Early bead shedding of the Vitalock acetabular cup—a report on 7 cases

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Between September 2000 and February 2001, 11 patients underwent 12 hybrid total hip arthroplasties with a Vitalock Talon acetabular component and a cemented Exeter stem (Howmedica International, Limerick, Ireland). Surgery was routinely performed via a posterolateral approach. The cup size was chosen according to the preoperative templating, and implanted using underreaming by 2 mm. Care was taken to avoid fretting between the cup and the retractors during impaction of the cup.

In 7 patients, the immediate postoperative radiographs showed that the beads had separated from the shell. The remaining 4 did not develop bead shedding during the follow-up. The cups showing bead shedding belonged to 6 different lots manufactured between February and May 2000. The diameters of the cups were 50, 52, 56 and 58 mm. We found 1 loose bead in 3 patients, 2 beads in 2, 4 beads in 1 and 8 beads in 1. The beads were located in De Lee and Charnley (1976) zone 1 in 2 patients, zone 2 in 4, zone 3 in 4 and in the periarticular soft tissues in 2 (Figure 1).

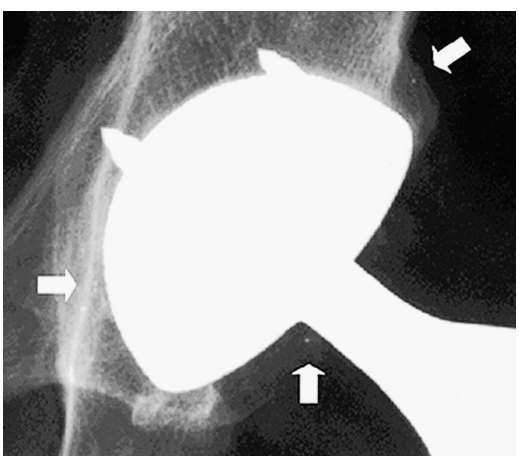

Figure 1. Postoperative radiograph shows 4 beads located in De Lee and Charnley areas 1 and 3, and 1 bead in the periarticular soft tissues.

After surgery, the patients were examined clinically and radiographically at 45 days, 3 months and once a year. At (6–20) months, the radiographs in all 7 patients showed stable components without radiolucencies or osteolysis as well as an additional separation of 1 and 2 beads in 2 patients.

Discussion

The testing of a new drug before it can be approved for use by the general public includes laboratory and animal studies, followed by human trials in 3 phases. This process takes, on average, 8.5 years for the Food and Drug Administration (1995) in the United States. However, orthopedic implants are not subjected to such extensive and rigorous studies before approval.

Unique types of failure have occurred in uncemented modular cups, including backside wear (Huk et al. 1994), failure of the locking mechanism securing the liner to the shell (González Della Valle et al. 2001), and separation of the porous ingrowth surface from the metal shell (von Knoch et al. 1997).

Sintered beads are among the most widely used porous ingrowth surfaces. Bead separation has

Previous reports of bead shedding

Author	Design	Component	Early/Late	Cases
Buchert et al. 1986	Mueller	Stem	L	2
Rosenqvist et al. 1986	PCA	TKA	E/L	22/77
Callaghan et al. 1988	PCA	Cup+stem	E/L	21/100
Davey and Harris 1988	PCA	Cup	E/L	10/70
Maloney et al. 1992	ARC	Cup	E/L	11/56
Bourne et al. 1994	PCA	Cup+stem	L	7/27
von Knoch et al. 1997	Arthropor	Cup	L	11/104
Berry et al. 2000	Bilobed oblong cup	Bilobed Oblong Cup	L	2/38

been found in hip and knee arthroplasty implants (Table). With modern sintering techniques, this complication has become exceptional.

Von Knoch and coworkers (1997) described 3 types of bead shedding: 1) late shedding produced by chemical corrosion at the interface between the beads and the substrate or between the beads themselves; 2) bead separation due to micromotion between the cup and the host bone seen in loose cups, well-fixed cups or as a precursor of cup loosening; and 3) early bead separation during cup impaction. The latter 2 types of failure may indicate a weak bond between the beads and the shell or among the beads themselves.

We report bead separation from a commercially available, chromium-cobalt alloy, hemispheric shell, that was detected on radiographs taken immediately after surgery. The Vitalock Talon design, has 3 fluted spikes that initially increase stability in the iliac bone. Although this type of failure can occasionally be found during quality control in cups from the same lot, the cups in our study belonged to 6 different lots.

Figure 2. Extensive bead embedding in the polyethylene articular surface of a porous acetabular component of a different design.

We are particularly concerned about the beads detected in the periarticular soft tissues of 2 patients. They can be sources of third body wear if entrapped in the articulating surfaces (Figure 2). Moreover, gradual bead shedding may jeopardize cup fixation by ingrowth and provide a pathway for polyethylene wear migration.

So far as we know, this is the first report on early bead separation in this cup design. Gil Garay and coworkers (2000) reported no revisions in 39 Vitalock cups with clustered holes after a follow-up of 6 years (5–7). No bead shedding was detected and osteolysis was seen in 1 patient.

In summary, in our short experience with this cobalt-chromium alloy shell, loose beads were detected immediately after surgery in most cases. Patients who have implants with this cup design should be closely monitored. This component should undergo further, exhaustive mechanical testing to determine the cause of our findings.

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No competing interests declared.

Berry D J, Sutherland C J, Trousdale R T, Colwell C W, Chandler H P, Ayres D, Yashar A A. Bilobed oblong porous coated acetabular components in revision total hip arthroplasty. Clin Orthop 2000; 371: 154-60.

Bourne R B, Rorabeck C H, Ghazal M E, Lee M H. Pain in the thigh following total hip replacement with a Porous-Coated Anatomic prosthesis for osteoarthrosis. J Bone Joint Surg (Am) 1994; 76: 1464-70.

Buchert P K, Vaughn B K, Mallory T H, Engh CA, Bobyn D. Excessive metal release due to loosening and fretting of sintered particles on porous-coated hip prostheses. J Bone Joint Surg (Am) 1986; 68: 606-9.

Callaghan J J, Dysart S H, Savory C G. The uncemented Porous-Coated Anatomic total hip replacement. J Bone Joint Surg (Am) 1988; 70: 337-46.

Davey J R, Harris W H. Loosening of cobalt chrome beads from a porous-coated acetabular component. A report of ten cases. Clin Orthop 1988; 231: 97-102.

De Lee J G, Charnley J. Radiological demarcation of cemented sockets in total hip replacement. Clin Orthop 1976; 121: 20-32.

Food and Drug Administration. FDA Consumer. From Test Tube To Patient: New Drug Development in the United States. Second Edition, 1995.

Gil Garay E, Gomez Cordero P, Peleteiro Pensado P. Hemispheric porous-coated acetabular component with and without screw fixation. Hip Int 2000; 10: 248.

González Della Valle A, Salonia-Ruzo P, Li S, Pellicci P, Sculco T P, Salvati E. Dislodgment of polyethylene liners in first and second generation Harris-Galante acetabular components. J Bone Joint Surg (Am) 2001; 83: 553-9.

Huk O L, Bansal M, Betts F, Rimnac C M, Lieberman J R, Huo M H, Salvati E A. Polyethylene and metal debris generated by non-articulating surfaces of modular acetabular components. J Bone Joint Surg (Br) 1994; 76: 568-74.

Maloney W J, Davey J R, Harris W H. Bead loosening from a porous-coated acetabular component. A follow-up note. Clin Orthop 1992; 281: 112-4.

Rosenqvist R, Bylander B, Knutson K, Rydholm U, Röoser B, Egund N, Lindgren L. Loosening of the porous coating of bicompartmental prostheses in patients with rheumatoid arthritis. J Bone Joint Surg (Am) 1986: 68: 538-42.

von Knoch M, Sychterz C J, Anderson Engh C, Engh C A. Incidence of late bead shedding from uncemented porous coated cups. A radiographic evaluation. Clin Orthop 1997; 342: 99-105.