P-18

Minimally Invasive Method for Epicardial Implantation of Implantable Cardioverter Defibrillators in Children

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Introduction: Epicardial implantation of Implantable Cardioverter Defibrillators (ICDs) is considered in the presence of an intracardiac shunt, venous access issue or small body size. More common technique of epicardial ICD implantation involves placement of epicardial patches through sternotomy. In the present study, our experience with epicardial ICD coil implantation using a minimally invasive method is reported.

Methods: Subjects who underwent epicardial ICD implantation between January 2010 and December 2011 were included. Clinical and procedural data of these patients were retrospectively evaluated.

Results: A total of 6 patients were included in the study. The median age was 6.2 years (range 3.8 - 9.5). The median weight was 15.8 kg (range: 12-24). Implantation diagnoses included long QT syndrome (n=3), catecholaminergic polymorphic ventricular tachycardia (n=1), and hypertrophic cardiomyopathy (n=1) and fast monomorphic ventricular tachycardia (n=1). Minimally invasive method involved a subxiphoid incision in order to place the epicardial pacing leads. ICD coil was placed in the transverse sinus in 4 patients using an access path posterior to the heart. Second approach (anterior approach) involved a path anterior to the heart to reach the epicardial location posterior to the left atrial appendage and this was performed in 2 patients. The median defibrillation threshold (DFT) at implant was 10 J (range: 5 to 10 J). A lower DFT was observed in patients who had leads placed using the anterior approach (10 J vs. 5 J). Appropriate ICD shocks were observed in 3 patients during a median follow-up of 13 months (range: 5-18). No inappropriate shocks were noted. One patient suffered pericardial tamponade and required surgical drainage and medical therapy. A patient with long QT syndrome developed ICD
storm and was successfully treated with left cardiac sympathetic denervation. No other complications were observed.

Conclusions: Epidardial ICD coil implantation using a minimally invasive method is effective in children in whom transvenous approach is challenging. Anterior implantation approach appears to result in lower DFT values. Further studies are needed to assess for the optimal technique for epicardial ICD and coil implantation in children.