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Accuracy of the Nunn Method in Measuring Acetabular Cup Migration

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ABSTRACT

The accuracy of the Nunn method in measuring acetabular component migration was compared with 3 other radiological methods and with roentgen stereophotogrammetry in 34 pelvic radiographs. The Nunn method seems to have the same or better accuracy than the other non-computerized methods, but less accuracy than the computerized EBRA method.

INTRODUCTION

In a previous study (1) we evaluated the accuracy of 2 non-computerized radiological methods, those of Sutherland et al. (5) and of Wetherell et al. (6), and of 2 computerized methods, those of Sultzer (Sultzer Inc., Switzerland) and of EBRA (4), in measuring acetabular component migration as compared with roentgen stereophotogrammetric analysis (RSA). We have now determined the accuracy of another non-computerized method, that of Nunn et al. (3).

MATERIAL AND METHODS

During the first 3 postoperative years 34 pelvic AP-radiographs were taken of 9 hip prostheses, examined by roentgen stereophotogrammetry (2). In the Nunn method (3) the cranial migration is measured as the vertical displacement of the cup center relative to the inter-teardrop line, and medial migration is measured as the horizontal displacement of the cup center relative to the ipsilateral teardrop. The accuracy of the measurements was, after correction by a radiological enlarging factor of 1.23, determined by roentgen stereophotogrammetry, and was compared with the accuracy of the previously (1) investigated methods (Sutherland, Wetherell, EBRA, RSA) in measuring acetabular component migration.

RESULTS

The time required for measurements by the Nunn method was 10 minutes per radiograph. In some of the radiographs, however, the teardrop line was difficult to define, thus causing uncertainty in drawing the reference lines. The mean value (and the standard deviation) of the absolute difference between the values obtained with the Nunn method and the corresponding RSA-values was 0.58 mm (SD 0.70 mm) in the medial direction, and 0.76 mm (SD 0.71 mm) in the cranial direction, respectively (Figure 1).

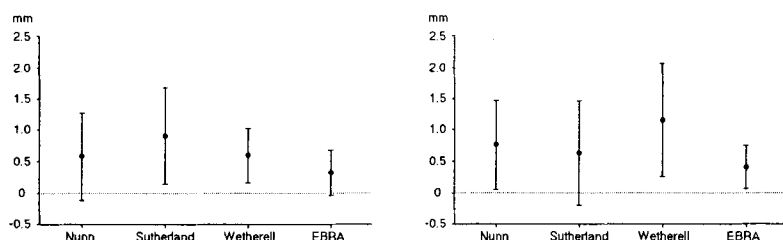


Figure 1. Mean and standard deviation of the absolute difference of the values obtained by the analyzed methods and RSA in the medial (left) and cranial (right) direction. The migration measured by RSA were used as standard and set as null.

DISCUSSION

The Nunn method is as quick and easy to learn and to perform as the other non-computerized methods (1). A pencil and a ruler are the necessary equipment, all 3 methods can be employed using a digitizer, computer and suitable software if desired. In the medial direction, the use of the teardrop (3) has about the same accuracy as when the obturator-brim line (6) is used, but seems to have a better accuracy than when the Köhler line (5) is used. In the cranial direction, the use of the teardrop (3, 5) seems to have a better accuracy than when the sacroiliac-symphysis line (6) is used. The methodological limit in accuracy for direct measurements from standard radiographs is probably partly due to variations in tilt of the pelvis. An analysis of the tilt of the pelvis, as done in the EBRA method (1, 4), therefore improves the accuracy of the measurements based on nonstandardized radiographs.

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