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Three-dimensional printing in cardiac surgery and interventional cardiology: a single-centre experience.

Abstract:
In individual cases, routine preoperative imaging might not be sufficient for optimal planning of cardiovascular procedures. Three-dimensional printing (3D), a widely used technique to build life-like replicas of anatomical structures that has proven value in different medical disciplines, might overcome these shortcomings. However, data on 3D printing in cardiovascular medicine are limited to single reports. This stimulated us to present our single-centre experience with 3D printing models in cardiac surgery and interventional cardiology. Between the years 2006 and 2013, we fabricated 3D printing models using preoperative computed tomography or magnetic resonance imaging data in paediatric and adult cardiac surgery, as well as interventional cardiology. We present the 8 most representative cases. The models were very helpful for perioperative planning and orientation, as well as simulation of procedures due to the exact and life-like illustration of the cardiovascular anatomy. The fabrication of 3D printing models is feasible for perioperative planning and simulation in a variety of complex cases in paediatric and adult cardiac surgery, as well as in interventional cardiology. Further studies including more patients and providing more data are expected to demonstrate that the use of 3D printing may decrease morbidity and mortality of complex, non-routine procedures in cardiovascular medicine.