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The application of 3D printed, kinaesthetic models for undergraduate medical anatomy teaching

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Objectives: Technological advances have facilitated the creation of various novel teaching tools that improve effectiveness of anatomy teaching, including 3D printed models and the creation of kinaesthetic models, where three- dimensional anatomy models can be physically manipulated to illustrate functional anatomy. The aim of this project is to combine these two modalities, create a 3D printed kinaesthetic anatomy model, and then test its efficacy in teaching undergraduate medical students the Biomechanics of the Rotator Cuff in comparison to the currently used plastic models.

Methods: Anonymized CT scans were transferred to ©Cura Software 3.1 for modification and 3D printing. The 3D printed model was then modified to illustrate the biomechanics of movement of the Rotator Cuff. Twenty-one volunteers were split into two groups of intervention (3D printed model) and control (Plastic model) and attended the same teaching tutorial and quiz in the end. The overall scores, and qualitative data on the models were then analysed for statistically significant differences.

Results: A kinaesthetic 3D printed model was successfully produced to illustrate all movements of the rotator cuff accurately. No significant differences were found in the overall score of students, but the 3D printed model was generally found to be more 'helpful' and 'recommended for future teaching'.

Conclusions: A kinaesthetic, 3D printed model did not increase overall exam performance when compared to a plastic model. They were significantly preferred by students, and with some refinement, 3D printed kinaesthetic anatomy models may be used in the future for undergraduate medical teaching.

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