affected by femoral neck fractures and treated with cemented and uncemented bipolar hemiarthroplasty.(4)

Materials And Method

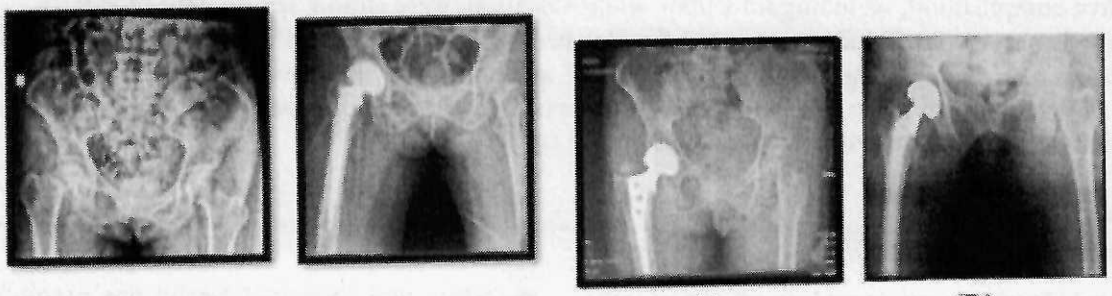
This prospective comparative study includes patients admitted to the orthopedics department at RDGMC, Ujjain, M.P., during the year July 2022-July 2024. In this study 44 cases of fractured neck femur were taken into account of those who underwent bipolar hemiarthroplasty and were divided into two groups, cemented and uncemented, based on fixation method. The aim of this study is to compare the effectiveness and safety of two surgical modalities (cemented and uncemented bipolar hemiarthroplasty) in the treatment of femoral neck fractures in elderly patients.

The primary objective of this study is to evaluate the clinical and functional outcomes between cemented and uncemented bipolar hemiarthroplasty in terms of improvement in ambulatory status of patients at variable periods, range of motion, and return to daily life activities.

Secondary objectives include identifying differences in outcomes between the two groups regarding blood loss, operative time, duration of hospital stay, dislocation rates, rate of reoperation, postoperative complications, and mortality rate. The outcome after surgery was assessed by the Harris Hip Score (HHS)(5).

Inclusion criteria were patients with fracture of the neck of the femur, elderly patients aged 65 years and above, patients with failed internal fixation, patients who were medically fit for surgery, and patients with both recent and old fractures. Exclusion criteria involve patients below 65 years of age; patients with arthritic changes involving the acetabulum; non-ambulatory patients prior to injury; patients with pre-existing joint pathologies like avascular necrosis of the femoral head, rheumatoid arthritis, and infection; and patients unwilling to undergo surgery.

A Case Of Cementer Bipolar Hemiarthoplasty



(A) (B) (C) (D)

© 2025 IJMSCR. All Rights Reserved

Results

The study included two groups, the cemented group and the uncemented group, each consisting of 22 patients, which accounted for 50% of the total population per group. In the cemented group, the mean age was 72.50 ± 6.70 years. In the uncemented group, the mean age was 73.96 ± 7.49 years. The gender distribution in the cemented group was 11 females (50%) and 11 males (50%), while in the uncemented group, there were 8 females (36.4%) and 14 males (63.6%), which was comparable.

In terms of intraoperative skin incision length, the cemented group had a mean of 11.77 ± 1.72 cm, while the uncemented group had a mean of 12.05 ± 1.56 cm.

Comparison of duration of surgery between the two groups. The mean duration of surgery in the cemented group was 1.81 ± 0.32 hours, while in the uncemented group, it was 1.23 ± 0.42 hours. The difference was found to be statistically significant (P=0.001). The mean duration of surgery was much longer in the cemented group compared to the uncemented group. The comparison of blood loss between the two groups. The mean blood loss in the cemented group was 122.73 ± 29.79 ml, while in the uncemented group, it was 86.36 ± 44.14 ml. The difference was found to be statistically significant (P=0.003). Higher blood loss was seen in the cemented group compared to the uncemented group.

The comparison of intraoperative complications between the two groups. In the cemented group, bone cement implantation syndrome was seen in 1 (4.5%) patient. In the uncemented group, fracture of the proximal femur was seen in 1 (4.5%) patient.

The mean duration of hospital stay in the cemented group was 7.36 ± 2.01 days, while in the uncemented group, it was 9.68 ± 3.82 days. The difference was found to be statistically significant (P=0.016). The mean duration of hospital stay was significantly longer in the uncemented group compared to the cemented group.

The comparison of postoperative weight bearing started between the two groups. Postoperatively, weight bearing was started in the cemented group by 1.64 ± 1.05 days, while in the uncemented group, it was started on 7.55 ± 6.01 days. The difference was found to be statistically significant (P=0.001). The weight-bearing uncemented group was started late compared to the cemented group.

The above table shows the comparison of mean Harris Hip Score between the two groups at different time points.

Time point	Group-A (Cemented)	Group-B (Uncemented)	't value Df	P value
Preoperative	11.36 ± 5.49	11.82 ± 5.74	-0.268, df=42	**0.790, NS**
At 1 month	56.59 ± 3.35	47.55 ± 5.66	6.449, df=42	**0.001***
At 3 months	79.64 ± 1.81	75.41 ± 7.97	2.425, df=42	**0.020***
At 6 months	**90.96 ± 1.81**	**86.09 ± 7.26**	**3.050, df=42**	**0.004***

© 2025 IJMSCR. All Rights Reserved

Preoperative: The mean Harris Hip score in cemented grroup was 11.36 ± 5.49 and in uncemented group, it was 11.82 ± 5.74.

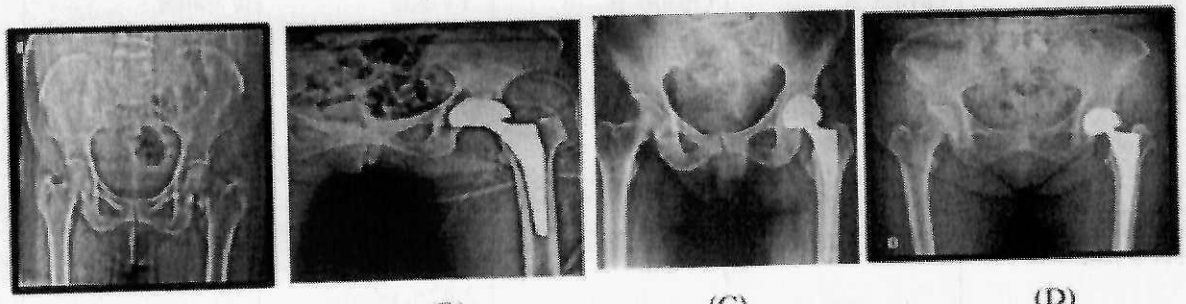
At 1 month: The mean Harris Hip score in cemented group was 56.59 ± 3.35 and in uncemented group, it was 47.55 ± 5.66. The difference was found to be statistically significant (P=0.001). The mean Harris Hip score was significantly higher in cemented group compared to uncemented group.

At 3 months: The mean Harris Hip score in cemented group was 79.64 ± 1.81 and in uncemented group, it was 75.41 ± 7.97. The difference was found to be statistically significant (P=0.020). The mean Harris Hip score was significantly higher in cemented group compared to uncemented group.

At 6 months: The mean Harris Hip score in cemented group was 90.96 ± 1.81 and in uncemented group, it was 86.09 ± 7.26. The difference was found to be statistically significant (P=0.004). The mean Harris Hip score was significantly higher in cemented group compared to uncemented group. At all the postoperative time points, the mean Harris Hip score was significantly higher in cemented group compared to uncemented group.

The postoperative complications between the two groups, **cemented group:** Foot drop was noted in 1 (4.5%) patient and superficial infection was seen in 1 (4.5%) patient **uncemented group:** Aseptic implant loosening was seen in 1 (4.5%) patient and superficial infection was seen in 1 (4.5%) patient.

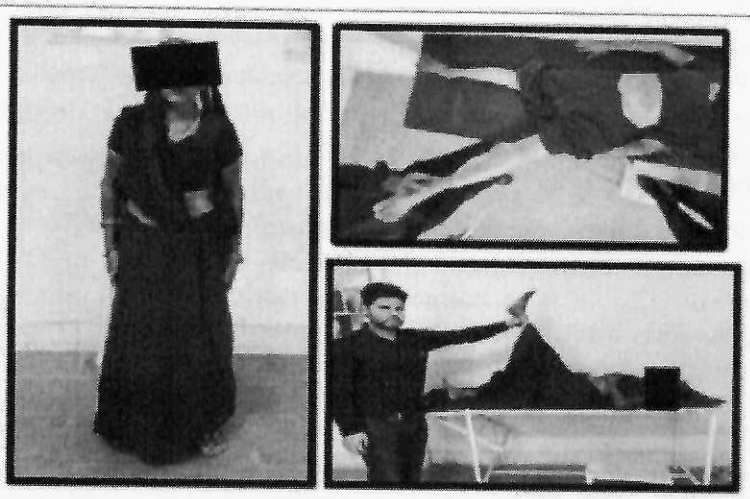
A CASE OF UNCEMENTED HEMIARTHROPALASTY



(A) (B) (C) (D)

(A)Preop x-ray PBH-AP view of left fracture neck of femur
(B) Immediate Postop x-ray PBH-AP View showing prosthesis in situ.
(C) Postop x-ray PBH-AP View 3 month,
(D) 6 months follow up sequentially.

© 2025 IJMSCR. All Rights Reserved



DISCUSSION

Our study involved 44 patients, equally divided into a cemented group and an uncemented group. In our study, the age distribution revealed that most patients fell within the 65 to 80-year age bracket, with similar mean ages observed in both groups (72.50 ± 6.70 years in the cemented group and 73.96 ± 7.49 years in the uncemented group, P=0.501). In a prospective study, Khorami et al.(6) (2016) (n=51) compared cemented versus uncemented hemiarthroplasty in patients with displaced femoral neck fractures and found insignificant differences in the ages of patients between the uncemented (mean age 71.7 years, range 65-76) and cemented groups (mean age 79 years, range 70-92) (p = 0.45). Pawar et al.(7)(2019) also reported the mean age of the patients was 75 (68-88) years in the cemented group (n=55) and 72.7 (65-78) years in the uncemented group (n=35). In a retrospective study, Choi et al. (8)(2016) reported the mean age of patients who underwent cemented hemiarthroplasty (n = 115) was 77 years, while for those who underwent uncemented hemiarthroplasty (n = 65), it was 76 years, with no significant difference between the two groups (p = 0.51). Similarly, a study conducted by Patil et al.(9) (2020) reported the mean age in the cemented group (n=60) was 69.8 ± 3.21, and the uncemented group (n=60) was 69.6 ± 3.26, and Çankaya et al.(10) (2013) reported a mean age of 78 ± 7.11 in the cemented group (n=40) and 76 ± 7.52 in the uncemented group (n=46). Our study aligns with those conducted by Khorami et al., Pawar et al., Choi et al., Patil et al., and Çankaya et al. Gender distribution in the cemented group was 11 females (50%) and 11 males (50%), while in the uncemented group, there were 8 females (36.4%) and 14 males (63.6%), which was comparable (P=0.361). Movrin et al.(11)(2020) reported 33 males and 46 females in the cemented group.

(n=79) and 31 males and 48 females in the uncemented group (n=79) (P = 0.86). Patil et al.(9) (2020) reported female preponderance: 27 males and 33 females in the cemented group (n=60) compared to 25 males and 35 females in the uncemented group (n=60) (P = 0.713). Similarly, Çankaya et al.(10) (2013) reported 10 males and 36 females in the cemented group (n=40) versus eight males and 32 females in the uncemented group (n=46) (P = 0.843). These results collectively exhibited insignificant gender distribution differences between the two groups across the studies.

In our study of the mode of injury in the cemented group, falling on the ground was reported by 14 (63.6%) patients, and road traffic accidents by 8 (36.4%) patients. In the uncemented group, falling on the ground was reported by 13 (59.1%) patients, and road traffic accidents by 9 (40.9%) patients. There was no statistically significant association between mode of injury and the groups (P=0.757). Similarly, Raj et al.(12) (2022) reported that accidental falls were the most common mechanism of injury in the cemented group (n=20), involving 65% of patients, while in the uncemented group (n=20), road traffic accidents (RTA) were the most common mechanism, involving 55% of patients, with no significant difference between the two groups. Mohabey et al.(13) (2017)

© 2025 IJMSCR. All Rights Reserved

(cemented group, n=20, and uncemented group, n=20) reported that 97.5% of femoral neck fractures were due to minimal trauma, typically from slipping and falling on flat ground or in the bathroom, while only one case resulted from a road traffic accident.

The cemented group had a mean duration of surgery of 1.81 ± 0.32 hours, and the uncemented group had a mean duration of surgery of 1.23 ± 0.42 hours, indicating that the surgery duration was longer in the cemented group compared to the uncemented group (P=0.001). In a systematic review and meta-analysis, Li et al.(14) (2020) (782 uncemented and 795 cemented) found that cemented hemiarthroplasty had a significantly longer operation time compared to uncemented hemiarthroplasty across eight randomized controlled trials involving 1587 patients (OR = −7.30, 95% CI, −13.13, −1.46; P = .01). Santini et al.(15)(2005) (n=53, cemented and n=53, cementless) reported that the duration of operation was significantly less in the cementless group compared to the cemented group (56.98 ± 55.00 minutes vs. 75.00 ± 22.43 minutes, respectively; p<0.001). Also, Figved et al.(16) (2009) (n=112, cemented and n=108, cementless) demonstrated that the duration of surgery was significantly shorter in the uncemented group compared to the cemented group (70.2 minutes vs. 82.6 minutes, respectively; mean difference 12.4 minutes, 95% CI 7.2–17.6; p < 0.001). In a prospective study, Khorami et al.9 (2016) (n=51) observed that the operative time was significantly shorter in the uncemented group compared to the cemented group (75 minutes vs. 95 minutes, respectively; p = 0.001). A meta-analysis of Lin et al.(17) (2019) showed shorter operation time in uncemented hemiarthroplasty than in cemented hemiarthroplasty (WMD = 8.22 min, 95% CI, 5.57–10.86 min; P < .00001). Our study corroborates previous findings, including those by Li et al., Santini et al., Figved et al., Khorami et al., and Lin et al., showing shorter surgery durations in cementless compared to cemented procedures.

In our study, patients in the cemented group exhibited significantly higher blood loss, with a mean of 122.73 ± 29.79 ml, compared to the uncemented group, with a mean of 86.36 ± 44.14 ml (P=0.003). A follow-up study by Wang et al.(18) (2021) [cemented group (n = 105) and uncemented group (n = 51)] revealed that the uncemented group had significantly less intraoperative blood loss, with average intraoperative blood loss reported as 299.0 ± 133.2 mL in the uncemented group compared with 370.1 ± 171.2 mL in the cemented group (p = 0.01).

In a meta-analysis, Elmenshawy et al.(2021) reported that among thirteen studies comprising 1561 bipolar hemiarthroplasties (770 cemented and 791 uncemented), uncemented hemiarthroplasty (288 ml) was associated with significantly lower blood loss compared to cemented hemiarthroplasty (362 ml) (p < 0.0001). In another meta-analysis, Fu et al.[22] (2023) (n=33,127) demonstrated that intraoperative blood loss was significantly lower in the uncemented bipolar hemiarthroplasty group compared to the cemented group, with a weighted mean difference (WMD) of 80.57 ml (95% CI: 61.14-99.99, P < 0.00001) and no evidence of heterogeneity (I^2 = 0%, P = 0.89). In conclusion, the blood loss in cemented was significantly higher compared to the uncemented bipolar hemiarthroplasty. In a systematic review, Ahn et al.(19)(2008) reported a significantly higher weighted average blood loss of 476 mL in the cemented group (n=1632) compared to 338 mL in the uncemented group (n=981) (p<0.001).

In terms of intraoperative complications, one complication was observed in both the cemented and uncemented groups. There was an insignificant association between the complications and the groups (P=0.368), indicating comparable intraoperative complications between the groups. Fu et al.(22) (2023) reported elderly patients over 60 years old with femoral neck fractures (n = 33,127) who underwent cemented bipolar hemiarthroplasty showed a lower incidence of intraoperative fractures. Also, Elmenshawy et al.(2021) reported that among thirteen studies comprising 1561 bipolar hemiarthroplasties (770 cemented and 791 uncemented), uncemented hemiarthroplasty was associated with significantly less infection (p = 0.03) and lower risk of heterotopic ossification (p = 0.007). Our study correlates with other studies and indicates no significant differences in the intraoperative complications.

In our study, the duration of hospital stay was also compared. The cemented group had a mean duration of 7.36 ± 2.01 days, while the uncemented group had a mean duration of 9.68 ± 3.82 days. There was a significant difference (P=0.016), indicating a more extended hospital stay in the uncemented group compared to the cemented group. Conversely, there

© 2025 IJMSCR. All Rights Reserved

are many studies that demonstrated no significant difference between the groups with respect to length of hospital stay. In a meta-analysis, Elmenshawy et al. (2021) reported the average hospital stay for the cemented group (n=770) was 16.27 days, and in the uncemented group (n=791), it was 16.17 days, which was an insignificant difference between the groups (p = 0.27). Figved et al.(16)(2009) observed no significant difference in hospital stay duration, with the cemented group (n=112) staying 7.8 ± 4.11 days and the uncemented group (n=108) staying

8.4 ± 9.02 days (P = 0.52). Chaurasia et al.(20) (2018) reported no significant difference in hospital stay duration between the cemented group (n=26) (12 ± 2.31 days) and the uncemented group (n=28) (13 ± 3.17 days), with a P value of 0.67. Khorami et al.(6) (2016) (n=51) found no significant difference in hospital stay duration between the cemented group (11 ± 3.46 days) and the uncemented group (10 ± 3.17 days), with a P value of 0.67. Çankaya et al.(10)(2013) reported no significant difference in hospital stay duration between the cemented group (n=40) (9.10 ± 2.34 days) and the uncemented group (n=46) (9.80 ± 2.45 days), with a P value of 0.195.

In our study of the cemented group, a 1.5 cm limb length discrepancy was seen in 2 (9.1%) patients. In the uncemented group, 1 to 2 cm limb length discrepancy was seen in 4 (18.2%) patients. There was no statistically significant association between the postoperative limb length discrepancy and the groups (P=0.380). Prashanth et al.(21) (2017) found no changes in limb lengths in both groups; however, two patients in the cemented group (n=24) and four patients in the uncemented group (n=28) exhibited shortening of 1.5 cm. Raj et al. (12)(2022) reported no statistically significant difference between the two groups regarding leg length deformity (p=0.164), with only two patients presenting with 0.5 cm and 1.0 cm leg length deformity, respectively.

In our study, postoperative weight-bearing was started in the cemented group by 1.64 ± 1.05 days, while in the uncemented group, it was started on 7.55 ± 6.01 days. The difference was found to be statistically significant (P=0.001). Similarly, Elhadi et a(22) (2019) revealed that out of 60 patients who were treated with cemented bipolar hemiarthroplasty, 93.3% of patients started partial weight-bearing on the 1st postoperative day, indicating positive early mobilization. In a prospective study, Rai et al. (12)(2017) demonstrated increased walking ability in the cemented group (n=24) as compared to the cementless group (n=24) in the early follow-up period. Similarly, Parker et al.(23) (2010) (n = 200 cemented and n = 200 uncemented) reported mobility was better regained in those treated with cemented bipolar hemiarthroplasty (p =0.005) at six months post-operation.

In our study, we have used the Harris Hip Score (HHS) to evaluate functional outcomes. With mean HHS being statistically insignificant between the groups (P=0.871). Both groups showed comparable functional results. The Harris Hip Scores were preoperatively similar between the groups: cemented group = 11.36 ± 5.49 and uncemented = 11.82 ± 5.74 (P = 0.790). However, at postoperative time points (1 month, 3 months, and 6 months), the Harris Hip score was significantly higher in the cemented group (1 month: 56.59 ± 3.35, 3 months: 79.64 ± 1.81, and 6 months: 90.96 ± 1.81) compared to the uncemented group (1 month: 47.55 ± 5.66, 3 months: 75.41 ± 7.97, and 6 months: 86.09 ± 7.26) (P=0.001, P=0.020, P=0.004, respectively). Inngul et al.(24) (2015) reported significantly better mean HHS in the cemented group (n = 67) (78 ± 14) compared to the uncemented group (n = 74) (70.7 ± 14.6) at 4 months, but at 12 months, they found no statistically significant difference between the groups. Patil et al.(9) (2020) reported

Harris Hip scores showed no significant difference between cemented (n=60) and uncemented (n=60) hemiarthroplasty at 3 and 6 months, but at 12 months, cemented hemiarthroplasty had significantly higher scores (p=0.033). Another study, Prashanth et al.(21)(2017), compared cemented (n=24) and uncemented (n=24) hemiarthroplasty in terms of HHS at 3, 6, and 12 months and reported statistically insignificant differences. In our study, we observed a statistically significant improvement of HHS at every interval in a cemented group compared to the uncemented group.

In our study, postoperative complication rates were similar across the two groups and included slight rates of foot drop, superficial infection, limb length disparity, and aseptic prosthesis loosening. The cemented group had one incidence of foot drop (sciatic nerve neuropraxia) and one case of superficial

© 2025 IJMSCR. All Rights Reserved

infection. The uncemented group experienced one instance of aseptic prosthesis loosening and one case of superficial infection. Both groups experienced 2 (9%) postoperative complications, indicating comparable postoperative complications between the groups. In contrast, Choi et al.(8)(2016) observed that the patients in the cemented group (n=115) had a significantly lower rate of complications (postoperative infection, P=0.04) compared to the cementless group patients (n=65). In a meta-analysis, Elmenshawy et al.(2021) reported patients with cemented hemiarthroplasty suffered significantly less postoperative thigh pain than those with cementless implantation ($p < 0.00001$). Azegami et al.(25) (2011) (n=1169) demonstrated supportive evidence that using cement during hemiarthroplasty can reduce residual hip pain and allow better restoration of function. Similarly, Li et al. (14) (2013) revealed that patients with cemented stems had better postoperative clinical outcomes. They had no difference in major postoperative complications compared with patients with cementless stems. Our study results align with previous studies' findings of Choi et al., Elmenshawy et al., Azegami et al., and Li et al., showing no significant association between the complications and the two groups.

Conclusion

This study compared cemented (Group A) and uncemented (Group B) bipolar hemiarthroplasty, revealing significant differences in surgical and functional outcomes. Patients in the cemented group demonstrated significantly better functional outcome, shorter hospital stays and earlier initiation of weight bearing compared to the uncemented group. While in patients in the uncemented group demonstrated significantly shorter surgery durations, and reduced intraoperative blood loss compared to the cemented group. Furthermore, patients in the cemented group achieved clinically significant improvement in the Harris Hip Scores at key postoperative intervals: 1 month (P=0.001), three months (P=0.020), and six months (P=0.004). These findings indicated superior functional recovery and better patient-reported outcomes over time compared to Uncemented group. However, demographic characteristics, comorbidities, modes of injury, and complication rates were comparable between the groups, preventing the study from bias outcomes. Thus, through this study we can conclude that the cemented bipolar hemiarthroplasty is a better modality in terms of hospital stay, early mobilization and functional outcome when compared with uncemented bipolar hemiarthroplasty. However, Uncemented group had its own advantages like shorter operative time, less blood loss and no complications related to cement.

References

1. Baghdadi S, kiyani M, kalantar SH, Shiri S, Sohrabi O, Beheshti Fard S, et al. Mortality following proximal femoral fractures in elderly patients: a large retrospective cohort study of incidence and risk factors. BMC Musculoskelet Disord [Internet]. 2023 Aug 30 [cited 2025 Jun 10];24:693. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10466793/
2. Khan AQ, Mohammad J, Qamar R, Siddiqui YS, Sabir AB, Abbas M. Cemented unipolar or modular bipolar hemiarthroplasty for femoral neck fractures in elderly patients - which is better? Int J Burns Trauma [Internet]. 2021 Dec 15 [cited 2025 Jun 10];11(6):447–55. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8784747/
3. Inngul C, Hedbeck CJ, Blomfeldt R, Lapidus G, Ponzer S, Enocson A. Unipolar hemiarthroplasty versus bipolar hemiarthroplasty in patients with displaced femoral neck fractures. A four-year follow-up of a randomised controlled trial. Int Orthop [Internet]. 2013 Dec [cited 2025 Jun 10];37(12):2457–64. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3843188/
4. Ono T, Watanabe N, Hayakawa K, Kainuma S, Yamada H, Waseda Y, et al. Comparative outcomes of cemented versus cementless stems in bipolar hemiarthroplasty for femoral neck fractures. Medicine (Baltimore) [Internet]. 2024 Oct 11 [cited 2025 Jun 10];103(41):e39946. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11479440/
5. Harris Hip Score - an overview | ScienceDirect Topics [Internet]. [cited 2025 Jun 10]. Available from: https://www.sciencedirect.com/topics/medicine-and-dentistry/harris-hip-score

© 2025 IJMSCR. All Rights Reserved

6. Khorami M, Arti H, Aghdam AA. Cemented versus uncemented hemiarthroplasty in patients with displaced femoral neck fractures. Pak J Med Sci. 2016;32(1):44–8.
7. Pawar ED, Mishra S, Rohra H, Shah NZ, Dahodwala DT. Cemented vs uncemented bipolar hemiarthroplasty in neck of femur fractures: A case series of 90 patients. Int J Orthop Sci [Internet]. 2019 [cited 2025 Jun 10];5(4):144–8. Available from: https://www.orthopaper.com/archives/2019.v5.i4.1663/cemented-vs-uncemented-bipolar-hemiarthroplasty-in-neck-of-femur-fractures-a-case-series-of-90-patients
8. Choi JY, Sung YB, Kim JH. Comparative Study of Bipolar Hemiarthroplasty for Femur Neck Fractures Treated with Cemented versus Cementless Stem. Hip Pelvis. 2016 Dec;28(4):208–16.
9. Patil T, Malve S, Dattu V, Upadhay A. Cemented or uncemented bipolar hemiarthroplasty for femoral neck fractures in aged patients. Int J Orthop Sci [Internet]. 2020 Jan 1 [cited 2025 Jun 10];6(1):1327–32. Available from: http://www.orthopaper.com/archives/?year=2020&vol=6&issue=1&ArticleId=2006
10. Cankaya D, Ozkurt B, Tabak AY. Cemented calcar replacement versus cementless hemiarthroplasty for unstable intertrochanteric femur fractures in the elderly. Ulus Travma Ve Acil Cerrahi Derg Turk J Trauma Emerg Surg TJTES. 2013 Nov;19(6):548–53.
11. Movrin I. Cemented versus uncemented hemiarthroplasty for displaced femoral neck fractures: A randomized controlled trial with two years follow-up. Acta Orthop Traumatol Turc [Internet]. 2020 Jan [cited 2025 Jun 10];54(1):83–8. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7243692/
12. Raj R, Kumar S, Pawar S. A comparative study between cemented and un-cemented hemiarthroplasty management of fracture neck of femur in elderly patients. Int J Adv Med [Internet]. 2022 Jun 27 [cited 2025 Jun 10];9(7):775–82. Available from: https://www.ijmedicine.com/index.php/ijam/article/view/3482
13. PDF [Internet]. [cited 2025 Jun 10]. Available from: https://www.orthopaper.com/archives/2017/vol3issue4/PartI/3-4-65-315.pdf
14. Li N, Zhong L, Wang C, Xu M, Li W. Cemented versus uncemented hemi-arthroplasty for femoral neck fractures in elderly patients: A systematic review and meta-analysis of randomized controlled trials. Medicine (Baltimore). 2020 Feb;99(8):e19039.
15. Santini S, Rebeccato A, Bolgan I, Turi G. Hip fractures in elderly patients treated with bipolar hemiarthroplasty: comparison between cemented and cementless implants. J Orthop Traumatol [Internet]. 2005 Jun [cited 2025 Jun 10];6(2):80–7. Available from: https://jorthoptraumatol.springeropen.com/articles/10.1007/s10195-005-0086-5
16. Figved W, Opland V, Frihagen F, Jervidalo T, Madsen JE, Nordsletten L. Cemented versus uncemented hemiarthroplasty for displaced femoral neck fractures. Clin Orthop. 2009 Sep;467(9):2426–35.
17. Lin FF, Chen YF, Chen B, Lin CH, Zheng K. Cemented versus uncemented hemiarthroplasty for displaced femoral neck fractures: A meta-analysis of randomized controlled trails. Medicine (Baltimore). 2019 Feb;98(8):e14634.
18. Wang Y, Wang Z, Tian S, Tan Z, Zhu Y, Chen W, et al. Cemented versus uncemented hemiarthroplasty for femoral neck fractures in patients with neuromuscular diseases: a minimum of 2 years' follow-up study. J Orthop Surg [Internet]. 2021 Jul 1 [cited 2025 Jun 10];16(1):418. Available from: https://doi.org/10.1186/s13018-021-02572-6
19. Ahn J, Man LX, Park S, Sodl JF, Esterhai JL. Systematic review of cemented and uncemented hemiarthroplasty outcomes for femoral neck fractures. Clin Orthop. 2008 Oct;466(10):2513–8.
20. Chaurasia T, Charan R. Cemented versus uncemented hemiarthroplasty in elderly patients with displaced femoral neck fractures. Int J Res Orthop [Internet]. 2018 Apr 25 [cited 2025 Jun 10];4(3):519–22. Available from: https://www.ijoro.org/index.php/ijoro/article/view/674

Volume 8, Issue 3, May-June 2025, Page No 442-451

© 2025 IJMSCR. All Rights Reserved

21. Prashanth Y. Comparative Study of Surgical Management of Fracture Neck of Femur with Cemented Versus Uncemented Bipolar Hemiarthroplasty. J Clin Diagn Res [Internet]. 2017 [cited 2025 Jun 10]; Available from: http://jcdr.net/article_fulltext.asp?issn=0973-709x&year=2017&volume=11&issue=2&page=RC17&issn=0973-709x&id=9454
22. Outcome of primary cemented bipolar hemiarthroplasty in older patients with unstable hip fracture: A prospective study - Journal of Musculoskeletal Surgery and Research [Internet]. [cited 2025 Jun 10]. Available from: https://journalmsr.com/outcome-of-primary-cemented-bipolar-hemiarthroplasty-in-older-patients-with-unstable-hip-fracture-a-prospective-study/
23. Parker MI, Pryor G, Gurusamy K. Cemented versus uncemented hemiarthroplasty for intracapsular hip fractures: A randomised controlled trial in 400 patients. J Bone Joint Surg Br. 2010 Jan;92(1):116–22.
24. Inngul C, Blomfeldt R, Ponzer S, Enocson A. Cemented versus uncemented arthroplasty in patients with a displaced fracture of the femoral neck: a randomised controlled trial. Bone Jt J. 2015 Nov;97-B(11):1475–80.
25. Azegami S, Gurusamy KS, Parker MJ. Cemented versus uncemented hemiarthroplasty for hip fractures: a systematic review of randomised controlled trials. Hip Int J Clin Exp Res Hip Pathol Ther. 2011;21(5):509–17.

Volume 8, Issue 3, May-June 2025; Page No 442-451
© 2025 IJMSCR. All Rights Reserved

(International Print / Online Journal)

ISSNprint: 2209-2870
ISSNonline: 2209-2862

42

IJMSCR

International Journal of
Medical Science and Current Research

Submit Manuscript Online

Home | About US | Editorial Board | Indexing | Current Issue | Archive Issue | Submit Your Paper | Upcoming Events | Download | Contact Us

Impact Factor: 5.545

IJMSCR Menu

- Call For Paper
- Publication Charge
- Indexing
- Author Guideline
- Copyright Claims
- Mode of payment

News

- Submit Your Article/Research Paper/Manuscript
- Call For Paper - Volume - 9 Issue - 4 July - August 2026

Latest Issues

- Call For Conference
- Upcoming Conference

Our Policies

- Article Correction Policy
- Advertise with Us
- Publication Ethics Policy
- Journal Paper Prints
- Privacy Policy

Indexing

INDEX COPERNICUS INTERNATIONAL

Google Scholar

ScopeMed

PubMed National Library of Medicine

Academic Resource Index ResearchBib

IARC Impact Factor

Directory of Research Journals Indexing (DRJI)

PUBLONS EVALUATING ACADEMIC RESEARCH

INNO SPACE SJIF Scientific Journal Impact Factor

GLOBAL IMPACT FACTOR

SJIF IMPACT FACTOR: 4.617

I2OR



Cosmos

EDUINDEX

EuroPub

About us | Call for paper | Online submission | Journal Indexing | Contact











Read More | Read More | Read More | Read More | Read More

S. S. Medical College, Rewa (M.P.)

No. IEC. ---13---

Date: ---19-07-16

Institutional Ethics Committee (Human Studies)

CERTIFICATE

This is to certify that the project No.10 entitled **" Comparative evaluation of propofol, Etomidate, and propofol etomidate admixture at induction characteristics during general anaesthesia ."**submitted by ***Dr. Sunita Alawa P.G. Student Anaesthesia Batch 2015*** ., under guidance of ***Dr. Awtar Singh Yadav Asso. Prof. Anaesthesia and Co-guide Dr. Subhashchandra Agrwal Assistant Prof Anaesthesia*** has been approved by the Institute Ethics Committee/Sub- Committee (Human Studies). at its meeting held on 25-02-2016, under the following terms and conditions.

This approval is valid for three years or the duration of the project whichever less is.

Member Secretary
Institutional Ethical Committee
S.S. Medical College, Rewa (M.P.)

Member Secretary

Chairman
Institutional Ethical Committee
S.S. Medical College, Rewa (M.P.)
Chairman

Institute Ethics Committee (Human studies) SSMC,Rewa

ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 9, Issue – 2, April – 2024 , Page No. : 132 – 140

A Comparative Study between Propofol and Etomidate for Induction During General Anaesthesia

[1]Dr. Sunita Alawa, Assistant Professor, Department of Anaesthesiology, R.D Gardi Medical College Ujjain (M.P.)

[2]Dr. Sandeep Bhinde, Associate Professor, Department of Orthopedics, R.D. Gardi Medical, College, Ujjain (M.P.)

Corresponding Author: Dr. Sunita Alawa, Assistant Professor, Department of Anaesthesiology, R.D Gardi Medical College Ujjain (M.P.)

Citation this Article: Dr. Sunita Alawa, Dr.Sandeep Bhinde, "A Comparative Study between Propofol and Etomidate for Induction During General Anaesthesia", IJMSIR - April - 2024, Vol – 9, Issue - 2, P. No. 132 – 140.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Propofol and Etomidate are non-barbiturate inducing agents. These drugs have different induction characteristics and recovery profiles. Propofol causes pain at the injection site, and hypotension but has clear-headed recovery whereas Etomidate is cardio-stable but can cause myoclonus.

Objective: The purpose of this study is to compare Propofol and Etomidate on induction characteristics i.e. loss of eyelash reflex, pain at the injection site, myoclonus, hemodynamic parameters and recovery profile.

Methods: 60 patients of ASA grade I and II, age group 18-55 years scheduled for the elective surgical procedure under general anaesthesia were randomly divided into two groups of 30 patients each. Patients in the group -I was induced with inj. Propofol (3mg/kg) i.v and patient of the group -II were induced with inj. Etomidate (0.3 mg/kg) i.v.

Onset time i.e. time to the disappearance of eyelash reflex, pain at the injection site and myoclonus, were noted. Continuous hemodynamic monitoring i.e. HR, SBP, DBP, MAP and recovery profile was done. All the results were tabulated and statistically analysed.

Result: Patients in the etomidate group showed little change in mean arterial pressure (MAP) and heart rate (HR) compared to propofol ($p > 0.05$) from baseline value. Pain on injection was higher in the propofol group while myoclonus activity was higher in the etomidate group.

Conclusion: This study concludes that etomidate is a better agent for induction than propofol because of hemodynamic stability and less pain on injection.

Keywords: Propofol, Etomidate, Mean arterial pressure; Heart rate; Pain; myoclonus; loss of eyelash reflex; recovery profile.

Introduction

Since the introduction of general anaesthesia, no ideal induction agent has yet been discovered in terms of providing stable haemodynamics during endotracheal intubation. All methods used for induction of anaesthesia, it is aimed to preserve the haemodynamic balance and to provide optimal conditions for the patient by reducing side effects.[1]

Traditionally anaesthesia was induced by inhalational anaesthetic agents i.e. Ether and chloroform, later some other inhalation agents were also introduced i.e. Halothane, Isoflurane and Sevoflurane. Inhalational

agents have slower onset and longer residual effects . Some cause irritation to respiratory mucosa, coughing, bronchospasm and marked haemodynamic changes.[2]

These effects can be overcome by using intravenous anaesthetic agents. The introduction of intravenous anaesthetic agents in the 1930s caused a major shift in the concept of anaesthesia by replacing the inhalation anaesthetic agents with intravenous anaesthetic agents.[3]

The Thiopentone sodium developed and researched by John Lundy and was clinically introduced in 1934 by Ralph M. Water at the University of Wisconsin Medical School (Madison, USA) was the first licensed intravenous anaesthetic induction agent used for induction of anaesthesia.[4]

Thiopentone sodium was the leading inducing agent of choice for the next 50 years. It causes bronchospasm and apnea. For these reasons, Thiopental is less commonly used nowadays.

Gradually newer intravenous anaesthetic induction agents were introduced such as Ketamine, Propofol and Etomidate.[2]

Propofol and Etomidate are non-barbiturates and are the most popular, acting and smooth intravenous-inducing agents.[5]

Propofol (2,6-diisopropyl phenol) is the most commonly used induction agent in general anaesthesia, due to its rapid onset and short duration of action. Propofol decreases blood pressure, cardiac output and systemic vascular resistance due to inhibition of sympathetic vasoconstriction and impairment of baroreceptor reflex regulatory system. Hypotension and pain on injection are the major drawbacks.[6]

Etomidate is a carboxylated imidazole-containing compound characterized by haemodynamic stability, minimal respiratory depression and cerebral protective effects. Its lack of effect on the sympathetic nervous system, baroreceptor reflex regulatory system and increase in coronary perfusion even in patients with moderate cardiac dysfunction makes it an induction agent of choice in cardiac patients.[7]

The most important side effect of Etomidate is myoclonus. Myoclonus is a serious problem in patients with open globe eye injury and nonfasting condition. One of the most important, but rare side effects of this drug is the suppression of steroid production by reversible inhibition of the 11-beta-hydroxylase enzyme.[8]

Various other studies have been done in the past to compare the different anaesthetic agents for induction of general anaesthesia. When Propofol is used alone causes pain at the injection site and hypotension. When Etomidate is used alone is haemodynamically stable but causes myoclonus. So in search of an ideal induction agent, we conducted the study to evaluate Propofol, and Etomidate for induction, haemodynamic stability and their side effects.[9]

Material and Method

The present study entitled **"A comparative study between Propofol and Etomidate for induction during general anaesthesia"** was carried out in the Department of Anaesthesiology, S.S. Medical College and associated Sanjay Gandhi and Gandhi Memorial Hospitals, Rewa (MP) from April 2016 to March 2018. After approval from the institutional ethical committee, the study was conducted on ninety patients of ASA grade I and II between 18 to 55 years of age of either sex posted for elective surgery under general anaesthesia.

Pre anaesthetic checkup of all patients was done. A thorough preoperative evaluation was done including history, general physical examination, systemic examination, airway assessment and relevant laboratory investigations of all patients.

© 2024 IJMSIR, All Rights Reserved

Inclusion criteria: All the surgical patients of ASA grade I and II between 18 to 55 years of age of either sex posted for elective surgery under general anaesthesia.

Exclusion criteria: Patients with Mallampatti grade III-IV, known hypersensitivity to in. Propofol or Etomidate, Cardiovascular dysfunction, were excluded from the study.

Patients fulfilling the selection criteria were briefly explained about the nature of the study and anaesthetic procedure. A written informed consent was obtained from all the patients and was kept nil orally for at least 6 hrs before surgery.

Ninety patients were randomly divided into three groups of thirty patients each depending on the study drug given.

Group I (n-30) were given Inj. Propofol 2.5mg/kg body weight I.V.

Group II(n-30) were given Inj. Etomidate 0.3mg/kg body weight I.V.

The study drugs were prepared in coded syringes by another resident to make the study blind and unbiased.

After shifting the patients to the operation table, NIBP, ECG and pulse oximeter were attached. Baseline parameters were recorded. An IV line was secured with an 18G IV cannula for fluids and other drug administration.

All the patients were uniformly premedicated with inj Glycopyrrolate 0.01mg/kg body weight, Inj. Midazolam 0.3mg/kg body weight, Inj. Fentanyl 2mcg/kg body weight and injection ondansetron 0.08mg/kg body weight intravenously 15 min before induction.

Pre-oxygenation was done with 100% oxygen for three minutes. The study drugs were provided in coded syringes which were prepared by another resident. Patients were induced by the study drug according to the Group.

After giving the study drug, induction time (from the start of injection to the disappearance of eyelash reflex) was recorded. Pain at the injection site and myoclonus were noted in all the patients. After the loss of eyelash reflex in. Succinylcholine 1.5 mg/kg, was given to facilitate muscle relaxation 60 seconds after injection of succinylcholine endotracheal intubation was done using an appropriate size endotracheal tube Anaesthesia was maintained with O2:N2O (30:70), Sevoflurane 2% and Inj. Atracurium intermittently.

Induction time: The induction time was noted in seconds from the start of injection to the disappearance of the eyelash reflex.

Pain at injection site: Pain at the injection site was assessed in all the patient Groups. The score was noted immediately before the patient lost consciousness.

Myoclonus: The severity of the myoclonus was recorded.

Heart rate, and non-invasive blood pressure (systolic blood pressure, diastolic blood pressure and mean arterial pressure) were recorded at 1 min before induction and 1min after induction, just after intubation and at 2 min, 5min, 10min, 15min, 20min, 30min, 45min,60min at end of surgery.

After surgery, patients were reversed with Inj. Glycopyrrolate 0.5mg and Inj. Neostigmine 2.5 mg and were extubated.

Recovery profile: To assess recovery characteristics after intubation in Propofol, Etomidate and admixture of Propofol-Etomidate Groups, we observed drowsiness, excitement, PONV and cough.

More than 20% fall in MAP below baseline was considered as hypotension and was treated by decreasing Sevoflurane and in. Mephentermine 6mg intravenously. More than a 30% rise in MAP above baseline was considered hypertension. A heart rate less than 60 bpm

© 2024 IJMSIR, All Rights Reserved

was considered bradycardia and a heart rate less than 50 bpm was treated with inj. Atropine 0.6mg intravenously. Heart rate greater than 100 bpm was considered as tachycardia.

At the end of the study, the observation was decoded, tabulated and statistically analysed by using mean, standard deviation, p-value, ANOVA test Chi-square test and student t-test. For comparison, p value less than 0.05 was taken to be statistically significant and less than 0.0001 was taken to be highly significant.

Observation

Chart 1 - Patients Characteristics

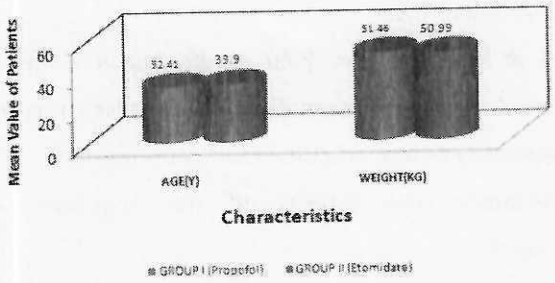


Chart 2 - Gender Distribution

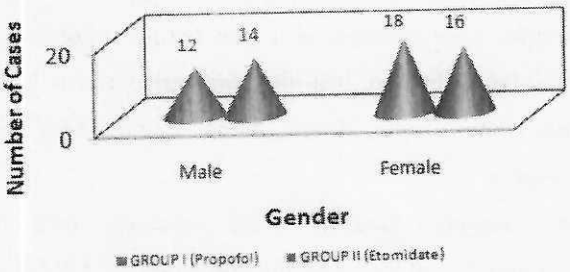


Chart 3: Comparison of induction time in different groups

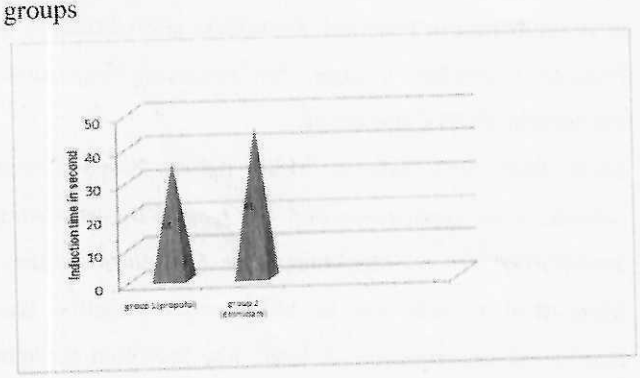


Chart 4 - Comparison Of Pain At Injection Site On Different Groups

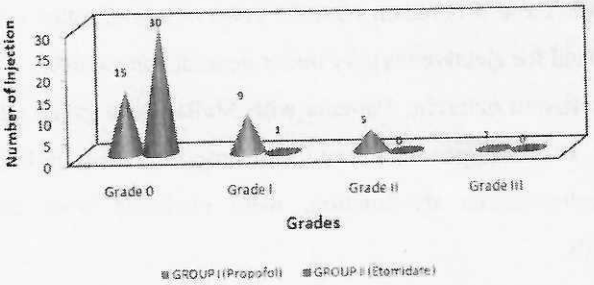


Chart 5 - Incidence of myoclonic movement in different groups

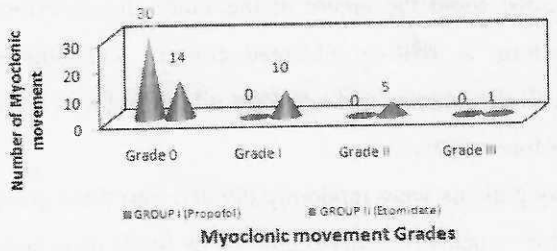


Chart 6- Comparison of Mean heart rate at different time interval

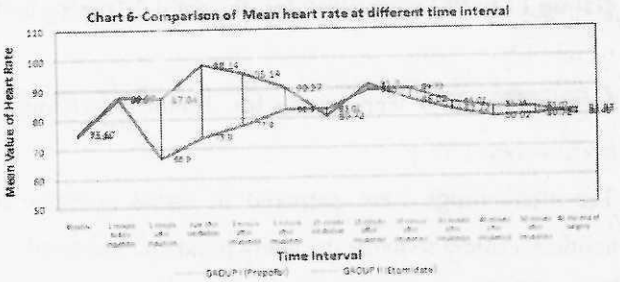


Table 1: Comparison of heart rate at different time interval

Time Interval	Group I (Propofol)	Group II (Etomidate)	p-value
Baseline	74.94 ± 5.78	75.57 ± 4.47	0.5867
1 minute before Induction	86.87 ±5.74	87.57 ± 4.47	0.6004
1 minute after induction	66.9 ± 5.76	87.04 ± 4.40	0.0001
Just after intubation	73.9 ± 5.76	98.14 ± 4.20	0.0001
2 minute after intubation	77.9 ±5.76	95.14 ± 4.20	0.0001
5 minute after intubation	82.9 ±5.78	90.27±4.21	0.0001
10 minute	83.02±9.78	80.72 ± 7.92	0.062

© 2024 IJMSIR, All Rights Reserved

intubation			
15 minute after intubation	89.3 ± 6.32	91.3 ± 3.07	0.124
20 minute after intubation	89.73 ± 9.70	86.02 ± 8.85	0.127
30 minute after intubation	85.02 ± 9.78	82.72 ± 7.92	0.062
45 minute after intubation	83.46 ± 9.78	80.02 ± 7.81	0.138
60 minute after intubation	83.02 ± 9.78	80.72 ± 7.92	0.062
End of surgery	80.46 ± 5.76	81.93 ± 5.81	0.329

Table 2: Comparison of Systolic Blood Pressure at Different Time Interval

Time Interval	Group I (Propofol)	Group II(Etomdate)	P-value
Baseline	120.3 ± 6.12	122.26 ± 4.48	0.1597
1 minute before laduction	119.63 ± 5.33	121.86 ± 4.62	0.089
1 minute after induction	98.6 ± 6.12	119.26 ± 4.48	0.0001
Just after intubation	109.6 ± 6.15	135.26 ± 4.4	0.0001
2 minute after intubation	113.6 ± 6.123	131.26 ± 5.48	0.0001
5 minute after intubation	119.6 ± 6.14	127.26 ± 4.48	0.0001
10 minute intubation	124.7 ± 6.17	124.2 ± 4.52	0.722
15 minute after intubation	123.7 ± 6.57	123.2 ± 4.02	0.723
20 minute after intubation	124.8 ± 6.17	124.2 ± 6.52	0.716
30 minute after intubation	125.7 ± 6.09	125.2 ± 4.52	0.719
45 minute after intubation	125.8 ± 5.18	125.5 ± 5.57	0.813
60 minute after intubation	125.5 ± 6.09	124.6 ± 4.62	0.522
At the end of surgery	126.4 ± 6.22	125.2 ± 4.52	0.396

Table 3: Comparison of Diastolic Blood Pressure at Different Time Interval

Time Interval	Group I (Propofol)	Group II (Etomidate)	P-value
Baseline	77.45 ± 3.99	79.86 ± 5.38	0.052
1 minute before induction	75.51 ±3.99	77.82 ± 5.32	0.062
1 minute after induction	62.2 ± 3.96	75.46 ± 7.08	0.0001
Just after intubation	65.63 ± 3.72	77.00 ± 4.29	0.0001
2 minute after intubation	67.37 ± 3.28	73.00 ± 3.83	0.0001
5 minute after intubation	72.40 ± 2.95	71.43 ± 2.27	0.305
10 minute intubation	72.13 ± 6.25	70.53 ± 5.25	0.287
15 minute after intubation	72.8 ± 5.93	70.73 ± 5.65	0.172
20 minute after intubation	72.06 ± 6.29	70.33 ± 5.99	0.261
30 minute after intubation	74.13 ± 6.25	72.53 ± 5.25	0.287
45 minute after intubation	76.33 ± 4.46	74.46 ± 6.43	0.196
60 minute after intubation	78.66 ± 6.11	76.54 ± 6.56	0.189
At the end of surgery	78.87 ± 5.82	78.16 ± 6.62	0.661

Chart 7: Comparison of Mean Arterial Pressure At Different Time Interval

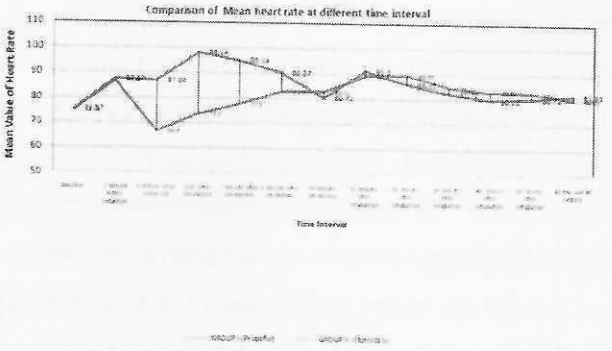
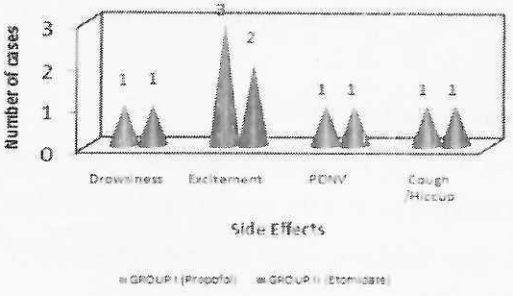


Table 4: Comparison of Mean Arterial Pressure at Different Time Interval

Time Interval	Group I (Propofol)	Group II (Etomidate)	P value(I vs. II)
Baseline	89.26 ± 4.71	88.2 ± 7.47	0.514
1 minute before Induction	85.76 ± 4.72	85.2 ± 7.47	0.730
1 minute after induction	70.26 ± 4.12	83.7 ± 5.94	0.0001
Just after intubation	77.26 ± 4.71	89.36 ± 6.57	0.0001
2 minute after intubation	77.12 ± 4.89	87.86 ± 6.63	0.0001
5 minute after intubation	82 ± 4.89	86.36 ± 7.24	0.014
10 minute intubation	82.13 ± 6.25	80.53 ± 5.25	0.287
15 minute after intubation	84.45 ± 3.37	86.15 ± 5.13	0.135
20 minute after intubation	84.17 ± 5.47	87.62 ± 6.55	0.031
30 minute after intubation	85.73 ± 9.70	82.02 ± 8.55	0.127
45 minute after intubation	85.99 ± 7.51	85.42 ± 4.73	0.726
60 minute after intubation	85.60 ± 6.11	83.54 ± 6.56	0.189
At the end of surgery	85.60 ± 6.11	83.54 ± 6.56	0.189

Chart 08 : Recovery characteristics



Discussion

Induction is a critical step in general anaesthesia. All anaesthetic agents used for induction of anaesthesia aim to maintain stable haemodynamics. Various anaesthetic agents have been used in the past i.e. Inhalational agents,

© 2024 IJMSIR, All Rights Reserved

Thiopantone sodium, Ketamine. Presently Propofol and Etomidate are popular non-barbiturate inducing agents. Due to rapid onset and short duration of action, they are a drug of choice for induction. In recent years combination of various anaesthetic agents has been used to reduce the dose and side effects of individual agents.(9) The present study entitled " A comparative study between Propofol and Etomidate for induction during general anaesthesia " was carried out in the Department of Anaesthesiology, S.S. Medical College and associated Sanjay Gandhi and Gandhi Memorial Hospitals, Rewa (MP) from 2016 to 2018. To find out a better-inducing agent for general anaesthesia. We compare Propofol and Etomidate to the induction characteristics, haemodynamic parameters and recovery profile.

After giving the study drug, induction time (from the start of Injection to the loss of eyelash reflex), pain at the Injection site, myoclonus, haemodynamic parameter and recovery profile were noted in all the patients.

Heart rate and non-invasive blood pressure (systolic blood pressure, diastolic blood pressure and mean arterial pressure) were recorded at regular intervals. All data were recorded, tabulated and statistically analysed using ANOVA, t-test and chi-square test whichever was applicable.

Induction characteristic

Induction time- In our study shows the mean induction time of Group I is 35 ± 10 second, and Group II 45 ± 9 second. The induction time is faster in Group I and Group II (I > II).

Pain at Injection site:-

The incidence of pain at the injection site was higher in Group I as compared to Group II and Group III. The difference in pain at the Injection site was clinically as well as statistically significant ($p < 0.0003$)

The incidence of myoclonus was more in Group II as compared to Group I.

Heart Rate

The baseline mean Heart Rate (HR) in Groups I& II, was 74.94 ± 5.78, and 75.57 ± 4.47 respectively. The baseline heart rate of both Groups is almost equal and the difference in HR was statistically insignificant in all the two Groups. ($P>0.05$)

After induction, the mean HR in Groups I. & II were 66.9± 5.76, 87.04 ± 4.40 respectively. The HR was decreased in patients of both Groups from baseline value. The decrease in HR was more in Group I as compared to Group II. Inter-group comparison of mean HR shows significant differences among both Groups. ($P<0.05$)

Just after intubation as well as after 2 min. of intubation, the mean HR was 73.9 ± 5.76 & 98.14 ± 4.20 and just after intubation and 77.9 ± 5.762, & 95.14 ± 4.20, 2 min after intubation in Group I, Group II, respectively. There was an increase in HR in both Groups from baseline value. However, this increase in HR was more in Group II as compared to Group I. The inter-group comparison shows the difference in the increase in HR was statistically significant in both Groups ($p <0.05$).

After 5 min of intubation, the mean HR was 82.9 ± 5.78, & 90.27 ± 4.21 in Group I, and Group II respectively. There was an increase in HR in both Groups from baseline value. The inter-group comparison shows the difference in increase in HR was statistically significant between Group I &II.

After 10 minutes of intubation and up to the end of surgery, the changes in mean HR were statistically insignificant ($p >0.05$).

Systolic blood pressure

The baseline mean SBP was 120.3 ± 6.12 mmHg, & 122.26 ± 4.48 mmHg in Groups I, and II respectively. The baseline SBP of both Groups are almost equal and

© 2024 IJMSIR, All Rights Reserved

the difference in SBP was statistically insignificant in both Groups. (P> 0.05).

After induction, the mean SBP was 98.6 ± 6.12mmHg,& 119.26±4.48mmHg in Groups I, and II respectively. The SBP was decreased in patients of both Groups from baseline value. The decrease in SBP was more in Group I as compared to Group II. The inter-group comparison shows the difference of decrease in SBP was statistically significant between Group I &II ($p < 0.05$).

After intubation, the mean SBP was 109.6±6.13mmHg, & 135.26 ± 4.4 mmHg in Groups I, and II respectively. There was an increase in SBP in both Groups from baseline value. However, this increase in SBP was more in Group II as compared to Group I. The inter-group comparison shows the difference in increase in SBP was statistically significant in both Groups. ($p < 0.05$).

After 2min as well as after 5 min of intubation, the mean SBP was 113.6 ± 6.12 mmHg, and 131.26 ± 5.48mmHg at 2min after intubation and

119.6 ± 6.14, and 127.26 ± 4.48 mmHg, at 5 min after intubation in Group I, and Group II, respectively.

There was a slight increase in SBP in both Groups from baseline value. The inter-group comparison shows the difference in increase in SBP was statistically significant in Groups I &II.

After 10 min of intubation up to the end of surgery, the changes in mean SBP were statistically insignificant ($p >0.05$).

Diastolic blood pressure

The baseline mean DBP was 77.45 ± 3.99 mmHg, and 79.86 ± 5.38 mmHg, in Groups I, and II respectively. The baseline DBP of both Groups are almost equal and the difference in DBP was statistically insignificant in both Groups. (P> 0.05).

After induction, the mean DBP was 62.2 ± 3.96 mmHg, and 75.46 ± 7.08 mmHg in Groups I, and II respectively. The DBP was decreased in patients of both Groups from baseline value. The decrease in DBP was more in Group I as compared to Group II.

The inter-group comparison shows the difference of decrease in DBP was statistically significant between Group I &II($p < 0.05$).

After intubation, the mean DBP was 65.63 ± 3.728 mmHg, and 77.00 ± 4.29 mmHg, respectively in Group I and II. There was an increase in DBP in both Groups from baseline value. But this increase in DBP was more in Group II as compared to Group I. In the inter-group comparison, the difference in increase in DBP was statistically significant in both Groups. ($p < 0.05$)

After 2 minutes of intubation, mean DBP was 67.37 ± 3.285 mmHg and 73.00 ± 3.833 in Group I, and Group II, respectively. There was a slight increase in DBP in both Groups from the baseline value. The inter-group comparison shows the difference of increase in DBP was statistically significant in Group I &II ($p < 0.05$).

After 5 minutes of intubation, mean DBP was 72.40 ± 2.95 mmHg, and 71.43 ± 2.27 mmHg in Group I, and Group II, respectively. There was a slight increase in DBP in both Groups from the baseline value. The inter-group comparison shows the difference of increase in DBP was insignificant between Group I & II and Group II ($p >0.05$).

After 10 min of intubation up to the end of surgery, the changes in mean SBP were statistically insignificant in patients of both Groups. ($p >0.05$).

Mean arterial pressure

The baseline mean MAP was 89.26 ± 4.71, and 88.2 ± 7.47, in Groups I and II respectively. The baseline MAP of both Groups are almost equal and the difference in MAP was statistically insignificant in both Groups. (P> 0.05).

© 2024 IJMSIR, All Rights Reserved

After induction, the mean MAP was 70.26 ± 4.12 mmHg and 83.7 ± 5.94 mmHg in Groups I, and II respectively. The MAP was decreased in patients of both from baseline value. The decrease in MAP was more in Group I as compared to Group II. The inter-group comparison shows the difference of decrease in MAP was statistically significant between Group I &II ($p < 0.05$).

After intubation, the mean MAP was 77.26 ± 4.71 mmHg and 89.36 ± 6.57 mmHg, respectively in Group I, and II. There was an increase in MAP in both Groups from baseline value. However, this increase in MAP was more in Group II as compared to Group I. The inter-group comparison shows the difference in increase in MAP was statistically significant in both Groups. ($p < 0.05$).

After 2min as well as after 5 min of intubation, mean MAP was 77.12 ± 4.89 mmHg, 87.86 ± 6.63, at 2min after intubation and 82±4.89 mmHg, 86.36 ± 7.24 mmHg at 5 min after intubation in Group I, and Group II respectively. There was a slight increase in MAP in both Groups from baseline value. The inter-group comparison shows the difference in increase in MAP was statistically significant in Groups I &II ($p < 0.05$).

After 10 min of intubation up to the end of surgery, the changes in mean SBP were statistically insignificant in patients of both Groups. ($p > 0.05$).

Decreases in HR, SBP, DBP and MAP by Propofol are due to inhibition of the sympathetic nervous system and impairment of the baroreceptor reflex regulatory system. Minimal changes in HR, SBP, DBP and MAP by Etomidate are due to a lack of effect on the sympathetic nervous system and baroreceptor reflex regulatory system.

Recovery characteristics

In our study, we observed recovery characteristics after intubation. The incidence of drowsiness was found to be equal (3%) in patients of both Groups i.e. Group I, and II respectively.

The incidence of excitement was found to be 3% and 6% in Groups I, and II respectively.

The incidence of PONV & cough/hiccups was found to be 3%, 3%, in Group I, II respectively.

Conclusion

This study concludes that etomidate is a better agent for induction than propofol because of hemodynamic stability and less pain on injection. The only drawback was a high incidence of myoclonus. Therefore we concluded that etomidate is a better drug in patients with hemodynamic fluctuation at Induction. like uncontrolled hypertension, severe illness, septic, and patients with heart disease.

References

1. Meena K, Meena R. A Comparative Study of Effect of Propofol, Etomidate and Propofol Plus Etomidate Induction on Hemodynamic Response to Endotracheal Intubation: A RCT. J Anesth Clin Res. 2016 Jan 1;07
2. A Comparative Evaluation of Propofol, Etomidate and Admixture of Propofol - Etomidate for Induction During General Anaesthesia. 2016;7(4).
3. Swerdlow BN, Holley FO. Intravenous anaesthetic agents. Pharmacokinetic-pharmacodynamic relationships. Clin Pharmacokinet. 1987 Feb;12(2):79–110.
4. Papper E m. The fiftieth anniversary of the use of thiopentone in man*. Anaesthesia [Internet] 1984 [cited 2024 Apr 24];39(6):517–9. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2044.1984.tb07352.x
5. Comparison of etomidate and propofol-mediated anesthesia induction followed by intubation and sevoflurane maintenance during ERCP in obese

© 2024 IJMSIR, All Rights Reserved

patients - PMC [Internet]. [cited 2024 Apr 24]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8430081/

6. Marik PE. Propofol: therapeutic indications and side-effects. Curr Pharm Des. 2004;10(29):3639–49.
7. Rathore VS, Singh S, Taank P, Khandelwal A, Kaushal A. Clinical Analysis of Propofol, Etomidate and an Admixture of Etomidate and Propofol for Induction of General Anaesthesia. Turk J Anaesthesiol Reanim [Internet]. 2019 Oct [cited 2024 Apr 24];47(5):382–6. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6756308/
8. A descriptive study of myoclonus associated with etomidate procedural sedation in the ED - PubMed [Internet]. [cited 2024 Apr 24]. Available from: https://pubmed.ncbi.nlm.nih.gov/23558062/
9. Wan C, Hanson AC, Schulte PJ, Dong Y, Bauer PR. Propofol, Ketamine, and Etomidate as Induction Agents for Intubation and Outcomes in Critically Ill Patients: A Retrospective Cohort Study. Crit Care Explor [Internet]. 2021 May [cited 2024 Apr 24];3(5):e0435. Available from: https://journals.lww.com/ccejournal/Fulltext/2021/05000/Propofol,_Ketamine,_and_Etomidate_as_Induction.32.aspx

© 2024 IJMSIR, All Rights Reserved

ISSN(online) : 2458-868X ISSN(print) : 2458-8687

(https://www.ijmsir.com)

International Print/Online Journal

International Journal of Medical Science and Innovative Research (IJMSIR)

Open Access and Peer Reviewed Journal

IJMSIR MENU

- Call For Paper (https://www.ijmsir.com/home/call_for_paper)
- Publication Charge (https://www.ijmsir.com/submission/manuscript_pu
- Indexing (https://www.ijmsir.com/indexing)
- Author Guideline (https://www.ijmsir.com/submission/author_guidelines)
- Copyright Form (https://www.ijmsir.com/submission/copyright_form)
- Mode of Payment (https://www.ijmsir.com/home/payment)

NEWS

Very low fees Rapid Decision Rapid (https://www.ijmsir.com/news/detail/7)
Experts And Thorough Peer Review

- Submit Your Article/Research Paper/ManuScript (https://www.ijmsir.com/news/detail/3)

INDEXING

PubMed - National Library of Medicine- ID : 101731606
(https://www.ncbi.nlm.nih.gov/nlmcatalog/?term=IJMSIR)

PubMed National Library of Medicine NLM
(https://www.ncbi.nlm.nih.gov/nlmcatalog/?term=ijmsir)

PubMed
(https://www.ncbi.nlm.nih.gov/myncbi/1ZSEq_bjP5n5E/bibliography/1

Google Scholar
(https://scholar.google.com/citations?hl=en&imq=IJMSIR&user=8bPUQuwAAAAJ)

Impact Factor: 8.134
(http://sjifactor.com/passport.php?id=20043)

INNO SPACE SJIF Scientific Journal Impact Factor
(http://sjifactor.com/passport.php?id=20043)

Directory of Research Journals Indexing DRJI
(http://olddrji.lbp.world/JournalProfile.aspx?jid=2458-868X)

- You Enjoy Higher Citation Open Access
  Very low fees Rapid Decision Rapid

· LATEST ISSUES ·

- Call For Conference
  (https://www.ijmsir.com/Latest_issue/callfor)
- Upcoming Conference
  (https://www.ijmsir.com/Latest_issue/upcoming)

OUR POLICIES

- Peer Review Policy
  (https://www.ijmsir.com/Latest_issue/peer_review_policy)
- ICMJE Guideline
  (https://www.ijmsir.com/Latest_issue/guideline)
- Anti-Plagiarism Policy
  (https://www.ijmsir.com/Latest_issue/anti_plagiarism)
- Publisher Role
  (https://www.ijmsir.com/Latest_issue/publisher_role)
- Article Correction Policy
  (https://www.ijmsir.com/Latest_issue/article_correction_policy)
- Article Withdrawal Policy
  (https://www.ijmsir.com/Latest_issue/withdraw)
- Open Access Policy
  (https://www.ijmsir.com/Latest_issue/open_access)
- License Term Policy
  (https://www.ijmsir.com/Latest_issue/license_term)
- Digital Archive Policy
  (https://www.ijmsir.com/Latest_issue/digital_archive)
- Repository Policy
  (https://www.ijmsir.com/Latest_issue/repository_policy)
- Advertise with Us
  (https://www.ijmsir.com/home/advertise)

(https://journalseeker.researchbib.com/)

(http://www.icmje.org/journals-following-the-icmje-recommendations/#I)

(https://publons.com/journal/78105/international-journal-of-medical-science-and-innov)

(https://www.citefactor.org/journal/index/16229/international-journal-of-medical-science-and-innovative-research-ijmsir#.XEdFdWlS_IV)

(https://www.mendeley.com/search/?query=International+Journal+of+Medical+Science+and+Innovative+Research+%28IJMSIR%29+&dgcid=md_homepa

(http://esjindex.org/search.php?id=1699)

(http://www.i2or.com/8.html)

(https://europub.co.uk/journals/international-journal-of-medical-science-and-innovative-research-ijmsir-J-16825)

Research Article

To Evaluate the Functional and Radiological Outcome of Total Knee Replacement for Osteoarthritis Knee using Medial Parapatellar Approach and Posterior Stabilized (PS) Design

Vivek Singh, Rajarshi Deep Srivastava, Sandeep Bhinde, Pravesh Jain, Ashish Agrawal, Rohit Parmar, Palash Jethaliya, Ankit Agarwal, Shubham Nagdev*

Background: Osteoarthritis (OA) of the knee is one of the most common causes of pain and disability among the elderly population worldwide. Total knee arthroplasty (TKA) has emerged as an effective surgical intervention for end-stage osteoarthritis by relieving pain, restoring alignment, and improving functional mobility. The present study was conducted to evaluate the functional and radiological outcomes of total knee replacement using the medial parapatellar approach and posterior stabilized (PS) prosthesis design.

Aim: To evaluate the functional and radiological outcomes of total knee replacement for osteoarthritis of the knee using the medial parapatellar approach and posterior stabilized (PS) design.

Methodology: This prospective observational analytical study was conducted in the Department of Orthopaedics, R.D. Gardi Medical College and Hospital, Ujjain, Madhya Pradesh, from November 2023 to April 2025 after Institutional Ethics Committee approval. A total of 50 patients aged more than 50 years with Kellgren and Lawrence Grade III and IV osteoarthritis of the knee were included. All patients underwent cemented total knee arthroplasty through a standard medial parapatellar approach using posterior-stabilized implants. Functional assessment was performed using Knee Society Score (KSS) and range of motion (ROM), while radiological assessment was carried out using the Knee Society Total Knee Arthroplasty Radiographic Evaluation and Scoring System. Statistical analysis was performed using IBM SPSS version 22.0.

Results: The mean age of participants was 63.8 ± 7.9 years, with females constituting 52% of cases. Most patients were overweight (62%) and had Grade IV osteoarthritis (58%). Significant improvement in Knee Society Score was observed from a preoperative mean of 50.06 ± 6.44 to 86.16 ± 5.77 at 1 month (*p-value* <0.001), 90.96 ± 4.94 at 3 months (*p-value* <0.001), and 92.50 ± 4.16 (*p-value* <0.001) at 6 months postoperatively. Mean ROM improved from 92.72 ± 13.65° preoperatively to 111.52 ± 5.22° at 6 months (*p-value* <0.001). Postoperative complications were minimal, with 94% of patients showing no complications; aseptic loosening, thromboembolism, and superficial infection were observed in 2% each.

Conclusion: Total knee arthroplasty using the medial parapatellar approach and posterior-stabilized design provides excellent functional recovery, significant improvement in range of motion, and a low complication rate in patients with advanced knee osteoarthritis. Proper patient selection, meticulous surgical technique, and structured rehabilitation play a crucial role in achieving favorable postoperative outcomes.

Access this article online

Website: www.cijmr.com

DOI: 10.58999/cijmr.v5i03.445

Keywords: Arthroplasty, Replacement, Knee, osteoarthritis, range of motion, articular, overweight.

Introduction

Osteoarthritis (OA) is a chronic degenerative disorder of the joints and represents one of the leading causes of disability worldwide. Globally, it affects more than 500 million individuals, making it one of the most prevalent musculoskel*et al.* diseases(1). The global burden of OA is substantial. Recent estimates indicate that approximately 528 million people worldwide are affected, including about 23% of individuals aged 40 years and older. . The disease is characterized by progressive degeneration of articular cartilage accompanied by joint inflammation and structural changes, which result in pain, stiffness, and reduced mobility. These symptoms significantly impair physical activity and overall quality of life (2).

Department of Orthopaedics, R.D. Gardi Medical College and Hospital, Ujjain, Madhya Pradesh, India

Correspondence to: Rajarshi Deep Srivastava, Department of Orthopaedics, R.D. Gardi Medical College and Hospital, Ujjain, Madhya Pradesh, India. E-mail: rdssrivastava112@gmail.com

Submitted: 02/06/2026 Revision: 06/08/2026

Accepted: 06/08/2026 Published: 25/09/2026

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

How to cite this article: Singh V, Srivastava RD, Bhinde S, Jain P, Agrawal A, Parmar R, Jethaliya P, Agarwal A, Nagdev S. To Evaluate the Functional and Radiological Outcome of Total Knee Replacement for Osteoarthritis Knee using Medial Parapatellar Approach and Posterior Stabilized (PS) Design. Central India Journal of Medical Research. 2026; 5(3):50-56.

Table 1: Inclusion and Exclusion criteria for study

Inclusion criteria	*Exclusion criteria*
Adult Patients with Clinical and Radiological signs & symptoms of Knee Osteoarthritis (Kellgrens and Lawrence Grade-III & Grade IV degree of reduction of space in knee joints) B. Both gender, Age >50 years C. Medically and surgically fit patients D. Patients willing for surgery	A. Patients with no reduction in space in knee B. Age< 50 years C. Medically and Surgically unfit patients D. Patients not willing for surgery

Another important aspect of osteoarthritis is the weak correlation between radiographic findings and clinical symptoms. Among individuals older than 50 years, only about half of those with radiographic evidence of OA report symptoms, a pattern also seen in knee osteoarthritis. In contrast, radiographic changes in hand osteoarthritis produce clinical symptoms in only 3–7% of cases(3).

Total knee replacement (TKR) is one of the most successful reconstructive procedures in orthopaedic surgery, providing significant relief from pain and functional limitations. However, its long-term success depends on precise restoration of knee anatomy.

The present study aims to prospectively evaluate the clinical and functional outcomes of primary TKR in patients with osteoarthritic knees. By assessing objective clinical parameters alongside patient-reported outcomes, this research seeks to identify factors influencing surgical success and to develop strategies for optimizing results. Understanding these relationships will be crucial for enhancing patient selection, refining surgical techniques, and improving rehabilitation protocols, ultimately contributing to better long-term outcomes for individuals undergoing TKR.

Aim

The aim of the study is to evaluate the functional and radiological outcome of total knee replacement for osteoarthritis knee using medial parapatellar approach and posterior stabilized (PS) design.

Objectives

- To study the demographic and clinical profile of patients undergoing total knee arthroplasty.
- To assess functional outcomes using KSS and ROM.
- To evaluate postoperative complications.
- To identify factors influencing postoperative outcomes

Methodology

This prospective observational analytical study was conducted in the Department of Orthopaedics at R.D. Gardi Medical College and Hospital, Ujjain, Madhya Pradesh, over a period of 18 months from November 2023 to April 2025, after obtaining Institutional Ethics Committee approval. A total of 50 patients with satisfying inclusion and exclusion criteria were included in the study (Table 1).

In our study, the required sample size was calculated based on detecting a clinically meaningful improvement in functional outcome scores (Knee Society Score) and range of motion (ROM) following total knee arthroplasty. Assuming a two-tailed significance level (alpha) of 0.05, a power (1 - beta) of 80%, and anticipating a minimum clinically important difference (MCID) with a moderate-to-large effect size (d >= 0.5), a minimum sample size of 42 patients was required. To account for a potential 15% loss to follow-up over the 6-month evaluation period, a total of 50 patients were enrolled. Final repeated-measures analyses confirmed that N = 50 achieved > 90% statistical power to detect changes across time points. Hence, N = 50 patients were included in the study satisfying inclusion and exclusion criteria. All patients underwent detailed preoperative evaluation including clinical history, physical examination, radiological assessment, laboratory investigations, nutritional assessment, and anaesthetic fitness. Standard weight-bearing radiographs and long-leg alignment views were obtained for deformity assessment and implant templating. Preoperative counselling and informed written consent were obtained from all participants.

Total Knee Arthroplasty (TKA) was performed under strict aseptic precautions using a standard medial parapatellar approach. Tibial and femoral bone cuts were made using appropriate alignment guides, followed by soft tissue balancing in varus and valgus deformities. Trial implantation, assessment of alignment, stability, and patellar tracking were performed prior to final cemented implantation of prosthetic components. Wound closure was done in layers with drain placement and sterile dressing application.

Postoperatively, patients received standard analgesia, antibiotics, DVT prophylaxis, and physiotherapy

rehabilitation. Early mobilization, quadriceps strengthening, range of motion exercises, and gait training were initiated as per rehabilitation protocol. Patients were followed up on the 7th, 10th, and 15th postoperative days, and subsequently at 1 month and 3 months.

Functional outcome was assessed using the Knee Society Score (KSS) and range of motion (ROM), while radiographic evaluation was performed using the Knee Society Total Knee Arthroplasty Radiographic Evaluation and Scoring System. Data were entered into Microsoft Excel and analysed using IBM SPSS version 22.0. Continuous variables were expressed as mean ± standard deviation and categorical variables as frequencies and percentages. Paired t-test was applied where appropriate, and *p-value* <0.05 was considered statistically significant.

Table 2: Sociodemographic and clinical profile of patients in the study

Variable	*Category*	*Frequency*	*Percentage*
Age group (years)	50–59	15	30
60–69		20	40
	70–79	13	26
	≥80	2	4
	Mean Age	63.8 ± 7.9 years	
Gender	Female	26	52
	Male	24	48
BMI category	Underweight (<18.5)	0	0.0
	Normal weight (18.5–24.9)	9	18.0
	Overweight (25.0–29.9)	31	62.0
	Obese (≥30.0)	10	20.0
Side involvement	Right	30	60
	Left	20	40
Osteoarthritis Grade	Grade III	21	42
	Grade IV	29	58
Co-morbidity	None	24	46
	Hypertension	9	18
	Diabetes mellitus	7	14
	Asthma	7	14
	Thyroid disorder	3	6
Occupation	Farmer	20	40
	Labourer	15	30
	Homemaker	10	20
	Clerk	5	10

Result

Sociodemographic and Clinical Profile of Study Participants (n=50)

The majority of participants belonged to the 60 to 69 years age group (40%), with a mean age of 63.8 ± 7.9 years. Females (52%) slightly outnumbered males (48%). Most patients were overweight (62%), while 20% were obese, indicating a strong association between elevated BMI and osteoarthritis. Right-sided knee involvement was more common (60%). Grade IV osteoarthritis predominated (58%), suggesting advanced disease at presentation. Nearly half of the participants had no co-morbidities, while hypertension was the most common associated condition (18%). Occupationally, farmers (40%) and labourers (30%) formed the majority, indicating that physically demanding work may contribute to knee osteoarthritis (Table 2).

Complication

Out of 50 patients, the majority (94%) experienced no postoperative complications, indicating that the procedure is generally safe. Aseptic loosening, thromboembolism and superficial infection were rare, each occurring in 1 patient (2%). No single complication predominated, and all adverse events were infrequent.

Knee Society Score

The comparison of Knee Society Scores (KSS) between preoperative and postoperative periods was performed using the paired t-test. Before surgery, the average knee function score (Knee Society Score, KSS) of the patients was about 50.06, indicating limited knee function. After surgery, the knee function improved substantially 1 month after surgery: The average score rose to 86.16, showing a large improvement in mobility and pain relief 3 months after surgery: The average score further increased to 90.96, indicating continued recovery and better knee function. 6 months after surgery: The average score reached 92.50, showing that most patients had regained near-normal knee function. These findings indicate a marked and progressive improvement in functional outcome following surgery. The improvement is rapid within the first month and continues steadily through 3 and 6 months. The results demonstrate that the intervention provides significant and sustained functional recovery over time (Table 3).

Preoperative & Postoperative changes in ROM

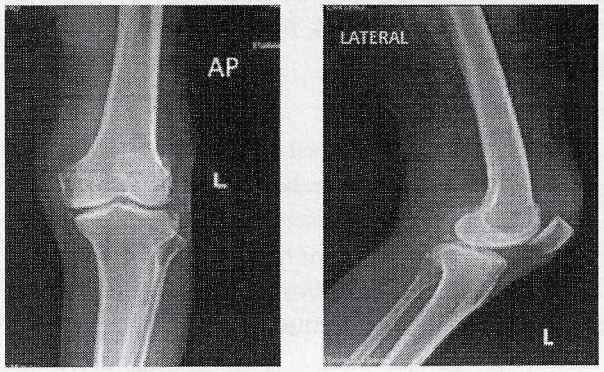
There is a steady and significant improvement in knee ROM from preoperative to 6 months. Maximum improvement

Table 3: Comparison of Knee Society Score with time frame

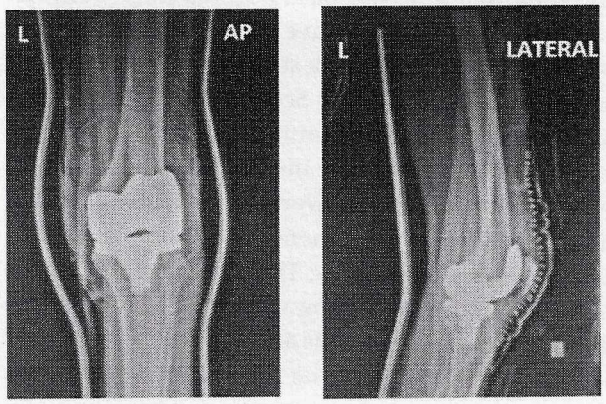
Parameter	*Mean score ± Standard deviation*	*Mean difference ± Standard deviation*	*p-value*
Preoperative KSS	50.06 ± 6.44	—	
KSS at 1 month postoperative	86.16 ± 5.77	36.10 ± 9.10	<0.01
KSS at 3 month postoperative	90.96 ± 4.94	40.90 ± 8.61	<0.001
KSS at 6 month postoperative	92.50 ± 4.16	42.44 ± 8.08	<0.001

Table 4: Preoperative & Postoperative changes in ROM

Time point	*Mean ROM (°)*	*Standard deviation (SD) (°)*	*Mean difference ± SD (°)*	*p-value*
Preoperative	92.72	13.65	—	
1 Month postoperative	103.64	6.66	+10.92 ± 9.46	<0.001
3 Months postoperative	108.58	5.09	+15.86 ± 11.23	<0.001
6 Months postoperative	111.52	5.22	+18.80 ± 11.26	<0.001

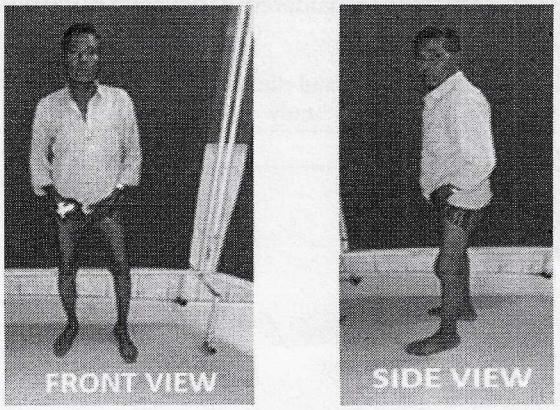


Preoperative radiograph (Left Knee)

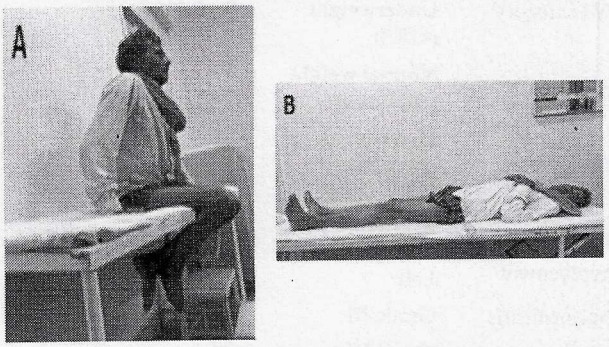


Postoperative radiograph (Left Knee)

Figure 1 : Preoperative and Postoperative radiographs of left knee



Preoperative Clinical Photographs
A) Note Knee Varus B) Note flexion deformity



Postoperative Clinical Photographs
A) Knee flexion ROM , B) Knee extension ROM

Figure 2: Clinical photograph

occurs in the early postoperative period (first 1–3 months). From 3 to 6 months, improvement continues but plateaus, suggesting functional stabilization. The decreasing SD over time indicates that outcomes become more uniform and predictable postoperatively (Table 4).

Discussion

This study assessed clinical characteristics and functional outcomes following total knee arthroplasty (TKA) in 50 patients with knee osteoarthritis. The principal findings were: a majority of patients were in the 60–69-year

age group; slight female predominance was observed; increased body mass index (BMI) was common; most patients had KL grade IV disease; significant improvements in Knee Society Score (KSS) and functional postoperative range of motion (ROM) were demonstrated postoperatively. These findings will be discussed in the context of the current evidence.

The mean age of our study was 63.8 ± 7.9 years, with the highest proportion (40%) in the 60–69-year age bracket. This aligns with the known epidemiology of knee osteoarthritis, which is primarily a disease of older adults due to age-related cartilage degeneration and cumulative joint loading over time. A Systematic review and meta-analysis by Koh et al on a total of 390,888 primary TKAs and 7338 revision TKAs reported the highest prevalence of symptomatic knee osteoarthritis in the sixth to seventh decades of life, consistent with global demographic trends in TKA utilization (age 60–75 years) (4). Female patients comprised 52% of the cohort, again consistent with published studies by Cho et al (5) done on 696 patients. A study by Tucker *et al.*6 suggests that postmenopausal hormonal changes, altered biomechanics, and differences in joint alignment and ligament laxity contribute to higher rates of knee OA in women compared to men, although this association is not uniform across all populations. In our study, the mean BMI was 28.2 ± 3.4 kg/m². Most patients were either overweight (58%) or obese (24%, Class I). A large retrospective analysis on 3918 patients by Lawrence et al.[7] have found that although obese patients may have worse absolute pre- and postoperative patient-reported outcome measure scores. Another systematic review by Shumnalieva *et al.*[8] also concluded that obesity is associated with accelerated osteoarthritis of knee. Boyce *et al.*[9] in their systematic review and meta-analysis concluded that BMI ≥30 kg/m² was associated with a trend toward lower functional scores post-TKA and higher complication risk. Furthermore, Pasqualini *et al.*[10] recently demonstrated that while heavier patients experience distinct early recovery trajectories, overall 1-year patient-reported outcomes and satisfaction rates remain comparable across BMI categories.

The majority of patients had Kellgren–Lawrence (KL) grade IV osteoarthritis (60%), with the remainder having grade III in the study. The use of radiographic OA severity as a predictor of surgical outcome is well recognized; Lange et al in their study having 240 subjects concluded that greater disease severity often correlates with more pain and lower preoperative function, potentially allowing greater scope for postoperative improvement in functional scores (11). Beyond radiographic baseline, concurrent systemic medical conditions such as diabetes mellitus significantly impact surgical recovery trajectories and require optimized perioperative optimization (12). Additionally, pre-existing psychological factors—including clinical depression and anxiety—have been shown to directly influence patient perception of postoperative pain relief and overall functional recovery (13).

In our study, 90% of patients had no postoperative complications, and only a small proportion developed adverse events, indicating a high safety profile. These findings are consistent with the existing literature Healy et al (14) through survey of 102 clinical members, Mulcahy et al (15) through their literature review of 59 studies, which reports relatively low overall complication rates following primary TKA. Thromboembolic events were rare complication in our study (2%). Previous studies such as by Dai et al (16) on 1,460,901 primary TKA have also identified venous thromboembolism (VTE) as a notable early postoperative risk. Aseptic loosening was seen in 2% of our study population which is consistent with a study by Yao *et al.* (17) who in their systematic review and meta-analysis demonstrated relatively infrequent early loosening in early post-operative period. Large national registry analyses—including the German Arthroplasty Registry (18) and the UK National Joint Registry (19)—similarly demonstrate that primary cemented TKA yields consistently low early infection rates and superior long-term implant survival. Furthermore, systematic analysis by Hong et al. (20) confirms that adherence to modern standardized prophylaxis protocol minimizes overall 30-day postoperative adverse event rates.

A key finding of our study was the highly significant improvement in Knee Society Score (KSS) from preoperative baseline (50.06 ± 6.44) to 86.16 ± 5.77 at 1 month, then to 90.96 ± 4.94 at 3 months and further to 92.50 ± 4.16 at 6 months.

Our study also showed significant improvements in knee ROM, with mean increases of +10.92 ± 9.46 at 1 month, +15.86 ± 11.23 at 3 months and +18.80 ± 11.26 at 6 months postoperatively. study by Bade et al (21) on two pooled prospective randomized controlled trials having 64 subjects show that preoperative ROM is one of the strongest predictors of ROM achieved after TKA, even when adjusting for other factors such as age, sex, and muscle strength. Our findings are consistent with Peeters et al (22) who in their study demonstrated that objective

functional scores like Knee Society Scores and Range of motion improve markedly after primary TKA, with most of the gains occurring within the first 3–6 months and continuing to plateau thereafter. This characteristic post-TKA recovery velocity is further supported by Polascik et al. (23), who observed that early functional trajectories within the first 90 days strongly establish the overall recovery baseline. Additionally, recent findings by Gil et al. (24) emphasize that early range of motion recovery trajectories directly influence long-term functional outcome scores and patient satisfaction. Finally, systematic evidence from Shetty et al. (25) highlights that multi-dimensional postoperative physical therapy strongly correlates with long-term quality-of-life gains in primary TKA cohorts.

Conclusion

Total knee arthroplasty results in highly significant improvements in functional outcome and range of motion in patients with knee osteoarthritis (Figure 1,2). Baseline functional status, disease severity, and mechanical alignment are key independent predictors of postoperative outcome at 6 months. While demographic factors such as age and BMI are important clinical considerations, they are not definitive predictors of functional recovery when considered in isolation. Comprehensive preoperative evaluation, alignment optimization, and personalized rehabilitation planning are essential to maximize the benefits of TKA for patients with end-stage knee osteoarthritis.

References

1. Li E, Tan J, Xu K, Pan Y, Xu P. Global burden and socioeconomic impact of knee osteoarthritis: a comprehensive analysis. Front Med (Lausanne). 2024;11:1323091. doi:10.3389/fmed.2024.1323091.
2. GBD 2021 Osteoarthritis Collaborators. Global, regional, and national burden of osteoarthritis, 1990-2020 and projections to 2050: a systematic analysis for the Global Burden of Disease Study 2021. Lancet Rheumatol. 2023;5(9):e508-e522. doi:10.1016/S2665-9913(23)00163-7.
3. Bedson J, Croft PR. The discordance between clinical and radiographic knee osteoarthritis: a systematic search and summary of the literature. BMC Musculoskelet Disord. 2008;9:116. doi:10.1186/1471-2474-9-116.
4. Koh IJ, Kim TK, Chang CB, Cho HJ, In Y. Trends in use of total knee arthroplasty in Korea from 2001 to 2010. Clin Orthop Relat Res. 2013;471(5):1441-1450. doi:10.1007/s11999-012-2622-y.
5. Cho HJ, Chang CB, Kim KW, Park JH, Yoo JH, Koh IJ, et al. Gender and prevalence of knee osteoarthritis types in elderly Koreans. J Arthroplasty. 2011;26(7):994-999. doi:10.1016/j.arth.2011.01.007.
6. Tucker KK, Waterbrook AL. Presentation of arthritis in female patients. In: Lajam CM, Cohen-Rosenblum A, editors. Evaluation and Management of Hip and Knee Arthritis in Women. Philadelphia: Elsevier; 2026. p.11-15.
7. Lawrence KW, Sobba W, Rajahraman V, Schwarzkopf R, Rozell JC. Does body mass index influence improvement in patient reported outcomes following total knee arthroplasty? A retrospective analysis of 3918 cases. Knee Surg Relat Res. 2023;35(1):21. doi:10.1186/s43019-023-00195-1.
8. Shumnalieva R, Kotov G, Monov S. Obesity-related knee osteoarthritis-current concepts. Life (Basel). 2023;13(8):1650. doi:10.3390/life13081650.
9. Boyce L, Prasad A, Barrett M, Dawson-Bowling S, Millington S, Hanna SA, et al. The outcomes of total knee arthroplasty in morbidly obese patients: a systematic review of the literature. Arch Orthop Trauma Surg. 2019;139(4):553-560. doi:10.1007/s00402-019-03127-5.
10. Pasqualini I, Huffman N, Redfern RE, Digital Health in Arthroplasty Writing Committee, Piuzzi NS. Despite greater improvement in pain and function among obese patients shortly after total knee arthroplasty, there is no difference in patient-reported outcomes and satisfaction between body mass index classes at 1 year postoperatively. J Arthroplasty. 2024;39(7):1719-1725.e1. doi:10.1016/j.arth.2024.01.043.
11. Lange JK, Yang HY, Collins JE, Losina E, Katz JN. Association between preoperative radiographic severity of osteoarthritis and patient-reported outcomes of total knee replacement. JB JS Open Access. 2020;5(3):e19.00073. doi:10.2106/JBJS.OA.19.00073.
12. Berkovich Y, Nissan EC, Maman D, Hirschmann MT, Yonai Y, Steinfeld Y, et al. Diabetes and total knee arthroplasty: a nationwide analysis of complications, hospitalization outcomes and revision burden. Knee Surg Sports Traumatol Arthrosc. 2025;33(9):3250-3260.
13. Heijbel S, W-Dahl A, E-Naili J, Hedström M. Patient-reported anxiety or depression increased the risk of dissatisfaction despite improvement in pain or function following total knee arthroplasty: a Swedish register-based observational study of 8745 patients. J Arthroplasty. 2024;39(11):2708-2713.
14. Healy WL, Della Valle CJ, Iorio R, Berend KR, Cushner FD, Dalury DF, et al. Complications of total knee arthroplasty: standardized list and definitions of the Knee Society. Clin Orthop Relat Res. 2013;471(1):215-220. doi:10.1007/s11999-012-2489-y.
15. Mulcahy H, Chew FS. Current concepts in knee replacement: complications. AJR Am J Roentgenol. 2014;202(1):W76-W86. doi:10.2214/AJR.13.11308.
16. Dai WL, Lin ZM, Shi ZJ, Wang J. Venous thromboembolic events after total knee arthroplasty: which patients are at a high risk? J Knee Surg. 2020;33(10):947-957. doi:10.1055/s-0039-1688962.
17. Yao K, Chen Y. Comprehensive evaluation of risk factors for aseptic loosening in cemented total knee arthroplasty: a systematic review and meta-analysis. J Exp Orthop. 2024;11(3):e12095. doi:10.1002/jeo2.12095.
18. Szymski D, Walter N, Straub J, Wu Y, Melsheimer O, Grimberg A, et al. Low implantation volume, comorbidities, male sex and implantation of constrained TKA identified as risk factors for septic revision in knee arthroplasty: a register-based study from the German Arthroplasty Registry. Knee Surg Sports Traumatol Arthrosc. 2024;32(7):1743-1752. doi:10.1002/ksa.12182.
19. Mohammad HR, Judge A, Murray DW. A matched comparison of cementless unicompartmental and total knee replacement outcomes based on the National Joint Registry for England, Wales, Northern Ireland and the Isle of Man. Acta Orthop. 2022;93:478-487.

doi:10.2340/17453674.2022.2743.

20. Hong SH, Kwon SC, Lee JH, Moon S, Kim JI. Influence of diabetes mellitus on postoperative complications after total knee arthroplasty: a systematic review and meta-analysis. Medicina (Kaunas). 2024;60(11):1757. doi:10.3390/medicina60111757.
21. Bade MJ, Kittelson JM, Kohrt WM, Stevens-Lapsley JE. Predicting functional performance and range of motion outcomes after total knee arthroplasty. Am J Phys Med Rehabil. 2014;93(7):579-585. doi:10.1097/PHM.0000000000000065.
22. Peeters G, Rainbird S, Lorimer M, Dobson AJ, Mishra GD, Graves SE. Improvements in physical function and pain sustained for up to 10 years after knee or hip arthroplasty irrespective of mental health status before surgery. Acta Orthop. 2017;88(2):158-165. doi: 10.1080/17453674.2016.1250059.
23. Polascik BW, Horn M, Pyati S, Mariano ER, Ginsberg JP, Raghunathan K. Knee Injury and Osteoarthritis Outcome Score trajectories after primary total knee arthroplasty in United States Veterans. Cureus. 2023;15(3):e36670. doi:10.7759/cureus.36670.
24. Gil JN, Gray CF, Prieto HA, Parvataneni HK, Miley EN, Rutledge RS, et al. Impact of range of motion trajectory on patient-reported outcomes following total knee arthroplasty. J Arthroplasty. 2025;40(9):2303-2308. doi:10.1016/j.arth.2025.02.039.
25. Shetty S, Maiya GA, Rao KGM, Vijayan S, George BM. Factors determinant of quality of life after total knee arthroplasty in knee osteoarthritis: a systematic review. J Bodyw Mov Ther. 2024;40:1588-1604. doi:10.1016/j.jbmt.2024.08.013.