International Journal of Health Sciences and Research
Vol.12; Issue: 8; August 2022
Website: www.ijhsr.org
Review Article *ISSN: 2249-9571*

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

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DOI: https://doi.org/10.52403/ijhsr.20220810

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 statistically significant difference between these two groups in Functional Outcome (Harris Hip Score) 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 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,

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

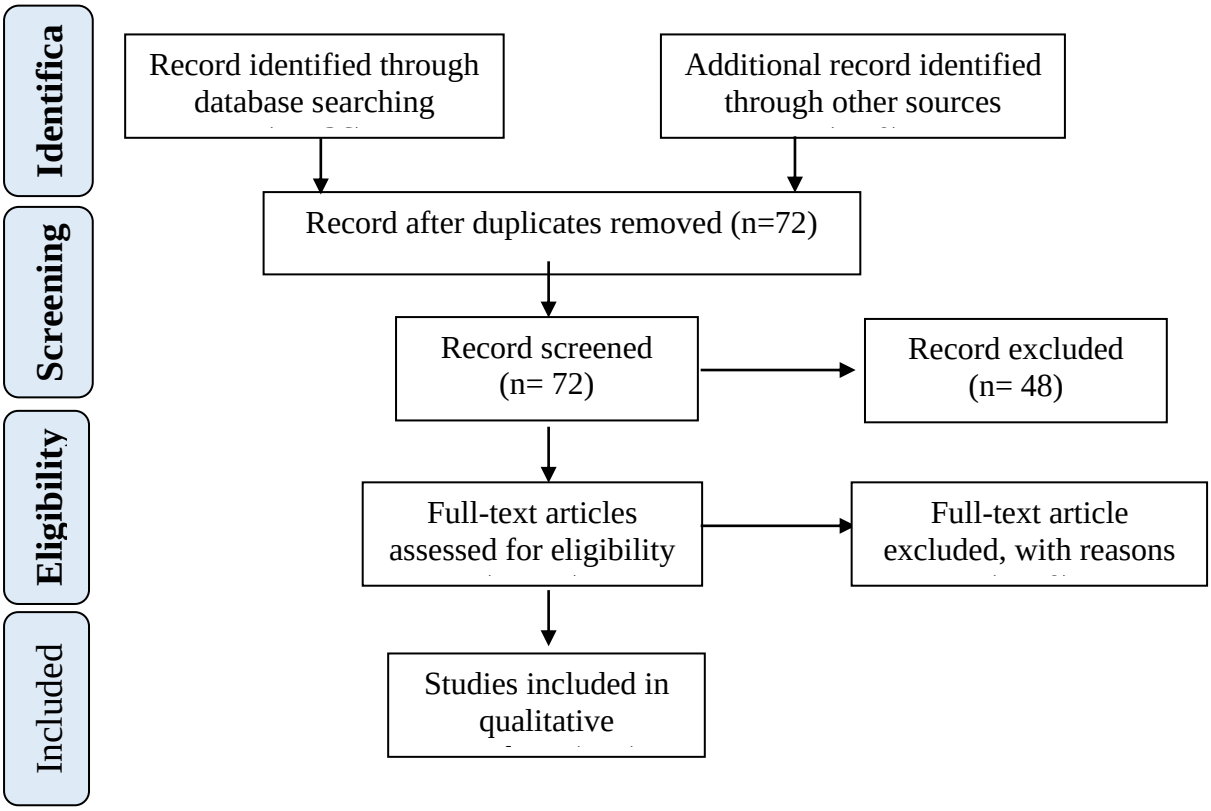
need for adequate hip function and a higher risk of joint erosion following arthroplasty than in the past. Seems to favor the THA trick. [1]

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 urethane (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 AND METHOD

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 I^2 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.

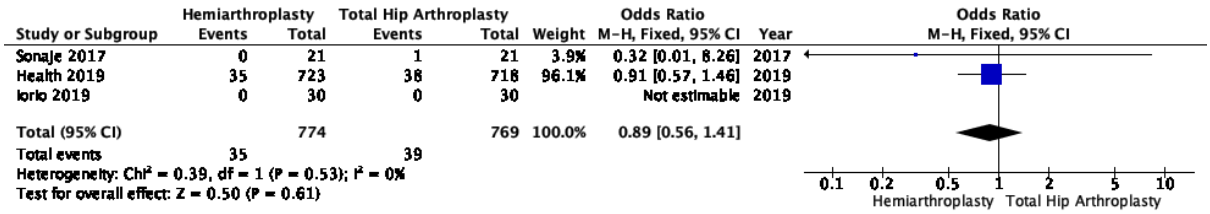


Figure 1 Pooled analysis of Functional outcome (Harris Hip Score)

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.

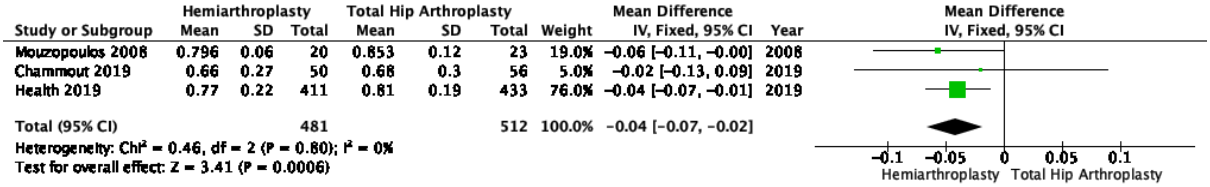


Figure 2 Pooled analysis of EQ-5D outcome

Table 1 List of studies included

No	Reference	Journal	Study Design	Level of Evidence
1	Sonaje *et al*, 2017	Eur J Orthop Surg Traumatol	A Prospective Randomized Controlled Study	I
2	Health *et al*, 2019	The New England Journal of Medicine	Randomized Controlled Trial	I
3	Chammout *et al*, 2019	The Journal of Bone and Joint Surgery	Randomized Controlled Trial	I
4	Iorio et al, 2019	SICOT-J	Randomized Controlled Trial	I
5	MouzoPoulus *et al*, 2008	International Orthopaedics Journal	Randomized Controlled Trial	I

Table 2 Characteristic of Patients

No	Reference	Total Sample Size	Treatment Protocol		Mean age (SD)		Gender Male/Female ratio	
			Hemiarthroplasty	Total Hip Arthroplasty	Hemiarthroplasty	Total Hip Arthroplasty	Hemiarthroplasty	Total Hip Arthroplasty
1	Sonaje *et al*, 2017	40 patients	20	20	65.3 (61-73)	66.4 (60-74)	Males: 6 Females: 14	Males: 7 Females: 13
2	Health *et al*, 2019	1441 patients	723	718	78.6 ± 8.6	79.1 ± 8.3	Males 223/722 Females 499/722	Males 208/718 Females 510/718
3	Chammout *et al*, 2019	120 patients	60	60	86 ± 4 years	85 ± 4 years	Males 15/60 Females 45/60	Males 15/60 Females 45/60
4	Iorio et al, 2019	60 patients	30	30	83	82	Males 13/30 Females 17/30	Males 12/30 Females 18/30
5	MouzoPoulus *et al*, 2008	129 patients	34	37	74.23 ± 3.77	73.07 ± 4.93	Males 10/34 Females 24/34	Males 9/37 Females 28/37

Table 3 Outcome Characteristics

No.	Reference	Study Comparison	Follow up Duration	Clinical outcomes	Complications
1.	Sonaje *et al*, 2017	To comparison of functional outcome of bipolar hip arthroplasty and total hip replacement in displaced femoral neck fractures in elderly in developing jcountry	24 months	Functional outcome by modified harris hip scoring Blood loss Criteria of pain Distribution of sample on basis of function Range of motion Duration operation Cost effective	- acetabular erosion
2.	Health *et al*, 2019	To compare the efficacy of hemiarthroplasty compared with total hip arthroplasty for displaced femoral neck fravtures in octogenarians	24 months	WOMAC total score WOMAC pain score WOMAC function score EQ-5D utility index score EQ-5D VAS score	

3.	Chammout *et al*, 2019	The purpose of this study is to compare the functional outcome and donor site morbidity between the peroneus tendon and hamstring tendon in ACL reconstruction	3 months 12 months 24 months	Harris hip score EQ-5D Pain numerical rating scale Activities of daily living	Dislocation Superficial infection Deep periprosthetic infection Non healing fracture Pneumonia Pulmonary embolism Myocardial infarct Cerebral vascular lesion Acute kidney failure
4.	Iorio et al, 2019	The purpose of this study is to compare dislocation rates of DMC THA with hemiarthroplasty (HA) in elderly patients with displaced FNF and a diagnosis of dementia.	24 months	Dislocation Re-operation Length of surgery Duration of stay 30 days mortality 1 year mortality	
5.	MouzoPoulus *et al*, 2008	The purpose of this study is to determine the correlation between surgical treatment of hip fracture and postoperative function in the elderly	48 months	Barthel Index Score Harris Hip Score Range of passive hip motion Gait speed of individuals	

Table 4. Characteristic of Outcome of studies

No	**Reference**	**Outcome Measure**				
		Harris Hip Score	**Pain**	**Range of Motion**	**Fungctional Score**	**EQ-5D**
1	Sonaje *et al*, 2017	BHA Mean ± SD 83.85 ± 6.62 THR Mean ± SD 88.00 ± 5.76	BHA Mean ± SD 40.2 ± 3.94 THR Mean ± SD 41.6 ± 2.01	BHA Mean ± SD 4.3 ± 0.80 THR Mean ± SD 4.6 ± 0.50	BHA Mean ± SD 35.35 ± 6.50 THR Mean ± SD 37.8 ± 5.61	
2	Health *et al*, 2019	-	Total Hip Arthroplasty 6 (0.8) Hemiarthroplasty 12 (1.7)	-	-	Mean Difference in Score at 24 Mo, Total Hip Arthroplasty vs. Hemiarthroplasty (99% CI) 0.04 (−0.03 to 0.11)
3	Chammout *et al*, 2019	Hemiarthroplasty 88 ± 12 (n = 59) Total Hip Arthroplasty 89 ± 10 (n = 60)	Hemiarthroplasty 0.4 ± 1.6 (n = 59) Total Hip Arthroplasty 0.38 ± 1.3 (n = 60)	-	-	Hemiarthroplasty 0.67 ± 0.34 (n = 59) Total Hip Arthroplasty 0.75 ± 0.26 (n = 60)
4	Iorio et al, 2019	-	-	-	Hemiarthroplasty 48 (42–63) THA 5.5 (5–7)	Hemiarthroplasty 59 (45–74) THA 6.1 (5–8)
5	Mouzopoulos *et al*, 2008	Total arthroplasty group 1 year : 81.6±4.9 4 years : 83.7±4.8 Hemi-arthroplasty group 1 year : 77.81±9.6 4 years : 79.5±6.5	-	-	Total arthroplasty group Prefracture function: 87.4±17.4 Function after 1 year : 84.8±14.8 Function after 4 years : 85.3±11.6 Hemi arthroplasty group Prefracture function : 81.05±8.95 Function after 1 year : 76.8±6.8 Function after 4 years : 79.6±6.3	-

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. [2]

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. [3]

Health et al. Showed sensitivity analyses wherein sufferers withinside 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. [5]

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. [6]

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. [7]

CONCLUSION

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

Acknowledgement: None

Conflict of Interest: None

Source of Funding: None

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How to cite this article: I Nyoman Yuda Raditya, Cokorda Gde Oka Dharmayuda. Comparative treatment of hemiarthroplasty between total hip arthroplasty versus hemiarthroplasty for femoral neck fracture in elderly: a systematic review and meta-analysis. *Int J Health Sci Res.* 2022; 12(8):71-77. DOI: *https://doi.org/10.52403/ijhsr.20220810*

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