

CLINICAL RESULTS OF COMPUTER-ASSISTED TOTAL HIP ARTHROPLASTY

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INTRODUCTION:

Acetabular component malposition is a primary cause of hip instability and wear following total hip arthroplasty (THA). The purpose of the current study is to document the affect of surgical navigation during THA on acetabular component position.

MATERIALS AND METHODS:

Eighty-three primary THAs were performed with the assistance of surgical navigation. The patients were positioned laterally and AP virtual fluoroscopic images of each hip were acquired after a reference frame was percutaneously affixed to the pelvis (Medtronic Surgical Navigation Technology). The horizontal position of the pelvis was determined by creating a virtual line connecting the two teardrops. The acetabular component was then inserted with a goal of 41 degrees of abduction relative to the inter-teardrop line. The actual abduction angle was then measured post-operatively on the AP pelvis radiograph. The results were compared to 85 hips performed without navigation.

RESULTS:

The mean acetabular abduction angle measured post-operative averaged 40.8 degrees (range 35 to 49 degrees). The reference frame was noted to be loose at the completion of THA surgery on one case, resulting in an abduction angle of 49 degrees. The 85 cups placed without navigation had a mean abduction angle of 42.8 degrees (range 25 to 59 degrees). Using surgical navigation, the pelvises of patients with severe contractures and deformities were often noted to be malpositioned, to up to 15 degrees from a true lateral position. Cup position also changes significantly during the process of cup insertion which may largely be caused by changes in position of the patient's pelvis during cup impaction. While pelvic malposition during surgery can be tracked with surgical navigation, pelvic malposition during one of the procedure performed without navigation resulted in an excessively horizontal cup (25 degrees of abduction). No hips have dislocated in either group.



Image 1

Acetabular reamer with reference frame attached.

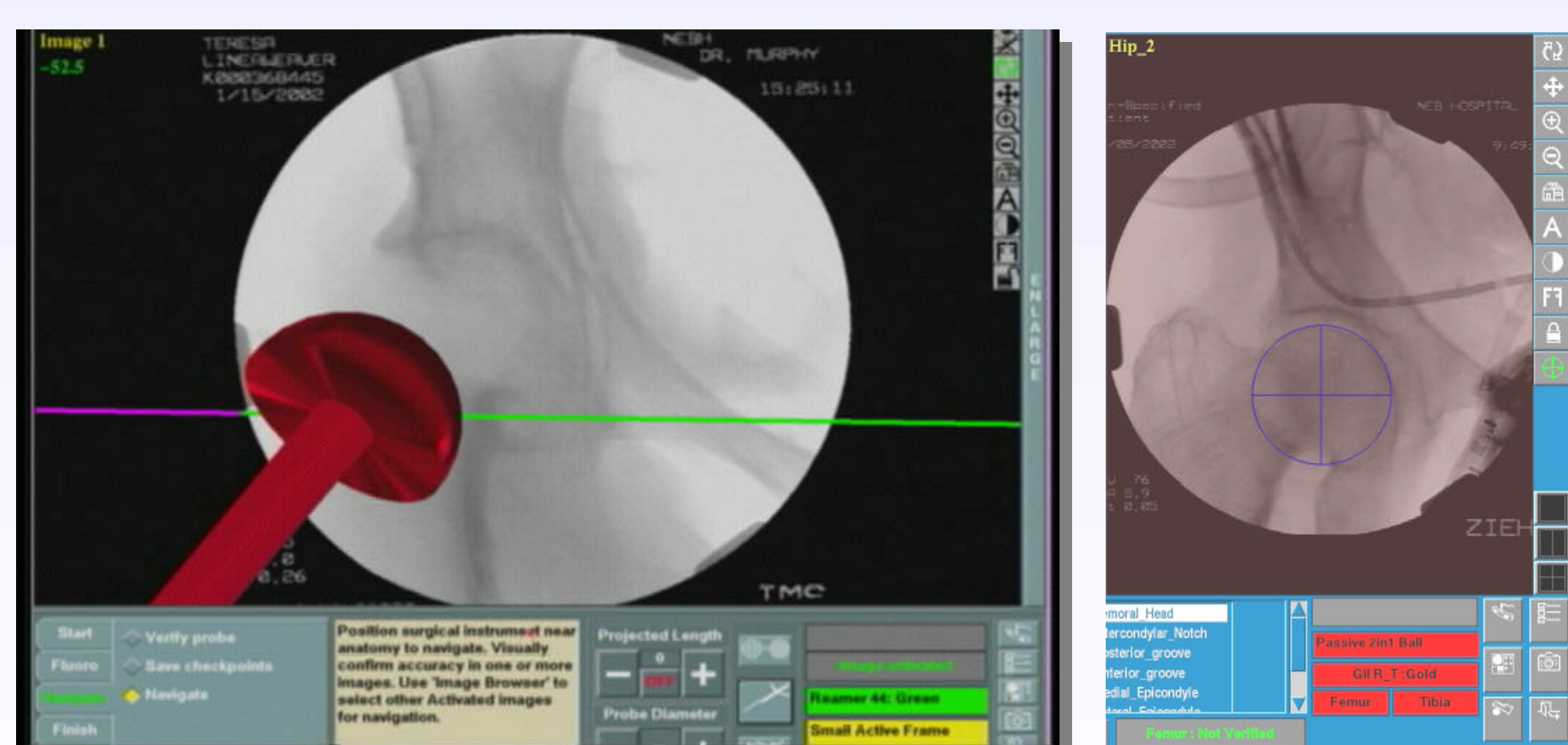
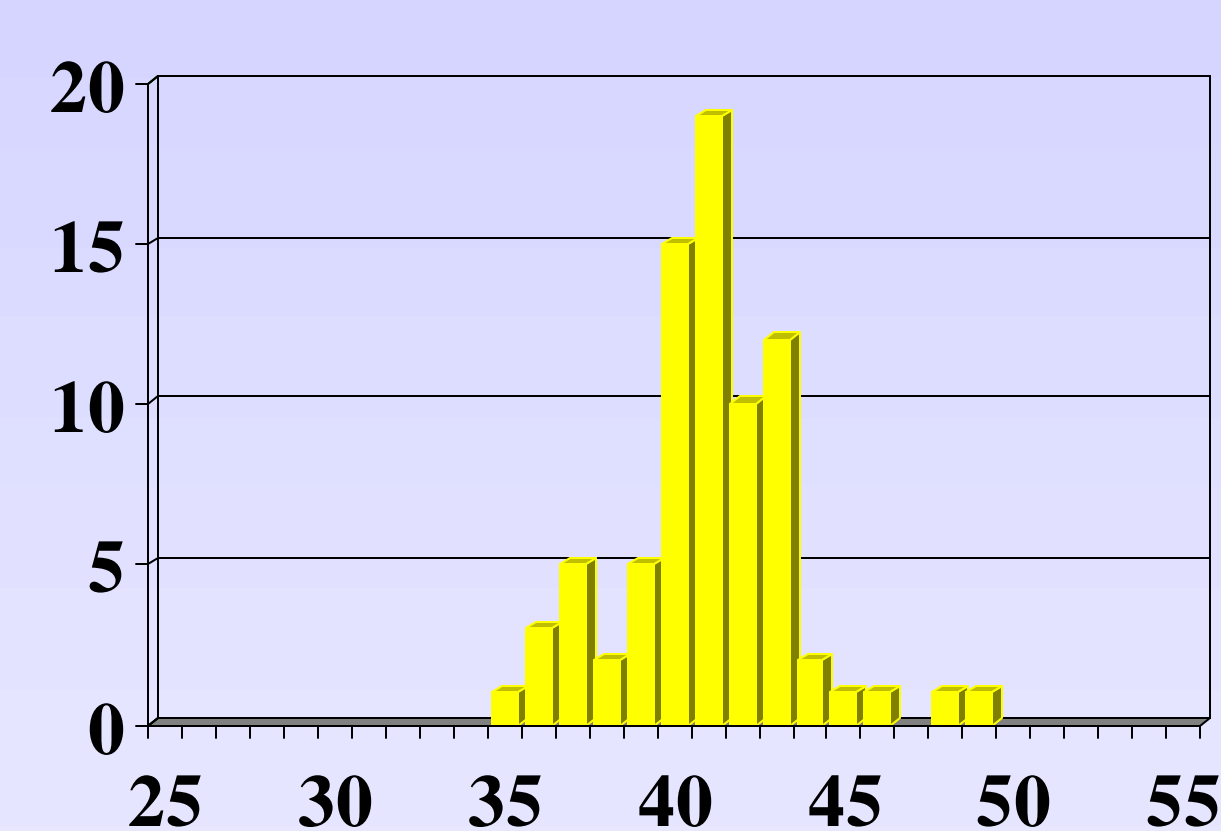


Image 2-a and 2-b

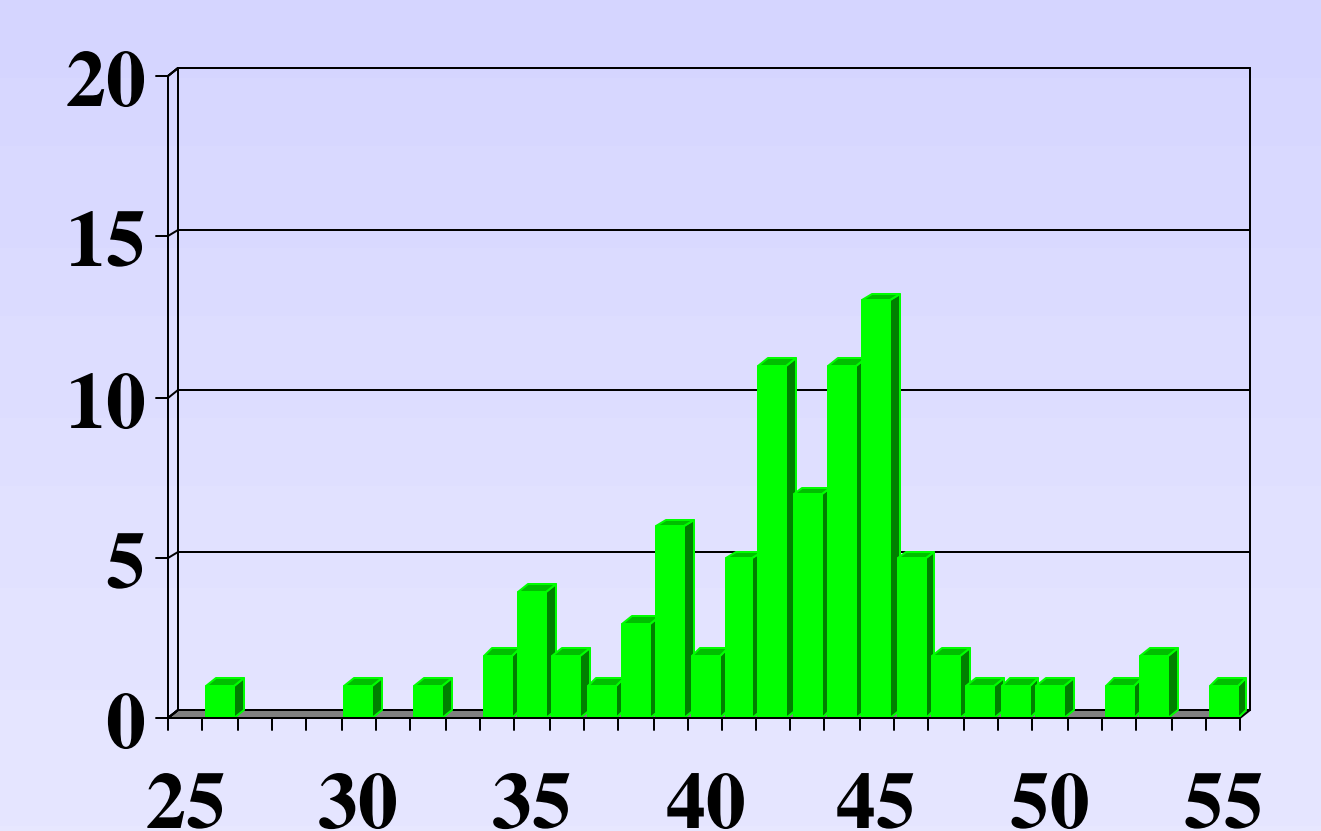
Fluoronav software actual screen output.

Images 3-a and 3-b

Acetabular component abduction angle with (3a) and without (3b) intra-operative surgical navigation.



■ W Nav
(n=83)



■ W/O Nav
(n=84)

CONCLUSION:

Intra-operative surgical navigation of acetabular component insertion can eliminate significant acetabular component malposition by tracking pelvic position during surgery. Since component malposition is known to cause hip dislocation and wear, it is likely that improved acetabular component positioning with the use of navigation will lead to lower dislocation and wear rates following THA.

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