

# Transbaffle radiofrequency ablation of reentrant atrial tachycardia in a child with hypoplastic left heart syndrome after Fontan correction

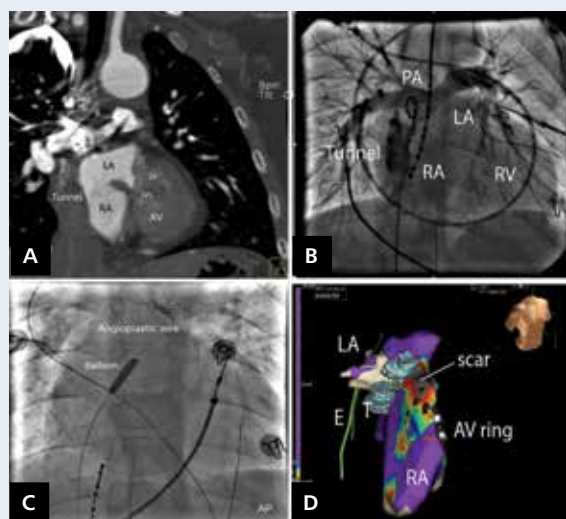
Zabieg ablacji częstoskurczu przedsionkowego u dziecka po korekcji Fontana z powodu hipoplazji lewego serca

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Patients with functionally single ventricle undergo several operations in order to regulate pulmonary blood flow; however, it limits the access to the chambers of the heart. Incisional tachycardia after surgery is frequently life threatening. Because it rarely responds to medical treatment, radiofrequency (RF) ablation is an optimal option with a relatively high success rate. A 7-year-old boy with hypoplastic left heart syndrome (HLHS) after Fontan procedure was admitted with recurrent atrial tachycardia (AT). Medical treatment failed and the patient required several electrical cardioversions. An echocardiogram and computed tomography (CT) scan confirmed HLHS with aortic atresia, severe mitral hypoplasia, small left ventricle ( $1.2 \times 0.9$  cm), systemic right ventricle ( $4.0 \times 4.2$  cm) with preserved systolic function, and a large atrial septal defect (Fig. 1A). The decision was made to perform RF ablation; however, the first attempt failed because tachycardia was not inducible. A second ablation was necessary because of ongoing AT with haemodynamic deterioration. The procedure was started with angiography of the tunnel with late phase visualisation of both right and left atria, showing small fenestration (Fig. 1B). A 5 F ablation electrode was unable to cross the fenestration. An angioplastic wire (Whisper ES, Abbott) was inserted through a transeptal catheter (8 F, SLO, St. Jude Medical) to the atrium and two inflations of an angioplastic balloon ( $3.5 \times 15$  mm, Sprinter Legend NC, Medtronic) were performed (Fig. 1C). After dilatation, the transeptal catheter was introduced to the atrial compartment. A ten-pole electrode was positioned in the oesophagus for reference. Tachycardia (CL 278 ms) was easily induced with a single stimulus. The bipolar and propagation map of both atria were created with Ensite/Navix. Entrainment was used to find the isthmus zone between the right upper-lateral part of atrioventricular valve and the tunnel (Fig. 1D). An application line with a small curve 4 mm tip 6 F ablation catheter (Celcius, Cordis) was created leading to cessation of AT after 16 s of application. After 30 min AT was no longer inducible. The patient was discharged after 4 days, and during 24 months of follow-up arrhythmia did not recur. The access to the heart after extracardiac Fontan palliation may require transconduit, transthoracic, or transapical puncture, which has been performed in a limited number of patients. Postoperative AT is frequently macro-reentrant with the circuit within the right atrium. The anatomical barriers created by the orifices of vena cava, coronary sinus, atrial septum patch, suture lines of atriopulmonary anastomosis, or lateral tunnel repair may create the multiple isthmi of tachycardia. The location of important anatomical points was facilitated by angiography of the conduit and late-phase visualisation of the atria. Angiography and CT scan integrated with a 3 dimensional electro-anatomical map was crucial to perform the entrainment and finally achieve the successful ablation. With longer life expectancy of patients after congenital heart disease surgery, electrophysiologists will be challenged with complex forms of arrhythmia requiring advanced visualisation and mapping techniques.



**Figure 1.** A. Computed tomography (CT) of the heart. Contrast given to the right peripheral vein opacifies the subclavian vein and pulmonary arteries (PA). Right (RA) and left (LA) atria with large atrial septal defect, right ventricle (RV) and small left ventricle (LV) are presented on the scan. The tunnel is shown as a structure running along the lateral wall of the RA; IVS — interventricular septum; B. Angiography performed during ablation. Pigtail catheter is positioned high in the tunnel. The contrast fills the tunnel and both PA well. The late phase of angiography gives visualisation of both atria and the level of the atrioventricular (AV) valve; C. The predilatation of the fenestration with a  $3.0 \times 15$  mm noncompliant balloon; D. Navix/ENSITE activation map of the atria during tachycardia. The tunnel (T) is merged manually from a CT scan giving visualisation of the surgical suture between the tunnel and the RA. The grey zone indicates the scars (low potentials, no capture) at the roof of the RA. There is a line of points indicating the PPI – AT CL = 0 between the tunnel and AV valve (blue “0”); E — electrode in the oesophagus for reference. Brown dots represent radiofrequency application line

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**Conflict of interest:** none declared