No Difference in Polyethylene Wear Using Metal or Ceramic Femoral Heads

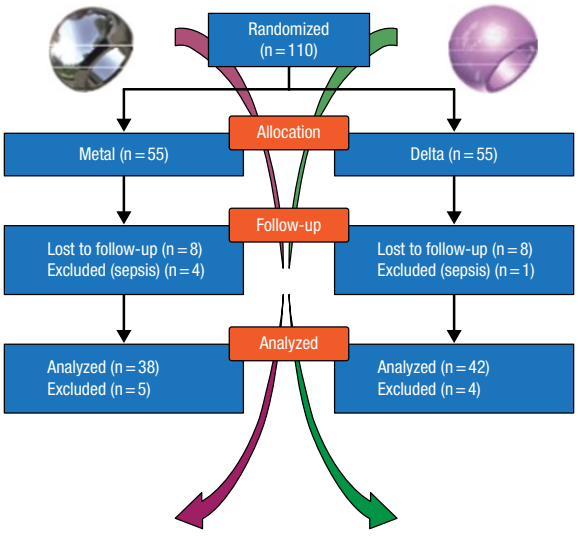
Written by Nicola Parry

Amine Zaoui, MD, Université René Descartes, Paris, France, presented data from a trial comparing the effect of femoral head material against conventional polyethylene (CPE) wear in total hip arthroplasty (THA). The results of the study demonstrated that the choice of a metal compared with a delta ceramic femoral head did not significantly influence creep or wear of a contemporary annealed polyethylene socket.

The study was conducted to examine the effect of femoral head material on CPE wear in a consecutive, prospective, randomized series of low friction THAs, said Dr Zaoui. Inclusion criteria included patients aged between 18 and 75 years with hip osteoarthritis. The study enrolled 110 patients (mean age, 60.6 years) from April 2007 to June 2008 who were randomized to receive either a 22.2-mm-diameter metal (n=55) or delta ceramic (n=55) femoral head (Figure 1). All patients received a polyethylene socket that was moderately cross-linked (3 Mrad of gamma radiation in nitrogen) and annealed at 130°C.

The primary outcome of the study was femoral head penetration at a minimum of 4 years' postoperative follow-up. This was evaluated using the Martell method, by an investigator who was blinded to the study's randomization.

Figure 1. Flow Chart Illustrating Patient Randomization in the Study



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Complete data were available for 38 hips in the metal group at a median follow-up of 4.4 years, and in 42 hips in the delta ceramic group at a median follow-up of 4.0 years. Eight patients were lost to follow-up in each group, some patients in the metal and ceramic groups were removed from the final analysis due to sepsis (4 vs 1), and additional patients were excluded for other reasons (5 vs 4).

However, according to Dr Zaoui, at up to the 5-year follow-up, the results of this study showed no significant difference in CPE creep or wear using a metal femoral head compared with a delta ceramic head. The mean femoral head penetration was 0.14 vs 0.12 mm/y ($P=.48$), and the mean creep at the approximately 1-year follow-up was 0.27 vs 0.25 mm ($P=.56$). The mean steady-state penetration rate was 0.07 vs 0.06 mm/y ($P=.48$). There were no reports of ceramic femoral head fracture or periprosthetic osteolysis in either group.

Additional studies with longer-term follow-up will be required to further evaluate the potential clinical benefits of delta ceramic as the choice of femoral component in THA, concluded Dr Zaoui.

Lateral Column Lengthening as a Repair for Adult Flatfoot Deformity

Written by Jill Shuman

Adult flatfoot deformity is a progressive condition that causes flattening or collapse of the arch of the foot and is characterized by pain and difficulty managing daily activities. Although damage to the posterior tibial tendon is the most common cause, other contributing factors include arthritis, injury, and Charcot foot. Among patients who have a flexible—as compared to rigid—arch collapse, surgery can often help improve pain and walking ability.

Two commonly performed adult flatfoot procedures include subtalar arthroereisis (SA) and lateral column lengthening (LCL). During the SA procedure, an implant is placed below the talus to stabilize the subtalar joint by limiting excessive pronation and preserving varus range of motion. LCL allows surgeons to create a higher arch by realigning the calcaneus.

To evaluate whether one procedure might offer better repair than the other, Lee Bing Howe, MD, Yong Loo Lin School of Medicine, Singapore, described outcomes from a study that compared clinical and radiographic outcomes of the two surgeries. Eighteen consecutive patients (11 men, 7 women) with adult stage II flexible flatfoot deformity were randomized to surgical treatment with either LCL (n=9) or SA (n=9) performed by a senior surgeon. All patients also underwent a concomitant endoscopic gastrocnemius recession procedure, a medializing calcaneal osteotomy,

and a modified Kidner procedure. LCL procedures were performed using an 8-mm wedge plate; SA was performed using a size 10-mm implant. The average age at the time of surgery was comparable in the LCL (30.8 years) and SA (31.7 years) groups.

Clinical outcomes were measured using pre- and postoperative American Orthopaedic Foot & Ankle Society (AOFAS) Ankle-Hindfoot Scale and the SF-36 Health Survey Update (SF-36) scores at 3, 6, 12, and 18 months. Radiographic measurements were assessed using 10 parameters on the anteroposterior (AP) and lateral weight-bearing radiographs at 6 and 18 months. The minimum length of follow-up was 18 months.

At the time of the final follow-up, only patients in the SA group showed significant improvement in SF-36 scores ($P < .05$). Postoperative AOFAS scores showed significant improvements in both groups (LCL group, $P = .038$; SA group, $P = .008$).

At 18 months, both groups showed significant improvements ($P < .05$) in 5 of the 10 radiologic parameters measured: (1) talus–first metatarsal angle (AP), (2) talus–first metatarsal angle (lateral), (3) calcaneal pitch angle (lateral), (4) talonavicular uncoverage angle (AP), and (5) and medial column height (lateral).

According to Prof Howe, these data suggest that in adults with flexible flatfoot deformity, the SA procedure is similarly effective for the LCL as measured clinically and radiographically. However, he cautioned that it will be important to monitor how long the correction ultimately persists before the overall effectiveness of the procedure can be determined.

Customized Cutting Blocks Reduce Surgical Time for Total Knee Arthroplasty

Written by Nicola Parry

Nattapol Tammachote, MD, Thammasat University, Bangkok, Thailand, presented data from a study comparing the use of a customized cutting block (CCB) with conventional instrumentation (CI) in patients undergoing total knee arthroplasty (TKA). The results demonstrated that CCBs save surgical time, thereby improving operating theater efficiency.

CCBs are designed to improve alignment accuracy in TKA, and this technology provides advantages over the use of CI, including a lack of reliance on instrumentation of the intramedullary femoral canal. Nevertheless, it does carry some disadvantages, such as the need for preoperative scheduling for imaging studies and preoperative planning time by the surgeon, as well as the delay in obtaining the CCB. Yet, although the ultimate goal of using this patient-specific instrumentation is to allow more efficient use of operative resources, increase component alignment accuracy, and thereby improve patient outcomes, well-designed studies to confirm its efficacy are lacking.

Table 1. Total Knee Arthroplasty Operative Time Using a CCB or CI

Component	CCB	CI	*P* Value
Exposure	13	13	.42
Bone cutting	26	32	< .0001
Implantation	24	26	.06
Wound closure	30	33	.01

Data presented in minutes.
CCB, customized cutting block; CI, conventional instrumentation.
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Prof Tammachote and colleagues therefore conducted a randomized controlled trial to compare the use of a CCB with CI in TKA. The study was performed from 2012 to 2014 at a single center, and it enrolled 129 patients. Inclusion criteria included patients aged between 50 and 85 years with osteoarthritis of the knee who were willing to wait 4 to 6 weeks for surgery and had no contraindication for preoperative magnetic resonance imaging. Patients were excluded if they had undergone previous ipsilateral hip, knee, or ankle replacement or had metallic hardware around the knee or deformity of the tibia or femur.

A total of 108 patients were ultimately included in the study and were randomized to undergo TKA using either CCB (n = 54) or CI (n = 54). All surgeries were performed by the same experienced surgeon, using the standard medial parapatellar approach. Patients were followed for up to 3 months, and primary outcome measurements included limb and prosthesis alignment, operative time, and hemodynamic evaluations.

According to Prof Tammachote, the average operative time was 11 minutes shorter in the CCB group (93 vs 104 minutes; $P < .0001$; Table 1).

However, there was no significant difference in the mean hip-knee-ankle angle (179.4° vs 179.1°; $P = .55$) between the CCB and CI groups. Hemodynamic evaluations were also similar between the groups, including the average total blood loss postsurgery (466 vs 514 mL; $P = .21$) and reduction in hemoglobin concentration at 24 hours postsurgery (2.2 vs 2.8 g/dL; $P = .42$).

The results of this study demonstrate that use of the CCB for TKA reduces surgical time compared with CI, thereby improving operating theater efficiency. CCB use is also as accurate as CI when the procedure is performed by an experienced surgeon, and there is no difference in hemodynamic outcomes, concluded Prof Tammachote.