

Significance of Transvenous Endocardial Pacing

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DESCRIPTION

Various types of univentricular hearts have increased survival due to Fontan surgery and its variations. One of the most crucial conditions for the long-term efficient operation of this preload dependent circulation is an atrial rhythm that is regular and synchronized with the atrioventricular beat. A sizeable percentage of these survivors require different types of pacing for bradyarrhythmias, frequently as a result of sinus nodal dysfunction and occasionally as a result of atrioventricular nodal block. After this operation, the easy methods for endocardial pacing *via* the superior vena cava are no longer available due to the redirection of the venous flows away from the heart chambers. The preferred treatment is epicardial pacing since endocardial leads in systemic ventricles have additional risks of thrombosis. However, issues with epicardial pacing include lead fractures often, elevated pacing thresholds causing early battery depletion, and surgical adhesions. Due to the difficulty in gaining access to the heart chambers during Fontan circulation when epicardial pacing fails, endocardial lead installation is also difficult. This review covers univentricular heart morphologies that may require pacing, problems with epicardial pacing, various methods for endocardial pacing in patients with disconnected superior vena cava, pacing in various variations of Fontan surgeries, problems with systemic thromboembolism with endocardial leads, atrioventricular valve regurgitation linked to pacing leads, and device infections. Even though it is technically highly challenging, an epicardial pacing and lead replacement are always possible in the vast majority of patients who have undergone Glenn shunt and Senning surgery.

Congenital heart disorders and brady arrhythmia

Brady arrhythmias are related to a number of surgical procedures used to address congenital cardiac conditions. These rhythm problems are more frequently accompanied with heterotaxy syndromes, atrioventricular discordance, and single ventricles than others. Due to sinus node dysfunction in 9–23% of patients and aberrant atrioventricular nodal conduction in 2–16%

of patients, pacemaker installation is the most frequent reintervention after Fontan surgery. Atrioventricular nodal block can develop after atrial tachyarrhythmia therapy or it can happen spontaneously in a small proportion of univentricular hearts. It may occasionally occur after specific surgical operations, such as the expansion of the bulboventricular foramen following a Fontan procedure. The number of young patients receiving permanent pacing for bradyarrhythmias has increased due to advances in pacemaker designs, bettering operator expertise, and shrinking of pulse generators and leads. The small size of paediatric patients and the frequent venous occlusions following pacing, however, dissuade against the establishment of pacing therapy at a very young age.

Due to recent advancements to Fontan surgery and the longer life of patients with univentricular hearts, a sizeable number of these survivors now require pacemaker insertion for a variety of bradyarrhythmias. Epicardial pacing, despite the preferred approach, frequently fails because of high thresholds, lead fractures, and challenges with recurring surgical revision of leads because of adhesions. Due to the venacaval diversion away from the heart during this operation, endocardial lead implantation requires particular methods and uncommon access. The present modification of Fontan surgeries, which uses an extracardiac synthetic conduit for the diversion of inferior vena cava, does not permit any native atrial tissue around the conduit. Previous modifications of Fontan surgeries provided an easier site to pace the heart within the right atrium. Endocardial leads need to be introduced through the right atrial wall, pulmonary valve, hepatic veins, venous collaterals, fenestrations made during surgery, or catheterization lab. Now there are more methods for pacing the uni-ventricular heart to treat bradyarrhythmias due to the many access points and procedures. Endocardial transvenous leads may exacerbate the greater thrombogenicity of the Fontan circulation, which calls for appropriate systemic anticoagulation to reduce the risk of systemic thromboembolism. Thorough safe procedures can prevent endocarditis and other issues related to endocardial pacing, such as atrio-ventricular valve regurgitations.

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