

Three-dimensional rotational angiography in newborns and infants with hypoplastic left heart syndrome

Koleśnik A., Zubrzycka M., Rewers B., Migdał A., Brzezińska-Rajszyś G.

Cardiovascular Interventions Laboratory, The Children's Memorial Health Institute, Warsaw, Poland

Introduction: Recently 3D rotational angiography (3DRA) became a standard imaging method. It allows to create three-dimensional images, three-dimensional roadmaps for navigation during diagnostic catheterization and interventional procedures as well as to obtain tomographic images similar to those created with standard computed tomography. In newborns and infants, however, the volume of injected contrast medium and radiation dose should be strictly considered. We present our experience with 3DRA in infants after first stage palliation for hypoplastic left heart syndrome.

Methods: Twelve 3DRAs were performed in 12 patients with hypoplastic left heart syndrome using Philips Allura Clarity system. The age of patients was 1-10 months (avg. 6 months). In all cases undiluted contrast medium was injected into the right ventricle without rapid pacing. Rotation time was 4.1 s, the injection delay 2 s, injection time 5 s, contrast medium dose maximum 2 ml/kg, contrast medium flow 1-3 ml/s.

Results: 3DRA was done during 9 interstage diagnostic catheterisations, 2 implantations of stents into the Sano conduit and one duct stenting following bilateral pulmonary artery banding. In all cases the quality of 3DRA images was satisfactory for 3D reconstruction and roadmapping. Quality of cone-beam computed tomography images (XperCT, Philips) allowed for accurate visualisation and measurements of anatomical structures. Moreover, the details impossible to depict with two-dimensional angiography, e.g. relationship of vascular structures to airway, could be assessed. Contrast volume ranged from 5 to 18 ml. Radiation dose per acquisition was 2.09-5.59 mGy (Air Kerma, median 3.06 mGy) and 153-527 mGycm² (Dose Area Product, median 323.5).

Conclusions: In newborns and infants with hypoplastic left heart syndrome 3DRA can be safely used to obtain diagnostic images and support interventions with low volume of contrast medium and reasonable radiation dose.