Early detection of prosthetic-hip loosening

Comparison of low- and high-viscosity bone cement

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In 1987, we reported the 1-year migration of the prosthetic components in 16 hips followed by roentgen stereophotogrammetry after fixation with either low- or high-viscosity cement. We now report the migration of these prosthetic components during another 2 postoperative years. Eight acetabular components, four in each group, migrated cranially; and four femoral components, three in the low-viscosity and one in the high-viscosity group, migrated distally. All but two migrations were obvious 4 months postoperatively, which indicates that what is called late loosening is the result of late detection rather than of late occurrence of loosening. Low-viscosity cement did not provide improved prosthetic fixation.

In a roentgen stereophotogrammetric study (1), we reported the 1-year migration of the prosthetic components in 16 hips after fixation with low- or high-viscosity cement. We now report the migration along the longitudinal axis of these prosthetic components during another 2 postoperative years. Roentgen stereophotogrammetry (2) was performed 1 week, 4 months, 1 year, and 3 years postoperatively (Figure 1). Displacements less than 0.2 mm were not considered significant (3).

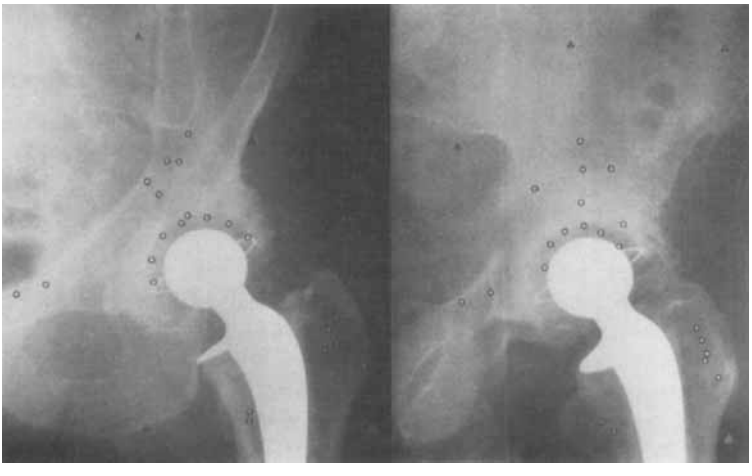

Figure 1. A hip (stereo pair) with 0.8-mm-diameter tantalum balls (○) positioned in the iliac bone, the greater and lesser trochanters, and in the acetabular component. Reference balls (Δ) for exact localization of the films.

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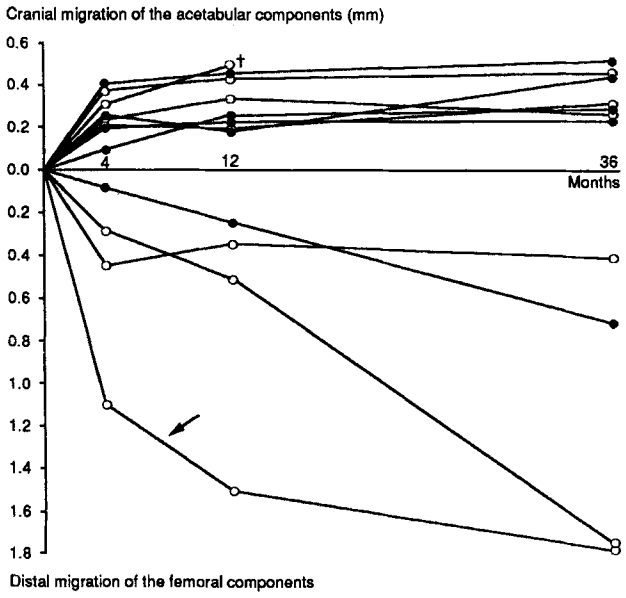

Figure 2. Migration along the longitudinal axis of the migrating eight acetabular and four femoral components. (Eight acetabular and 10 femoral components did not migrate during the observation period.) ○ = low-viscosity (Palacos E cum gentamicin, Merck) and ● = high-viscosity cement (Palacos R cum gentamicin, Merck). Arrow indicates the femoral component associated with slight pain initially at weightbearing.

Eight of the 16 acetabular components (4/8 with low-viscosity and 4/8 with high-viscosity cement) and 4 of the 14 femoral components (3/8 with low-viscosity and 1/6 with high-viscosity cement) migrated during the observation period (Figure 2). In all the cases but 2 (one acetabular and one femoral), the migration was seen within 4 months after surgery. One acetabular component, which in our previous study (1) was found to be migrating close to the lower limit of significance, proved to be nonmigrating after reexamination and recalculation. Migration was rapid during the initial 4 months, and then in most cases slower. Three years after surgery, the patient with the initially fastest migrating femoral component had slight pain at weightbearing; all other patients were asymptomatic. One patient died of an acute myocardial infarction during the observation period.

Because all but two migrations were obvious 4 months postoperatively, our findings indicate that the increased rate of failure with time after arthroplasty, what is called late loosening, is the result of late detection rather than of late occurrence of loosening. Loosening of the cemented hip prosthesis may be a consequence of heat injury of bone induced during polymerization of the cement or of insufficient mechanical support to the cement by weak cancellous bone (3). These causes are not influenced by the viscosity of the cement, and we conclude that the use of low-viscosity cement does not improve prosthetic fixation.

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