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POSTER SECTIONS

ECR 2026 / C-28927

3D Printing with Silicone Filling: Creation of an Anatomical Hand Model

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Learning objectives

To develop and evaluate a low-cost anatomical hand and wrist model produced by FDM 3D printing with silicone filling, calibrated using radiographic and CT data, and to assess its anatomical fidelity, imaging realism, mechanical durability, and suitability for training in musculoskeletal radiology, orthopedics, and anatomy education.
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Background

Conventional radiography and computed tomography data from ten patients with distal radius fractures were acquired following European imaging guidelines. Tissue densities were calibrated using radiographic histograms and Hounsfield Unit values to define consistent segmentation thresholds. Image segmentation was performed using open-source software, and anatomical models of the hand and wrist were produced by FDM 3D printing in PLA, followed by silicone filling to simulate soft tissues. Production time, material consumption, and cost were recorded. Model quality, imaging realism, and mechanical performance were evaluated using Likert-scale...
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Findings and procedure details

All ten anatomical hand and wrist models were successfully manufactured using FDM 3D printing on the first attempt, demonstrating high reproducibility and reliability of the proposed workflow. The total production time per complete model was approximately 21 hours, with a mean material consumption of 135 g of PLA and ~820 g of silicone, resulting in an average total cost of €47.66 per model, substantially lower than most commercial simulators. [Fig 1][Fig 2][Fig 3].Densitometric calibration based on radiographic histograms and Hounsfield Unit (HU) measurements enabled consistent...
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Conclusion

This study demonstrates that a low-cost anatomical hand and wrist model produced by FDM 3D printing with silicone filling can achieve high anatomical fidelity, realistic radiographic and CT appearance, and sufficient mechanical robustness for repeated training. The integration of densitometric calibration based on radiography and CT data

ensures imaging behavior comparable to clinical examinations, enabling reliable fracture visualization and procedural simulation. This approach provides an accessible and reproducible tool for education and training in musculoskeletal radiology, orthopedics, and anatomy.

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Personal information and conflict of interest

J. Pinheiro: Nothing to disclose L. Luz: Nothing to disclose E. Seiça: Nothing to disclose L. Silva: Nothing to disclose R. Gonçalves: Nothing to disclose J. Paulo Sousa: Nothing to disclose H. Boeiro: Nothing to disclose

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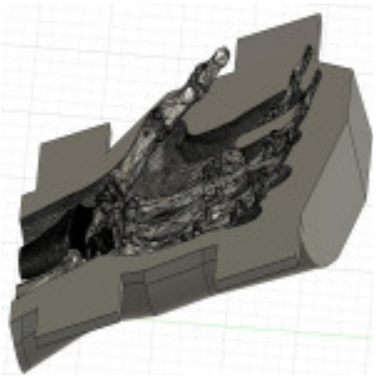

Fig 1: *Mold and corresponding bone model (top), with silicone filling and the mold...*

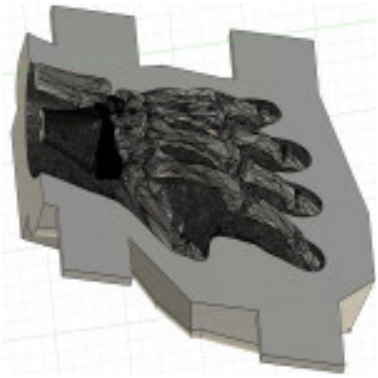

Fig 2: *Mold and corresponding bone model (top), with silicone filling and the mold...*

Fig 3: *Mold and corresponding bone model (top), with silicone filling and the mold...*

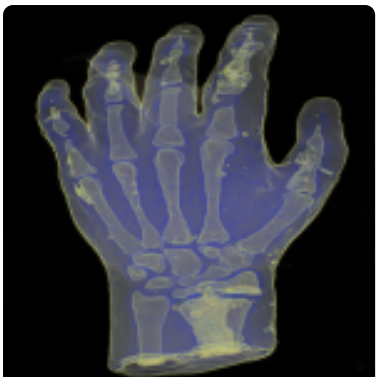

Fig 4: VRT reconstruction.

Fig 5: VRT reconstruction.

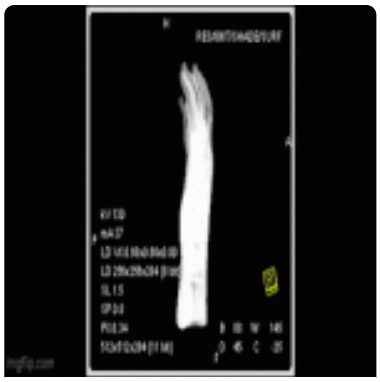

Fig 6: VRT reconstruction.