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Original Article

Cementless total hip arthroplasty in patients aged ≥ 80 yearsTakahito Yuasa^{a,*}, Katsuhiko Maezawa^{a,b}, Masahiko Nozawa^{a,c}, Kazuo Kaneko^a^a Department of Orthopaedic Surgery, Juntendo University School of Medicine, Bunkyo-ku, Tokyo 113-8421, Japan^b Juntendo Urayasu Hospital, Urayasu City, Chiba 279-0021, Japan^c Juntendo University Nerima Hospital, Nerima-ku, Tokyo 177-8521, Japan

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ABSTRACT

Background/purpose: We evaluate the clinical and radiological results of cementless total hip arthroplasties (THAs) in patients aged ≥ 80 years.**Methods:** We compared the clinical and radiological results of 30 cementless THAs done in patients aged ≥ 80 years (older group) and aged 60–69 years (control group).**Results:** The Harris Hip score significantly decreased in the older group 1 year after the operation and at the final follow-up observation ($p = 0.001$), but no joints required revision surgery due to poor initial fixation or early loosening.**Conclusion:** Cementless THA in the elderly is safe and durable at the time of the follow-up.

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1. Purpose

The average Japanese life expectancy is 80.21 years in males and 86.61 years in females,¹ and Japan is one of the countries where people enjoy longevity. Many orthopedic disorders including degenerative disorders often cause functional impairment and disturb daily life. Osteoarthritis of the hip is a representative disorder affecting activities of daily living (ADL). With an increase in the average life expectancy, opportunities to perform total hip arthroplasty (THA) in aged patients have been increasing.² THA has been reported to improve pain and functional impairment,

allowing the reacquisition of ADL.^{3–8} However, since aged patients often have a past medical history before the operation and a high risk of postoperative complications, such as dislocation and pneumonia, perioperative management is important.^{9–11} In aged patients undergoing THA, initial implant fixation is a problem due to the possible bone fragility caused by bone quality deterioration. There has been a study that compared the outcomes of cemented THA between aged (≥ 80 years) and younger groups,¹² but no study that compared the outcomes of cementless THA. We retrospectively evaluated the clinical and radiological results of cementless THA between patients aged ≥ 80 years and those aged 60–69 years.

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2. Patients and methods

Between 2001 and 2012, we performed cementless THA in 27 patients (32 joints) aged ≥ 80 years, of whom 25 (30 joints) who could be followed up for ≥ 1 year were included as the subjects in the older group. All of them were female, and the primary disorder was osteoarthritis of the hip in 24 joints, post-traumatic femoral head necrosis in 5, and rapidly destructive coxopathy in 1. In bilateral cases, THA was performed staged. As a control group, 27 females aged 60–69 years who underwent THA for osteoarthritis of the hip during the same period were included. The study had ethical approval and all patients gave informed consent. Autologous blood was donated and stored whenever possible, and surgery was performed using the posterior approach in all patients. Full weight bearing was allowed 2–3 weeks after the operation. A Converge cup and Natural Hip stem (Zimmer, Warsaw, Indiana, USA) were used in 6 joints and a Reflection cup and Synergy Select stem (Smith & Nephew, London, UK) in 24 joints in each group. The clinical results, the Harris Hip score,¹³ hospitalization period, complications, final walking ability, and mortality rate were evaluated. Radiographic assessment was performed by two orthopedic surgeons using Noble's classification¹⁴ for the preoperative medullary cavity shape of the femur, DeLee & Charnley's classification¹⁵ for radiolucent lines on the acetabular side, and Gruen's classification¹⁶ for those on the femoral side.

2.1. Statistical analysis

Statistical analysis of differences between the two groups was performed using GraphPad Prism 5 version 5.0. Chi-square test was used for qualitative variables, and Student's t-test was used for quantitative variables. Levels of significance reaching 95% or more were accepted.

3. Results

The mean age at the time of the operation was 83.1 years (80–89 years) in the older group and 64.1 years (60–69 years) in the control group. The mean follow-up period was 67 months (16–121 months) in the older group and 66 months (18–126 months) in the control group ($p = 0.924$). The number of patients with a past history of disease was 16 (53.3%) in the old group and 6 (20%) in the control, being significantly higher in the former. The past diseases are shown in Table 1. The

Table 1 – Preoperative complications.

	Older group	Control group
Hypertension	11	6
Arrhythmia	2	1
Respiratory disease	6	1
Angina pectoris	2	0
Diabetes mellitus	3	0
Thrombosis	2	
Renal failure	1	
Malignant tumor	2	

Table 2 – Changes in the Harris Hip score.

	Older group (SD)	Control group (SD)	p-Value
Preop	41.32 (6.36)	42.56 (4.77)	0.123
Postop 1 year	80.10 (6.08)	90.29 (4.80)	0.001
Final follow-up	73.72 (11.88)	89.32 (4.37)	0.001

Table 3 – Postoperative complications.

	Older group	Control group	p-Value
Confusion	3 (10%)	1 (3.3%)	0.300
Pneumonia	3 (10%)	1 (3.3%)	0.300
Urinary tract infection	2 (6.7%)	1 (3.3%)	0.359
Dislocation	2 (6.7%)	1 (3.3%)	0.359

number of patients requiring allogeneic blood transfusion was 6 in the older group and 0 in the control group, being significantly higher in the former ($p = 0.0098$).

The Harris Hip score after the operation improved compared with the preoperative score in both groups, but significantly decreased in the older group 1 year after the operation and at the final follow-up observation (Table 2). Mean improvement of the pain component of Harris Hip score was 19.6 (SD 6.76) in the older group and 21.9 (SD 4.09) in control group ($p = 0.143$). The mean hospitalization period was 50.8 days (22–76 days) in the older group and 44.8 days (24–75 days) in the control group, without a difference between the two groups ($p = 0.141$). As postoperative complications, neither local infection nor thrombosis developed, while confusion, pneumonia, urinary tract infection, and dislocation occurred, and their incidences did not significantly differ between the two groups (Table 3). None of the patients with dislocation as a postoperative complication developed redislocation requiring revision surgery. At the time of the final follow-up observation, 6 patients (20%) in the older group required walking assistance, but all patients in the control group could walk unassisted; the walking ability was significantly lower in the older group ($p = 0.024$). Two patients (6.67%) in the older group died, while none in the control group died ($p = 0.492$).

As a result of radiographic assessment, the preoperative medullary cavity shape of the femur according to Noble's classification was the stovepipe canal in 7 joints (23.3%) in the older group and 1 (3.3%) in the control group ($p = 0.022$). After the operation, no joint showed radiolucent lines on the acetabular side. On the femoral side, radiolucent lines in Gruen's Zone 2 or 6 were observed in 4 patients in the older group and in 2 in the control group. No sinking occurred in any joint. No joints required revision surgery due to poor initial fixation or early loosening.

4. Discussion

A problem of THA in aged patients is the possibility of a decrease in initial fixation due to bone fragility caused by bone quality deterioration. Aged patients often have a past history of disease before undergoing surgery and a high risk of developing postoperative complications. Therefore, perioperative management is important.

Keisu et al.¹⁷ reported that radiolucent lines on the acetabular side were observed in 41% of 124 joints in 114 patients during a mean follow-up period of 5 years (2–11 years) after cementless THA, but none required revision surgery, and postoperative complications developed in 24% (pulmonary embolism, 6.5%; urinary tract infection, 4.1%). Pieringer et al.¹⁸ reported that radiolucent lines around the implant were observed in only a few hips after a mean follow-up of 69 months (29–94 months) following cementless THA in 48 hips in 43 patients, but none of them required revision surgery, and intraoperative fracture, dislocation, and fracture around the stem occurred in 1 (2.1%), 2 (4.1%), and 2 hips, respectively. In recent years, Clement et al.¹² compared the outcome of THA between 171 hips of patients aged ≥80 years and 495 hips of patients aged 65–74 years, 12 months after the operation, and observed no significant difference in improvement in the Oxford hip score, but reported a higher degree of satisfaction with the operation, higher incidences of postoperative complications (pneumonia, angina pectoris), and a higher mortality rate in the older group.

On the other hand, Ogino et al.¹⁹ evaluated data on 6989 hips of 6540 patients aged ≥80 years at the time of THA using the Finnish Arthroplasty Registry. The mean postoperative survival period was 5.1 years. With revision THA as the endpoint, the implant survival rate was 97% at 5 years and 94% at 10 years. The reason for revision THA was loosening in 46%, dislocation in 20%, periprosthetic fracture in 13%, and infection in 13%. Since the rate of revision THA was significantly lower after cement fixation than after cementless fixation on the femoral side, they concluded that cement fixation is desirable on the femoral side.

In the present study, the Harris Hip scores as clinical results in the older group improved after THA but were significantly lower than in the control group. The walking ability at the final follow-up was significantly poorer in the older group. This may have been because aggravation of knee disorder or degenerative spinal disorder reduced the muscle strength, affecting the walking ability. The hospitalization period was longer than the other countries, because most of the patients were completely cured and left the hospital in Japan. X-ray evaluation showed enlargement of the femoral marrow cavity in many patients in the older group, but initial implant fixation after cementless THA presented no problem, and there were no hips requiring revision surgery. The incidences of postoperative complications did not significantly differ between the older and control groups. However, the older group frequently had a past history of disease, and perioperative management may be important. Periprosthetic femoral fracture caused by trauma is known to be a major mode of failure of cementless THA.^{20,21} However, there was no periprosthetic femoral fracture and this was related to the excellent results of the femoral component. The limitations of this study were a small number of patients, a relatively short-term evaluation due to aged subjects, and the absence of patient-based assessment.

In conclusion, although clinical outcome and ability to walk were lower than the control group, cementless total hip arthroplasty in the elderly is safe, and durable at the time of the follow-up.

Conflict of interest

The authors have none to declare.

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