

عنوان مقاله:

The Accuracy of 3D Printed Carpal Bones Generated from Cadaveric Specimens

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خلاصه مقاله:

Background: Computer assisted three-dimensional (3D) printing of anatomic models using advanced imaging has wide applications within orthopaedics. The purpose of this study is to evaluate the 3D printing accuracy of carpal bones. Methods: Seven cadaveric wrists underwent CT scanning, after which select carpal bones (scaphoid, capitate, lunate, and trapezium) were dissected in toto. Dimensions including length, circumference, and volume were measured directly from the cadaver bones. The CT images were converted into 3D printable stereolithography (STL) files. The STL files were converted into solid prints using a commercially available 3D printer. The 3D printed models' dimensions were measured and compared to those of the cadaver bones. A paired t-test was performed to determine if a statistically significant difference existed between the mean measurements of the cadavers and 3D printed models. The intraclass correlation coefficients (ICC) between the two groups were calculated to measure the degree of agreement. Results: On average, the length and circumference of the 3D printed models were within 2.3 mm and 2.2 mm, respectively, of the cadaveric bones. There was a larger discrepancy in the volume measured, which on average was within 0.65 cc (15.9%) of the cadaveric bones. These differences were not statistically significant ($P > 0.05$). There was strong agreement between all measurements except the capitate's length and lunate's volume. Conclusion: 3D printing can add value to patient care and improve outcomes. This study demonstrates that 3D printing can both accurately and reproducibly fabricate bony models that closely resemble the corresponding cadaveric anatomy. Level of evidence: V

کلمات کلیدی:

(cadaver, Carpal bones, Computed Tomography (CT), Three-dimensional (3D

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