

Evaluation of implantable cardioverter defibrillator therapy in preventing sudden cardiac death in paediatric patients in the Netherlands

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Background – Implantable Cardioverter Defibrillator (ICD) therapy has shown to be effective in the prevention of sudden cardiac death (SCD) for more than two decades. Lead integrity problems, inappropriate shocks and infections are main concerns of ICD therapy particularly in children. We aimed to analyse our experience with ICD treatment in children.

Methods – A multicentre retrospective review of all patients below 18 years at implant was performed. Primary outcomes were mortality, re-intervention, appropriate and inappropriate shock and the occurrence of complications.

Results – Between 1990 and 2016, 170 (102 male) children in the Netherlands underwent ICD implantation. The median age at implantation was 13 years (9-16). In 93 patients the ICD was implanted as primary prevention. Underlying cardiac diseases were primary electrical disease (48%), congenital heart disease (6.5%) and cardiomyopathy (40%). A transvenous ICD system (TV-ICD) was implanted in 65% (n = 110), 24% had a non-transvenous system (NTV-ICD) and 11 % had a subcutaneous ICD (S-ICD). The follow-up time was 5 (2-9) years. 11 patients died (6.5%) due to cardiac disease, 9 had a heart transplant (5%) and 10 had the ICD removed (6%). 71 patients experienced complications (42%) including infection (N=17), lead dysfunction (N=68) and pleural effusion (N=5). In patients <12 years the occurrence of complications was significantly higher (56%) compared to patients ≥12 years (32%) (p= 0.002). More patients with NTV ICD systems experienced complications (67%), compared to TV systems (35%) and S-ICDs (28%) (p= 0.001). 53 patients (32%) experienced appropriate shocks; 26 patients (16 %) experienced inappropriate shocks. The number of patients with inappropriate shocks was significantly less compared to earlier reports. The main cause of inappropriate shocks were lead fracture (N= 5), T-wave over sensing (N=5) and supraventricular tachycardia (N=11). Less patients with a cardiomyopathy had inappropriate shocks (6%) compared to patients with congenital heart disease (27%) and primary electric disease (23%) (p=0.006).

Conclusion – In the paediatric ICD patients complications are more likely to happen in patients <12 years and those with a NTV system. Compared to earlier reports there were significantly less inappropriate shocks. Patients with a cardiomyopathy have less inappropriate shocks.