

Variance in predicted cup size by 2-dimensional vs 3-dimensional computerized tomography-based templating in primary total hip arthroplasty

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Background

Preoperative total hip arthroplasty templating can be performed with radiographs using acetate prints, digital viewing software, or with computed tomography (CT) images. The authors' hypothesis is that 3D templating is more precise and accurate with cup size prediction as compared to 2D templating with acetate prints and digital templating software.

Methods

Data collected from 45 patients undergoing robotic-assisted total hip arthroplasty compared cup sizes templated on acetate prints and OrthoView software to MAKOpasty software that uses CT scan. Kappa analysis determined strength of agreement between each templating modality and the final size used. t tests compared mean cup-size variance from the final size for each templating technique. Interclass correlation coefficient (ICC) determined reliability of digital and acetate planning by comparing predictions of the operating surgeon and a blinded adult reconstructive fellow.

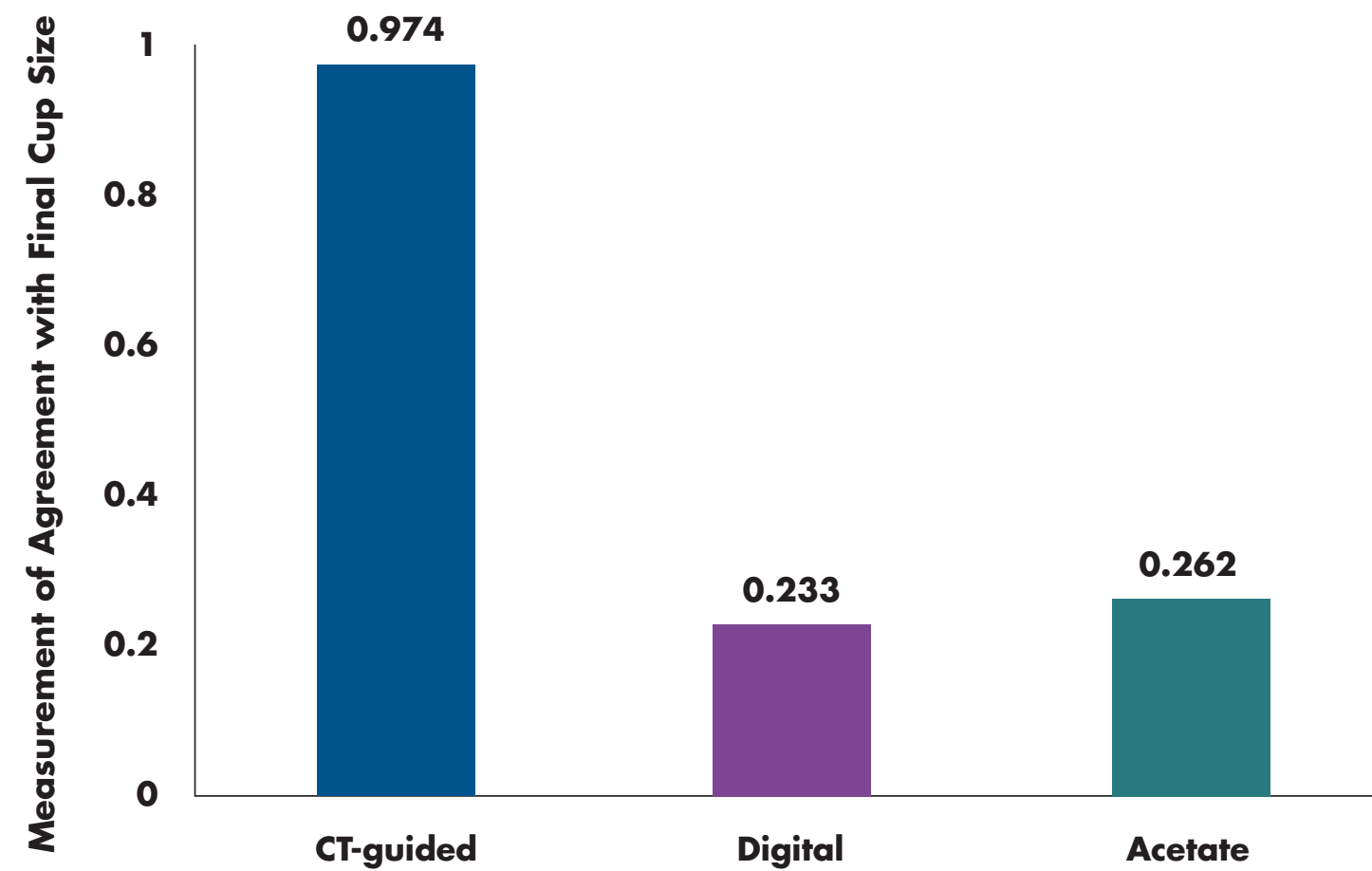


Fig. 1
 Kappa analysis of CT-guided, digital, and acetate templating.

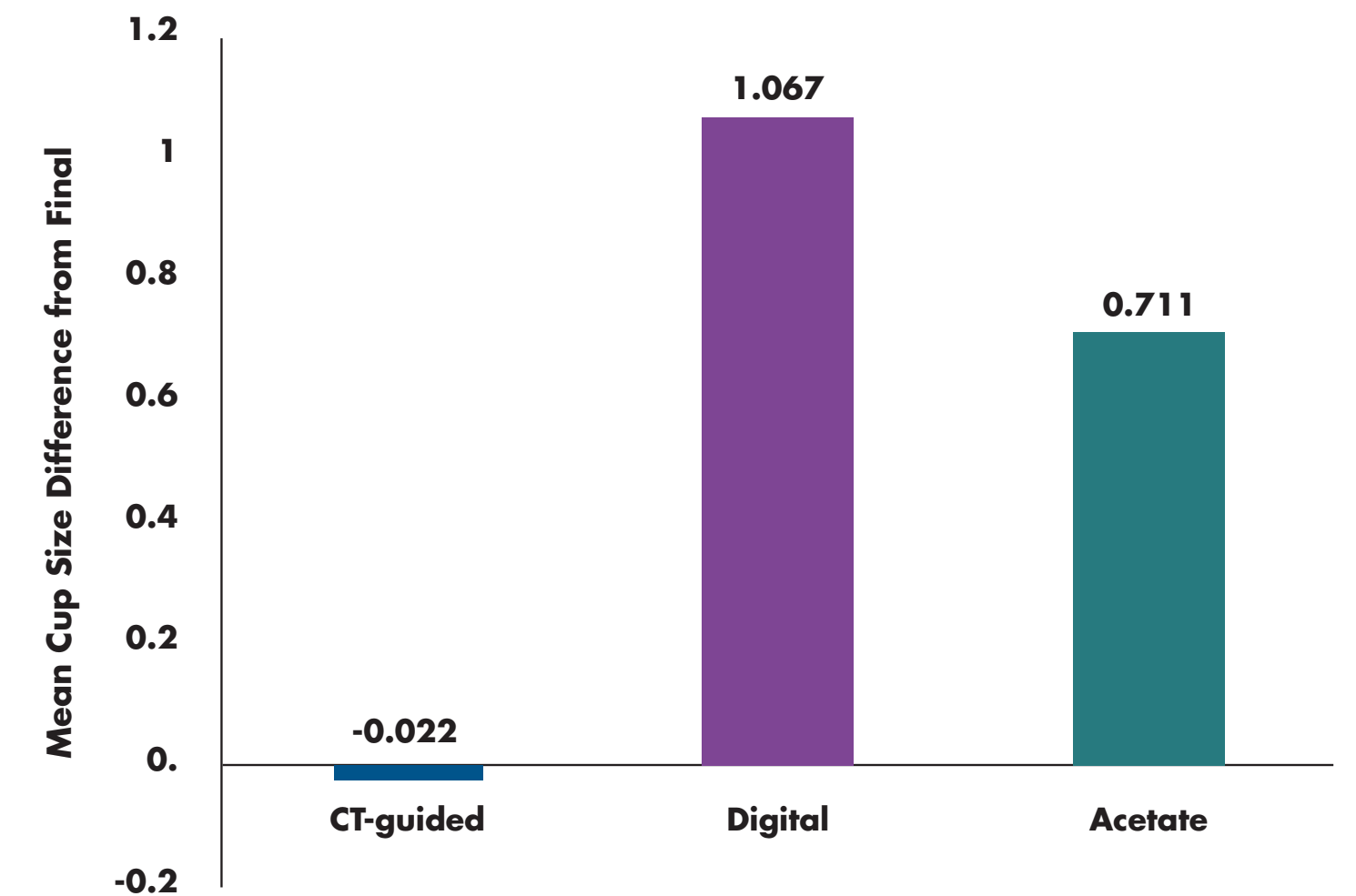


Fig. 2
 Mean cup size difference from final: CT-guided vs digital vs acetate templating.

Results

The Kappa values for CT-guided, digital, and acetate templating with the final size was 0.974, 0.233, and 0.262, respectively. Both digital and acetate templating significantly overpredicted cup size, compared to CT-guided methods ($P < .001$). There was no significant difference between digital and acetate templating ($P = .117$). Interclass correlation coefficient value for digital and acetate templating was 0.928 and 0.931, respectively.

Conclusions

CT-guided planning more accurately predicts hip implant cup size when compared to the significant overpredictions of digital and acetate templating. CT-guided templating may also lead to better outcomes due to bone stock preservation from a smaller and more accurate cup size predicted than that of digital and acetate predictions.

Reference:
 Osmani F, Thakkar S, Ramme A, Elbuluk A, Wojack P, Vigdorichik J. Variance in predicted cup size by 2-dimensional vs 3-dimensional computerized tomography-based templating in primary total hip arthroplasty. Arthroplasty Today Volume 3 (2017) 289-293.
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