Three-dimensional measurement method of arthritic glenoid cavity morphology: Feasibility and reproducibility

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Summary
Introduction: Glenoid component loosening is the main complication of total shoulder arthroplasty. Better knowledge of the arthritic glenoid cavity anatomy can help in developing new implants and techniques. The goal of this study was to describe and validate the reproducibility of a CT scan-based, 3D measurement method used to describe various parameters characterizing arthritic glenoid cavity morphology.

Materials and methods: Twelve CT scans and 29 CT arthrogram were evaluated. These scans were taken from 41 patients with glenohumeral osteoarthritis who received an anatomical shoulder prosthesis. A 3D reconstruction of the scapula was performed based on the DICOM files. Following the 3D volume acquisition, points on the glenoid articular surface were manually extracted by three observers, each one three times, allowing one week between readings, to determine the inter- and intra-observer reproducibility. The intraclass correlation coefficient (ICC) was calculated on five 3D parameters that were automatically calculated: glenoid height, glenoid width, height at maximum width glenoid version and radius of the articular surface best-fit sphere.

Results: The intra-observer and inter-observer ICC were 0.91 to 0.99, and 0.95 to 0.99, respectively.

Discussion: This study is the first to report on a reproducible 3D measurement method, based on CT scans, for the arthritic glenoid cavity, which derives the joint radius of curvature among other morphology parameters. These 3D measurements are advantageous because they are free of problems related to patient positioning in the CT scanner and to the choice of slices,

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