Utility of Cardiac 3D Printing in Neonatal Mitral Valve Repair

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Introduction

Mitral valve repair can be challenging because of both the unique pathologic morphology of a dysplastic valve as well as the limited ability to visualize surrounding anatomy by standard echocardiography.

Case Presentation

Birth

Newborn Failed CCHD

Echo: Dysplastic mitral valve leaflets, resulting in mitral regurgitation and severe left atrial enlargement

DOL #2

Cardiogenic shock resulting in NEC and multiorgan system failure

Intubated, started on milrinone and epinephrine, and transferred to a tertiary center

Workup

CTA highlighted severely aneurysmal LA spanning over 41cm craniocaudally

Echocardiogram demonstrated a dilated mitral valve annulus (PHN z-score +9.6)

Options & Planning

Medical management, transcatheter valve implantation, and surgical mitral valve repair

3D printing was performed to provide a more thorough anatomical assessment

Repair

Surgical repair with commissuroplasty and atroplasty

TEE demonstrated successful repair

Figures 1:

A – CTA, sagittal view. Dotted line demonstrates surgical approach via Sondergaard’s groove to access the mitral valve.

B – Labeled CTA 3D reconstruction.

Clinical Impact

Strengths of imaging modalities:

Echocardiography: assess the heart structure, function, and valves

CTA - preferred to visualize the great vessels, coronary arteries, and extracardiac structures.

3D echocardiography - valve leaflets and function.

Cardiac MRI - heart chamber volumes as well Qp:Qs ratio

Our case demonstrates 3D printing for improved evaluation of left atrial landmarks and mitral valve morphology

References