Transcatheter patent ductus arteriosus closure with echocardiographic guidance: Can Radiation exposure be reduced?

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Objective: The radiation dose from interventional cardiac catheterization is particularly relevant when treating children because of their greater radiosensitivity compared with adults. Transcatheter closure of patent ductus arteriosus (PDA) as well as other more complex pediatric interventions has raised concerns regarding radiation exposure. The purpose of this study is to show how to perform transcatheter closure of PDA in children while giving less ionized radiation and to prove that the amount of radiation as well as unnecessary additional contrast material can be reduced.

Methods: In this prospective study, we included 63 children those had transcatheter closure of PDA. Following appropriate device selection based on PDA morphology and diameter; transthoracic echocardiography images and control aortography findings were analyzed. Results were compared for presence of residue, the amount of contrast, radiation dose and follow-up data.

Results: The mean age, weight, and minimum ductal diameter were 5.1 ± 4.4 years, 19.3 ± 14.7 kg, and 3.0 ± 1.2 mm, respectively. Following devices were used during procedure: Gianturco coils (10/63), Amplatzer Duct Occluder (ADO, 31/63), Flipper coils (19/63), and Amplatzer vascular plug (3/63). Total durations of procedure and scopy, the amounts of radiation dose and contrast were as follows; 56.4 ± 19.4 mins, 12 ± 6.4 mins, 28.1 ± 14.7 cmgy/cm2/kg and 4.2 ± 2.3 cc/kg. In control aortography shortly after the procedure, residual shunt was detected in different levels in 39.7% of patients and 9.5% demonstrated residual shunt in real-time echocardiography. In echocardiographic control one day later, occlusion percentile was 98.4%. In control aortography, exposure of radiation was 13.3% of total and the amount of infused contrast was 27.2% of total. If residual shunt was seen in control aortography but not in echocardiographic evaluation; those patients had no residual shunt in the follow-up.

Conclusion: With the appropriate device selection, patients may be exposed less radiation and contrast material if echocardiographic evaluation is performed after transcatheter closure of PDA instead of last control aortography injection.