

Determination of the Pull-Out/ Holding Strength at the Taper-Trunnion Junction of Hip Implants

Authors : Obinna K. Ihesiulor, Krishna Shankar, Paul Smith, Alan Fien

Abstract : Excessive fretting wear at the taper-trunnion junction (trunnionosis) apparently contributes to the high failure rates of hip implants. Implant wear and corrosion lead to the release of metal particulate debris and subsequent release of metal ions at the taper-trunnion surface. This results in a type of metal poisoning referred to as metallosis. The consequences of metal poisoning include; osteolysis (bone loss), osteoarthritis (pain), aseptic loosening of the prosthesis and revision surgery. Follow up after revision surgery, metal debris particles are commonly found in numerous locations. Background: A stable connection between the femoral ball head (taper) and stem (trunnion) is necessary to prevent relative motions and corrosion at the taper junction. Hence, the importance of component assembly cannot be over-emphasized. Therefore, the aim of this study is to determine the influence of head-stem junction assembly by press fitting and the subsequent disengagement/disassembly on the connection strength between the taper ball head and stem. Methods: CoCr femoral heads were assembled with High stainless hydrogen steel stem (trunnion) by Push-in i.e. press fit; and disengaged by Pull-out test. The strength and stability of the two connections were evaluated by measuring the head pull-out forces according to ISO 7206-10 standards. Findings: The head-stem junction strength linearly increases with assembly forces.

Keywords : wear, modular hip prosthesis, taper head-stem, force assembly and disassembly

Conference Title : ICBEST 2015 : International Conference on Biomedical Engineering Systems and Technologies

Conference Location : Los Angeles, United States

Conference Dates : September 28-29, 2015