Decreased head-neck ratio diameter and component malposition in total hip arthroplasty are factors known to result in impingement, increased rates of dislocation, wear and failure. In addition to these complications, impingement of the femoral neck on the acetabular component of a hip resurfacing may result in femoral neck fracture and loosening of the acetabular component. Little is known regarding the optimum femoral and acetabular hip resurfacing component position to avoid impingement.

In the first part of this study we analysed the radiographic component position of 131 consecutive hip resurfacings. In the second part the effect of three component variables on the range of motion to impingement were analysed using a dry bone model:

- Inclination of the acetabular cup
- Version of the acetabular cup
- Femoral head-neck diameter ratio

The mean femoral-stem shaft angle in the first part of the study was 138° (range 121° to 158°). The mean acetabular inclination angle was 45° (range 30° to 63°). This wide range in position mirrors that described in the literature. The dry bone study revealed an optimum acetabular cup inclination tending towards 50° and an anteversion of 25°. A large diameter femoral head relative to the femoral neck resulted in a greater range of motion to impingement. A fine balance however exists, to remove a minimum amount of pelvic bone to accommodate a larger acetabular component with an 'oversized' femoral component.

The acetabular resurfacing cup positions described allow the greatest range of physiological hip movement. New technology and improvements to existing equipment and techniques will hopefully lead to more accurate placement of hip resurfacing components minimising the risk of impingement and its complications in this high demand group of patients

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