



## REVERSE HYBRID TOTAL HIP ARTHROPLASY A 10 YEARS FOLLOW-UP IN BANDUNG, INDONESIA

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### ABSTRACT

Reverse hybrid hip replacement uses a cemented all-polyethylene cup and an uncemented stem. Despite increasing use of this method in Bandung, there has been very little documentation of results. We collect data on reverse hybrid THAs and cemented THAs which performed in Bandung from January 1st, 2007 until December 31st, 2017 then compared the survival rate and Harris Hip Score. We found equal survival rate of Reverse hybrid THA compared to cemented THA, at 5 years (95.7% vs 96.0%) and at 10 years (92.4% vs 92.0%), both Harris Hip Score shows excellent results (91.2 vs 93.8). With a follow-up of up to 10 years, reverse hybrid THAs performed well, and similarly to all-cemented THAs from the same time period. The reverse hybrid method might therefore be an alternative to all-cemented THA.

**KEYWORDS :** Reverse Hybrid, Total Hip Arthroplasty, Indonesia

### I. Introduction

Total hip arthroplasty (THA) has completely revolutionized the nature in which the arthritic hip is treated, and is considered to be one of the most successful orthopaedic interventions of its generation.<sup>1</sup> In United States, more than 200.000 THA are conducted annually. Superiority of either cemented or cementless implants has been a longstanding debate.<sup>2</sup>

Reverse hybrid (RH) in total hip arthroplasty (THA) is a cemented polyethylene cup with a cementless femoral stem.<sup>3</sup> This method is based on good clinical results of cemented cups and of some uncemented stems in the Norwegian Arthroplasty Register (NAR).<sup>4</sup> McNally et al reported more than 90% survival with a cemented cup/uncemented stem combination after 12 years. The Norwegian Arthroplasty Register (NAR) has also shown that some uncemented femoral stems may have better long-term results (> 10 years) than cemented stems in patients 60 years of age or younger.<sup>5</sup>

The use of reverse hybrid (RH) in total hip arthroplasty also increased in Bandung-Indonesia this past decade. Despite increasing use of this method, there has been very little documentation of results. In the present study, we compared the results of reverse hybrid THAs with those of cemented THAs based on large numbers and a long follow-up of total hip arthroplasty (THA) in Bandung.

### II. Methods

We performed a retrospective chart review from reverse hybrid THAs and cemented THAs which performed in Bandung from January 1st, 2007 until December 31st, 2017. Patient notes were canvassed for demographic, as well as details regarding early or late complications, revision surgery, the survival rate and measurement of the outcome of THA using Harris Hip Score.

Between January 1st, 2007 until December 31st, 2017, total of 203 primary total hip replacements were performed in 198 patients. All primary cemented and reverse hybrid THAs operated during the period 2007–2017 were included, regardless of the reason for hip replacement.

There are 92 reverse hybrid THAs and 111 cemented THAs (Table 1). The cohort included 88 men and 115 women, with a mean age 58.5 years (range 19 to 98 years old).

Risk Ratio (RR) with 95% confidence interval (CI) was estimated using Cox regression analyses, with adjustments for age, sex, and diagnosis (osteoarthritis (OA), inflammatory arthritis, and others).

The Kaplan-Meier method was used for estimation of survival probabilities for the prostheses, with 95% confidence interval (CI).<sup>5</sup> All statistical analysis were processed using SPSS version 16. The Chi-square test was used to compare the frequency of variable,  $p < 0,05$  was considered statistically significant.

### III. Results

The mean age was lower in the reverse hybrid group than in the cemented group: 54.3 (19–83) vs 61.9 (16–98) years. The proportion of males was higher in the cemented group than in the reverse hybrid group (45% vs. 41%). In the total material, median follow-up was 4.2 (0–10) years in the reverse hybrid group and 5.9 (0–10) years in the cemented group.

In reverse hybrid group, the most common cause of operation were osteoarthritis (66.3%) followed by hip fracture (11.9%), femoral head necrosis (10.8%) and rheumatoid arthritis (7.6%). In cemented group, the most common cause of operation were osteoarthritis (58.5%) followed by hip fracture (16.2%), femoral head necrosis (13.5%) and rheumatoid arthritis (8.1%)

**Table 1. Demographic data for reverse hybrid and cemented THA, comparison of survival and the risk ratio of revision.**

	Reverse Hybrid (n=92)	Cemented (n=111)	p
Median follow-up	4.2 (0-10)	5.9 (0-10)	
Mean Age	54.3	61.9	
% Men	41	45	
Diagnosis, %			
Osteoarthritis	66.3	58.5	
RA/inflammatory	7.6	8.1	
Sequelae hip fracture	11.9	16.2	
Femoral Head Necrosis	10.8	13.5	
Others	3.2	3.6	
Revision	7	9	
5-years survival, %	95.6 (94.4-96.1)	96 (95.2-96.4)	
10-years survival, %	92.4 (91.8-92.7)	92 (91.2-92.4)	0.4b
Risk Ratio (95% CI)	1,15 (0.95-1.35)	1 (Reference)	0.06a
Harris Hip Score	91.2 (82-100)	93.8 (84-100)	

Chi-squared test.

b RR adjusted for age, sex, and diagnosis.

**Table 2. Comparison of both group regarding the cause of revision**

	Reverse Hybrid	Cemented
Aseptic loosening	3 (42.8%)	2 (22.2%)
Periprosthetic fracture	3 (42.8%)	3 (33.4%)
Deep infection	1 (14.4%)	4 (44.4%)
Total	7	9

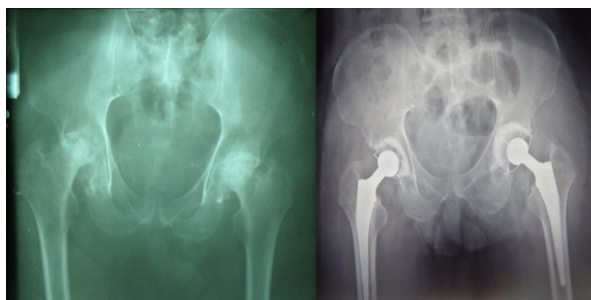
There were 7 revision cases in reverse hybrid group, compared with 9 revision cases in cemented group. The 5-years survival rate of reverse hybrid THA was 95.6% (94.4-96.1) compared with 96 (95.2-96.4) and 10-years survival rate of reverse hybrid THA was 92.6 (91.8-92.7) compared with 92 (91.2-92.4) (not statistically significant). The Risk Ratio of reverse hybrid group was 1.15 with p value 0.4 (not statistically significant).

The outcome of arthroplasty were measured using Harris Hip Score, it shows no statistically significant difference between reverse hybrid 91.2 (82-100) compared to cemented group 93.8 (84-100) with p value 0.06 using Chi-square test.<sup>6</sup>

### I. Discussion

The use of reverse hybrid (RH) in total hip arthroplasty increased in Bandung-Indonesia this past decade. The proportion of reverse hybrid and the cemented THA from 2007 to 2017 was 4.5 : 5.5.

In this study, the proportion of males was higher and the mean age was lower in the reverse hybrid group than in the cemented group with younger patients in the reverse hybrid group 4.3 (19-83) vs 61.9 (16-98) years. It is in accordance with findings from the Norwegian Arthroplasty Register (NAR), that showed poorer results with uncemented cups than with cemented cups, and good long-term results for some uncemented stems in young patients.<sup>4</sup>



**Picture.** Preoperative and postoperative Xray of patient with bilateral reverse hybrid THA

The most common cause of revision for reverse hybrid THA were aseptic loosening (42.8%), periprosthetic fracture (42.8%) and deep infection (14.4%); for cemented THA were deep infection (44.4%), periprosthetic fracture (33.4%) and aseptic loosening (22.2%).

The risk for implant loosening was higher in reverse hybrids compared to cemented THA (42.8% vs 22.2%) especially in patients aged  $\geq 65$  years. Periprosthetic femoral fractures are seen more often when using uncemented stems, especially during the first 6 months after surgery.<sup>8</sup> In our study, all of the patients with periprosthetic fracture and 67% patients with aseptic loosening in reverse hybrid group were  $\geq 65$  years. In older patients, the bone is more fragile and the risk of cracks and fractures is therefore higher. On the other hand, cement reinforces the weak bone, making a stronger construct.<sup>9</sup>

There was significant difference in the risk of infection in reverse hybrids compared to cemented THA (14.4% vs 44.4%), especially in

the older patients. All of the patients in reverse hybrid group and 75% the patients in cemented group with deep infections were  $\geq 65$  years. There is often a correlation between higher age and a higher rate of comorbidity, and therefore a higher risk of infection.<sup>10</sup>

Reverse hybrid THA had a slightly lower 5-years survival rate (95.6%) compared to cemented THA (96%). The reason was high number of early revisions, especially due to periprosthetic femoral fractures in reverse hybrid THA used in elderly patients. 10-years survival rate was 92 (91.2-92.4) and 92.6 (91.8-92.7). It is accordance to National Joint Replacement Registry of Australia (2013) that stated uncemented THA have more early revisions than cemented ones, but from 8 years onwards the survival of uncemented THAs was better than that of cemented THAs.<sup>9,11</sup>

THA achieves excellent technical outcomes with 10-year survival exceeding 95%, 25-year implant survival greater than 80%, and significant benefits for pain, mobility, and physical function. However, these traditional indicators of surgical success may not mirror the patient's post-operative experience or healthcare efforts. Post-operative health related quality of life is now the key goal of surgery and measure of operative outcome.<sup>12</sup>

Harris Hip Score was used for the assesment of post-operative health related quality in this study. It shows no statistically significant Harris Hip Score difference between reverse hybrid 91.2 (82-100) compared to cemented group 93.8 (84-100) with p value 0.06 using Chi-square test.

Both reverse hybrid and cemented group show excellent post-operative health related quality of live. Majority of patients were satisfied with the results of their surgery as well as their ability to undertake activities of daily living. These excellent results reflect the health related quality of live benefits conferred by total hip arthroplasty surgery, either reverse hybrid or cemented technique.<sup>12-14</sup>

In summary, we found no statistically significant differences between reverse hybrid and all-cemented THAs in this study. Both groups performed well, with 92-92.6 survival after up to 10 years of follow-up. Due to the small number of revisions in the present study, we cannot make any conclusions regarding the revision of reverse hybrid THA and cemented THA.

With a short-to medium-term follow-up, it appears that the reverse hybrid method might be a promising alternative in THA surgery, but long-term follow-up will be required to evaluate reverse hybrid THA has any advantage over cemented THA.

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