

Comparison of Echocardiography and Cardiac CT angiography in Evaluating Pulmonary Artery and Pulmonary Valve Annulus in Pediatric Patients with Tetralogy of Fallot: A Single-Center Study in Bangladesh

Khalada Parvin Deepa¹, Nusrat Ghafoor², Jesmin Ara Parven³, Most. Razina Jubaida⁴
Saikat Barua⁵, Md. Abdullah Al Shoyeb⁶, Md. Ibrahim Khalilullah⁷, Nawshin Siraj⁸,

ABSTRACT

Background: Congenital heart disease (CHD) is a common structural birth defect and a leading cause of death in children under five worldwide. Tetralogy of Fallot (TOF) is the most common cyanotic CHD, representing 7–10% of the cases. Clinically significant TOF requires early intervention, and detailed assessment of pulmonary artery and valve anatomy, is critical for surgical decision-making and long-term outcomes. This study compared trans thoracic echocardiography (TTE) and Cardiac CT Angiogram (CTA) in evaluating the pulmonary arteries and pulmonary annulus in children with cyanotic CHD-TOF.

Methods: This cross-sectional study included 68 children aged 5 years or younger with TOF who underwent TTE and CTA from January 2024 to September 2025. The diameters of the pulmonary valve annulus, the main pulmonary artery (MPA) with

its branches, the right (RPA) and left (LPA) pulmonary arteries were assessed using both modalities. TTE measurements were compared with those from CTA and analyzed using Pearson's correlation and Bland–Altman analysis.

Results: TTE showed good correlation with CTA for assessing the pulmonary arteries and pulmonary valve annulus, with Pearson's *r* values of 0.64, 0.53, 0.50, and 0.72 for the MPA, RPA, LPA, and pulmonary valve annulus, respectively. Bland–Altman analysis indicated that TTE measurements of the MPA were slightly higher on average than CTA (mean difference 0.34 mm; 95% LOA -6.41 to 7.11 mm), while the RPA, LPA, and pulmonary valve annulus were slightly lower on average, with overall good agreement between the two modalities.

Conclusion: There is good correlation and good agreement between TTE and cardiac CTA for assessing the pulmonary valve annulus and pulmonary

Author list with affiliations 1. Dr. Khalada Parvin Deepa Assistant Professor and Associate Consultant Department of Radiology and Imaging Ibrahim Cardiac Hospital and Research Institute, Shahbag, Dhaka. Email: khaladadeepa@gmail.com Phone No: 01673640085 ORCID Id: 0009-0009-7470-1751 2. Dr. Nusrat Ghafoor Professor Department of Radiology and Imaging Ibrahim Cardiac Hospital and Research Institute, Shahbag, Dhaka Email: ghafoornusrat@yahoo.com Phone No: 01711316595 ORCID Id: 0000-0003-3303-2968 3. Dr. Jesmin Ara Parven Assistant Professor and Associate Consultant Department of Radiology and Imaging Ibrahim Cardiac Hospital and Research Institute, Shahbag, Dhaka Email: drjesmindnmc@gmail.com Phone No: 01716781886 ORCID ID: 0009-0004-4430-2921 4. Dr. Most. Razina Jubaida Associate Professor Department of Radiology and Imaging Khwaja Yunus Ali Medical College & Hospital Email: jubaidarazina@gmail.com Phone No: 01715012712 ORCID ID: 0009-0000-2032-3294 5. Dr. Saikat Barua. Associate Professor. Radiology and Imaging Department Bangladesh Medical College, Dhanmondi, Dhaka. Email: saikatbarua1974@gmail.com Phone No: 01711973620. ORCID Id: 0009 0000 4346 0611 6. Dr. Md. Abdullah Al Shoyeb Assistant Professor and Associate Consultant. Department of Cardiac Surgery Ibrahim Cardiac Hospital and Research Institute, Shahbag, Dhaka. Email: Shoyebdj15@gmail.com Phone No: 01676015905 ORCID Id: 7. Dr. Md. Ibrahim Khalilullah Associate Professor Department of Anesthesiology Ibrahim Cardiac Hospital and Research Institute, Shahbag, Dhaka. Email: ibrahimbd805@gmail.com Phone: 01719614325 8. Dr. Nawshin Siraj Professor Department of Radiology and Imaging Ibrahim Cardiac Hospital and Research Institute, Shahbag, Dhaka. Email: nawshinsiraj@hotmail.com Phone No: 01711594097 ORCID Id: 01676015905 Corresponding author Dr. Khalada Parvin Deepa Assistant Professor and Associate Consultant Department of Radiology and Imaging Ibrahim Cardiac Hospital and Research Institute, Shahbag, Dhaka. Email: khaladadeepa@gmail.com Phone No: 01673640085 ORCID Id: 0009-0009-7470-1751