

Preface

Successful long-term results of total hip arthroplasty are mainly due to two facts: long-term stability of the implant and minimal wear of the articulating surfaces. Nowadays fixation of the implant component appears to be a minor problem as both options – cementless fixation and fixation using fourth generation cementing techniques – can achieve excellent long-term stability.

Wear of the articulating components in total hip arthroplasty remains the most challenging unsolved problem. The ideal bearing surface for total hip arthroplasty has been sought since the early days of this procedure. Beginning with polyethylene as a bearing surface by Sir John Charnley, a metal-on-metal bearing surface was introduced by McKee and Farrar to improve wear characteristics aiming at long-term survival of the implant. In the early 1970s Boutin initiated the first ceramic-on-ceramic articulation in France. Since these pioneering activities improvements in manufacturing techniques and materials have led to better long-term results – nevertheless each of these bearings have not only strengths but also weaknesses.

Conventional polyethylene–metal articulations are complicated long-term by wear debris and subsequent osteolysis and loosening. During recent years cross-linked polyethylene has shown improved wear characteristics compared with conventional polyethylene. Recent reports suggest that we have not yet reached the final stage of improvement as today vitamin E–stabilised cross-linked polyethylene is increasingly launched on the market. But, wear probably will not be as low as hard-on-hard bearings and we do not know if these new polyethylenes really can eliminate osteolysis especially in young and active patients.

The major advantage of ceramic-on-ceramic is its very low wear. But – there is still concern because of squeaking and fracture of the ceramic components. During the last decades ceramic technology has improved dramatically. Starting from a fracture risk of 1% in the 1980's there is now a probability of fracture for the ceramic head of only 0.002% and for the ceramic inlay of 0.02%. This improvement in technology is still in progress. Current problems concerning ceramic-on-ceramic prostheses include squeaking phenomena leading to patient complaints and, in some cases, to revision of the articulation. Evaluation of all these cases could show that this problem is associated with special types of implants and imperfect surgical techniques, for example, stripe wear due to edge loading of the ceramic inlay.

Metal-on-metal prostheses show low wear, no fracture risk and allow the largest femoral head-to-outside-cup-diameter-ratio. However, the concern here is the systemic metal ion

level elevation and metal allergy resulting in local lymphocytic response. Recent reports of increasing failure rates using this material in resurfacing arthroplasty as well as in large-diameter head metal-on-metal articulations have caused official warnings from some State authorities. Nevertheless, there are still high numbers of cases with excellent clinical results and no problems related to the metal articulation.

Considering all these advantages and disadvantages we have to be aware that wear issues are still a challenge in achieving the ultimate goal of total hip arthroplasty – an implant which functions for the whole life of every single patient.

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