# Clinical Accuracy of a Patient Specific Femoral Neck Osteotomy Guide

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## Introduction

Achieving an accurate femoral neck osteotomy can lead to improved control over leg length and offset in Total Hip Arthroplasty (THA) [1]. The OPS™ preoperative planning system (Optimized Ortho, Sydney, Australia) incorporates 3D templating from CT to determine an optimal stem position from which the osteotomy is planned, Fig 1.

This study investigates the accuracy of a patient specific instrument designed and 3D printed to deliver the planned osteotomy, Fig 2.

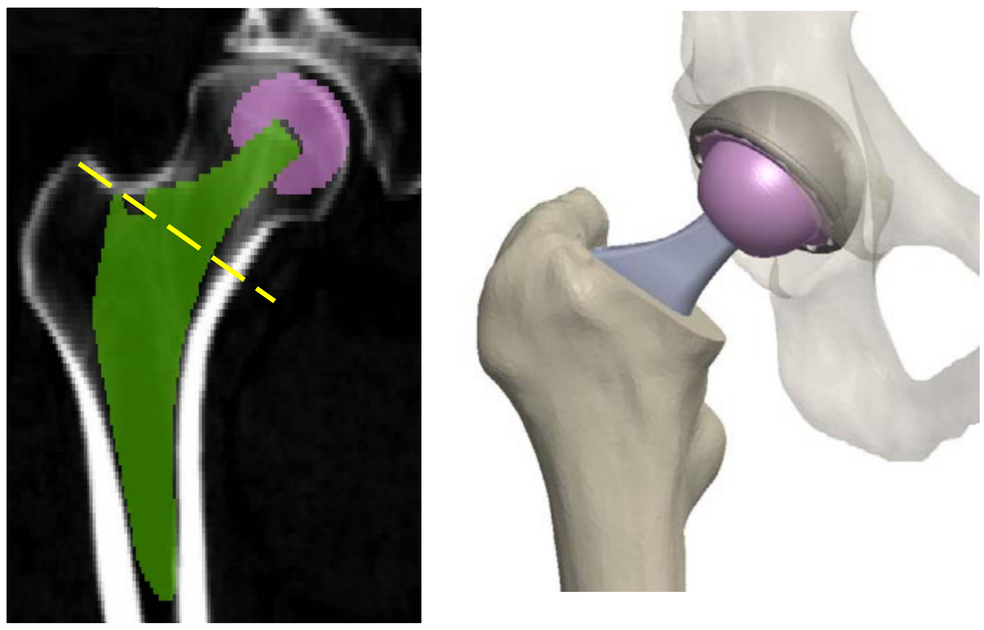

**Fig 1.** 3D templating from CT to determine a planned osteotomy.

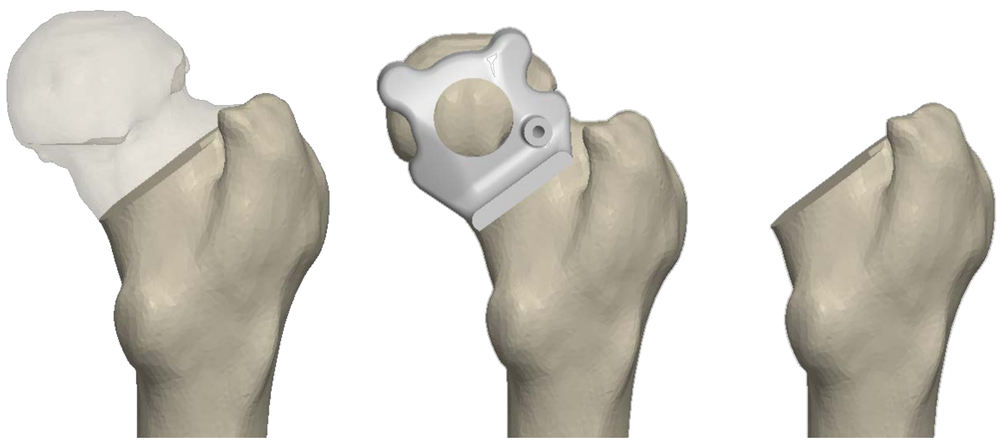

**Fig 2.** The patient specific instrument is designed to deliver the planned osteotomy intraoperatively.

## Methods: Intraoperative

- 100 patients received a Trinity™/TriFit TS™ cementless THA (Corin, Cirencester, UK) through a posterior approach.
- The femoral osteotomy for all patients was performed using the patient specific instrument, Fig 3.

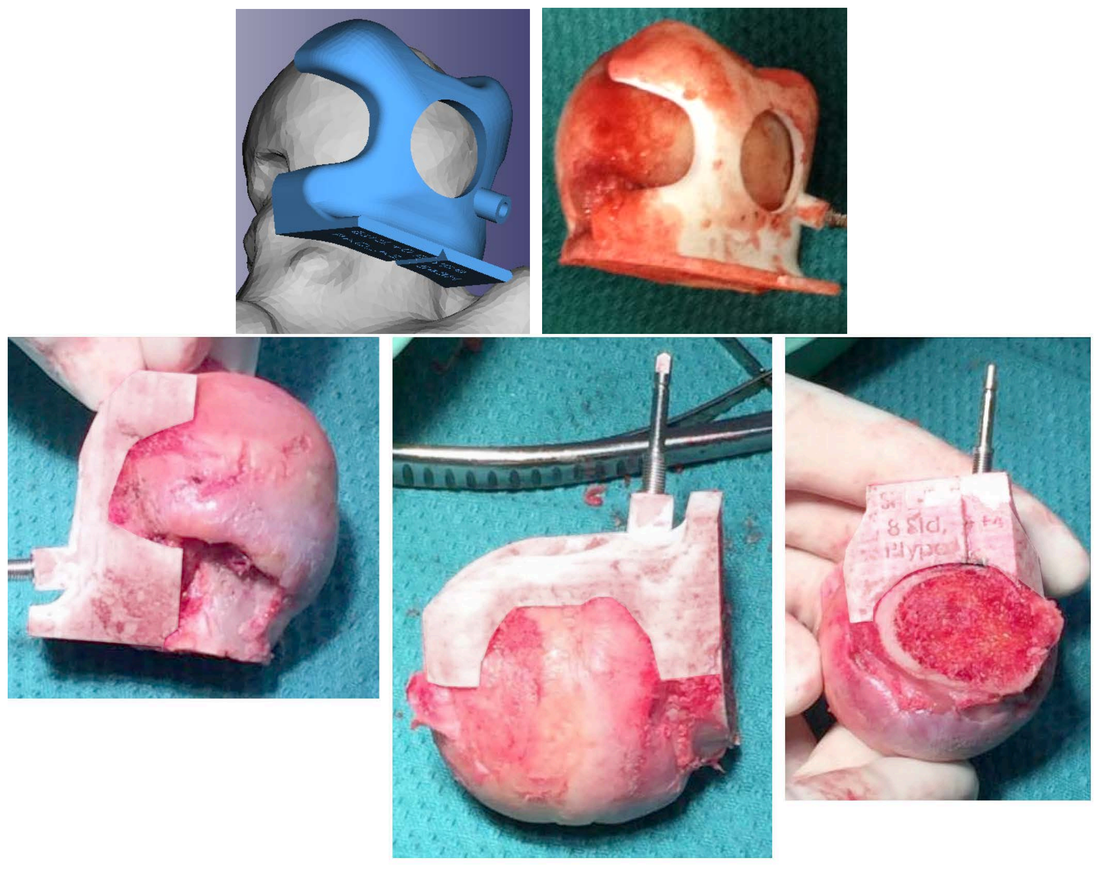

**Fig 3.** Patient specific instrument for femoral osteotomy: 3D model and intraoperative photos

## Methods: Postoperative

- The achieved level of osteotomy was confirmed postoperatively by registering a 3D model of the planned resected femur to the postoperative 2D radiograph, using Mimics X-ray module (Materialise, Belgium), Fig 4.

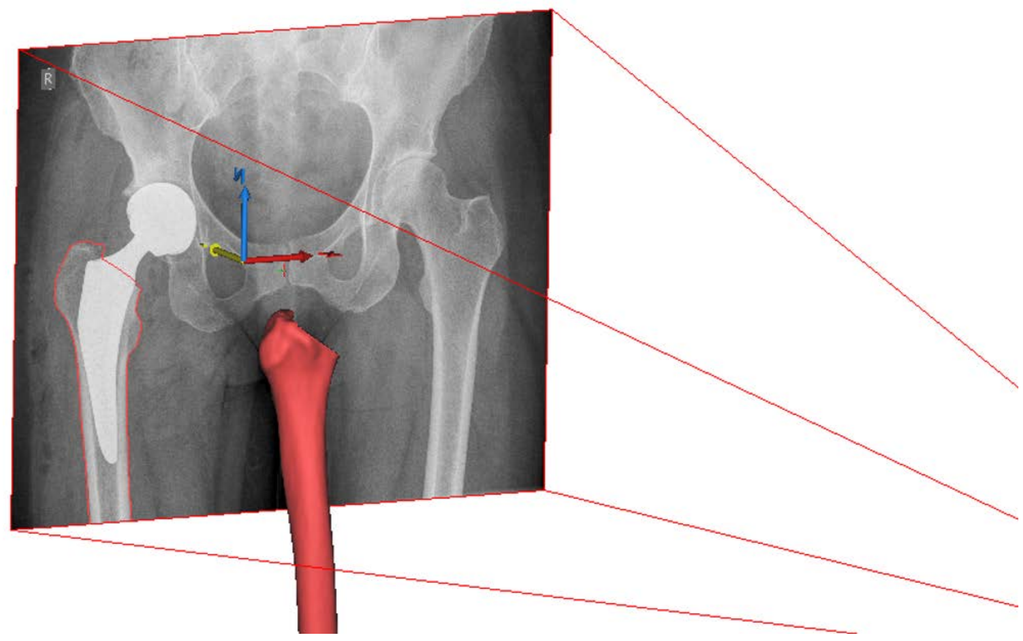

**Fig 4.** 3D to 2D registration of the resected femur to the postoperative radiograph

- Using 2D measuring software (Imatri Medical, South Africa), the image was scaled using the known cup diameter, Fig 5.
- Subsequently, the difference between the planned and achieved osteotomy level was measured, Fig 5.

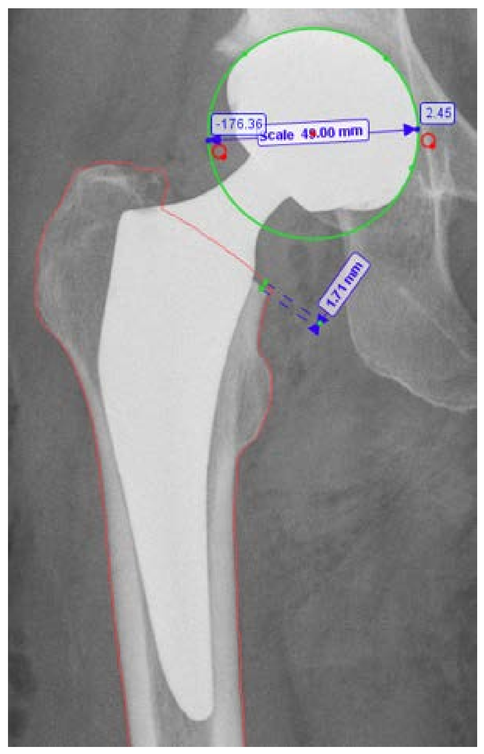


**Fig 5.** Measurement of the difference between the planned and achieved osteotomy level

## Results

The mean difference between the planned and achieved osteotomy level was 0.3mm, with a range of 0.0mm – 4.4mm.

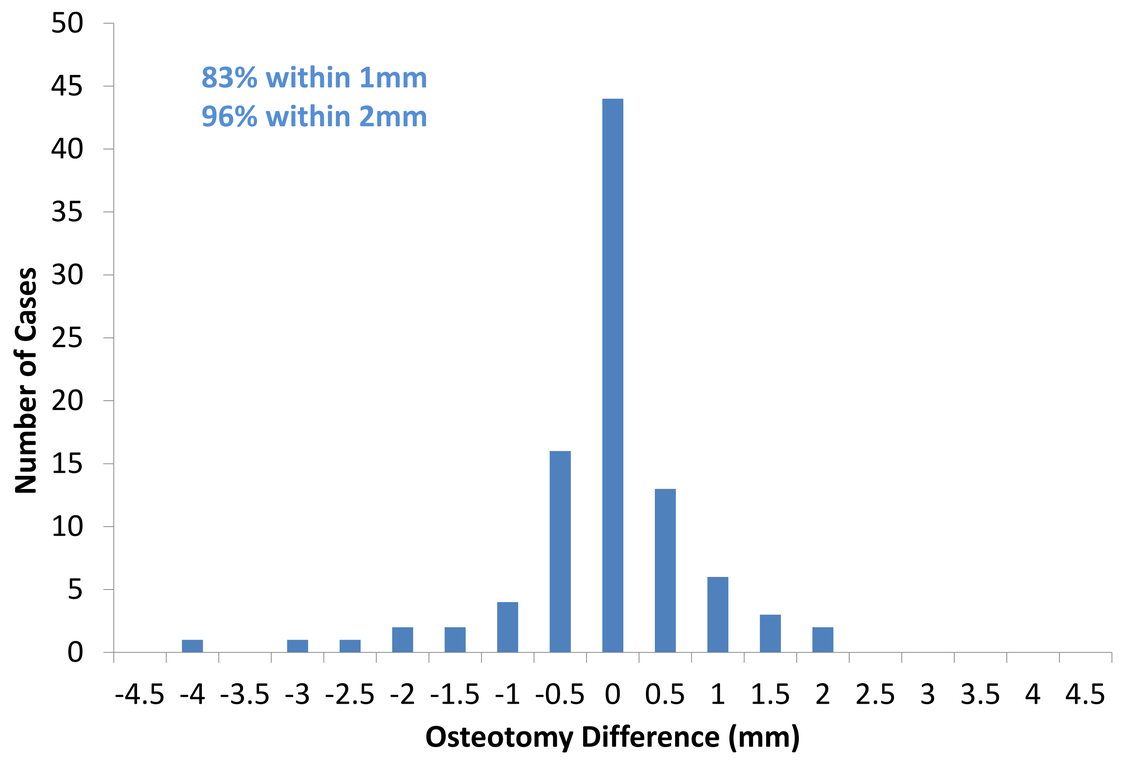


**Fig 6.** Osteotomy level difference from plan. 100 consecutive cases, 3 surgeons

## Conclusions

- The patient specific osteotomy guide showed high level of accuracy, with 96% of cases within 2mm and a maximum error of 4mm.
- By accurately controlling the level of osteotomy, a surgeon will have better control of leg length and offset.

**References**

1. Dimitriou D, Tsai T and Kwon Y (2015). *The effect of femoral neck osteotomy on femoral component position of a primary cementless total hip arthroplasty*. Int Orthop 39(12):2315-21.

**Disclosure** One or more of the authors are paid consultants to Corin Group. One of the authors is a shareholder of Corin Group.