The modular head/neck has been an industry standard for the past 10 years. This article concerns the stem distal to the articulation. In the use of cementless devices, fit is very important, and the healthiest bone will not repair or heal a poor initial fit. Fit can be difficult. The proportion between the metaphysis and diaphysis is not constant. One attempt to address these problems is the modular stem, such as the SROM (Joint Medical Products, Stamford, Conn). It provides intraoperative flexibility and customization, and, to date, it has given predictable clinical results (Cameron HU, personal communication, 1994). However, is there a built-in failure mechanism? Modular devices increase debris generation. Do we need them?

Clinical experience of up to 8 years has not yet demonstrated adverse clinical outcomes related to the laboratory data regarding the generation of particulate metal debris. However, there is no evidence that modular femoral stems provide better clinical results than one-piece implants. The 15-year experience with the anatomic medullary locking (AML) (DePuy, Warsaw, Ind) in hips done prior to 1985 reported six femoral components revised for loosening and a high percentage of osseous integration. In radiographic studies, femoral osteolysis has been reported about multiple cementless stems and is currently the greatest problem with cementless fixation. The occurrence of femoral osteolysis about the porous coated anatomic (PCA) (Howmedica, East Rutherford, NJ) has been reported at 8% to 37%; the AML, from 28% to 56%; the Harris Galante (Zimmer, Warsaw, Ind), from 8% to 31%; and the anatomic porous replacement (APR) (Intermedics, Austin, Tex) at 30%. The surgeon who is interested in minimizing osteolysis must question the risk-benefit ratio of modular stems. Most cementless devices are used in younger, more active patients, which further emphasizes the need to minimize long-term problems. In the young patient population, there is a higher percentage of distorted, proximal, femoral anatomy (eg, post-traumatic and congenital dysplasia, making fit of cementless devices more difficult). However, in most cases, a unitized stem can be used.

Initial implant stability is important to long-term clinical success and bone ingrowth. Initial instability of non-cemented implants is less than cemented implants. Experience with the SROM has shown that when tight metaphyseal (sleeve) and diaphyseal (stem) fit is obtained, the stems compare favorably to cemented stems when tested for torsional stability. Currently, most cementless devices use proximal coating to achieve fixation in the weaker, asymmetric bone of the metaphysis. However, it is easier to obtain fixation in the more cylindrical diaphysis. When the AML stem was press fit in the isthmus, 93% bone ingrowth was documented radiographically. Therefore, when using a proximally fixed, unitized stem, the surgeon must fit and fill the anteroposterior (AP) and the mediolateral (ML) dimensions of the metaphysis to achieve as much cortical contact as possible. Contemporary instrumentation and stems allow this with multiple sizes that include multiple proximal bodies in the AP and ML planes for each distal diameter.
Most unitized stems use circumferential, canal-sealing coating. This reduces polyethylene access to the periprosthetic interface. The extent of porous coating remains debatable and is not the purpose of this article. Approximately 80% of the cementless devices used are proximally coated. Stems >13 mm in diameter with extensive porous coating had a higher incidence of bone resorption. There is increased mechanical stability in the stems which are made of titanium alloy and designed to reduce cross-sectional area. Clinical data suggest that to reduce the likelihood of pronounced bone resorption, it would be beneficial for the implant to possess a bending stiffness of approximately one to one third that of a human femur. Contempor ary, titanium, unitized, proximally coated designs offer flutes to augment rotational instability and coronal slots to decrease cross-sectional area. These stems are offered in multiple sizes to address proximal/distal mismatch and proximal AP/ML mismatch.

Since all of the potential failure modes with two-piece acetabular implants have become a clinical reality (ie, dissociation, fracture, complete linear wear), perhaps a more conservative approach to the femoral side in the treatment of young, active patients should be used. Modularity can be used for revision and complete primary cases but should be questioned in all arthroplasties. In those cases where cementless fixation is not possible, one must remember that cement allows 100% fit and fill. Both Ballard et al. and Oishi et al. have reported excellent fixation of the femoral component in two recent long-term, follow-up studies.

REFERENCES