We reviewed 120 consecutive primary total hip replacements in 109 patients in whom a Freeman uncemented metal-backed component had been used. Acetabular components were used with a Freeman neck-retaining stem in one of three configurations: cemented smooth stem, uncemented smooth stem or uncemented ridged stem. After a mean follow up of 72 months (62 to 113) there were nine cases of aseptic loosening; a survivorship at eight years of 83%. In addition, more than one-third of the remaining surviving cups showed loosening radiologically. The Freeman acetabular component demonstrated a characteristic pattern of loosening on radiographs. The high incidence of aseptic loosening can be explained by poor design and material failure.

Patients and Methods

Between January 1987 and February 1991, 120 primary hip arthroplasties were carried out on 109 patients using a Freeman metal-backed acetabular cup (Corin Medical, Circencester, UK) and a Freeman neck-retaining femoral prosthesis (Corin Medical). The femoral stem was used in one of three configurations; a cemented smooth stem in 71, an uncemented smooth stem in 40. There were 51 men and 58 women with a mean age at operation of 58.9 years for the men (30 to 85) and 64.8 years for the women (22 to 87). Of the 109 patients, operation was carried out for osteoarthritis in 86%, inflammatory arthritis in 10%, trauma in 2%, and for other causes in 2%. A Hardinge approach was used for all the patients.

Those femoral prostheses which were cemented were implanted using a second-generation technique with low-viscosity polymethylmethacrylate containing gentamicin.

The minimum follow-up was for 62 months. A total of 26 patients had died. Of the four perioperative deaths, three were due to cardiovascular causes and one to a perforated viscus. Four patients were lost to follow-up. The 73 patients (82 hips) who did not have an infection were subjected to a clinical assessment and radiological review. The radiographs were assessed for the presence of radiolucent lines according to the zones described by DeLee and Charnley.

Results

Nine cups have been revised because of aseptic loosening and another for pain. The last was excluded from the survivorship analysis. The mean follow-up was 72 months (62 to 113). In none of the patients who died had the...
original cup been revised. There was one superficial infection, six deep infections with three occurring early and three late, eight cases of deep-venous thrombosis, and one of palsy of the common peroneal nerve.

Survival of the hip prostheses was assessed by life-table analysis (Table I). The Freeman metal-backed acetabular component had a cumulative survival at five years of 98% which had decreased to 83% at eight years.

Recent radiographs were available for 82 acetabular components and of these 20 (24%) had at least one radiolucent line which had developed since the original post-operative film. Four other cups had gross radiological

Fig. 1
The Freeman uncemented cup with HDP insert and screw for additional fixation.

Fig. 2a
Radiographs showing a) the Freeman cup immediately after surgery and b) aseptic loosening and the characteristic pattern of migration with movement of the cup superiorly and medially, pivoting around the screw.
migration (Fig. 2) with a characteristic pattern. Eleven had a fracture of the screw, indicating instability. Migration of the cup and fracture of a screw increased the rate of loosening to 38%, as assessed radiologically.

Discussion

We believe that there are features of the design of the uncemented Freeman acetabular component which may explain the poor survivorship and outcome. The metal back of the component is flexible and therefore allows differential movement between the metal and the HDP liner during normal functional use. The internal surface of the metal backing has a matt finish and is consequently rough. There is also a poor fit of the HDP liner into the metal back since it is a press-fit design aided by two superolateral lugs and the ‘magic peg’ which passes through a central hole in the metal back. All these features will potentiate abrasive wear of the polyethylene liner. The HDP liner is thin because of the 32 mm femoral heads and sits proud of the metal backing. This tends to cause fatigue wear and creep. The HDP is also in contact with the bone in several places around the component, allowing direct egress of particulate-rich joint fluid between the acetabular component and bone, thereby contributing to osteolysis.

The acetabular component has several features which cause the characteristic migration and loosening. Once the process of aseptic loosening has begun the presence of a titanium screw in the superolateral aspect of the cobalt-chrome implant raises the possibility of fretting and the ingress of joint fluid, rich in particles, around the screw. It also provides a fulcrum about which rotation can occur. This could explain the characteristic pattern of migration shown in Figure 2. There can also be differential movement at the junction of the screw and the flange which may lead to breakage of the screws (11/82, 13%). If there is a broken screw with this component its rate of migration is greater which leads to an increased likelihood of revision.

A rate of failure of 51% for a very similar ‘prototype’ acetabular component was described in 1996. It also had an inferior lug through which a screw could be inserted. A high rate of migration was described, although not in the superomedial direction which we observed. This could be explained by a resisting effect of the inferior lug on the acetabular notch. That report and our experience have demonstrated the poor outcome of this design of cup. It reinforces the view that if there is no long-term surveillance an unsatisfactory component may continue to be used without knowledge of the later outcome. While our patients had what might be considered an acceptable outcome at five years, at eight years it was poor. This has been shown to be the case with other prostheses. We support the view that constant clinical review must be recommended for all implants. Such vigilance will prevent the continued use of suboptimal devices.

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References