Metallosis caused by alumina ceramic screw fixation of grafted bone in a bipolar hip endoprosthesis

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Summary. We report a case of metallosis due to ceramic fragments in the inner bearing surface of the polyethylene cup of a bipolar hip prosthesis with fracture of the alumina ceramic screws used for grafted bone fixation. After bone-grafting acetabuloplasty with a Bateman bipolar endoprosthesis, gradual migration of the outer head occurred, and fracture of the screws was observed. Seven years after the operation, radiographs showed severe metallosis of the surrounding tissues. At revision, marked wear of the inner head was seen. Detailed examination revealed that many rough-edged ceramic particles originating from the fractured ceramic screws had become embedded in the inner surface of the polyethylene bearing insert. These extremely hard ceramic fragments had entered the prosthetic joint space during joint movement, thereafter causing continuous abrasion of the metal head. After revision, the concentration of the constituents of the prosthesis alloy in the serum decreased toward control levels. To prevent serious complications like those in the present case, screws should be inserted more than 1 cm from the outer head of a bipolar endoprosthesis, and the outer head should be removed as soon as possible if it comes into contact with the screws.

Case report

A 51-year-old woman, 137 cm tall and weighing 44 kg, who had bilateral osteoarthritis of the hip, underwent left bone grafting acetabuloplasty with two alumina ceramic screws, one AO screw, and one Kirschner wire using a Bateman bipolar endoprosthesis in September 1983. During insertion of the stemmed femoral component into the excessively narrow canal of the femur, fracture of the femur occurred, and wiring of the fractured femur was added.

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Ceramic fragments present in plastic can rapidly wear down a metal head, which has a hardness approximately ten times less than that of alumina ceramic. A similar complication of this kind, a case of massive wear of a metal head after revision of a total hip prosthesis with a fractured ceramic ball, has been reported previously [2]. We report another case, which demonstrates that even though ceramic fragments were produced outside the prosthetic joint, the same complication could arise.

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control plateau levels 7 weeks after the revision. These data indicate that Co differs from the other metals with regard to permeation into the serum.

Discussion

When foreign bodies are entrapped within a prosthetic joint between the plastic acetabulum and the metal head, so-called “three-body abrasive wear” occurs, and mainly the plastic acetabulum wears away. On the other hand, if rough-edged ceramic fragments, which are about ten times as hard as the metal head, once become entrapped between the metal-on-polyethylene articulating surfaces, they penetrate the polyethylene and abrade the metal head severely, resulting in massive wear of the head. In our present patient, smashed ceramic fragments had entered the prosthetic joint space of a Bateman bipolar endoprosthesis as the joint moved, resulting in the mechanism of wear described.

Alumina ceramic screws show excellent biocompatibility with body tissues, but tend to fragment when they break. Therefore, when these are used for grafted bone fixation in bipolar endoprostheses, bearing in mind the possibility of migration of the outer head [1], and in or-