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### Could 3D-printed models improve pre and per-operative management of anomalous origin of coronary artery?

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Introduction : Anomalous Origin of Coronary Artery (AOCA) is the second most frequent cardiovascular etiology of sudden death during exercise among children and its pre- and per-operative management remain discussed.

Methods : We retrospectively analysed patients who underwent surgery for AOCA in our hospital. We evaluated their 3D-printed models to describe their anatomy and predict the most efficient surgical gesture and its potential difficulties.

Results : between 2010 and 2017, 19 patients were operated on (Median age 15 years old, 37% asymptomatic). Preoperative functional or invasive tests (stress test, coronarography) didn't improve the management of AOCA. Coronary unroofing was the most frequent surgical gesture performed (n : 16 ; 84%), associated in 50% to a complementary gesture (pulmonary trunk translation, Lecompte's manoeuvre, sino-tubular junction's resection). There were no postoperative adverse events except pericardial effusion (n : 7 ; 36%) and no mortality. Median follow-up was 27 months. All patients are now asymptomatic. Based on CT-scan, we modelled, 3D-printed (photo) and presented 17 patients to a pluridisciplinary group. Due to a bad CT-scan quality, 2 models weren't 3D-printed. Referring to per-operative anatomy, our models improved the preoperative anatomy description in 47% of cases (n : 8). Main surgical gesture decided on 3D printed models was similar to surgical choice in 82% of cases (n : 14). Furthermore, complementary or alternative gesture to unroofing have been predicted in 7/11 cases (63%).  
Conclusions : Unroofing in AOCA surgical management shows good and safe results but preoperative management remain variable. With 3D printed models, we showed a real benefit on 3D anatomy description, and a good matching in the prediction of associated/alternative gesture to coronary unroofing.



Photo : Anomalous Origin of Right Coronary Artery (from left sinus) : printed model