



Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en



Original article

Comparison of cementless total hip arthroplasty survivorship between metal-on-highly cross-linked polyethylene and ceramic on ceramic bearings: A case control study with a 5–9-year follow-up

Yoshitoshi Higuchi*, Taisuke Seki, Yukiharu Hasegawa, Daigo Morita, Daigo Komatsu, Yasuhiko Takegami, Naoki Ishiguro

Department of Orthopaedic Surgery, Nagoya University Graduate School of Medicine, 65, Tsurumai-cho, 4668550 Showa-ku, Nagoya city, Aichi prefecture, Japan

ARTICLE INFO

Article history:
Received 9 July 2017
Accepted 5 April 2018

Keywords:
Ceramic on ceramic bearing
Metal-on-highly cross-linked polyethylene bearing
Total hip arthroplasty
Wear

ABSTRACT

Background: Currently, there is a lack of evidence on the medium-term follow-up of cementless total hip arthroplasty (THA) using metal-on-highly cross-linked polyethylene bearing (MoXPE), ceramic on ceramic bearing (CoC) at more than 5 years follow-up. Therefore, we performed a case control study to: compare the incidence rate of osteolysis; compare the longevity for both types of THAs, and to evaluate the wear rate of MoXPE THAs.

Hypothesis: CoC THAs will have a lower rate of osteolysis and better longevity than MoXPE THAs.

Patients and methods: We performed a retrospective analysis of 77 MoXPE (68 women, 9 men) and 105 CoC (85 women, 20 men) THAs, with an average patient age at the time of surgery of 64.7 years (range, 27 to 76 years). The cohorts were matched according to sex, body mass index, or diagnosis of hip joint disease. Clinical and radiologic measurements were analyzed at a mean follow-up of 6.7 years (range, 5–9 years).

Results: There were no between-group differences with regard to the Harris hip score (87.0 [64.0–98.0] and 89.9 [70.0–100.0] for the MoXPE and CoC group, respectively) and the incidence rate of osteolysis (2.6% and 1.9%, respectively). Revision was required for 1 case for each THA type. The Kaplan-Meier survival at 8 years, using implant loosening or revision as the end-point of analysis, was 96.1% (95% confidence interval [CI], 90.0–99.3) for the MoXPE group and 98.9% (95% CI, 92.2–99.8) for the CoC group ($p = 0.189$). The mean annual liner wear rate was 0.0160 mm/year (range, 0.0050 to 0.0390 mm/year) for the MoXPE THAs.

Discussion: There was no difference between CoC and MoXPE THAs in the incidence of osteolysis or in survival rate at 8 years post-surgery. Excellent clinical and radiological outcomes were obtained for both types of bearings.

Level of evidence: III, Case control study, case control retrospective design.

© 2018 Published by Elsevier Masson SAS.

1. Introduction

Total hip arthroplasty (THA) has become a common treatment for osteoarthritis of the hip [1,2]. However, despite improved implant designs and surgical techniques, wear of the bearing surface and the resultant wear-induced osteolysis continue to be major limitations to long-term prosthesis survival [3–6]. Metal-on-polyethylene bearing surfaces were once considered to be the gold standard for THA and have shown good long-term results in

elderly patients [1,5]. However, in recent decades, the debris generated from polyethylene liner wear over time was found to be associated with the occurrence of osteolysis, which subsequently leads to implant loosening and failure. To avoid problems caused by wear-induced debris, different bearing surfaces have been developed; such as metal-on-highly cross-linked polyethylene (MoXPE), which shows lower, linear and volumetric wear than conventional polyethylene [3,4,7]. Similarly, hard bearing surfaces which produce even less volumetric wear, such as ceramic on ceramic (CoC), have also been developed to address the problem of osteolysis. However, these bearing surfaces have their own inherent limitations, including ceramic fracture and squeaking [1,2,6,8]. In the last two decades, several systemic reviews and a number of clinical

* Corresponding author.
E-mail address: rdggd215@yahoo.co.jp (Y. Higuchi).

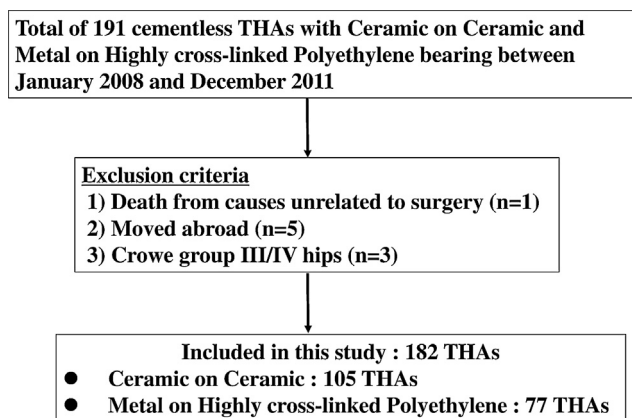


Fig. 1. Study flowchart (THAs: total hip arthroplasties).

randomized controlled trials have compared the survivorship of THA implants with different bearing surfaces. However, the results of these studies are controversial and, therefore, continue to be debated [2,6,8–11]. Therefore, we performed a retrospective case control study aiming study to:

- compare the incidence rate of osteolysis;
- compare the longevity for both types of THAs, and;
- to evaluate the wear rate of MoXPE THA. We hypothesized that CoC THAs will have lower osteolysis and better clinical outcomes and longevity than MoXPE THAs.

2. Materials and methods

2.1. Patient selection

Between January 2008 and December 2011, we performed consecutive primary cementless THAs with CoC and MoXPE. Depending on the senior surgeon performing the procedure, a CoC or MoXPE THA was selected. In total, 169 patients (182 THAs), who completed a minimum follow-up of 5 years, were eligible for the study. The exclusion criteria included death from causes unrelated to surgery (1 patient; 1 joint), patient inaccessibility (5 patients moved abroad; 5 joints) and Crowe group III/IV hips (3 patients; 3 joints) (Fig. 1). Demographic data are presented in Table 1. No significant differences were noted between the groups with regard to the distribution of sex, body mass index, or diagnosis of hip joint disease. However, patient age at surgery was significantly lower for the CoC than MoXPE group. Informed consent was obtained from all patients, and the study was approved by the ethics committee of our hospital (approval number: 2014-0106-2).

Table 1
Patient demographics.

Parameters	MoXPE (n = 77)	CoC (n = 105)	p-values
Age, (years) (range)	64.7 ± 9.7 (29–76)	55.9 ± 8.7 (28–76)	< 0.001
Sex, (male/female)	9/68	20/85	0.221
BMI, (kg/m ²) (range)	23.1 ± 3.2 (15.6–31.2)	23.0 ± 3.5 (16.7–31.9)	0.739
Follow-up, (years) (range)	6.6 ± 1.2 (5–8)	6.7 ± 0.9 (5–9)	0.251
Diagnosis, n (%)			0.359
Osteoarthritis	73 (94.8%)	93 (88.6%)	
Avascular necrosis	4 (5.2%)	11 (10.5%)	
Post traumatic osteoarthritis	0	1 (0.9%)	

MoXPE: metal-on-highly cross-linked polyethylene; CoC: ceramic on ceramic; BMI: body mass index. All values given as the mean and standard deviation.

Table 2
Characteristics of implants.

Parameters	MoXPE (n = 77)	CoC (n = 105)
<i>Cementless Cup</i>		
Trident PSL	24 (31.2%)	22 (21.0%)
TriAD HA	53 (68.8%)	74 (70.5%)
Secur Fit AD	NA	9 (8.5%)
<i>Cementless Stem</i>		
Super Securfit HA	77 (100%)	105 (100%)

MoXPE: metal-on-highly cross-linked polyethylene; CoC: ceramic on ceramic; NA: not available.

Table 3
Femoral head diameter.

Diameter	MoXPE (n = 77)	CoC (n = 105)
22 mm	7 (9.1%)	NA
26 mm	70 (91.9%)	NA
28 mm	0	67 (63.8)
32 mm	0	38 (36.2)

MoXPE: metal-on-highly cross-linked polyethylene; CoC: ceramic on ceramic; NA: not available.

2.2. Methods

A posterolateral approach was used for all procedures, with patients in the lateral decubitus position. The socket was fixed in the acetabulum using an acetabular alignment guide, with a target positioning of 20° of anteversion and 45° of inclination [12].

Acetabular and femoral components for all THAs were manufactured by Stryker Orthopaedics (Mahwah, NJ; Fig. 2, Table 2). Trident PSL and TriAD are similar designs with a hydroxyapatite arc-deposited titanium surface; the difference between these cups is only the number of screw holes.

For implants using the cobalt chrome head, the annealed highly cross-linked Crossfire polyethylene insert was used (Stryker Orthopaedics, Mahwah, NJ). For CoP implants, the BIOLOX[®] forte ceramic liner and head (Ceramtec, Plochingen, Germany) was used. In an effort to decrease the risk of ceramic liner fracture during insertion, and to protect the ceramic liner from prosthetic impingement on the femoral neck, this ceramic liner had an elevated metal-backed titanium sleeve (Fig. 2b) [1]. The diameter of the cobalt chrome and ceramic heads used is reported in Table 3.

2.3. Methods of assessment

Patients' clinical data, including the Harris hip score (HHS) [13], were prospectively recorded by a senior surgeon at 1 month prior to THA, at 6 months and 1 year post-THA, and then annually, up to the end-point of follow-up. These data were then retrospectively extracted from patients' medical records for analysis.

Radiographs of the hips were obtained in the standard antero-posterior (AP) view, with both hips in neutral rotation and 0°

Download English Version:

<https://daneshyari.com/en/article/8952495>

Download Persian Version:

<https://daneshyari.com/article/8952495>

[Daneshyari.com](https://daneshyari.com)