

## **Total hip arthroplasty with femoral shortening osteotomy using polished cemented stem vs. modular cementless stem in patients with Crowe type IV developmental dysplasia of the hip**

Takuji Miyazaki<sup>1</sup>, Tomohiro Shimizu<sup>2</sup>, Hisanori Ohura<sup>3</sup>, Naoyuki Katayama<sup>3</sup>, Norimasa Iwasaki<sup>4</sup>, Daisuke Takahashi<sup>1</sup>  
<sup>1</sup>Graduate School of Medicine, Hokkaido University, <sup>2</sup>Department of Orthopaedic Surgery, Faculty of Medicine, <sup>3</sup>Hokkaido Orthopaedic Memorial Hospital, <sup>4</sup>Hokkaido University School of Medicine

### **INTRODUCTION:**

Primary total hip arthroplasty (THA) for the developmental dysplasia of the hip (DDH) presents challenges procedure on both the acetabular and femoral sides. To place the acetabular component in the true acetabulum, THA for Crowe Type IV DDH often requires femoral shortening osteotomy to prevent nerve palsy due to leg extension.

Although there have been several reports of THA with femoral shortening osteotomy using cementless stems with good clinical outcomes, still little information regarding the advantages of a using a polished tapered stem. This study aimed to investigate the mid-term clinical and radiological outcomes of primary THA with femoral shortening osteotomy using modular and polished tapered stems and to compare the results between the modular and polished tapered stems.

### **METHODS:**

This retrospective review included 32 patients (37 hips) with Crowe type IV DDH who underwent primary THA with femoral shortening osteotomy using a modular stem (cementless group, 14 hips) or a polished tapered stem (cement group, 23 hips) between 1996 and 2018. Clinical data and radiographic assessments were reviewed to analyze the differences between the two groups. Harris hip scores (HHS) before the operation and at 1 year; and every year thereafter until at the final follow-up were analyzed.

Radiographs were taken using the same technique throughout the follow-up, and a standardized position of the beam and radiographic penetration were adopted. Changes in the longitudinal medullary cavity were investigated according to the Dorr classification; stem alignment was evaluated according to Christie's report. Thinning of the cortical bone and the occurrence of osteolysis were also analyzed according to the Gruen zone system. Bone union at the osteotomy site was defined as the presence of the bone bridge in both the AP and lateral radiographs.

### **RESULTS:**

The mean duration of patient follow-up of the cementless group (134.4 months) was longer than that of the cement group (75.5 months). There were no differences in clinical results, time of bone union (cementless group; 7.4 months and cement group 8.4 months ( $P=0.551$ )), and survival rate between the two groups (Fig.1). However, the cementless group exhibited a higher ratio of intraoperative fracture (Cementless 5/14 cases vs Cement 0/23 case,  $P=0.005$ ), thinning of the cortical bone (Cementless 14/14 cases vs Cement 14/23 cases,  $P=0.007$ ) and enlargement of the medullary cavity (Cementless 7/14 cases vs Cement 2/23 cases,  $P=0.014$ ). There were no cases showing stem alignment change in the cement group, and three cases in the cementless group (2 cases changed from neutral to varus and 1 case changed from neutral to valgus) (Fig.2). Although osteolysis occurred in 8 hips and 2 hips in zones 1 and 7, respectively, in the cementless group, there were no cases of osteolysis in the cement group ( $P<0.001$ ).

### **DISCUSSION AND CONCLUSION:**

Although there were differences in follow-up, the results of this study showed that there was no significant difference in operative time, blood loss, time to bone union, HHS, and survival rate between the cementless and cemented groups.

The cementless group exhibited a higher ratio of intraoperative fracture and thinning of the cortical bone, including medullary change and stem alignment changes compared to the cement group.

In conclusion, considering the occurrence of intraoperative fracture and radiographic analysis in the current study, the cement stem may have an advantage for patients with bone fragility and deterioration in bone quality.

Figure. 1

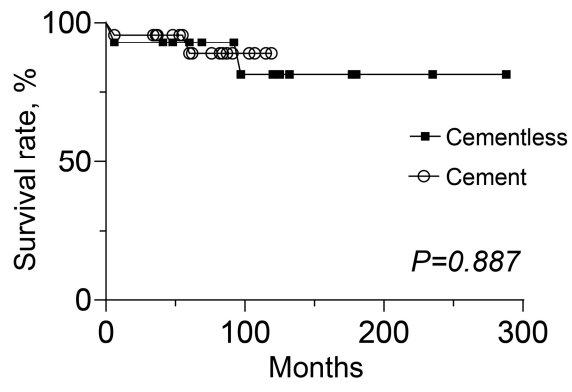


Figure. 2

