TORSIONAL STIFFNESS OF THE EXETER FEMORAL COMPONENT

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Abstract

Torsional loads occur frequently during activities of daily living that require standing on the flexed hip, such as rising from a chair and stair climbing. We hypothesized that the torsional stiffness of a highly polished double tapered stem would not be compromised during and following cyclic loading and that debonding of the stem would not be detrimental to function. This study was designed to investigate the torsional stiffness of the Exeter stem following periods of loading, generating subsidence of the stem, and to assess the torsional stability of the stem throughout the loading period and following complete debonding from the cement mantle. An experimental model was developed to test this hypothesis using analogue femora to include cyclic loading and torsional testing protocol.

A paired t-test found no statistical significance to indicate that there was any difference between torsional stiffness values throughout the loading cycle. Torsional stiffness was initially compromised following reimplantation. Loading of the specimen following reimplantation increased the stiffness. A paired t-test found no statistically significant difference between the stiffness prior to and following loaded reimplantation.

The results confirmed that the torsional stiffness of a highly polished double tapered stem design does not decrease following axial subsidence under cyclic loading. Additionally the stem behaved well following re-implantation as it was found that debonding did not have an obvious detrimental effect on the performance of the stem under cyclic and torsional loads.