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Introduction

Sizing is critical for uncemented THR implants. Femoral stems that are too small can lead to a short leg, stem subsidence, decreased offset and instability. Stems that are oversized can lead to decreased range of movement, excessive leg length and fractures. Variable magnification and out of plane rotations limit the reliability of 2D X-rays for accurate implant templating. The aim of this study was to measure the accuracy of the Trinity OPS™ (Corin, UK) planning software in predicting the implanted acetabular cup and femoral stem size.

Materials and Methods

A consecutive series of 49 patients, from three surgeons at a single institution, were sent for Trinity OPS™ pre-operative planning. Trinity OPS™ is a pre-operative, dynamic, patient-specific modelling system for acetabular and femoral implant positioning. The system requires a pre-operative CT scan that facilitates patient-specific implant sizing as well as positioning, Fig 1 and Fig 2.

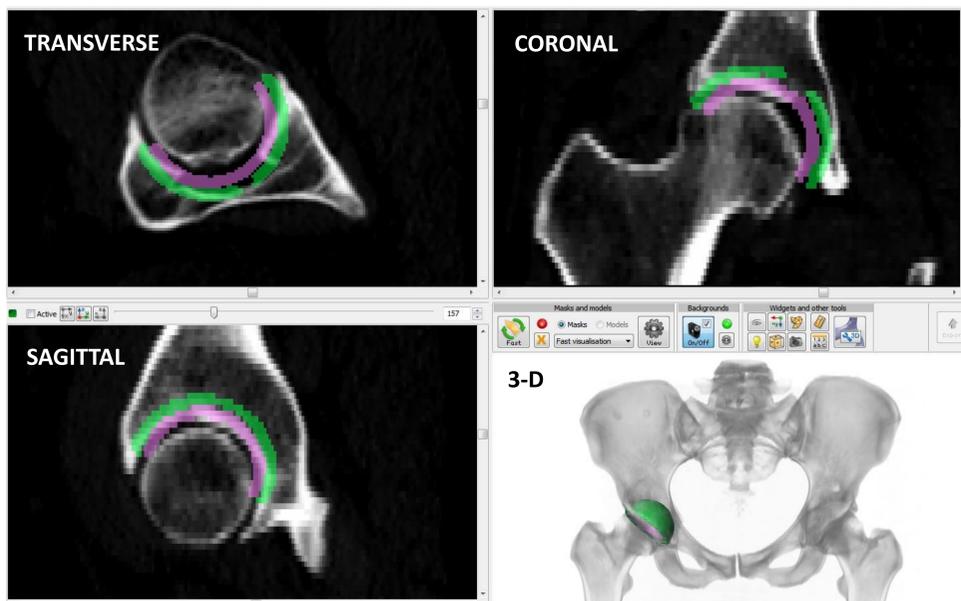


Fig 1. Three-dimensional positioning of the acetabular components in +CAD and ScanIP (Simpleware, UK) as part of the Trinity OPS™ Planning Software

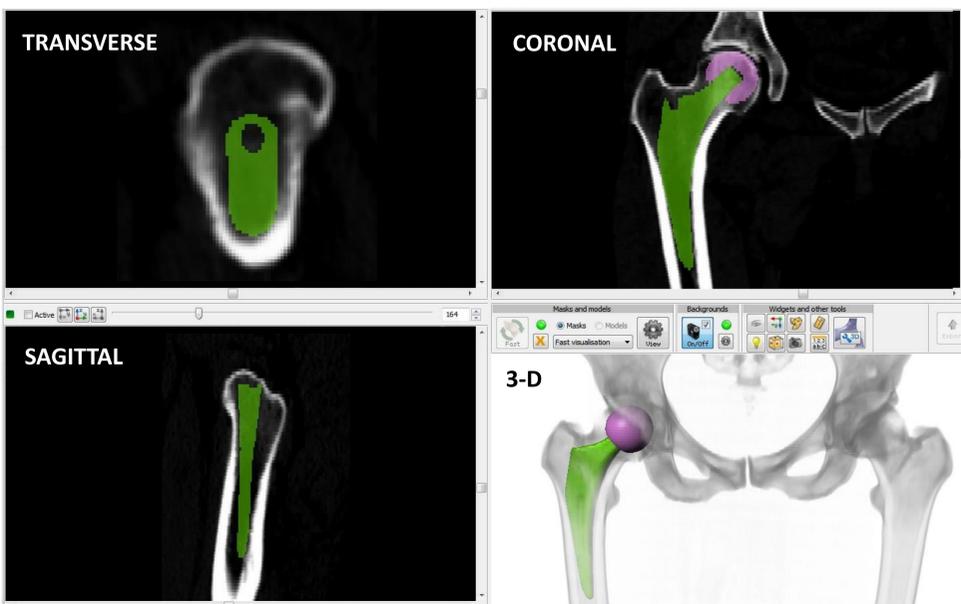
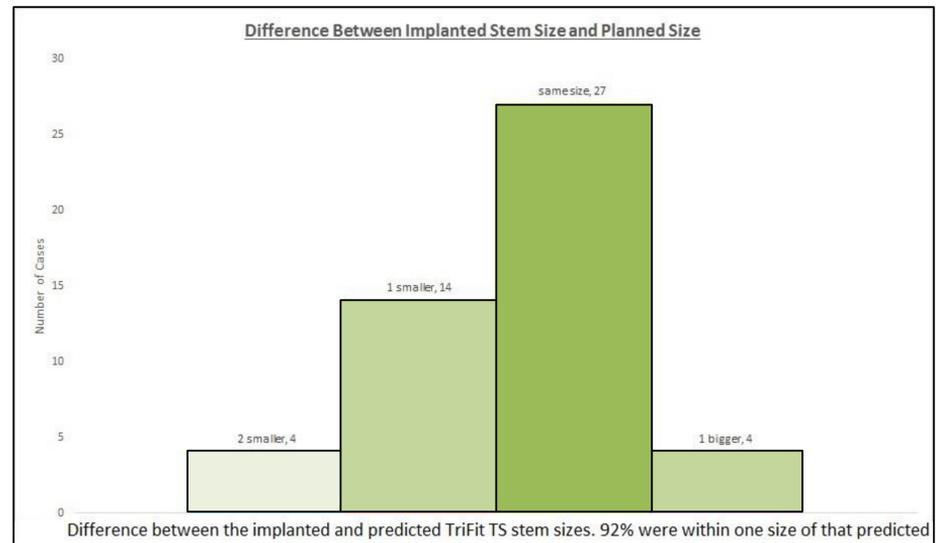


Fig 2. Three-dimensional positioning of the femoral components in +CAD and ScanIP (Simpleware, UK) as part of the Trinity OPS™ Planning Software

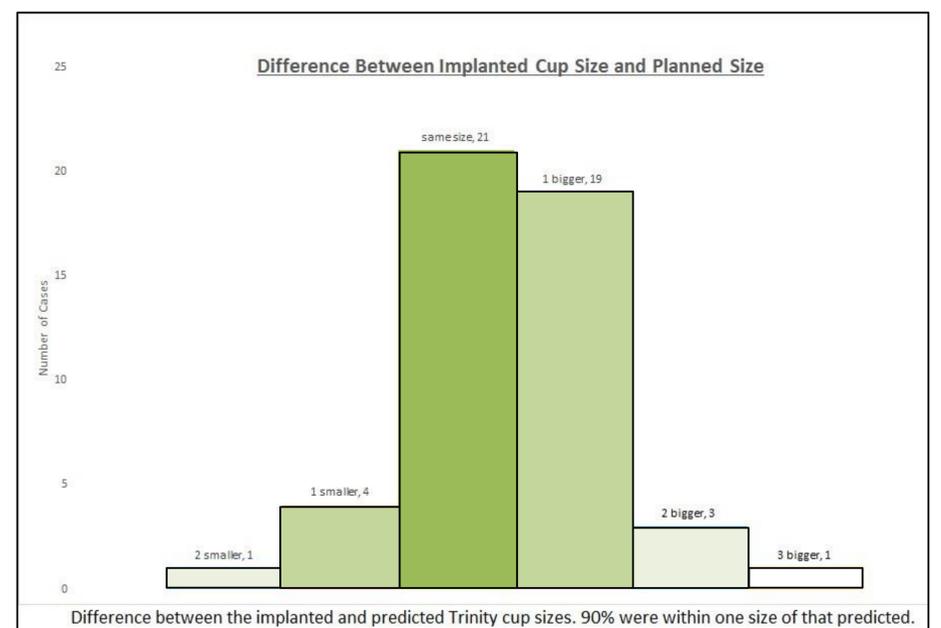
All patients received an uncemented Trinity™ acetabular component (Corin, UK) and an uncemented TriFit TS™ femoral component (Corin, UK) through a posterior approach. Of the 49 patients, 16 received a standard offset stem and 33 had lateralised stems. Review of the operative notes provided the actual sizes of implants used, which was retrospectively compared to the planned sizes in the pre-operative Trinity OPS™ reports.

Results



Femoral components: Of the 49 TriFit TS™ stems, 92% were within one size of that predicted. 27 matched exactly the predicted size, 18 were one size above or below the predicted and 4 within two sizes.

The use of lateralised or standard offset stems was predicted correctly in 80% of cases, with the variability being largely related to the depth of implantation of the acetabular component.



Acetabular components: Of the 49 Trinity™ acetabular shells, 90% were within one size of that planned. 21 matched exactly the predicted size, 23 were one size above or below the predicted, 4 within two sizes and 1 within three sizes.

Conclusions

- The results are similar to those of other comparable 3D templating systems [1,2].
- There is significant value in prediction of sizes of implants before surgery, both as an indicator to the surgeon as to the size expected, and also for minimising the inventory required to be supplied to the hospitals, which may reduce costs.

References

1. Sariali, E., et al., Accuracy of the preoperative planning for cementless total hip arthroplasty. A randomised comparison between three-dimensional computerised planning and conventional templating. *Orthop Traumatol Surg Res*, 2012. **98**(2): p. 151-8.
2. Hassani, H., et al., Comparisons of preoperative three-dimensional planning and surgical reconstruction in primary cementless total hip arthroplasty. *J Arthroplasty*, 2014. **29**(6): p. 1273-7.