SUMMARY AND CONCLUSION

Congenital heart disease (CHD) is a relatively common problem, with an incidence of approximately5 to 12 per 1000 live births. Over the past two decades, the trend has been to perform more types of surgical repair at infancy, even after operative repair, many of these patients have residual anatomic defects and require close longitudinal follow-up.

MRI has emerged as an important and growing means of cardiovascular imaging with many advantages over other radiological modalities including the ability to display large field of view, to produce image in any desired plane with excellent spatial and temporal resolution, lake of ionizing radiation and noninvasiveness.

Evaluation of congenital heart disease (CHD) is an important application of Cardiac MRI since the morphological details of chambers, septum, defects and anomalous connections are depicted accurately. Besides, flow information across valves, chambers, outflow tracts and shunts are also provided.

Cardiovascular MR imaging provides both morphologic and functional information that can be decisive in the treatment of neonates and infants with CHD. Excellent-quality MR images can be obtained when the technical parameters of the pulse sequences are adjusted to the small size an fast heart rates of these patients The capacity of MR imaging to accurately

demonstrate complex abnormalities of the entire thoracic vasculature can obviate potentially harmful cardiac catheterization in many cases.

MRI is useful for evaluating the anatomy of the cardiac chambers and great vessels by two features: the lack of signal intensity from flowing blood (signal void), which provides excellent contrast between the lumen and the myocardium or vessel wall and the simultaneous visualization of several (or all) cardiac components on multiple plane tomographic image.

In infant and neonates, echocardiography is the initial imaging modality of choice. Later on, especially after surgery, when scar tissue around the heart impedes ultrasound penetration and echocardiographic views are suboptimal, CMRI is the preferred imaging method.

Cardiac MRI is a powerful tool for complete characterization of congenital anatomy. Black-blood, white blood cine and 3D angiography offer complementary insights into congenital pathophysiology. Black-blood imaging offers superior resolution, contrast, and decreased sensitivity to metal artifacts. White blood cine imaging provides physiologic context to the anatomy, demonstrating flow patterns, valve motion, qualitative assessment of stenosis, regurgitation, and cardiac function. Contrast-enhanced MR angiography offers depiction of small vessel disease while also yielding the best 3D representations of vessel relationships.

MRI becomes superior to other conventional cardiac imaging modalities such as echocardiograohy and angiography. Contrast–enhanced MR angiography is particularly useful for the assessment of deep anatomic structures such as the pulmonary arteries, which are difficult to see on echocardiograms and difficult to access at selective angiography. Furthermore, cine MR images can provide additional information about cardiac function, valve patency, and the hemodynamic significance of vascular stenosis.

Echocardiography and angiography have traditionally been the primary imaging modalities used for the evaluation of cardiac shunts. Echocardiography is sensitive and noninvasive but has a limited acoustic window. Although angiography is frequently considered the standard method for achieving definitive diagnosis of cardiac shunts, it is invasive and requires the use of iodinated contrast material. CT can demonstrate structural heart disease such as septal defects and anomalous pulmonary venous and arterial anatomy; however, functional evaluation of shunts with CT has not been described extensively.

MR imaging is particularly useful for the evaluation of cardiac shunts as in ASD, VSD, and AVSD, in which echocardiography and conventional angiography have limited use. MR imaging is also well suited for the noninvasive quantification of shunt volume and functional evaluation of shunt severity.

So cardiovascular MRI has become an important alternative to echocardiography and angiography in initial investigation of complex CHD in infant and neonates or as follow up after surgery or catheter guided intervention.