Letter to the Editor

COMMENTARY ON "OSTEOLYSIS IN TOTAL HIP ARTHROPLASTY IN RELATION TO METAL ION RELEASE: COMPARISON BETWEEN MONOLITHIC PROSTHESES AND DIFFERENT MODULARITIES". WHAT IS THE EVIDENCE ON THE REAL PROS AND CONS?

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Dear Editor,

The progress in the field of total hip arthroplasty (THA) has been immense over the past 20 years or so, and outcomes have definitely improved. However, there are still significant debated aspects that need further evidence and research. A great potential for better results has been brought by the introduction of modular THA implants. Their advantages and disadvantages have been hypothesized and studied, but uncertainty still remains. Particularly, further evidence is needed to establish internationally accepted indications and guidelines, able to resolve doubts, and provide surgeons with the appropriate knowledge to balance the pros and cons of the available surgical alternatives and conservative strategies in revision surgery (1-3).

A major issue of total hip arthroplasty implants is the presence of active corrosion processes at the metallic surfaces and the release of particles due to wear. These processes are thought to be more frequent in modular implants (4-6). The active corrosion process of metallic surfaces and the release of particles due to wear are a source of soluble metal ions (predominantly Cobalt and Chromium (CoCr) (7). The particles are degraded by macrophages and eliminated. However, the precise mechanisms underlying these processes are still unknown. Certainly, there is a strong inflammatory response against the particles and ions around the implants, which subsequently causes loosening and implant failure (1-4).

The paper we are commenting on sought to investigate the presence of any association between serum and urine concentrations of metal ions released in THA and periprosthetic osteolysis for modular neck and monolithic implants, with clinical, radiographic, and tribological insights (1). A significant number of patients were included in the study groups (monoblock, modular with metal head, and modular with ceramic head) and a mid-term follow-up was reached (4 years on average). The presented data included radiological evaluation (to detect any area of osteolysis around the prosthesis of both the femur and the acetabulum) and serum and urinary tests (to assess the values of Chromium and Cobalt released) (1).

Received: 3 February 2022
Accepted: 1 March 2022

The evidence provided supports clear biomechanical advantages of modular implants but with the side effects of higher metal ion release and a greater prevalence of osteolysis. This should be well considered by surgeons when deciding what type of procedure to perform. Surgeons should appropriately balance which risks to assign to patients based on the specific clinical scenario, patient characteristics and mobility, functional goals, and specific implant indications. With our commentary, we would like to highlight the strengths and weaknesses of the published article and use the evidence provided to further discuss the matter, integrating the most recent available evidence-based knowledge with the final aim of delineating strong recommendations for surgeons when deciding on the type of THA implant to use.

Most of the previously published studies have correlated the elevation of ion levels to the type of prostheses (8-14). Osteolysis phenomena are rarely taken into account, and few clinical follow-ups have been reported. There is a particular lack of follow-ups longer than 3 years. On the other hand, the commented study has compared modular and monoblock implants clinically, radiographically, and tribologically, attempting to investigate the presence of any association between serum and urine concentrations of metal ions released in THA and periprosthetic osteolysis for modular neck and monolithic implants (1).

The combination of these data is rarely found in the available literature, and the presented results provide a significant boost to evidence-based knowledge on the topic. In fact, the paper provides both quantitative and qualitative data regarding the release of the most common periprosthetic metal ions in THAs (Cr and Co) and the presence of periprosthetic osteolysis. The evidence provided supports clear biomechanical advantages of modular implants but with the side effects of higher metal ion release and a greater prevalence of osteolysis. This should be well considered by surgeons when deciding what type of procedure to perform.

The commented study also reported a higher incidence of osteolysis in the modular group, almost the only group presenting grade 3 osteolysis. Serum and urinary chromium and cobalt values were also higher in the modular groups, with the highest levels in the metal head implants. Statistical linear correlation test results suggested positive correlations between increasing metal concentrations and incidences of osteolysis. However, no cases of pseudo-tumor were detected (1).

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