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Comparison of Hip Functional Value and Quality of Life Between Cemented and Uncemented Hip Arthroplasty Patients

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Abstract

Introduction. Hip arthroplasty is aimed to reduce pain and restore hip joint function. Until now, the most optimal method for fixation in Hip Arthroplasty is controversial. The purpose of this study was to analyze the comparison of hip functional value and quality of life between cemented and uncemented hip arthroplasty patients.

Methods. This study used cross sectional design. Data were collected via medical record and SF-12 questionnaire and Oxford hip score in patients who have received hip arthroplasty at general hospital Dr. Moh. Hoesin Palembang.

Results: There were 43 cases found, consisting of 28 cemented cases and 15 uncemented cases. The average age was 60.42 ± 19.44 years with an age range of 24-88 years. 20 subjects (46.4%) and 23 subjects (53.5%) women. The most preoperative diagnosis was trauma / fracture (69.8%), followed by osteoarthritis (16.3%), osteonecrosis (4.7%). Previous normality tests have been done with the Sapiro-Wilk test and homogeneity test. A comparison of hip functional values between cemented and uncemented hip arthroplasty patients had a value of $p = 0.76$ ($p < 0.05$) meaning there was no significant difference. Comparison of quality of life between cemented and uncemented hip arthroplasty patients has a value of $p = 0.592$ ($p < 0.05$) which also means there is no significant difference.

Conclusion: There was no difference in pelvic functional value and quality of life between cemented and uncemented hip arthroplasty patients.

Keywords : hip functional value, quality of life, hip arthroplasty

Introduction

Hip arthroplasty is a procedure of replacing the hip joint with a prosthesis which aims to reduce pain and restore the function of the hip joint as before. Hip arthroplasty is divided into two types, namely total hip arthroplasty and hemiarthroplasty. Total hip arthroplasty (THA) is an orthopedic surgical procedure wherein the acetabulum cartilage is replaced with an artificial metal shell and the head and collum femur are replaced with a prosthesis i.e. an artificial sphere and stem which is also made of metal. Hemiarthroplasty is an orthopedic surgery process which is basically almost the same as total hip arthroplasty but what differs in hemiarthroplasty is only the head and collum femur which is replaced with a prosthesis, whereas the cartilage of the acetabulum is not replaced with prostheses. [1,2,4,5]

Hip arthroplasty is considered one of the greatest successes in orthopedic surgery in the 20th century. Total hip arthroplasty was first popularized in the early 1960s by Sir John Charnley and is a milestone in orthopedic surgery. At present, more than 350,000 hip and knee joint replacements are carried out each year in the United States and are expected to continue to increase. At present there is still not much research done on the results of the Hip Arthroplasty procedure in Indonesia in general and Palembang in particular.[4,5]

One indication for an arthroplasty on the pelvis is a patient with a neck of femur and proximal femur fracture. The incidence of these fractures increases with age and is the most frequent fracture in the elderly, especially at the age of 70-80 years. The incidence of neck femur fractures in the United States is 63.3 cases per 100,000 people per year for women and 27.7 cases per 100,000 people per year for men. The number of neck femur fractures in Palembang alone, based on research by Carol et al in 2014, amounted to 32 patients. These fractures are more common in Caucasian, postmenopausal women, and sufferers of osteoporosis, but they are also often caused by falls, traffic accidents, and low bone density due to other health problems such as diabetes mellitus, stroke, alcohol consumption and osteomalacia. [4.5]

At the beginning of hip arthroplasty surgery, age is a very important consideration in the selection of patients. With general uncertainties surrounding the survival and long-term success of implants, elderly patients are considered as prime candidates for hip arthroplasty. Younger patients are considered contraindicated. With increasing data on the long-term success of hip arthroplasty,

the indication continues to patients who are younger and more active. High intensity exercise, heavy lifting, and a high level of activity can cause implant failure earlier. Younger and more active patients and heavy workers must modify their activity levels to a far more moderate lifestyle to ensure the success and long-lasting implant life.

The classic technique for fixation of hip implants as described by Sir John Charnley involves the use of acrylic bone cement, polymethylmethacrylate (PMMA), for fixation of femoral and acetabular implants. Preliminary reports reveal the failure of excessive femoral stem fixation with the development of large periprosthetic radiolucent on evaluation radiographs. This process was initially thought to be a reaction to acrylic bone cement and is called cement disease. Cement disease is caused by particles that result from movement between prosthetic surfaces. These movements may include movements of the prosthetic head against polyethylene, movement between the modular femoral head and bone shafts, or the movement between the modular acetabular shell and its polyethylene liner. These particles cause macrophages and the release of giant prostaglandin (PG) E2 collagenase cells and other humoral factors, which result in bone absorption. This process is known as osteolysis and continues to be a major factor causing failure of hip arthroplasty with the use of bone cement.

There is controversy about hip arthroplasty fixation techniques, whether using cement or uncemented. Some studies state that there is no difference in implant resistance, between cement and uncemented techniques in hip arthroplasty. Another study states that there is no difference in functional effects and quality of life between hip arthroplasty with cement and uncemented. [4,11] There were very limited research that seeks to explore the impact of hip arthroplasty with cement and uncemented , especially related to function and quality of life.

Measurement of pelvic functional degrees is an assessment of the disability of patients undergoing hip arthroplasty. This indicates the success of the action taken. One way to assess the functional degree of the pelvis is to use the Oxford hip score questionnaire. Measurement of quality of life has been developing for more than 20 years. Quality of life scores are recognized as important measures in research, health care and treatment evaluation. This is often used to evaluate interventions and treatment side effects as well as the effects of diseases and other biological processes over time. To assess the quality of life of patients is to use the short form health survey -12 (SF-12) questionnaire. [9,10,12]

Methods

The study design was observational analytic with a cross-sectional study design. To analyze the comparison of pelvic functional values and quality of life between cemented and uncemented hip arthroplasty patients at general hospital Dr. Moh. Hoesin Palembang. This study was approved by the ethics committee of the Faculty of Medicine, Universitas Sriwijaya (No, 254 / kptfkunsri-rsmh / 2017). The inclusion criteria for the sample were patients who had undergone the hip arthroplasty procedure, had undergone hip arthroplasty surgery for at least 3 months and were willing to participate in the study. While the exclusion criteria are neoplasm patients and unable to communicate well. 12 samples were obtained for each observation group.

The functional value of the pelvis is determined by assessing the function and disability of the pelvis of patients who have undergone total hip arthroplasty, using an oxford hip score. Where the results of this assessment are grouped into damage if the score is 40-48, mild-moderate if the score is 30-39, moderate if the score is 20-29 and heavy if the score is 0-19. Meanwhile, to assess the quality of life using the short form health survey -12 (SF-12) questionnaire.

Data were analyzed using IBM SPSS 24. Descriptive data is presented with tables or graphs. In addition the data were analyzed to find the normality of data distribution using the Saphiro-Wilk test. If the normality test data $p > 0.05$ the data are normally distributed. The data are analyzed analytically to see the comparison of hip functional values and quality of life between cemented and uncemented hip arthroplasty patients using the unpaired T test and Chi-square test. The degree of significance used $p < 0.05$.

Results

On the demographic characteristics found the number of subjects with male sex is less than women, namely as many as 20 subjects (46.5%) of which 16 subjects used bone cement and 4 subjects without using bone cement. While as many as 23 women (53.5%) where 12 subjects used bone cement and 11 subjects without using bone cement, with a value of $p = 0.107$ ($p > 0.05$) or not significant. The average age of hip arthroplasty patients was 60.42 ± 19.44 years with the youngest age range being 24 years and the oldest age was 88 years. The mean age of cemented hip arthroplasty subjects was 62.54 (± 18.38) years, age range 24-88 years. Whereas the uncemented

hip arthroplasty subjects had an average age of 56.47 (± 21.38) years, age range 24-82 years with a value of p = 0.335 (p> 0.05) or not significant. The most age groups are 40-69 years age group with 18 subjects (41.8%), followed by 70-89 years age group with 16 subjects (37.2%) and 20-39 years with 9 subjects (20.93%) with a value of p = 0.390 (p> 0.05).

Table 1. Subject Characteristics

Variable	value	Hip Arthroplasty		p
		Cemented	Uncemented	
Age (years)	X(±SD)	62,54 (±18,38)	56,47 (± 21,38)	0,335
	range (Min-max)	24-88	24-82	
	20-39	5	4	0,390
	40-69	13	5	
	70-89	10	6	
Sex	Male	16	4	0,107
	Female	12	11	
Height (cm)	X(±SD)	162,64(±9,46)	16053(±6,76)	0,450
	Range (Min-max)	145-184	150-180	
Weight (Kg)	X(±SD)	62,46(±14,38)	53,87(±9,14)	0,043*
	Range (Min-max)	40 – 94	40 – 70	
BMI (Kg/M^2)	X(±SD)	23,42(±4,16)	20,99 (±3,35)	0,059
	range (Min-max)	15,6 – 33,1	15,8 – 27,3	
	Underweight	4	4	0,311
	Normal	13	9	
	Pre-obese	9	2	
	Obese	2	0	
Length of stay (days)	X(±SD)	6,4 (±2,6)	6,7 (±2,6)	0,642
	Range (Min-max)	3 – 13	4 – 14	
	Median	6	7	
Operation type	Total Hip Arthroplasty	23	14	0,403
	Hemi hip arthroplasty	5	1	
Diagnosis preoperation	Osteoarthritis	3	1	0,896
	Trauma / Fractur	20	10	
	AVN / Osteonecrosis	1	1	
	Lain-lain	4	3	

The mean length of hospital stay after surgery on the study subjects was 6.5 ± 2.6 days, with the shortest duration of treatment being 3 days and the longest being 14 days. Based on the Shapiro-Wilk normality test the value of p = 0.019 (p <0.05) which indicates the variable is not normally distributed, it was decided to use the Man Whitney test, with a value of p = 0.642 (p>

0.05). Types of hip arthroplasty operations performed were total hip arthroplasty of 37 patients (86%) and hemi hip arthroplasty of 6 patients (14%). The number of cemented hip arthroplasty subjects with THA type of surgery was 23 subjects and hemi hip arthroplasty was 5 patients, while uncemented hip arthroplasty with THA type of surgery was 14 subjects and hemi hip arthroplasty was 1 subject with a value of p = 0.403 (p> 0.05). Based on the preoperative diagnosis of the study subjects, 4 patients (9.3%) with osteoarthritis, 30 patients (69.8%) with fractures in the proximal and neck femur, 2 patients (4.7%) with osteonecrosis and as many as 7 patients (16.3%) with other diagnoses such as pelvic dislocation, bursopathy with a value of p = 0.896), according to table 1.

Table 2. Comparison of pelvic functional values between cemented and uncemented Hip Arthroplasty patients

Variable		Hip Arthroplasty		P value
		Cemented	Uncemented	
Pelvic functional value	X(±SD)	31,71 (±11,99)	32,93 (±13,09)	p=0,760
	range (Min-max)	4 – 48	3 - 48	
	Satisfied	9	5	p=0,785
	mild–moderate	6	5	
	moderate-severe	9	3	
	severe	4	2	
	Total	28	15	

Based on the Shapiro-Wilk normality test obtained significance p = 0.172 (p> 0.05), which means that the variable has a normal distribution. Then homogeneity test with one way annova is used as reference material to determine the statistical test decision, it is found that the significance value of the variable degree of functional pelvis based on the use of bone cement is 0.982 (p> 0.05) which means it has the same or homogeneous variance. Then the paired T test was performed, where the significance was p = 0.76 (p> 0.05), which means that there was no significant difference in functional hip values between Cemented and Un reinforced Hip Arthroplasty. Chi square test was also carried out, where a significance value of p = 0.785 (p> 0.05) was obtained, which also means that there is no significant difference in functional hip value between Cemented and Un reinforced Hip Arthroplasty. Validity and reliability tests have been performed, found functional assessment of the pelvis using OHS has high validity and reliable, according to table 2.

Table 3. Comparison of quality of life between cemented and uncemented hip arthroplasty patients

Variable		Hip Arthroplasty		P value
		Cemented	Uncemented	
Quality of life	X(±SD)	668,39 ± 336,30	727,0 ± 356,26	p=0,592
	Range (Min-max)	85 – 1135	40 - 1115	
	Median	660	865	
	Good	12	9	p=0,455
	Moderate	8	2	
	Poor	8	4	
	Total	28	15	

The normality test with Shapiro-Wilk was found to have a significance of p = 0.045 (p <0.05) which means that the variable did not have a normal distribution. Then it was decided to use the test with Man Whitney, which was found that the asymptomatic significance value was p = 0.592 (p> 0.05). These results indicate that there is no significant difference in the level of quality of life between cemented and uncemented hip arthroplasty patients. Chi square test was also performed, found to have a significance of p = 0.455 (p> 0.05), this also showed that there was no significant difference in the level of quality of life between cemented and uncemented hip arthroplasty patients. Validity and reliability tests have been conducted, found an assessment of the level of quality of life using SF-12 has high validity and reliable (table 3).

Discussion

Comparison of pelvic functional values between Cemented and Un reinforced Hip Arthroplasty patients in the study subjects was obtained using the unpaired T test, where significance was obtained p = 0.76 (p> 0.05), which means that there were no significant differences in pelvic functional values between Cemented patients and Uncemented Hip Arthroplasty. Chi square test was also carried out, where a significance value of p = 0.785 (p> 0.05) was obtained, which also meant that there was no significant difference in functional value of the pelvis between Cemented and Unforced Hip Arthroplasty patients. This is similar to the

study which states that there is no significant difference in functional value of the pelvis between Cemented and Unforced Hip Arthroplasty patients. The results are slightly different from other studies which concluded that for the functional degrees of the pelvis in the group using bone cement, there tends to be no difference, if not the cemented group is superior to the uncemented group. 13-16 This is because the group using bone cement has clinical results and pelvic function is better in the early postoperative stages, but for long-term results it is still not clear between the two groups.

Comparison of the level of quality of life between cemented patients and uncemented hip arthroplasty obtained after using the Man Whitney test with an asymptomatic significance value of p = 0.592 (p> 0.05), also tested with Chi square, was found to have significance p = 0.455 (p> 0 , 05). These results indicate that there is no significant difference in the functional value of the hip and the level of quality of life between cemented and uncemented hip arthroplasty patients.[18] This is similar to the study which states that there is no significant difference in the level of quality of life between cemented and uncemented hip arthroplasty patients. This means that between cemented hip arthroplasty and uncemented hip arthroplasty patients provide almost the same therapeutic success. [19,20]

Conclusions

There were no significant differences in hip functional value and quality of life between cemented and uncemented hip arthroplasty patients.

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