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The accuracy of Intramedullary Femoral alignment in Total Knee Replacement in the prescence of ipsilateral Hip Replacement.

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Objectives: During total knee replacement (TKR) surgery, the most commonly used method for aligning the distal femur appropriately is via an intramedullary (IM) distal femoral alignment rod. The alignment of the rod itself is reliant on the isthmus which is used to most accurately place the rod in the correct anatomical axis. In the instance of something preventing the rod from entering the isthmus correctly, such as a hip replacement, then the degree of accuracy could be assumed to be even less.

Mechanical-anatomical malalignment has been shown to decrease the implant (TKR) survival and so methods of increasing accuracy of alignment relative to the mechanical axis have been developed. At present the most accurate method intraoperatively is computer navigation and several studies have demonstrated improved alignment.

An increasing number of patients year on year are having both knee and hip replacements and as the population ages the likelihood of having both a knee and hip replacement will also increase. We propose that the presence of a hip replacement within the isthmus of the femur may further decrease the accuracy of the IM alignment of the femur leading to incorrect implant positioning.

Methods: The study was conducted on 10 cadaveric specimens (20 femurs). Computational navigation instrumentation was attached in turn to each femur and the ideal alignment data recorded in a standard fashion by a single operator (principal investigator). A standard entry port was then be made in the femur for the introduction of the IM rod. An IM rod was then inserted with the distal femoral cutting block in the accepted position recorded blindly on the computer navigation (both in terms of varus/valgus alignment to the mechanical axis and the degree of flexion). The process was then repeated at 3 levels to represent primary and revision hip lengths from the greater trochanter (replicating the changes that would occur in the presence of a hip replacement) The process was recorded three times at each level.

Results: The resection angles between the cutting surface and the mechanical axis were measured and collected by means of computer navigation system. The results show that the IM alignment had mean Valgus of 0 degrees +/- 0.8 but with a hip replacement in situ this increased to 0.46 degrees +/- 1.49 (range 2.5 varus to 4.5 valgus), with a revision stem 0.825 +/- 1.68 (range 2.5 varus to 4.5 valgus) and long stemmed revision 1.325 +/- 2.09 (range 5 varus to 6.5 valgus). In terms of Flexion IM alignment had a mean flexion of 0.92 +/- 1.7 (range 3 extension to 4 flexion) but with a hip replacement in situ this increased to 1.88 degrees +/- 2.03 (range 2.5 extension to 8.5 flexion), with a revision stem 2.35 +/- 2.2 (range 2.5 extension to 8 flexion) and long stemmed revision 2.75 +/- 2.16 (range 3.5 extension to 7 flexion).

Conclusion: This Study concludes that the prescence of a hip replacement, in particular long stemmed prosthesis, further reduces the accuracy of IM alignment in the Femur for Total Knee Replacement. Consideration of an alternative method, such as navigation, should be considered in such situations.

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