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The 'Quartered Head Technique': A Simple, Reliable Way of Maintaining Leg Length and Offset during Total Hip Arthroplasty

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Abstract : Background: Requirements for satisfactory outcomes following total hip arthroplasty (THA) include restoration of femoral offset, version, and leg length. Various techniques have been described for restoring these biomechanical parameters, with leg length restoration being the most predominantly described. We describe a "quartered head technique" (QHT) which uses a stepwise series of femoral head osteotomies to identify and preserve the centre of rotation of the femoral head during THA in order to ensure reconstruction of leg length, offset and stem version, such that hip biomechanics are restored as near to normal as possible. This study aims to identify whether using the QHT during hip arthroplasty effectively restores leg length and femoral offset to within acceptable parameters. Methods: A retrospective review of 206 hips was carried out, leaving 124 hips in the final analysis. Power analysis indicated a minimum of 37 patients required. All operations were performed using an anterolateral approach by a single surgeon. All femoral implants were cemented, collarless, polished double taper CPT® stems (Zimmer, Swindon, UK). Both cemented, and uncemented acetabular components were used (Zimmer, Swindon, UK). Leg length, version, and offset were assessed intra-operatively and reproduced using the QHT. Post-operative leg length and femoral offset were determined and compared with the contralateral native hip, and the difference was then calculated. For the determination of leg length discrepancy (LLD), we used the method described by Williamson & Reckling, which has been shown to be reproducible with a measurement error of ±1mm. As a reference, the inferior margin of the acetabular teardrop and the most prominent point of the lesser trochanter were used. A discrepancy of less than 6mm LLD was chosen as acceptable. All peri-operative radiographs were assessed by two independent observers. Results: The mean absolute post-operative difference in leg length from the contralateral leg was +3.58mm. 84% of patients (104/124) had LLD within ±6mm of the contralateral limb. The mean absolute post-operative difference in offset from contralateral leg was +3.88mm (range -15 to +9mm, median 3mm). 90% of patients (112/124) were within ±6mm offset of the contralateral limb. There was no statistical difference noted between observer measurements. Conclusion: The QHT provides a simple, inexpensive yet effective method of maintaining femoral leg length and offset during total hip arthroplasty. Combining this technique with pre-operative templating or other techniques described may enable surgeons to reduce even further the discrepancies between pre-operative state and post-operative outcome.

Keywords : leg length discrepancy, technical tip, total hip arthroplasty, operative technique
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