3D Printed Surgical Simulation Models as educational tool by maxillofacial surgeons

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The aim of this study was to evaluate whether inexpensive 3D models can be suitable to train surgical skills to dental students or oral and maxillofacial surgery residents. Furthermore, we wanted to know which of the most common filament materials, acrylonitrile butadiene styrene (ABS) or polylactic acid (PLA), can better simulate human bone according to surgeons' subjective perceptions.; Upper and lower jaw models were produced with common 3D desktop printers, ABS and PLA filament and silicon rubber for soft tissue simulation. Those models were given to 10 blinded, experienced maxillofacial surgeons to perform sinus lift and wisdom teeth extraction. Evaluation was made using a questionnaire.; Because of slightly different density and filament prices, each silicon-covered model costs between 1.40-1.60 USD (ABS) and 1.80-2.00 USD (PLA) based on 2017 material costs. Ten experienced raters took part in the study. All raters deemed the models suitable for surgical education. No significant differences between ABS and PLA were found, with both having distinct advantages.; The study demonstrated that 3D printing with inexpensive printing filaments is a promising method for training oral and maxillofacial surgery residents or dental students in selected surgical procedures. With a simple and cost-efficient manufacturing process, models of actual patient cases can be produced on a small scale, simulating many kinds of surgical procedures.
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