

<sup>1</sup>W Riddell; <sup>2</sup>JV Baré; <sup>1,3</sup>JW Pierrepont; <sup>3</sup>CZ Stambouzou; <sup>4</sup>E Marel; <sup>2</sup>AJ Shimmin

<sup>1</sup>University of Sydney, NSW, Australia; <sup>2</sup>Melbourne Orthopaedic Group, VIC, Australia; <sup>3</sup>Optimized Ortho, NSW, Australia; <sup>4</sup>Peninsula Orthopaedics, NSW, Australia

## Introduction

Much of the accuracy of implanting uncemented femoral components relies on the accuracy of the femoral neck osteotomy.

This study looks at a concept for a new patient specific instrument from Optimized Ortho (Sydney, Australia), a division of Corin Group (Cirencester, UK), designed and printed in 3D from CT-templated scans of the patients' femora obtained at the time of the Optimized Ortho protocol for OPS™ acetabular planning, Fig 1. Following 3D templating, the osteotomy is planned, then the Patient Specific Guide is designed and 3D printed.

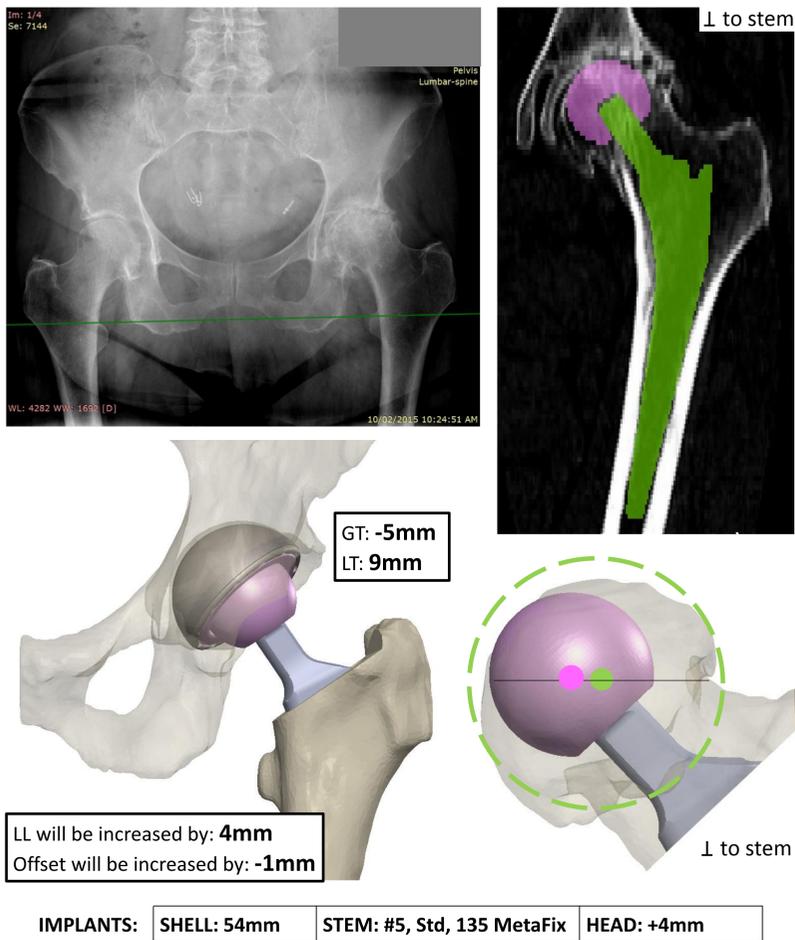


Fig 1. Optimized Ortho OPS planning algorithm involves 3D templating from CT to recreate the native head height. The surgeon can elect to alter the plan, if required

## Materials and Methods

Thirty-three patients received an uncemented Trinity™ acetabular component (Corin, UK) and an uncemented TriFit TS™ femoral component (Corin, UK) through a posterior approach. The femoral osteotomy for all patients was performed using the Patient Specific Instrument illustrated below, Fig 2.

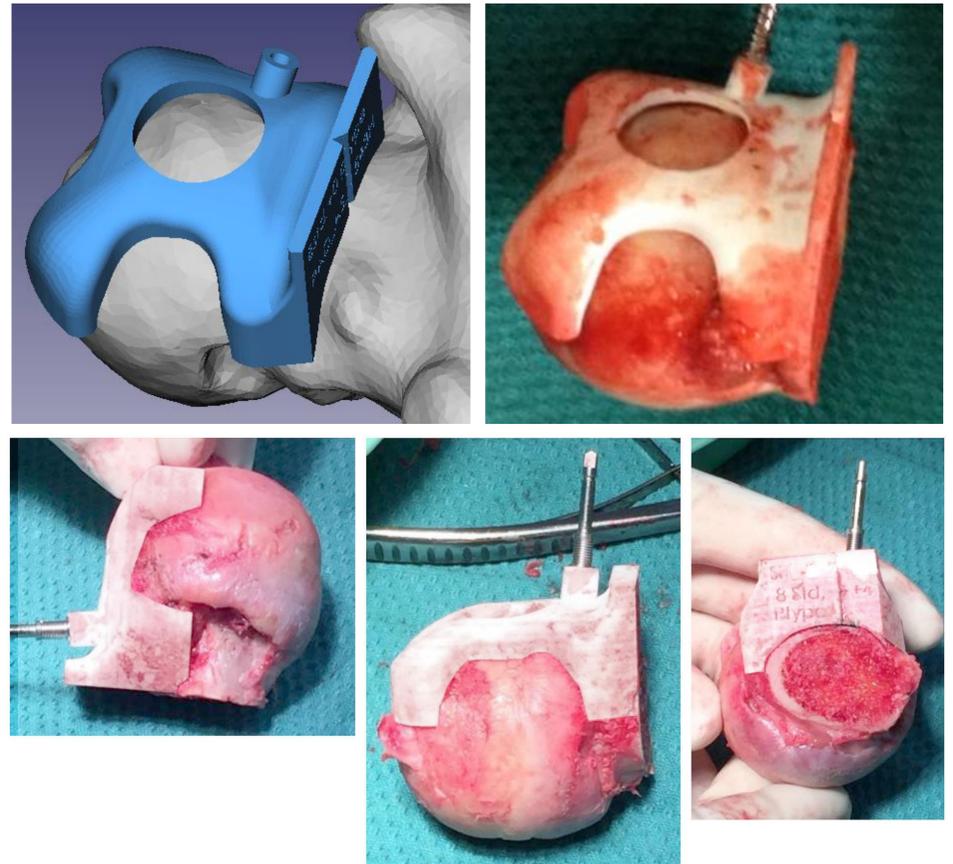


Fig 2. Patient Specific Instrument for Femoral Osteotomy: 3D Model and Operative Photos

The achieved level of osteotomy was confirmed postoperatively by doing a 3D/2D registration, using the Mimics X-ray module (Materialise, Belgium), of the planned 3D resected femur to the postoperative AP radiograph. The image was then scaled and the difference between the planned and achieved level of osteotomy was measured (Imatri Medical, South Africa).

## Method of Validation

- 1) Postoperatively, a 3D/2D registration matched the planned 3D resected femur to the postoperative AP radiograph, Fig 3.
- 2) The image was then scaled and the difference between planned and achieved level of osteotomy was measured, Fig 4.

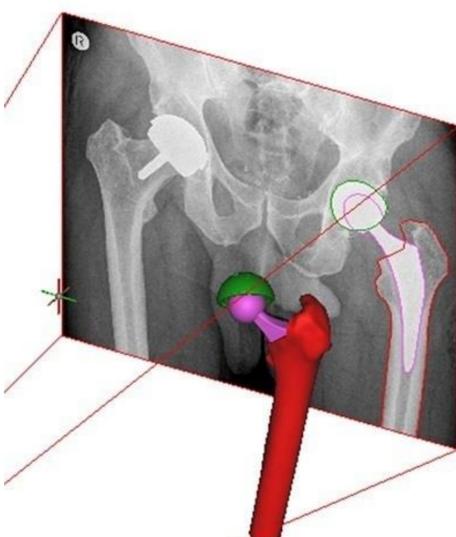


Fig 3. 3D to 2D registration of the resected femur to the postoperative AP radiograph



Fig 4. Measurement of the difference between the planned osteotomy level and that achieved

## Results

The mean difference between the planned and achieved osteotomy level was 0.7mm, with a range of 0.1mm – 6.6mm.

Only 1 patient had a difference of more than 3mm.

Of the 33 patients, 28 had a difference of less than 1mm.

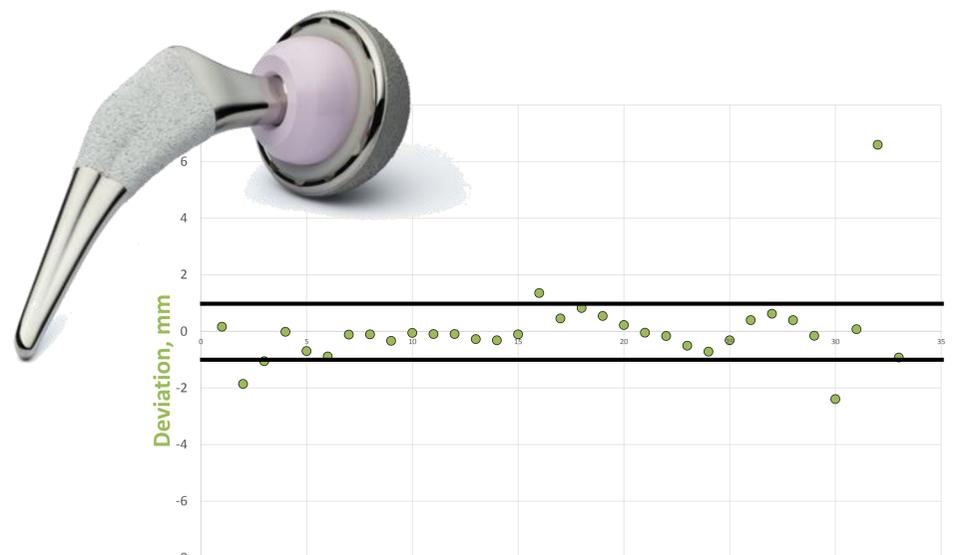


Fig 5. Resection level deviation from plan. 33 consecutive cases, 2 surgeons, 1 implant system

## Conclusions

- A patient specific femoral neck osteotomy guide was made from pre-operative 3D planning from CT.
- This femoral neck osteotomy guide showed very good clinical accuracy in the first group of patients.
- A larger study into planned and achieved leg length and offset is underway.