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A comparison of two scaling methods in digital templating of total hip replacement

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Introduction

Pre-operative templating is essential in the planning of total hip replacement. With the widespread use of digital image acquisition and Picture Archiving and Communication System (PACS) in HA hospitals, traditional templating method using transparent acetate templating sheets becomes less favourable since radiographs are not readily available. The use of digital templating has been shown to have comparable accuracy to the traditional templating method. Scaling of digital images is a critical step before digital templating to improve the accuracy of templating. Various scaling methods can be used in most digital templating software for calibration of digital images.

Objectives

The objective of our study is to compare the accuracy of two scaling methods for digital templating: 1. Radiographic marker (metal disc) method and 2. Fixed magnification factor method.

Methodology

Forty-five post-operative radiographs of 21 patients who had undergone either a total hip replacement or hemi-arthroplasty were evaluated. The size of the implanted femoral head component was measure in the CMS computer workstation and determined using the 2 scaling methods. The determined size was then compared with the known size of implant documented in the operation record. The mean absolute and relative measurement errors of both methods were determined and compared using Mann-Whitney U test.

Result

Both the mean absolute and relative measurement errors were significantly smaller in the fixed magnification factor method. We recommend the use of fixed magnification factor as the scaling method of choice due to its ease of use. It may also avoid potential placement error of radiological marker and more acceptable to patients and radiographers.