

Comparative Treatment Between Total Hip Arthroplasty Versus Hemiarthroplasty for Femoral Neck Fracture in Elderly: A Systematic Review and Meta-analysis

Cokorda Gde Oka Dharmayuda¹, I Nyoman Yuda Raditya²

¹Consultant of Department of Orthopaedic and Traumatology Sanglah General Hospital/ Faculty of Medicine, Udayana University, Denpasar, Bali, Indonesia

²Resident of Department of Orthopaedic and Traumatology Sanglah General Hospital/ Faculty of Medicine, Udayana University, Denpasar, Bali, Indonesia

Corresponding Author: Cokorda Gde Oka Dharmayuda

DOI: <https://doi.org/10.52403/ijhsr.20220715>

ABSTRACT

Introduction: Hip fractures are leading cause of disability worldwide, with displaced femoral neck fractures being of particular concern. There's different opinion about advantages of performing total hip arthroplasty or hemiarthroplasty, recent meta-analysis reported that total hip arthroplasty (THA) was superior to hemiarthroplasty (HA) in terms of reoperations, but inferior in terms of dislocations.

Methods: We conducted a literature search of 4 databases to identify randomized controlled trials comparing THA and HA in patients. Focus in this systematic review and meta-analysis is to compare clinical outcome between Hemiarthroplasty versus Total Hip Arthroplasty for Femoral Neck Fracture

Results: We found that there is no significant difference statistically. We found no significant difference in the functional outcome between two groups between these two groups in Functional Outcome (Harris Hip Score), EQ-5D outcome, Complication Rate Outcome and Revision Rate Outcome between Total Hip Arthroplasty versus Hemiarthroplasty for Femoral Neck Fracture in elderly.

Discussion: The choice of THA or HA in FNF in the active elderly remains uncertain, although different opinion has been reported, in our systematic review, no significant difference was found in the functional outcome between two groups measured with

Conclusion: There was no differences on functional outcome and EQ-5D between Total Hip Arthroplasty and Hemiarthroplasty on Femoral Neck Fracture in elderly

Keywords: [Total Hip Arthroplasty, Hemiarthroplasty, Femoral Neck Fracture]

INTRODUCTION

Hip fractures are a global health problem, the incidence of which is increasing over time. The incidence of hip fractures in Asian countries will increase from more than 1 million people per year in 1990 to more than 6 million by 2050. Femoral neck fractures (FNFs) are a major type of hip fracture, treated with internal fixation, Hemiarthroplasty (HA) or Total Hip

Arthroplasty (THA). Internal fixation is a preferred management option for the young or elderly who are intolerant to prosthetic surgery, THA are widely used in elderly FNF. In general, HA has the advantages of shorter operative time, less blood loss, less technical requirements, less economic burden and lower dislocation rate. 1

With increasing life expectancy and activity levels, today's older adults have a higher

need for adequate hip function and a higher risk of joint erosion following arthroplasty than in the past. Seems to favor the THA trick. 1

Due to the frailty and reduced physical demands of older people over the age of 75, there remains concern as to whether greater surgical trauma and higher dislocation rates outweigh the benefits of THA. Therefore, the choice of THA or HA in FNF for this population remains uncertain. Previous meta-analyses did not include strict age limits. Some of these studies also included patients who were unable to walk independently and who received polycarbonate uretan (PCU) THA. This increases non-uniformity and complicates them depending on the application. Findings of elderly patients. The purpose of this study is to compare the efficacy and safety of HA and THA in active elderly people aged 75 years and older, using the latest evidence from previously conducted RCTs. 1

MATERIALS & METHODS

Search Strategy

A systematic review was conducted in accordance to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Figure 1). A comprehensive literature search was performed to gather a full-length, peer-reviewed paper in English on comparison of clinical outcome between Hemiarthroplasty versus Total Hip Arthroplasty for Femoral Neck Fracture in Elderly. We searched PubMed, Google Scholar, and Cochrane Library. The focus in this systematic review and meta-analysis is to compare clinical outcome between Hemiarthroplasty versus Total Hip Arthroplasty for Femoral Neck Fracture in Elderly. Keywords in the search matched the MeSH rule and term used are (“Femoral Neck Fracture”), AND (“Hemiarthroplasty”), AND (“Total Hip Arthroplasty”).

Inclusion Criteria

This study included unique articles providing details regarding (1) clinical investigations of Femoral Neck Fracture

(single-bundle or double-bundle) utilizing Hemiarthroplasty and (2) studies straightforwardly contrasting results of Hemiarthroplasty versus Total Hip Arthroplasty. All strategies were essential tendon reproductions performed for indicative Femoral Neck Fracture.

Quality Evaluation

Assessment of study quality and risk of bias assessed using criteria developed by the Oxford Center for Evidence-based Medicine, perspicacity defined by the Grades of Recommendation Assessment, Development and Evaluation (GRADE) Working Group, and sanction made by the Agency for Healthcare Research and Quality (AHRQ). While the class of evidence is categorized into "class I" for good quality RCT, "class II" for moderate to poor quality RCT and good quality cohort, "class III" for moderate or poor-quality cohorts and case-control studies, "class IV" for the case series.

RESULT

Literature Search, Study Selection and Study Characteristics

The electronic research resulted in 236 records from various databases. After the process of identification, screening, eligibility, duplication elimination, and exclusion, the remaining 4 studies were included in qualitative and quantitative synthesis. The remaining articles were excluded due to lack of mean and standard deviation data and did not meet the inclusion and exclusion criteria.

Statistical Analysis

We utilized the Review Manager version 5.3 software (RevMan; The Cochrane collaboration Oxford, England) to perform all statistical analyses. Based on heterogeneity of the current study, we performed a sensitivity analysis to further assess the overall results. The heterogeneity across studies was examined through the I² statistic describing as follows: low, 25% to 50%; moderate 50% to 75%; or high >75%. We applied the fixed-effect models to calculate the total MDs/ORs when low

heterogeneity was seen in studies. In other cases, we used the random effects model. Studies with a P values less than .05 were thought to have statistical significance. Forest plots showed the findings of out meta-analysis.

Functional outcome

We performed a subgroup analysis to evaluate functional outcome (Harris Hip Score) between Total Hip Arthroplasty versus Hemiarthroplasty for Femoral Neck Fracture in elderly. We found that there is no significant difference statistically between these two groups in Functional Outcome.

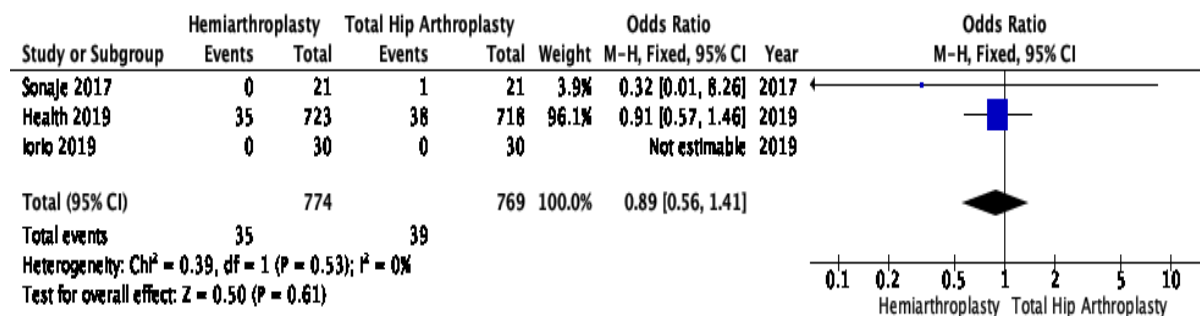


Figure 1. Pooled analysis of Functional Outcome (Harris Hip Score)

EQ-5D outcome

We performed a subgroup analysis to evaluate EQ-5D outcome between Total Hip Arthroplasty versus Hemiarthroplasty for Femoral Neck Fracture in elderly. From

three studies added in this subgroup analysis, we found no statistically difference in between those two groups for the EQ-5D outcome.

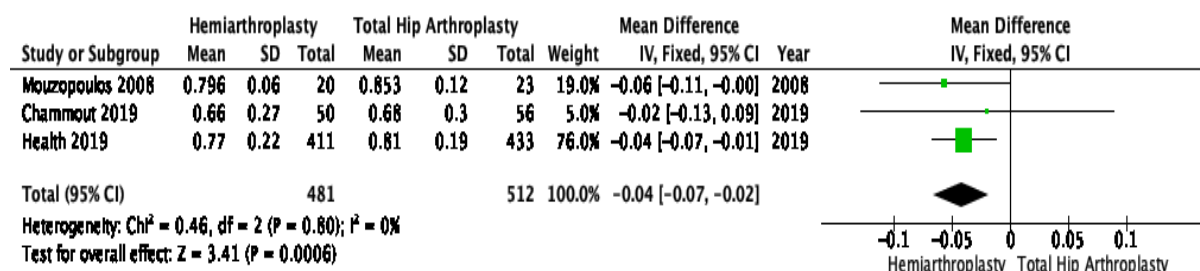


Figure 2. Pooled analysis of EQ-5D outcome

Complication Rate Outcome

Four studies (n = 501) report the complication rate at 1 to 5 years of follow-up. We found that HA has lower complication rate than THA. (RR= 1.25,

95% CI 0.94-1.65, p= 0.12), with low heterogeneity ($I^2 = 36\%$). Statistically the outcome of complication rate is higher on THA than HA.

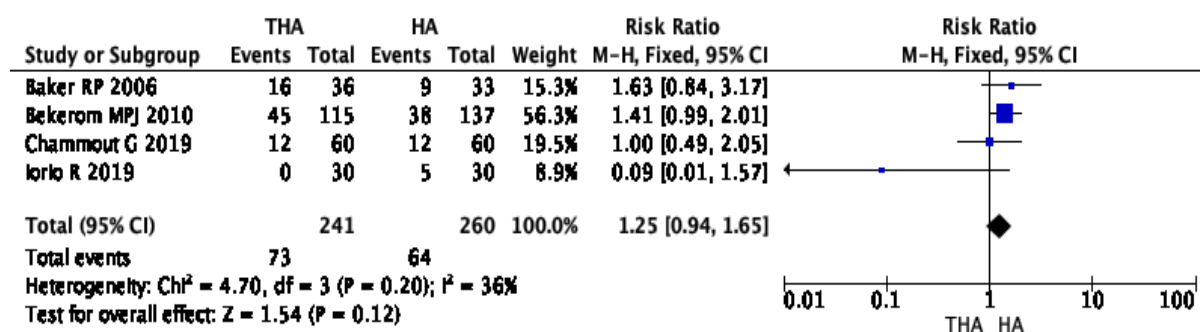


Figure 3. Forest Plot of Complication Rate between THA and HA

Revision Rate Outcome

Four studies (n = 513) reported risk of post-operative revision at 1 to 5 years.2–5. THA has lower revision rate than HH. (RR = 0.29, 95% CI = 0.10- 0.87, p = 0.03),

without heterogeneity (I2 = 0%). From that studies we found no significant difference between THA and HA in order of revision surgery.

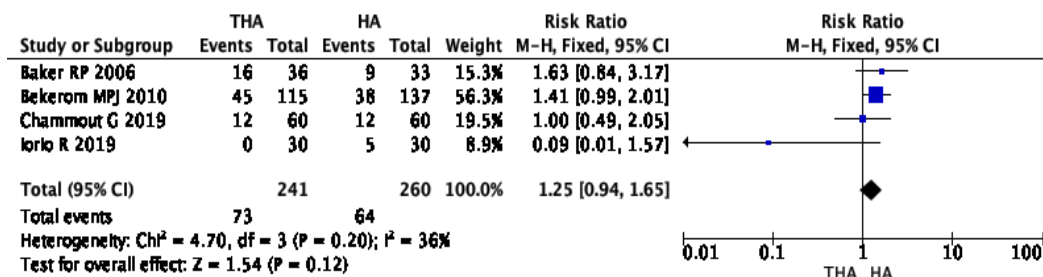


Figure 4. Forest Plot of Revision Rate between THA and HA

DISCUSSION

The choice of THA or HA in FNF in the active elderly remains uncertain. This systematic review and meta-analysis, which incorporates all available RCT evidence, demonstrates results that are consistent across the large body of the evidence to date. Based on the findings of this review, it is likely (moderate certainty evidence) that there is no clinically important difference between HA and THA. There is likely a small difference in functional outcome THA and a small difference in EQ-5D HA that may, or may not, be important.

With regard to patients' daily function, the point estimate for functional outcome, assessed in THA. The results, therefore, provide scant support for the use of THA in elderly patients in order to achieve a benefit in function in the short to medium-term. The pooled estimate did reveal a no significant but small benefit in favor of THA.

We found no significant difference in the functional outcome between two groups, which was supported by all the RCTs included. 6

Sonaje et al evaluated the functional outcome of BHA and THR in femoral neck fractures in elderly Indian patients, and we found that BHA compared with THR in terms of functional outcome calculated by MHH at the end of 2 years and can be considered a very high cost. -Effective treatment in developing countries. 7

Iorio et al. Showed sensitivity analyses wherein sufferers with inside the overall hip arthroplasty organization who had been misplaced to follow-up had been assumed to have had a danger of a number one occasion that turned into as much as four instances as excessive because the danger amongst people with whole follow-up did now no longer modify our primary findings. Data on function at some point of follow-up had been incomplete; 82.9% of sufferers finished at the least one follow-up questionnaire over 24 months, with whole facts from follow-up questionnaires to be had for 46.8% of sufferers at one year and for 42.1% of patients at 24 months. four Iorio et al Results from this look at spotlight that THA with DMC can be a higher answer than HA in sufferers with dementia; we suggested promising effects with reference to dislocation and reoperation fee after DMC THA. 8

Chanmout et al. showed no difference in outcome after treatment with hip arthroplasty or total hip arthroplasty in active October subjects and adolescents with displaced femoral neck fractures within 2 years after surgery. Cervical spondylectomy is an appropriate short-term intervention for this group of patients. 4

Mouzopoulos et al. showed to include patients 70 years of age and older, who had good cognitive status and moderate

dependence. In conclusion, we recommend total arthroplasty as the treatment of choice for subalveolar displacement hip fractures.

10

For the complication rate outcomes, we found on four studies show that HA is having lower complication rate than THA, however the result is not significant and might need further research. Meanwhile, the outcome of the revision rate between THA and HA shows that THA has lower revision rate. This could be due to the higher rate of acetabular erosion that need revision.²⁻⁵ From this meta-analysis, it seems that the result is more prone to no clinical important complication rate and of THA and HA up to 5 years of follow-up or function. While the revision for HA is higher than THA.

The author conducted analysis of patient based outcomes that use available and optimal related evidence for those who can be benefitted. There are some limitations of this study due to the data limitations. However, the outcomes result is quite satisfying.

CONCLUSION

There were no differences on functional outcome and EQ-5D between Total Hip Arthroplasty and Hemiarthroplasty on Femoral Neck Fracture in elderly. The statistical significancy of complication rate resulting in no difference outcome. However, THA is having less revision rate other than HA.

Acknowledgement: Authors thanks to all who participate in this study.

Conflict of Interest: There is no conflict of interest in this study.

Source of Funding: None.

Ethical Approval: Not required.

REFERENCES

1. Liu Y, Chen X, Zhang P, et al. Comparing total hip arthroplasty and hemiarthroplasty for the treatment of displaced femoral neck fracture in the active elderly over 75 years old: A systematic review and meta-analysis of randomized control trials. *Journal of Orthopaedic Surgery and Research* 2020; 15: 1–12.
2. Baker BR, Squires B, Cargan M, et al. Total Hip Arthroplasty And Hemiarthroplasty In Mobile, Independent Patients With A Displaced Intracapsular Fracture Oe The Femoral Neck A Randomized, Controlled Trial. 2006.
3. Iorio R, Iannotti F, Mazza D, et al. Is dual cup mobility better than hemiarthroplasty in patients with dementia and femoral neck fracture? A randomized controlled trial. *SICOT J*; 5. Epub ahead of print 2019. DOI: 10.1051/sicotj/2019035.
4. Chammout G, Kelly-Pettersson P, Hedbeck C-J, et al. HOPE-Trial: Hemiarthroplasty Compared with Total Hip Arthroplasty for Displaced Femoral Neck Fractures in Octogenarians. *JBJS Open Access* 2019; 4: e0059.
5. van den Bekerom MP, Hilverdink EF, Siersevelt IN, Reuling EM, Schnater JM, Bonke H, Goslings JC, van Dijk CN, Raaymakers EL. A comparison of hemiarthroplasty with total hip replacement for displaced intracapsular fracture of the femoral neck: a randomised controlled multicentre trial in patients aged 70 years and over. *J Bone Joint Surg Br.* 2010 Oct;92(10):1422-8. doi: 10.1302/0301-620X.92B10.24899. Erratum in: *J Bone Joint Surg Br.* 2011 Jan;93(1):140. PMID: 20884982.
6. Ekhtiari S, Gormley J, Axelrod DE, et al. Total Hip Arthroplasty Versus Hemiarthroplasty for Displaced Femoral Neck Fracture: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *The Journal of bone and joint surgery American volume* 2020; 102: 1638–1645.
7. Sonaje JC, Meena PK, Bansawal RC, et al. Comparison of functional outcome of bipolar hip arthroplasty and total hip replacement in displaced femoral neck fractures in elderly in a developing country: a 2-year prospective study. *European Journal of Orthopaedic Surgery and Traumatology* 2018; 28: 493–498.
8. Iorio R, Iannotti F, Mazza D, et al. Is dual cup mobility better than hemiarthroplasty in patients with dementia and femoral neck fracture? A randomized controlled trial.

- Sicot-J; 5. Epub ahead of print 2019. DOI: 10.1051/sicotj/2019035. International Orthopaedics 2008; 32: 367–373.
9. Umemoto S, Kamiya A, Matsuzaki M, et al. COPE trial. Nippon rinsho Japanese journal of clinical medicine 2006; 64 Suppl 6: 470–474.
10. Mouzopoulos G, Stamatakos M, Arabatzi H, et al. The four-year functional result after a displaced subcapital hip fracture treated with three different surgical options. *Int J Health Sci Res.* 2022; 12(7):109-114. DOI: <https://doi.org/10.52403/ijhsr.20220715>
