Title: Ceramic bearings with titanium adapter sleeves implanted during revision hip arthroplasty show minimal fretting or corrosion: a retrieval analysis

Authors: Koch C. N., Figgie M. Jr, Figgie M. P., Elpers M. E., Wright T. M.


Level of Evidence: Not indicated

Summary: Koch et al. aimed with this retrieval study to evaluate the magnitude of fretting, corrosion and metal transfer with sleeved ceramic heads. The titanium alloy sleeve allows the use of ceramic heads on used stem tapers that otherwise could be subjected to an inappropriate load on female taper. However, the sleeve creates new metal-ceramic and metal-metal interfaces, which may be prone to corrode.

24 hips with BIOLOX® delta heads and a paired with the titanium sleeve (BIOLOX® OPTION) were revised from December 2011 to December 2015 in 14 primaries and 10 revision hip replacement surgeries at the Hospital of Special Surgery (New York, USA). The reason of the revisions was not related to trunnion complications and none of the revisions were related to the femoral head. The mean implantation time was 15.5 months (range 1 -65), the mean patient age was 61.1 years (range 33-81) and average BMI was 28.3 (range 20-63), 13 were males and 11 females. 15 femoral stems were from titanium alloy, 6 from CoCr and 3 from TMZF. The ceramic heads bearing and taper surfaces were graded by metal transfer scoring system. The fretting and corrosion of titanium sleeves’ inner and outer surfaces were evaluated by Goldberg’s score.

The mean fretting score was 1.8 for the inner sleeve surface and 1.2 for the outer. The magnitude of fretting corrosion was not correlated to stem material. The mean metal transfer score of 2.3 was similar to the findings of a previous retrieval study performed by the authors with BIOLOX® forte heads.

In summary, the retrieved components showed little mechanical or corrosive damage. The authors’ findings support the use of BIOLOX® OPTION heads. The ceramic heads with the titanium sleeve are a safe option in revision total hip replacement.

Study Limitations: These results do not necessarily represent taper junction settings in well-functioning THAs. The sample size is small with short length of implantation (15.5 months).

Key Messages: The total Goldberg’s score of inner sleeve surface was found significantly (p < 0.05) higher than the outer surface, but the magnitude of corrosion is low and the damage minimal. BIOLOX® OPTION is a safe alternative to reduce the ALTR risk without compromising the ceramic head strength and the corrosion resistance of modular junction.