Original Article

Intracapsular Hip Fractures

Functional Outcome of Cemented Versus Uncemented Hemiarthroplasty for Intracapsular Hip Fractures

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ABSTRACT

Objectives: To determine the functional outcome of cemented versus uncementedhemiarthroplasty in displaced intracapsular fractures of the hip.

Study Design: Randomized control trial.

Place and Duration of Study: This study was carried out at the Orthopaedics Department, Shaikh Zayed Hospital Lahore and Ibn e Siena Hospital & Research Institute Multan from August 2010 to August 2013.

Materials and Methods: 110 patients with hip fractures fulfilling the criteria were included,55 patients in each group were randomized. Patients in group A were having cemented hemiarthroplasty and in group B were having uncementedhemiarthroplasty respectively. After surgery all patients were mobilized as soon as they were able. All patients were reviewed at 12 weeks follow up using a pain scale of one to six and a mobility scale of zero to nine.

Results: In group A, the preoperative mean pain score was 5.91±0.29 and postoperative mean residual pain score at 12 weeks was 2.73±0.45. In group B, the preoperative mean pain score was 5.91±0.29 and postoperative mean residual pain score at 12 weeks was 3.00±0.64. P value 0f 0.000 was significant in the favor of cemented hemiarthroplasty.

In group A, the preoperative (before fracture) mean mobility score was 7.20±0.75 and postoperative mean reduction in mobility score at 12 weeks was 2.80±0.76. In group B, the preoperative (before fracture) mean mobility score was 7.20±0.75 and postoperative mean reduction in mobility score at 12 weeks was 3.20±0.76. P value 0f 0.000 was significant in the favor of cemented hemiarthroplasty.

Conclusion: The use of cemented hemiarthroplasty lead to less pain in the hip and improved return of mobility as compared to an uncemented prosthesis.

Key Words: Hip Fractures, Hip Prosthesis, Femoral Neck Fractures

INTRODUCTION

Hip fractures are relatively common injuries in elderly people. The incidence of hip fractures is increasing as the general life expectancy of the population has increased significantly during the past few decades. More than 280,000 hip fractures occur in the United States every year and this incidence is expected to double by 2050.[1] These fractures are associated with substantial morbidity and mortality.[2]

These fractures in elderly individuals occur mostly due to moderate or minimal trauma.[3,4]The goal of treating hip fractures is to return patients to their pre-fracture levels of function without long-term disability. The advantages of prosthetic replacement allow immediate weight bearing to return elderly patients to the activity and help avoid complications of recumbency and inactivity.[5,6]

Displaced intracapsular hip fractures in elderly individuals are commonly treated by hemiarthrolpasty. The two most common types of hemiarthroplasty used for treatment of a displaced intracapsular hip fracture are the uncemented Austin-Moore hemiarthroplasty and the cemented Thompson hemiarthroplasty.It is thought that cementing the prosthesis provide more secure fixation and may result in less residual pain and better functions.[7]

Most of the time uncementedhemiarthroplasty is preferred in our setup but it has been found in limited international literature that cemented hemiarthroplasty with Thompson prosthesis led to less pain, improved mobility and reduced hospital stay compared to an uncemented hemiarthroplasty with Austin-Moore prosthesis with no increase in mortality related to use of cement.[8,9,10,11,12]

Austin Moore and Thompson Prosthesis

The continued use of a mixture of uncemented and cemented prosthesis reflects uncertainty as to the relative advantages and disadvantages of using bone cement.[13,14] Keeping in view the limited evidence of improved functional outcome with cemented over uncemented prosthesis in worldwide literature, and limited or perhaps no study regarding this have been found in our setup, we have decided to conduct study on functional outcome of cemented versus uncemented hemiarthroplasty for intracapsular hip fractures.

MATERIALS AND METHODS

We undertook a randomized controlled trial of 110 patients with a displaced intracapsular fracture of the hip to determine the functional outcome of cemented versus uncemented hemiarthroplasty. The study was carried out at the Orthopaedics Department, Shaikh Zayed Hospital Lahore and Ibn e Siena Hospital & Research Institute Multan. The duration of study was 3 year from August 2010 to August 2013.

After approval from the hospital ethical committee, 110 patients with hip fractures fulfilling the criteria admitting through outpatient and emergency department were included. Written informed consent, demographic information, history and examination were taken. 55 patients in each group were randomized by the opening of a sealed opaque numbered envelope, prepared by a person independent of the study, containing detail of the procedure to be undertaken. Patients in group A were having cemented hemiarthroplasty and in group B will be having uncementedhemiarthroplasty respectively. All operations were performed or supervised by the same orthopaedic surgeon and by a standard lateral approach. Same Brand of Austin Moore and Thompson prosthesis with cement was used in all patients. Standard techniques were used for cement when femur has been prepared by reaming and saline irrigation. All patients received perioperative antibiotic prophylaxis and 14 days of low molecular weight heparin as thrombo-embolic prophylaxis. After surgery all patients were mobilized as soon as they were able, with no restriction on hip movements or weight bearing.

All patients were reviewed at four, eight and twelve weeks in outpatient department after the surgery. For the follow up assessment, pain was assessed using a pain scale of one to six. All patients' pre and postoperative mobility was assessed using a mobility scale of zero to nine. All assessments were recorded on especially designed proforma.

Inclusion Criteria:

1. Displaced intracapsular hip fracture (Garden type III and IV)
2. Patient age > 60
3. Both genders

Exclusion Criteria:

1. Patients with pathological hip fractures
2. Previous treatment to same hip for a fracture
3. Patient with significant arthritis of the hip assessed radiologically

All the collected information were entered into SPSS version 17 for the analysis of data. The quantitative variables like age, residual pain score and mobility score were presented as mean and standard deviation. The qualitative variables like gender were presented as frequency and percentage. Mobility score was calculated preoperatively (i-e before fracture) and at 12 weeks post-operatively to calculate mean reduction in mobility score.

Pain Scale (1 – 6)

No pain	1
Occasional and slight pain	2
Pain when starting walking but getting better with occasional analgesia	3
No pain at rest, pain with activities, frequent mild analgesia	4
Constant but bearable pain, stronger analgesia used occasionally	5
Constant pain with frequent strong analgesia	6

Mobility Scale (0 – 9)

Could they get about the house? Was the patient able to get out of the house? Could they do their shopping?	
Without any difficulty	3
On their own with an aid	2
Only with someone else help	1
Not at all, bed or chair bound	0

Variables of interest such as residual pain and reduction in mobility score in the two groups were compared using t-test taking p value ≤ 0.05 as significant.

RESULTS

110 patients were divided into two groups i.e. A and B. In group A cemented hemiarthroplastyandin group B uncementedhemiarthroplasty was done. The mean age of the patients in group Awas 68.44±6.73 year andin group B was 71.24±8.73 year. (Table 1)

In group A, 35 (63.6%) patients were male and 20 (36.4%) patients were female. In group B, 29 (52.7%) patients were male and 26 (47.3%) patients were female. (Table 1)

In group A, thepreoperative mean pain score was 5.91±0.29and postoperative mean residual pain score at 12 weeks of follow up was 2.73±0.45. In group B, the preoperative mean pain score was 5.91±0.29 and postoperative mean residual pain score at 12 weeks of follow up was 3.00±0.64. P value 0f 0.000 was

significant in the favor of cemented hemiarthroplasty. (Table 2 & 3)

In group A, the preoperative (before fracture) mean mobility score was 7.20±0.75 and postoperative mean reduction in mobility score at 12 weeks of follow up was 2.80±0.76.In group B, the preoperative (before fracture) mean mobility score was 7.20±0.75 and postoperative mean reduction in mobility score at 12 weeks of follow up was 3.20±0.76. P value 0f 0.000 was significant in the favor of cemented hemiarthroplasty. (Table 2 & 3).

Table No 1: Mean Age and Gender Distribution in Group A (Cemented)and Group B (Uncemented)

	Group A (Cemented)	Group B (Uncemented)
Number of Patients	55	55
Mean Age (Std. Deviation)	68.44 (6.738)	71.24 (8.737)
Male (%)	35 (63.6%)	29 (52.7%)
Female (%)	20 (36.4%)	26 (47.3%)

Table No 2. Preoperative Mean Pain Score and Mean Mobility Score in Group A(cemented) and Group B(uncemented)

Preoperative	Group A (Cemented)	Group B (Uncemented)
Mean Pain Score	5.91±0.29	5.91±0.29
Mean Mobility Score (before fracture)	7.20±0.75	7.20±0.75

Table No 3: Postoperative Mean Residual Pain Score and Mean Reduction in Mobility Score in Group A (Cemented) and Group B (Uncemented)

Postoperative Outcome (12 weeks follow up)	Group A	Group B	P-value
Mean Residual Pain Score	2.73±0.449	3.00±0.638	0.00
Mean Reduction in Mobility Score	2.80±0.755	3.20±0.755	0.00

Table No 4: Paired Samples Correlations after t-test

		N	Correlation	Sig.value after T test
Pair 1	Residual Pain Score Group A & Residual Pain Score Group B	55	0.258	0.004
Pair 2	Mobility Score Group A & Mobility Score Group B	55	-0.156	0.013

DISCUSSION

This study is the first randomised trial to date on this topic in Pakistan and confirms the results of the previous international studies of patients with an intracapsular hip fracture which found that a cemented hemiarthroplasty leads to less residual pain and a better return of mobility than an uncemented prosthesis.[15] We were able to demonstrate that the marginally increased operation time and the potential operative complications associated with cement were not detrimental. Indeed, the reverse was true, with a clear trend to fewer general medical complications, fewer re-operations and a shorter hospital stay with the cemented prosthesis. The most important outcomes measured were pain and return of function.

The first hip fracture endoprostheses were designed for cementless use, but cemented fixation has become the preferred technique with current femoral components. Numerous reports have documented improved outcomes with cemented implants. The outcome of secondary surgery, particularly revision of the implant, was not significantly different between the two groups, although there was a tendency to more revision arthroplasties in the uncemented group.

Previously published randomised trials comparing cemented and uncementedhemiarthroplasties for patients with a fracture of the hip have been identified and summarized in the Cochrane Review on this subject. Sonne-Holm, Walter and Jensen, in 1982, compared the results of a cemented and an uncemented Austin-Moore hemiarthroplasty in 112 patients.[16]There was no difference in mortality between the two groups. Better walking ability and less pain was observed in those treated with the cemented prosthesis. Similar findings were recorded in a later study of 50 patients which compared a cemented and an uncemented bipolar hemiarthroplasty.[17]There was no difference in mortality between the groups, but significantly less pain in those treated with the cemented prosthesis. Walking ability was also superior with the cemented prosthesis.

Santini et al also compared a cemented and an uncemented bipolar hemiarthroplasty in 106 patients.[18] Again, there was no difference in mortality or functional activity between the two groups. Two studies involving a total of 190 patients compared a cemented with an uncemented Thompson prosthesis. Bothreported no statistically significant difference between the groups for mortality, and significantly more residual pain in those treated with an uncemented prosthesis.[19,20]

Branfoot, Faraj and Porter also compared a cemented with an uncemented Thompson prosthesis in 91 patients and reported no significant difference in mortality.[21]The mean pain scores in the 70 surviving patients tended to be higher, indicating more pain, for the uncemented

prosthesis, although the results were not statistically significant.

We chose the two prostheses used in this study as they are currently the most commonly used in the practice. It is possible that a modern uncemented prosthesis, perhaps with hydroxyapatite coating may produce superior outcomes to the uncemented Austin-Moore prosthesis which we used, but this remains to be proved in a randomized controlled trial. The only study that has compared an uncemented Austin-Moore with a hydroxyapatite-coated Furlong prosthesis in 84 patients was too small to make any definite conclusions on any difference between the two implants.[22]

In summary, this study found that a cemented Thompson hemiarthroplasty led to less pain in the hip, improved return of mobility and a reduced hospital stay compared to an uncemented Austin-Moore prosthesis. There was no increase in complications or mortality related to the use of cement.

CONCLUSION

Our study found that a cemented Thompson hemiarthroplasty led to less pain in the hip and improved return of mobility compared to an uncemented Austin-Moore prosthesis. There was no increase in complications or mortality related to the use of cement. In conjunction with previous studies which have also reported improved outcomes for a cemented rather than an uncementedhemiarthroplasty, we suggest that when a hemiarthroplasty is used for a fracture of the hip it should be cemented in place.

REFERENCES

1. Leighton RK. Fractures of the neck of femur. In: Bucholz RW, Heckman JD, Court-Brown CM, editors. Rockwood and green's fractures in adults. Philadelphia: Lippincott;2006.p.1753.
2. Lavelle DG. Fractures and dislocations of the hip. In: Canale ST, Beaty JH, editors. Campbell's operative orthopaedics. Philadelphia: Mosby; 2008. p. 3237.
3. Stevens JA, Olson S. Reducing falls and resulting hip fractures among older women. MMWR Recomm Rep 2000;49:3-12.
4. Mamji F, Hasan JA, Sabri S. Risk factors for osteoporosis in post-menopausal women with hip fractures. J Surg Pak 2010;15:82-6.
5. Hayat K, Ashfaq K, Tago IA, Bhatti A, Minhas S, Mehboob G. Factors related to development of traumatic osteonecrosis of femoral head. J Pak Orthop Assoc 2008;20:108-13.
6. Shafee M, Asghar M, Tariq MA. Pauwel`s osteotomy and oseosynthesis; Its use in patients with nonunion of femoral neck fractures. Prof Med J 2007;14:89-97.
7. Parker MI, Pryor G, Gurusamy K. Cemented versus uncementedhemiarthroplasty for intracapsular hip fractures: A randomised controlled trial in 400 patients. J Bone Joint Surg Br 2010;92:116-22.
8. Figved W, Opland V, Frihagen F, Jervidalo T, Madsen JE, Nordsletten L. Cemented versus uncementedhemiarthroplasty for displaced femoral neck fractures. Clin Orthop Relat Res 2009;467: 2426-35.
9. Vochteloo AJ, Niesten D, Riedijk R, Rijnberg WJ, Bolder SB, Koëter S, et al. Cemented versus non-cemented hemiarthroplasty of the hip as a treatment for a displaced femoral neck fracture: Design of a randomised controlled trial. BMC Musculoskeletal Disorders 2009;10:56.
10. Khan RJ, MacDowell A, Crossman P, Datta A, Jallali N, Arch BN, Keene GS. Cemented or uncementedhemiarthroplasty for displaced intracapsular femoral neck fractures. Int Orthop 2002;26:229–32.
11. Khan RJ, MacDowell A, Crossman P, Keene GS. Cemented or uncementedhemiarthroplasty for displaced intracapsular fractures of the hip: A systematic review. Injury 2002;33:13-7.
12. Foster AP, Thompson NW, Wong J, Charlwood AP. Periprosthetic femoral fractures--a comparison between cemented and uncemented hemiarthroplasties. Injury 2005;36:424-9.
13. Lennox IA, McLauchlan J. Comparing the mortality and morbidity of cemented and uncementedhemiarthroplasties. Injury 1993;24: 185–6.
14. Singh GK, Deshmukh RG. Uncementedaustin-moore and cemented thompson unipolar hemiarthroplasty for displaced fracture neck of femur--comparison of complications and patient satisfaction. Injury 2006;37:169-74.
15. Parker MJ, Gurusamy K. Arthroplasties (with and without bone cement) for proximal femoral fractures in adults. (Cochrane Review). The Cochrane Library, Chichester: Wiley; 2006.
16. Sonne-Holm S, Walter S, Jensen JS. Moore hemi-arthroplasty with and without bone cement in femoral neck fractures: a clinical controlled trial. Acta Orthop Scand 1982;53:953-6.
17. Dorr LD, Glousman R, Sew Hoy AL, Vanis R, Chandler R. Treatment of femoral neck fractures with total hip replacement versus cemented and noncementedhemiarthroplasty. J Arthroplasty 1986;1:210-18.
18. 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 2005;6:80-7.

19. Anderson GH, Dias JJ, Hoskinson J, Harper WM. A randomized study of the use of bone cement with thompson's prosthesis in the treatment of intracapsular fractures of the femoral neck. J Bone Joint Surg 1992;74:132-3.
20. Emery RJH, Broughton NS, Desal K, Bulstrode CJK, Thomas TL. Bipolar hemiarthroplasty for subcapital fracture of the femoral neck: a prospective randomized trial of cemented Thompson and uncemented Moore stems. J Bone Joint Surg 1991;73:322-4.
21. Branfoot T, Faraj AA, Porter P. Cemented versus uncementedthompson's prosthesis: A randomised prospective functional outcome study. Injury 2000;31:280-1.
22. Livesley PJ, Srivastiva VM, Needoff M, Prince HG, Moulton AM. Use of a hydroxyapatite-coated hemiarthroplasty in the management of subcapital fracture of the femur. Injury 1993;24:236-40.

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