The James A. Rand Young Investigator's Award

Questioning the "Nickel-Free" Total Knee Arthroplasty

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Notes

Introduction: A study was undertaken to determine how much metal is present in the knee joint from performing a TKA with standard cobalt-chromium (Co-Cr) components as well as with "nickel-free, hypoallergenic" components.

Methods: Joint fluid was collected immediately prior to arthrotomy and from drainage fluid the following morning to determine the amount of metal debris generated when performing a TKA with stainless steel sawblades and saw captures. Pre- and post-procedure joint fluid was collected from 24 consecutive cases of cemented Co-Cr components (Group I) and compared to a cohort of 17 patients with known or suspected metal allergy who had an Oxinium femoral and a titanium alloy tibial component.

Results: Group I patients had statistically higher levels of nickel (Ni; 30%, p=0.033), cobalt (Co; 1200%, p<0.0001) and chromium (Cr. 218%, p<0.0001). The cutting blocks and sawblades do not contain cobalt, which was the metal ion in highest concentration; therefore, the cobalt must have come from impacting the components. Subsequently, the debris generation purely from the sawblades and cutting blocks could be discerned from Group II, whose components do not contain Co, Cr, or Ni. Group II patients had 9.5x significantly higher Cr (0.50 vs. 0.053, p<0.001) and 5.1x higher Ni (1.37 vs. 0.267, p<0.0001) post-TKA vs. pre-TKA while the cobalt level was not significantly different as expected with the absence of Cobalt in the components (0.12 vs. 0.07, p=0.60). The nickel levels generated in performing an Oxinium TKA was 3.3x higher than when performing a Co-Cr TKA (1.37 vs. 0.41 ppb, p<0.001).

Conclusion: The substantial degree of nickel generation resulting from performing a hypoallergenic "nickel-free" TKA calls into question the rationale of utilizing more expensive, lower nickel components on the basis of known or suspected nickel or chromium allergy.

www.AAHKS.org/Meeting 47