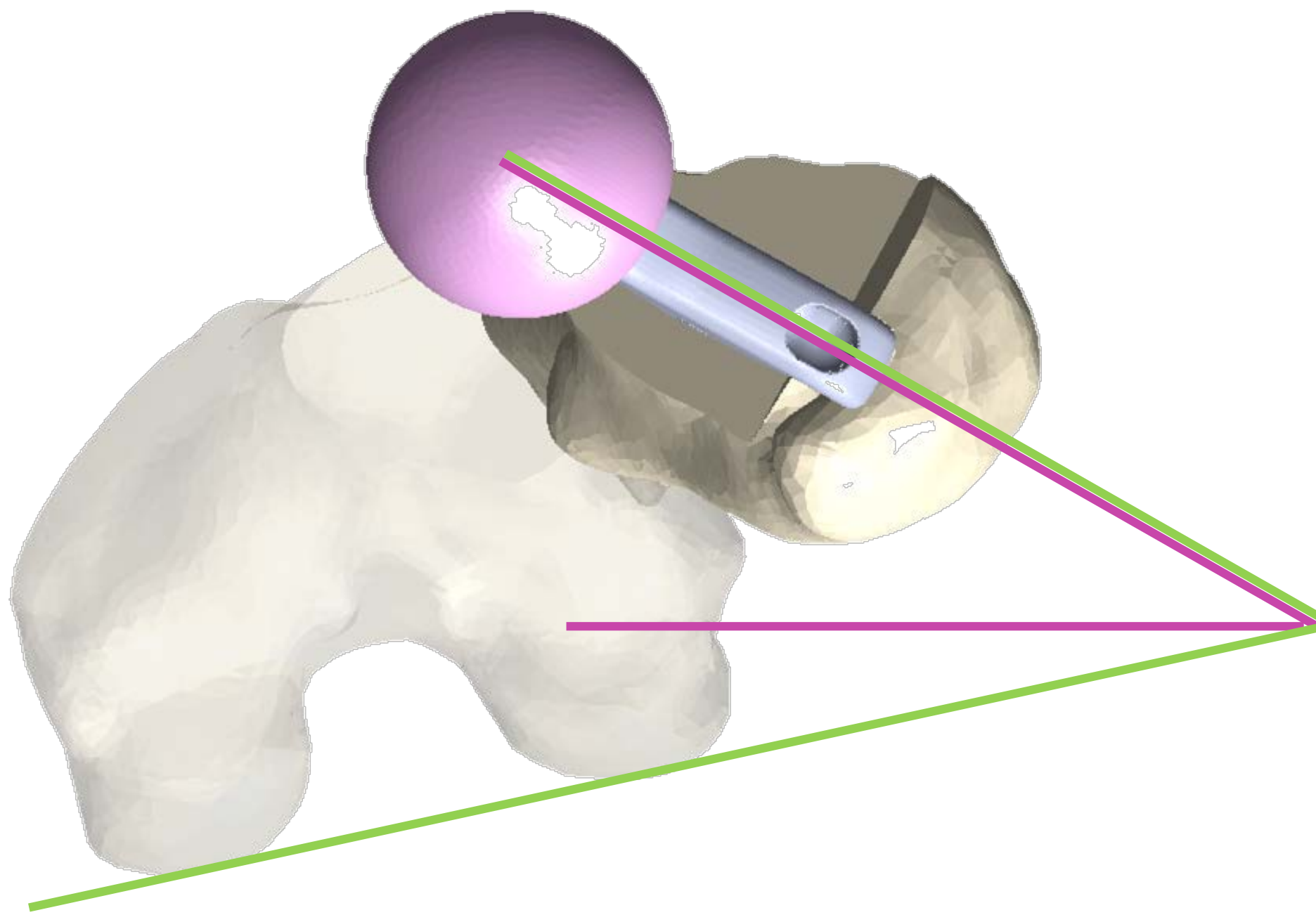


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## Introduction

- The posterior condyles of the distal femur are a common reference used to describe femoral anteversion.
- However, axial rotation of the femur can affect functional anteversion.
- This study investigates the post-operative differences between anatomically-referenced and functionally-referenced stem anteversion in the supine and standing positions.

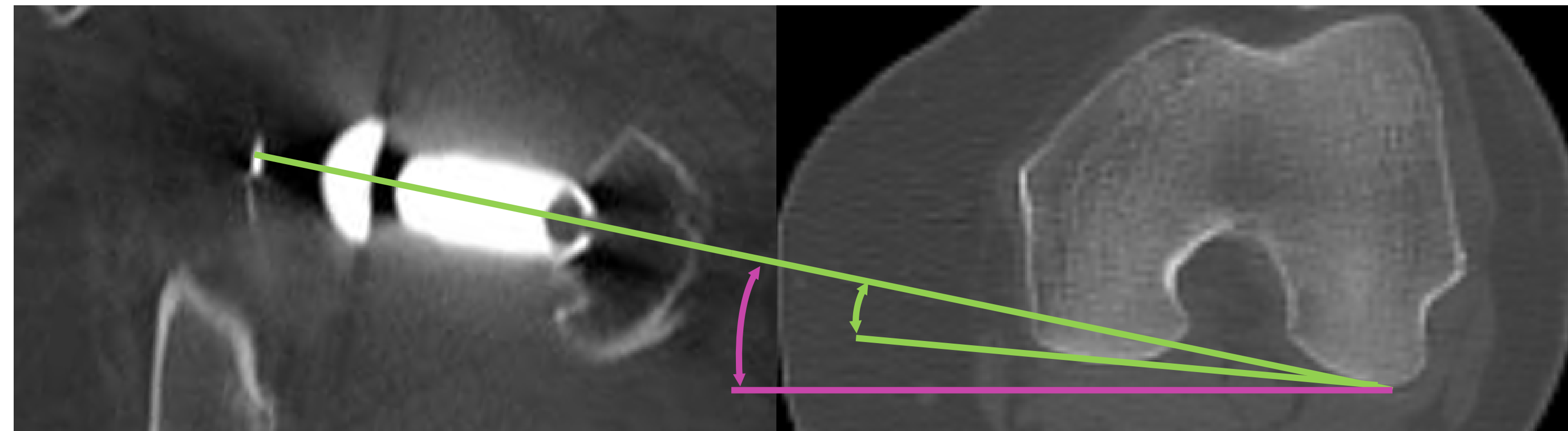


**Fig 1.** Transverse view of a femur. Stem anteversion to posterior condyles (anatomic), green = 42°. Stem anteversion to coronal plane (functional), pink = 29°.

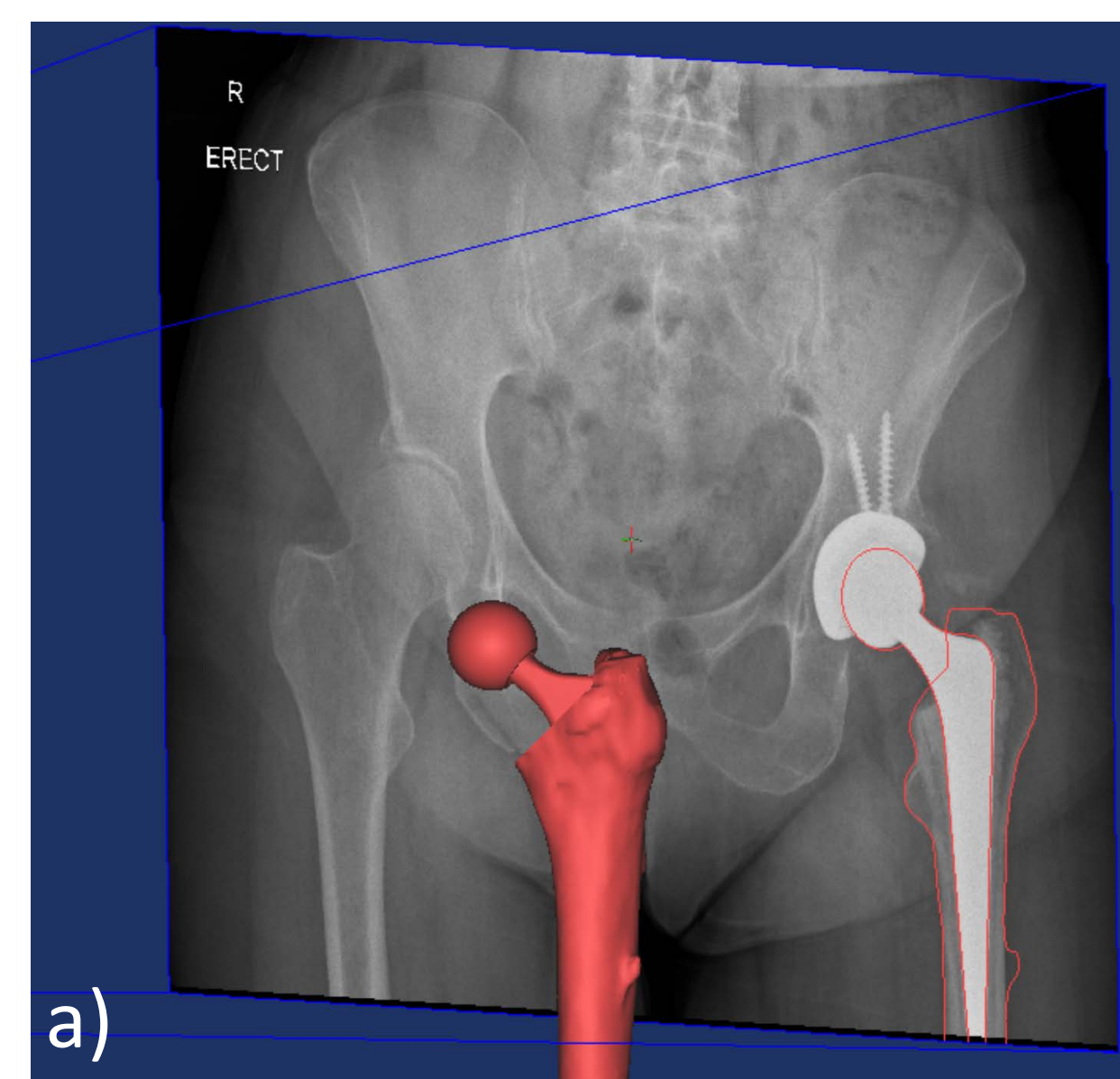
## Methods

35 patients receiving Trinity™/TaperFit™ hybrid total hip replacements (Corin, UK) and undergoing pre-operative analysis with the OPS® planning system (Optimized Ortho, Australia) were recruited for post-operative assessment.

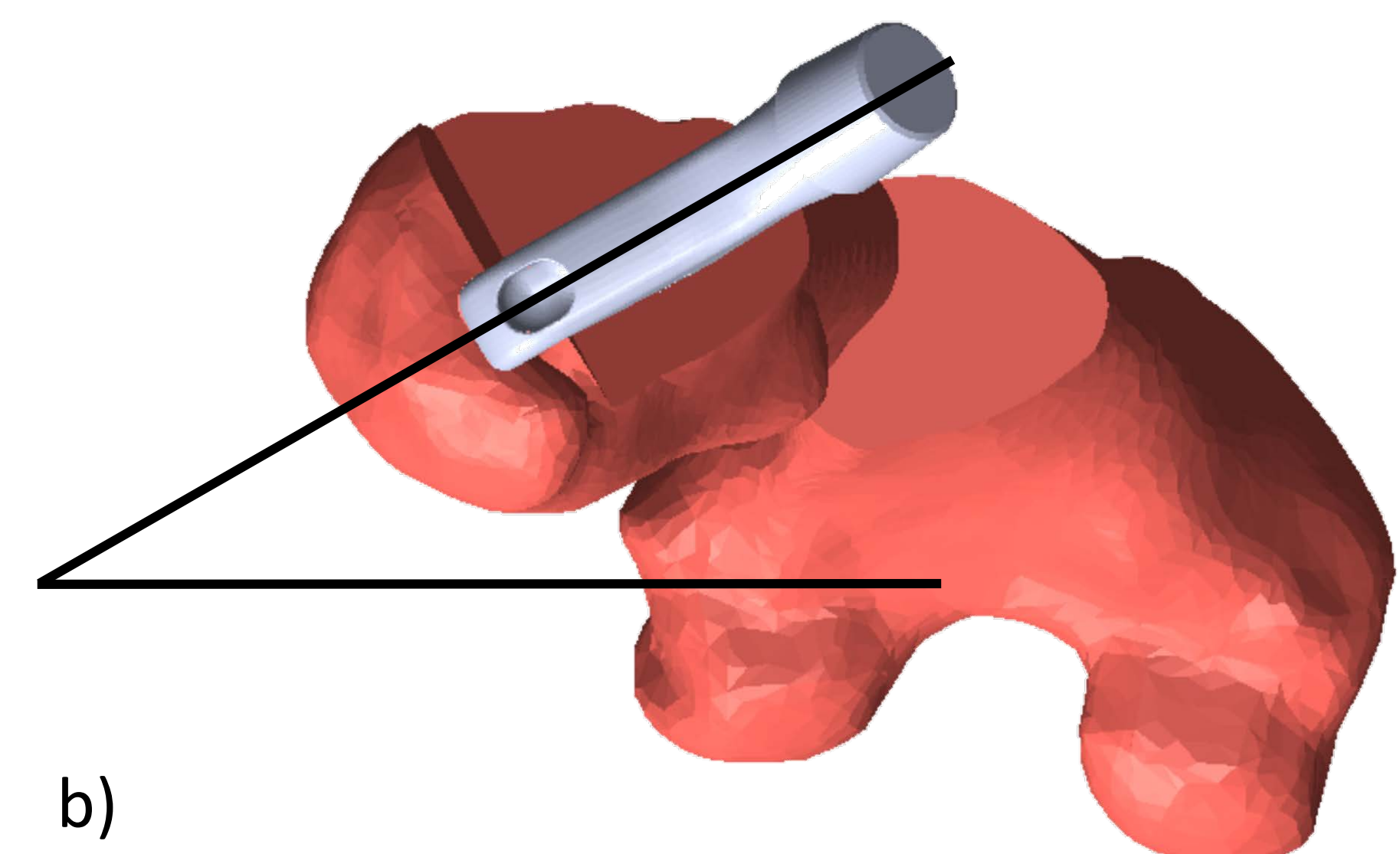
- Anatomic stem anteversion was measured from CT, referenced to the posterior condyles, Fig 2.
- Supine stem anteversion was measured from CT and referenced to the coronal plane, Fig 2.
- Standing stem anteversion was measured by matching the 3D femur to a post-operative standing X-ray in Mimics (Materialise, Belgium). Knowing the 3D position of the femur when standing, functional anteversion could be measured in reference to the coronal plane, Fig 3.



**Fig 2.** Anatomic stem anteversion, green, and functional stem anteversion in the supine position, pink, measured from CT

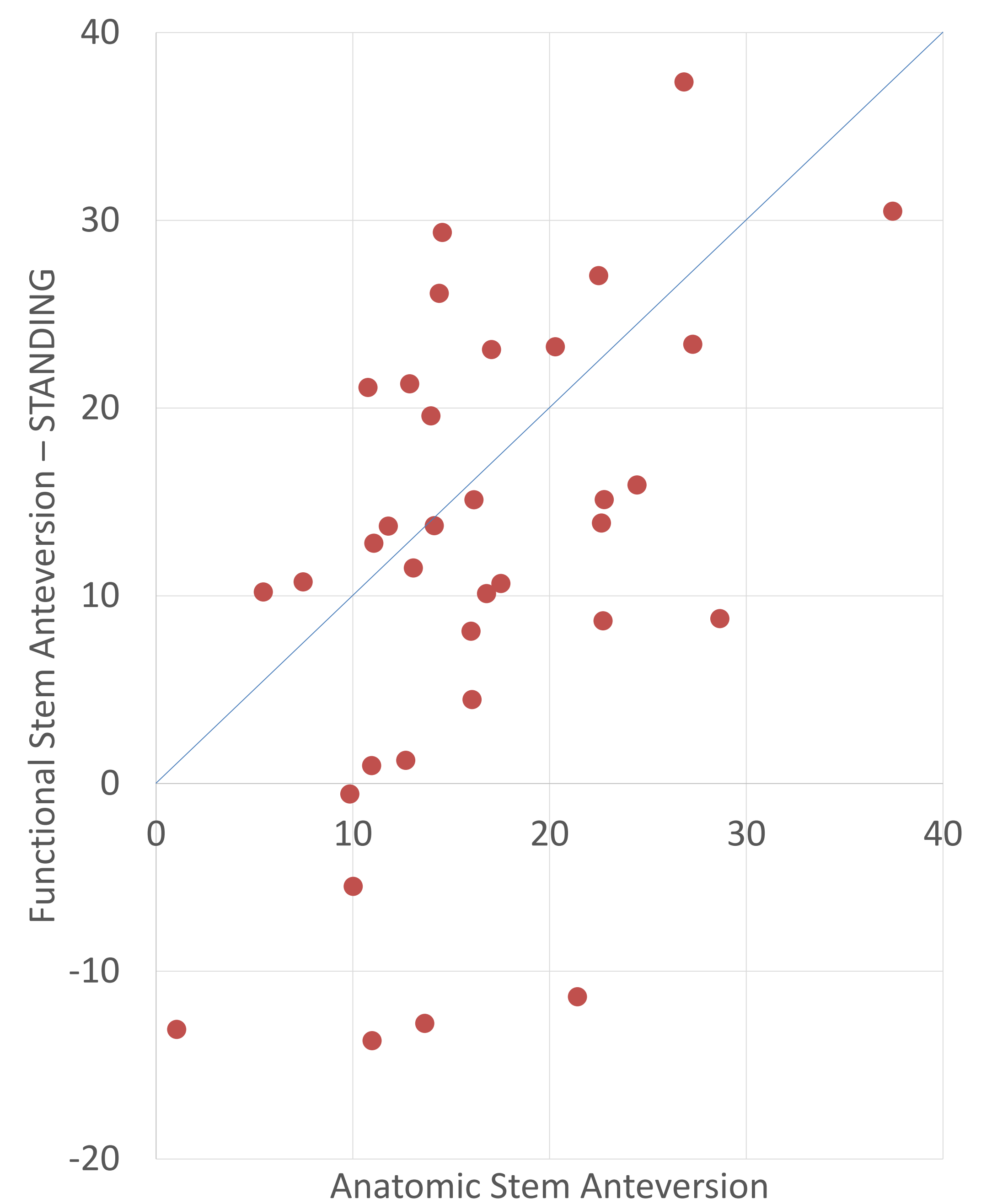
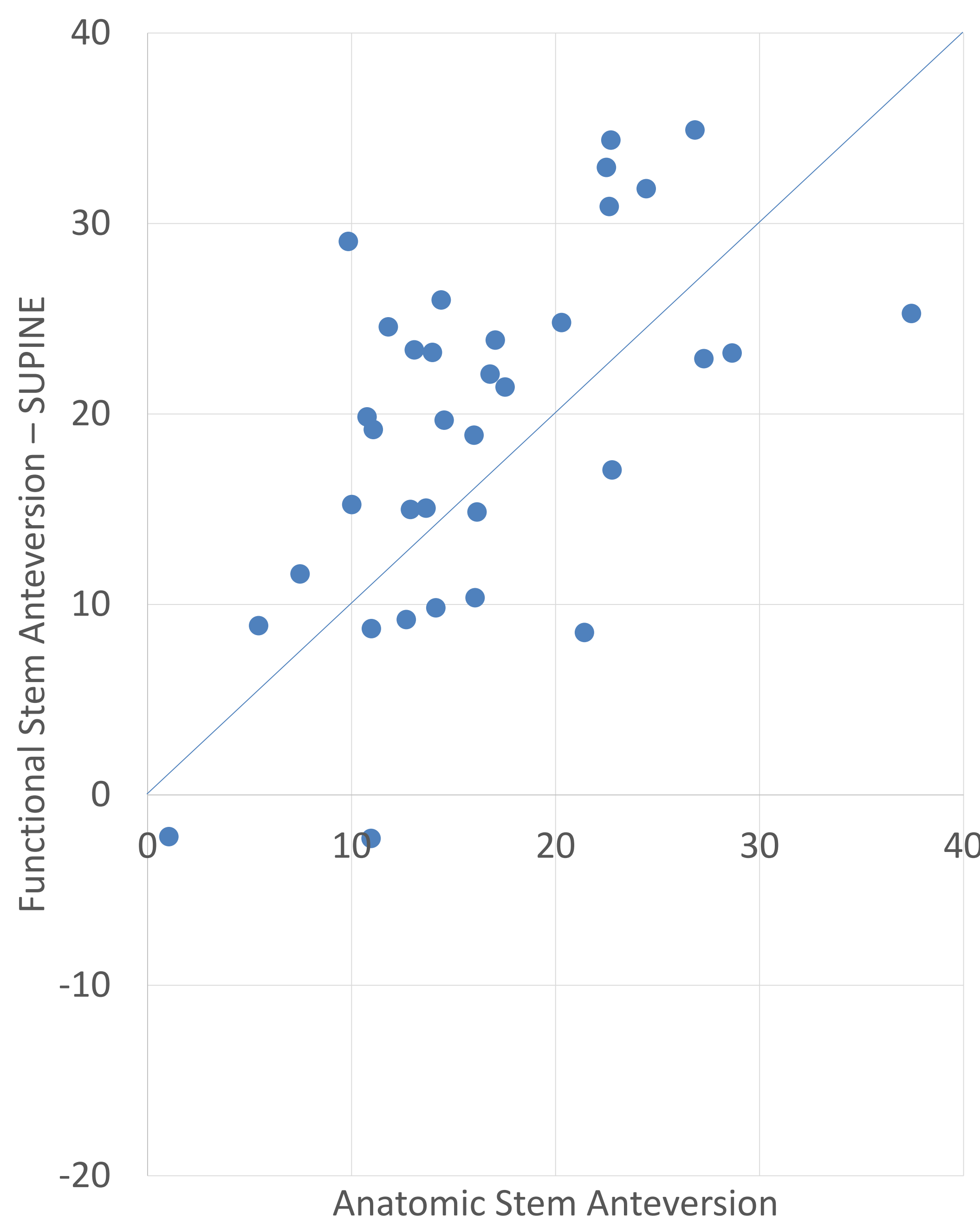


**Fig 3.** a) Registration of the 3D femur to the 2D post-operative standing AP X-ray; b) Functional stem anteversion in the standing position.



## Results

- Mean anatomic stem anteversion was 16.4° (1.1° to 37.5°)
- Mean supine stem anteversion was 19.2° (-2.3° to 34.9°)
- Mean standing stem anteversion was 11.7° (-13.7° to 37.4°)
- Patients' femurs were externally rotated when supine by a mean of 2.8° (-13.3° to 19.2°)
- Patients' femurs were externally rotated when standing by a mean of -4.7° (-32.8° to 14.8°)



## Conclusions

- Anatomic stem anteversion differs from functional stem anteversion in both the supine and standing positions due to axial rotation of the femur.
- As the Anterior Pelvic Plane is now widely recognized as an inappropriate reference for cup orientation due to variation in sagittal pelvic tilt, referencing stem anteversion to the distal femur may also be inappropriate and not provide a suitable description of the functional anteversion of the stem.