Fetal Echocardiography: A single center tertiary care experience

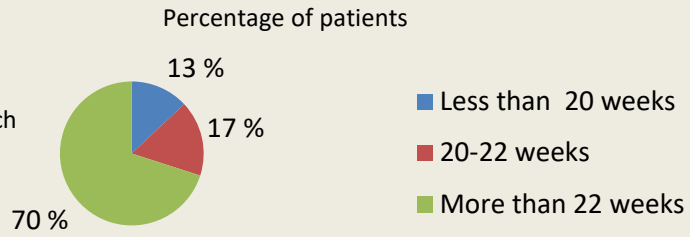
Dr Aamir Rashid , Dr Shaheera Ajaz , Professor Hilal rather , SKIMS , Srinagar , J& K ,India

BACKGROUND :Though fetal echocardiography is established screening tool for detection of cardiac anomalies; its utility and awareness remains less in less developed areas of world. There is no data from our region about usage & outcome of fetal echo. We planned to study indications , referral patterns and outcomes of fetal echo

Material methods: All pregnant ladies referred for fetal echo from Jan 2017 to july 2018 were included in the study. Details regarding gestational age, maternal, family history, exposure to teratogens, and reason for referral were recorded.

RESULTS: Total of 600 pregnant ladies underwent fetal echo. Mean age of patients was 28 ±4.2 years .Mean gestational age referred for fetal echo was 26 ±4 weeks .420(70%) of patients were more than 22weeks of gestational age(Fig1). The various indications are shown in Table 1 and various abnormalities are shown in Table 2 .24 of 600 (40 per 1000)screened fetal echos were abnormal .17(70.8%) were referred for an unsatisfactory/abnormal anomaly scan which were low risk pregnancies .The highest yield of CHD was in patients who had been referred for abnormal fetal anomaly scan when compared with other referral indications (17 of 50 (34%). vs 7of 550 (1.27%) in other indications (p=0.0001)

Fig1 Showing gestational age at which fetal echo was done



CONCLUSION: Most common indication for which fetal scan was abnormal was abnormal routine ultrasound which were mostly low risk pregnancies. Dedicated cardiac screening should be part of the routine anomaly scan. Detailed Fetal echo should be done in all patients who have any doubt on anomaly scan. The main concern in our scenario is the late referrals. Greater awareness in our community is needed for proper referral timings of fetal echo.

Table 1: Indications for fetal echo

INDICATIONS	NUMBER(%)
Maternal indications	
Bad Obstetrical history Pre gestational diabetes Congenital heart disease Medication use Connective tissue disorder	180(30%) 100(16.67%) 35(5.83%) 15(2.5%) 55(9.16%)
Abnormal/not properly visualized cardiac chambers on anomaly scan	50(8.33%)
Previous child with heart disease	105(17.5%)
Echogenic intracardiac focus (EIF)	25(4.16%)
Rhythm problems	15(2.5%)
Extracardiac malformations	20(3.33%)

Table 2: Abnormalities noted

Type Of CHD	Number(Percentage)
Ventricular Septal defect	**4(0.6%)**
Tetrology Of Fallot	**1(0.16%)**
Tricuspid atresia	**1(0.16%)**
Unbalanced AVCD	**1(0.16%)**
DORV Pulmonary stenosis	**2(0.33%)**
Hypoplastic left heart	**2(0.33%)**
Pulmonary atresia intact septum	**3(0.5%)**
Ebstein Anomaly	**1(0.16%)**
Single ventricle	**1(0.16%)**
Corrected TGA	**1(0.16%)**
Compete heart block	**2(0.33%)**
Fetal SVT	**2 (0.33%)**
Coarctation Of Aorta	**2 (0.33%)**
Fetal cardiac tumour	**1(0.16%)**

References
1. Zhang YF, Zeng XL, Zhao EF, et al. Diagnostic value of fetal echocardiography for congenital heart disease: a systematic review and meta-analysis. Medicine (Baltimore). 2015;94:e1759
2. Li M, Wang W, Yang X, et al. Evaluation of referral Indication for fetal echocardiography in Beijing. J Ultrasound Med. 2008;27:1291.
3. Rychik J, Ayres N, Cuneo B, et al. American Society of Echocardiography guidelines and standards for performance of the fetal echocardiogram. J Am Soc Echocardiogr. 2004;17:803–10.

Can APVS be missed? A case series

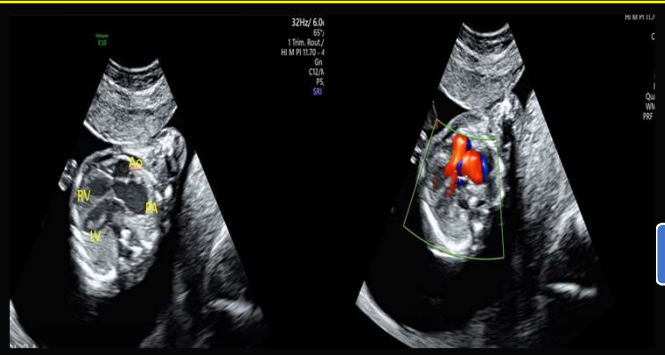
Authors: Dr Aashi Priyamvada, Dr Purvi A , Dr Adinarayan Makam
Institution: Adi Advanced Centre for Fetal Care, Bengaluru

Introduction

APVS defined as total or subtotal absence of pulmonary valve leaflets. It is a rare congenital anamoly which is having high association with other cardiac and in a lesser number non cardiac malformation. It is 3–6% (around 6:3000) of all cases of TOF.

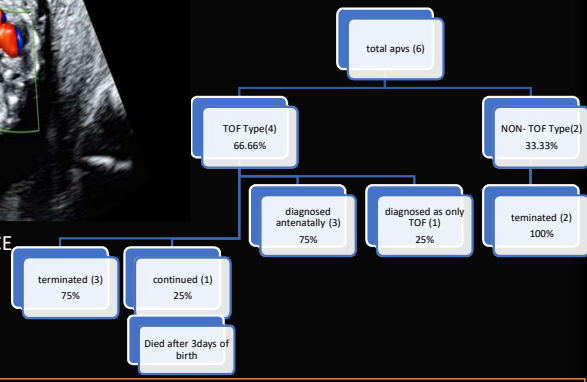
Aim & Methods

Evaluation of the absent pulmonary valve syndrome in antenatal scans,associated congenital malformations associated and its feto-neonatal outcome. **Duration-**Retrospective study -November 2015 to November 2019



Four chamber view showing BOW- TIE APPEARANCE and Enlargement of right ventricle.

Case Series



Diagnosis

Common features of both types are: ON ECHOCARDIOGRAPHY:[2]

- Rudimentary pulmonary valve tissue
  Aneurysmal dilatation of the main PA and branch PAs (BOW- TIE APPEARANCE)
  Enlargement of right ventricle

Colour flow mapping

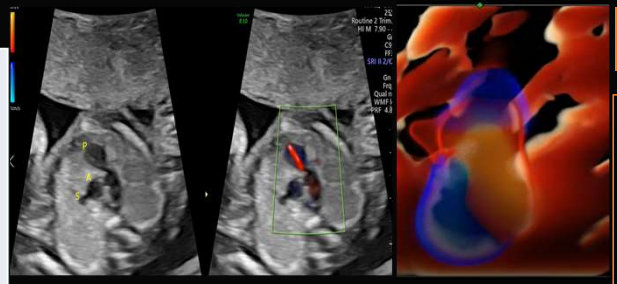
- Antegrade & retrograde flow at site of absent pulmonary valve (to-fro flow pattern also know as Yin- yan sign)
  Systolic pressure gradient across narrow pulmonary orifice

Common variant of Fallot type, distinguishing echocardiography features are:

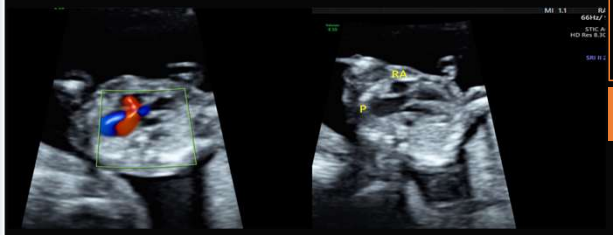
- Sub- aortic VSD with right to left shunt during systole and diastole
  Over-riding of aorta
  Absence of ductus arteriosus

Non Fallot type

- No VSD or only muscular VSD is observed
  Ductus arteriosus is patent



Three vessel view of fetal heart showing narrow pulmonary orifice and to & fro flow at site APV



Dilated PA showing to-fro flow pattern also know as Yin- yan sign. .

Conclusion

APVS is usually associated with high fetal morbidity. Diagnosis becomes important as association with cardiac and extra anamolies is present. The majority of cases have guarded prognosis until or unless postnatal identification is early, surgery is crucial. A keen eye for APVS should thus be present antenatally. first trimester diagnosis when the MPA is not significantly dilated becomes difficult and thus APVS can be missed. Invasive testing should be offered to the patient as significant chromosomal anamolies have been found to be associated with APVS.

References

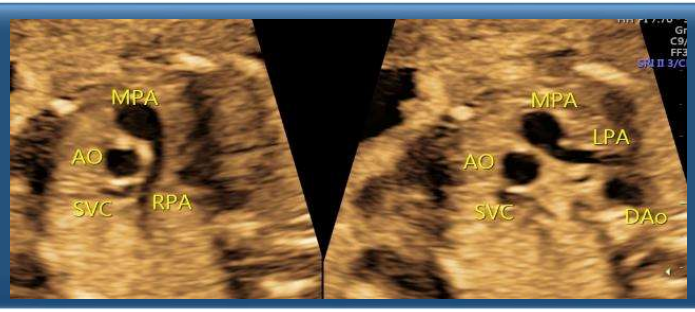
1.Philip S., Varghese M., Manohar K., Cherian K.M. Absent pulmonary valve syndrome: prenatal cardiac ultrasound diagnosis with autopsy correlation. Eur J Echocardiogr. 2011;12:E44. [PubMed] [Google Scholar]
2.Sauer U. Absence of pulmonary valve. Orphanet Encyclopedia. December 2003. http://www.orpha.net/data/patho/GB/uk-AbsPulmoValve.pdf

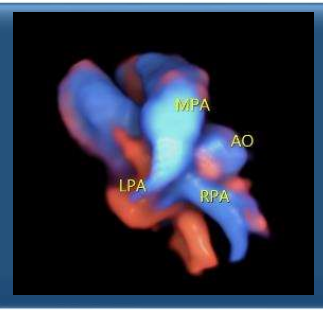
Crossed Pulmonary Arteries

Dr Alok Varshney M.D.,D.N.B. (RADIOLOGY)
CENTRAL DIAGNOSTICS , DWARKA, NEW DELHI

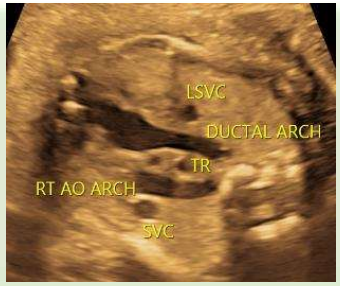
- Very rare malposition of branch pulmonary arteries
- The left pulmonary artery originates from the right side of the main pulmonary trunk and the right pulmonary artery from the left side
- Both arteries then cross over each other to reach the respective lungs, most often the LPA crossing above the RPA
- Usually found in association with complex congenital heart diseases, mainly with cono-truncal anomalies
- Rarely, it may occur as an isolated finding
- Prenatal diagnosis is extremely rare
- Report of 3 cases:
  Case 1 : Isolated criss-cross PA
  Case 2 : with Right aortic arch
  Case 3 : with Common arterial trunk

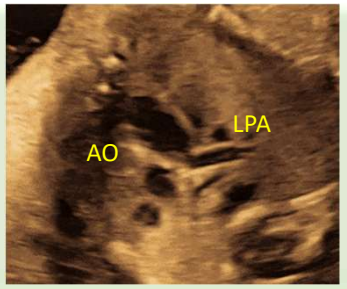
Case 1- 23 WKS
- Isolated
- No other cardiac/ extracardiac findings
- Normal outcome

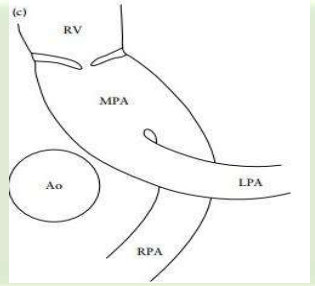




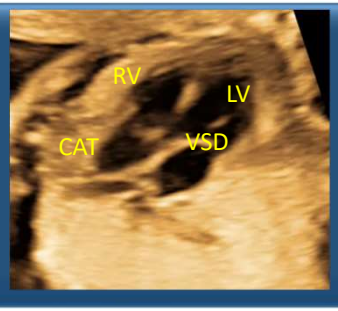
Case 2- 30 WKS
- With RAA-LDA and LSVC
- Ventriculomegaly
- 22q11 del

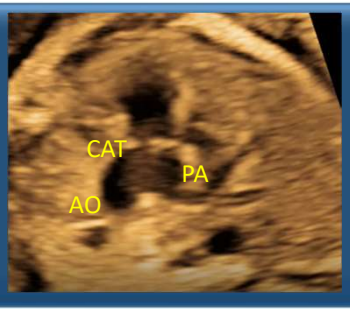


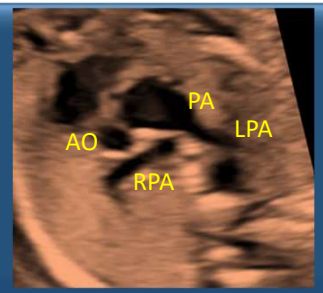




Case 3- 22 WKS
- With CAT type 1
- Pregnancy terminated

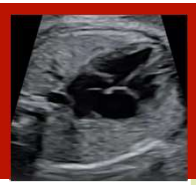






Equations of Congenital heart anomalies with assisted reproductive technologies: Case series and literature review

Prof. Dr. Debasmita Mandal[1], Dr. Saroj Mandal[2], Dr. SM Rahman[3]
[1]Fetal Medicine Consultant, [2]Assoc. Prof (Cardiology), [3]Founder & Director of Cradle Fertility Centre



BACKGROUND

Literatures have shown increased risk of CHD in pregnancies conceived after in-vitro fertilization (IVF)/ intracytoplasmic sperm injection (ICSI) when compared with spontaneous conceptions. The possible causes may be inherent in ART procedure , the underlying cause of infertility , advanced maternal age and the higher incidence of twin pregnancy associated with ART . Hypothesis has been drawn out favouring role of an early placental dysfunction for occurrence of CHD in pregnancies resulting from ART . The American Institute of Ultrasound in Medicine, American Society of Echocardiography and American Heart Association (AHA) consider IVF as an indication for a detailed cardiac scan as well.

We are presenting a case series of congenital heart anomalies in pregnancies with ART at our centre . Aim of presenting is to create awareness regarding essentiality of fetal echocardiography in these high risk pregnancies .

Materials & Methods

Pregnancies were screened by detailed anatomy scan and fetal echocardiography for the indication of ART. CHD were classified as either major or minor based on the need for postnatal surgical intervention. Results were compared to findings from various other studies examining CHD in pregnancies resulting from ART.

Results:

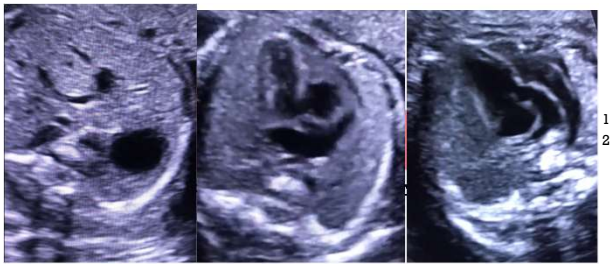
In 4 years of duration , 388 women conceived after IVF/ICSI . Out of which 384 could carry forward their pregnancy. We attended 310 singleton and 74 twin pregnancies. All kinds of anomalies were observed in 9 cases and out of which 4 were with major and 1 was with minor heart anomaly . **Our incidence of all congenital anomalies were 2.3% and heart anomalies were 1.2% of all pregnancies**. Half of the heart anomalies were observed in all twin pregnancies.

CONCLUSION

Pregnancies with ART should be taken care of judiciously by routine fetal echography, as incidence of anomalies including heart anomalies may increase and multiple pregnancy out of ART may also play important associated risk factor .

Results

case	age	gavidity	weeks	No. Of fetuses	Observed CHD	Associations
1	34	G1P0	21wks 2days	1	Ectopia Cordis	Ant abdominal wall defect
2	37	G1P0	20wks6days	2	TGA (Twin1)	UTDA1(Twin 2)
3	34	G2P0	25wks3days	2	TA	VSD, Pulmonary atresia
4	35	G1P0	23wks4days	1	CCTGA	VSD, dextrocardia
5	32	G1P0	20wks2days	1	ARSA	

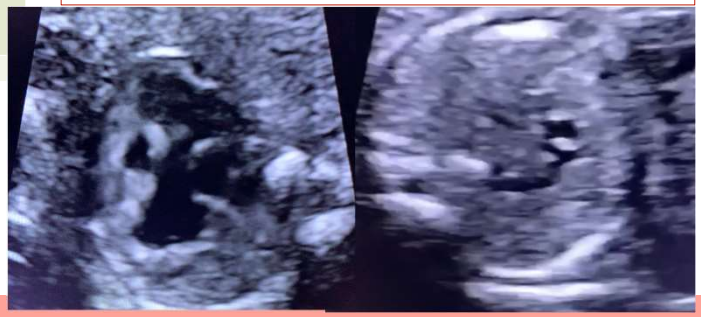


1
2

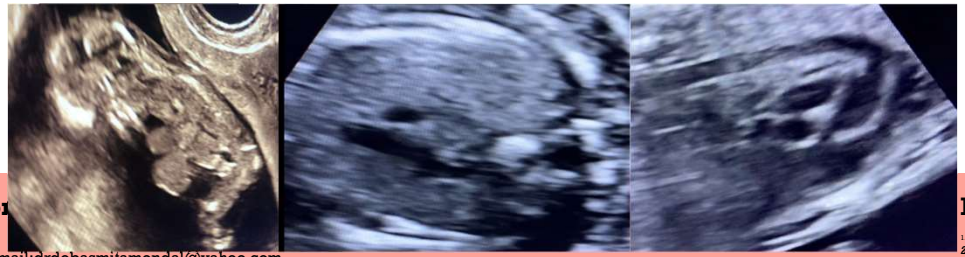
CCTGA, VSD, DEXTROCARDIA

Discussion

Author /yr	Incidence of CHD in ART infants(%)	Incidence of CHD in natural conceptions infants(%)	Class
Seggers, et al.(2015)	14.4	11.9	severe
Jwa et al .(2015)	0.48	0.5	severe
Kelly –Quon et al. (2013)	3.1	2.8	severe
Mozafari Kermani et al.	1.8	0	Mild



TA, VSD,PA



ECTOPIA CORDIS & TGA

Email:drdebasmitamondal@yahoo.com
Phone:9831522415

References

1. Giorgione et al. Congenital heart defects in IVF/ICSI pregnancy : systematic review and meta-analysis . Ultrasound Obstet Gynecol2018;51:33-42.
2. Seggers J et al. Congenital anomalies in offspring of subfertile couples . A registry based study in northen Netherlands. Fertility Sterility2015 , 103(4), 1001-1010.
3. Jwa , S. C et al. Risk of major congenital anomalies after assisted hatching : Analysis of 3 years data from National registry data of Japan . Fertility Sterility 2015 ; 48: 1218-1224.
4. Kelly-Quon et al. Congenital malformations associated with assisted reproductive technology : A California statewide analysis . Journal of Paediatric surgery2013 ; 48: 1218-24.
5. Mofzafari K. R. et al. Congenital malformations of infants with ART and natural conceptions in Tehran , Iran. Int Journ of fertility sterility 2018;11:304-8.

Detection of tuberous sclerosis complex in mother after detection of cardiac rhabdomyomas in fetus- 2 case reports

Dr Mamta Bansal*, Dr Gunjan Jindal

***DMRD, Attending consultant, Department of Radiodiagnosis,Hero DMC Heart Institute, Ludhiana**

•INTRODUCTION-

•Tuberous Sclerosis(TS) is an Autosomal dominant (TSC1 and TSC2 genes located chromosome 9 and 16) inherited multisystem disorder affecting skin, heart, CNS and other organs. Fetal cardiac rhabdomyomas are rare but still are the most common cardiac tumours in fetus with an incidence of 1/40000 postnatally. These are hamartomas comprised of cardiac muscle tissue. In >50% of cases, Cardiac rhabdomyomas are the first manifestation of TS. The most common location is left ventricle, although they can arise from any part of the myocardium. On Ultrasonography, they are seen as single or multiple non vascular hyperechoic masses (golf ball) attached to the myocardium or thickening of myocardium. They can be seen in the mid second trimester, as early as 20 weeks. Increased gestational age at diagnosis, large tumor size, multiple tumours, progression and association with other abnormalities are related to worse prognosis postnatally. Complications include cardiac arrhythmias, ventricular outflow obstruction, congestive heart failure and hydrops. If there is a positive family history of TS in the affected fetus, diagnosis of TS in the fetus becomes more predictive.

.

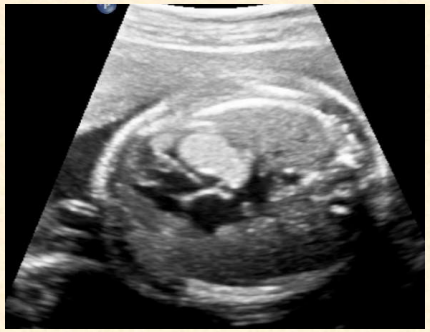
•CASE REPORT-

•We are presenting two cases in which fetal rhabdomyomas were detected on antenatal ultrasound and then on imaging of maternal abdomen, angiomyomas were detected. In both cases mother was diagnosed to have TS after antenatal detection of cardiac rhabdomyomas in the fetuses.

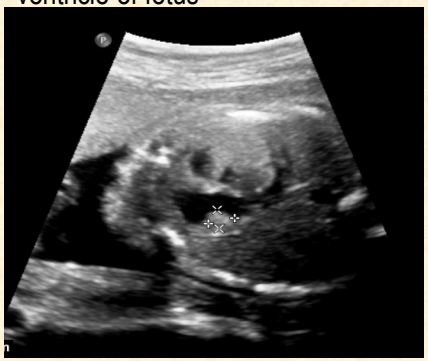
•DISCUSSION-

Cardiac rhabdomyomas are the first manifestation of TS. The most common location is left ventricle, although they can arise from any part of the myocardium. On Ultrasonography, they are seen as single or multiple non vascular hyperechoic masses (golf ball) attached to the myocardium or thickening of myocardium. They can be seen in the mid second trimester, as early as 20 weeks. Increased gestational age at diagnosis, large tumor size, multiple tumours, progression and association with other abnormalities are related to worse prognosis postnatally. Complications include cardiac arrhythmias, ventricular outflow obstruction, congestive heart failure and hydrops. If there is a positive family history of TS in the affected fetus, diagnosis of TS in the fetus becomes more predictive.

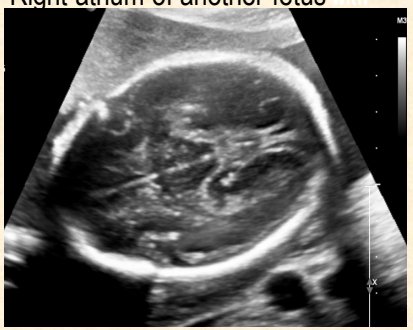
.



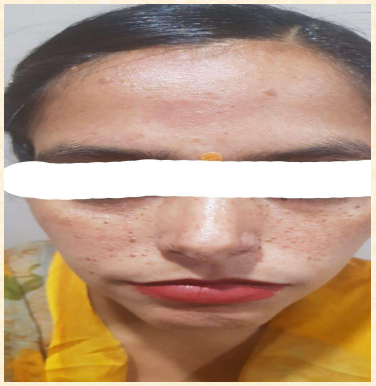
A hyperechoic mass seen in left ventricle of fetus



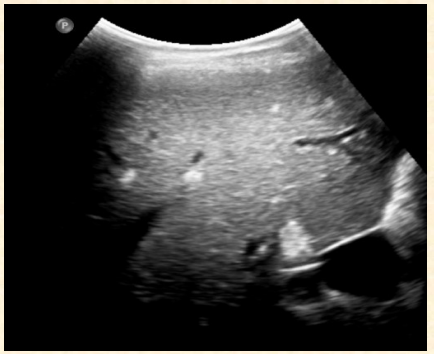
Small hyperechoic mass seen in Right atrium of another fetus



No e/o any cerebral tubers seen.



Small erythematous papules on the nose and cheek of mother- Adenoma Sebaceum



Multiple well defined hyperechoic lesions in liver parenchyma of mother

CONCLUSION- If a cardiac rhabdomyoma is detected in fetus without any maternal history of TS, complete evaluation of mother including genetic evaluation should be done.

.

A case of immune mediated fetal heart block

Dr Mamta Bansal, Dr Gunjan Jindal

DMRD, Attending consultant, Department of Radiodiagnosis,Hero DMC Heart Institute, Ludhiana

•**INTRODUCTION**-

•Complete heart block is the dissociation of atrial and ventricular contractions. It occurs in approximately 1 in 20000 live births. It can be associated with a structural heart disease or can be due to transplacental transfer of maternal autoantibodies in case of autoimmune process.

•**CASE REPORT**-

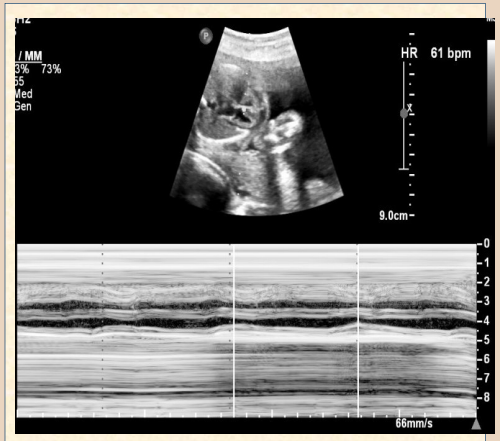
We present a case of immune mediated fetal heart block in a structurally normal heart. The patient was referred to us for fetal echocardiography at 25 weeks of gestation as bradycardia was detected on routine antenatal scan. On echocardiography, ventricular rate was 61 beats/min with complete dissociation of atrial and ventricular rates.

.

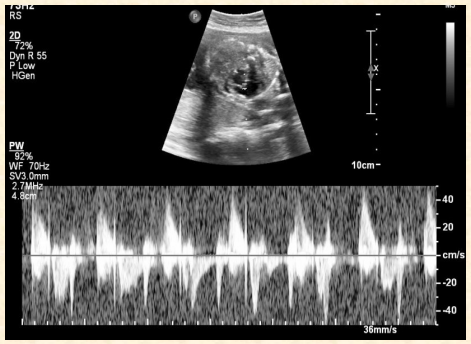
•Also, minimal pericardial effusion (3.4mm) was detected. Mother was anaemic and was a diagnosed case of autoimmune hepatitis. A diagnosis of complete heart block was made.

•**DISCUSSION**-

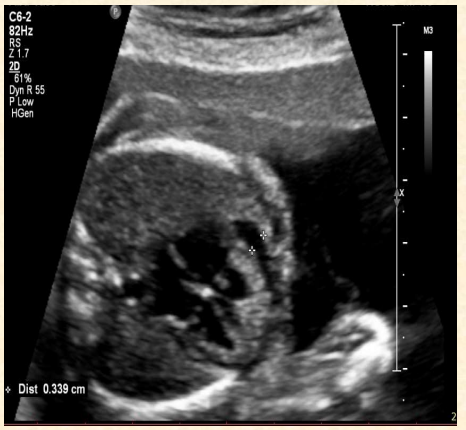
Congenital heart block can occur in structurally abnormal heart or in a structurally normal heart. Immune mediated complete heart block most commonly occurs in a structurally normal heart, although functional abnormalities can coexist. It occurs due to transplacental transfer of autoantibodies (anti-Ro/SSA and/or anti- LA/SSB). This results in inflammation in myocardium with resultant fibrosis. Once this immune reaction has occurred, disease is non reversible. On Ultrasonography, the atrial impulses are not transmitted to the ventricles. The ventricular rate is slower than usual (40-70 bpm). There can be subsequent development of pericardial effusion and fetal hydrops which further worsens the prognosis.



Ventricular rate was 61 bpm



Complete dissociation of atrial and ventricular rates



Small amount of pericardial effusion seen.

CONCLUSION- All women at risk with antibodies present, should be closely followed during the pregnancy with serial echocardiograms, specifically looking for the earliest signs of conduction system disease as complete heart block is associated with high morbidity and mortality.

Prenatal Diagnosis Of Anomalous Origin Of Left Pulmonary Artery-hemitruncus Arteriosus

-Dr. Mrunalini Rao, MBBS, DMRD, MD (Radiology) NIMS

Introduction

The anomalous origin of a branch pulmonary artery from aorta is an extremely rare cardiac vascular abnormality with only limited literature. We report a case diagnosed at 24weeks of gestational age.

Materials and method

25 year old primi gravida was referred for second trimester anomaly scan at 24 weeks. Family history was negative for congenital cardiac malformations. The scan was done using Samsung Ws 80 machine

Discussion

HEMITRUNCUS ARTERIOSUS is an uncommon congenital cardiovascular anomaly which refers to the abnormal originating of one branch of pulmonary artery from the aorta with the other branch arising normally from the right ventricle. This condition was first described by Fraentzel, 1868. In most patients, the right pulmonary artery originates from the ascending aorta next to aortic valve. In some patients, the left pulmonary artery originates from the ascending aorta, which is usually associated with the right aortic arch. If left unattended the pulmonary bed is vulnerable to early on set of pulmonary vascular obstructive disease. The surgical repair should be done within first 6 months.

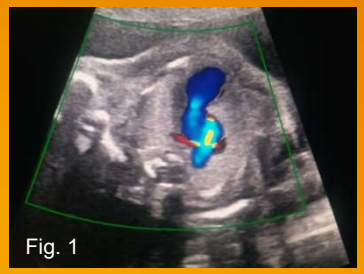


Fig. 1

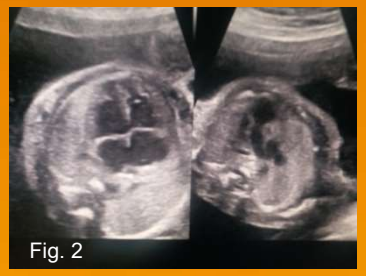


Fig. 2

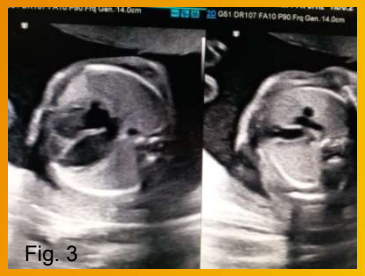


Fig. 3

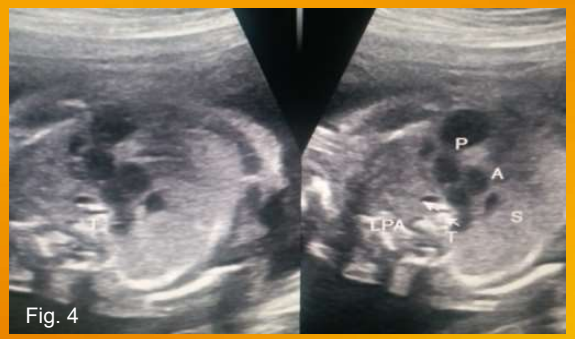
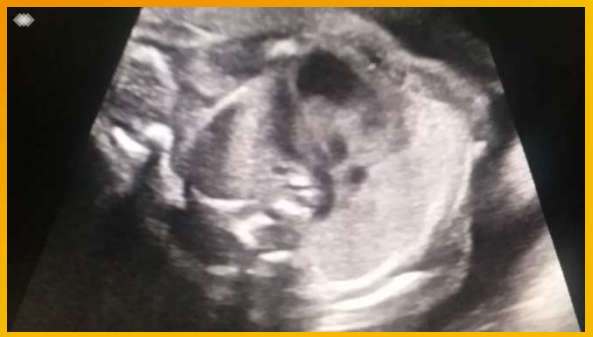


Fig. 4



Results

On songraphic examination, the heart had a normal cardiac axis with situs solitus, concordant atrio ventricular and ventriculo atrial connections. Three vessel view showed a right sided aortic arch with a right ductus arteriosus in a “V” shape configuration to right side of trachea(Fig.2 &3). The main pulmonary artery (PA) is continuous with right pulmonary artery The left pulmonary artery arose anomalously from the ascending aorta(Fig.1)

Conclusion

AOPA is an extremely rare cardiac anomaly. The key characteristics as follows.

1)The main PA continuous with one PA and there is no confluence with other

2)The anomalous PA arising from the ascending aorta is usually present in three vessel/3VT view.

Surgical management in early life results in an excellent hemodynamic and anatomic results &improved outcomes in these cases. Therefore ,early diagnosis in fetal period is essential

Title:The Less Trodden Path Of Left Brachiocephalic Vein – A Case Report.

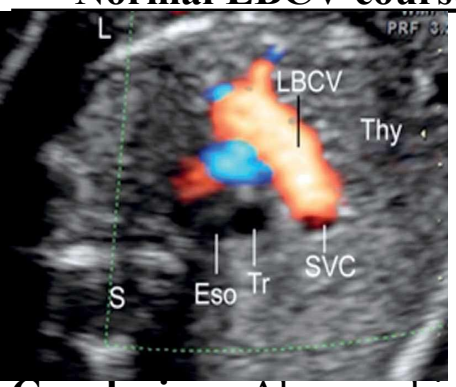
Author: Dr Rajani. G. M. (Consultant Radiologist VDC Hyderabad)

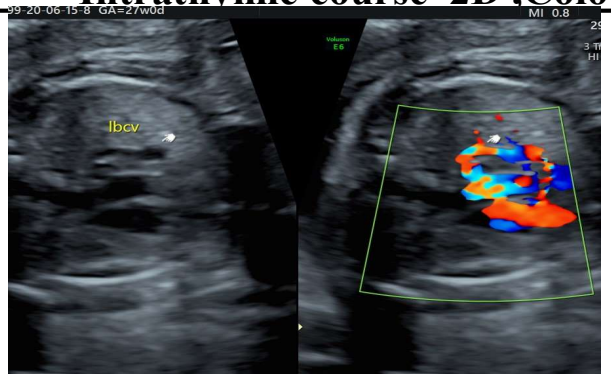
Background : The LBCV is not assessed routinely in fetal scan. This case emphasis study of abnormal course of LBCV and its importance.

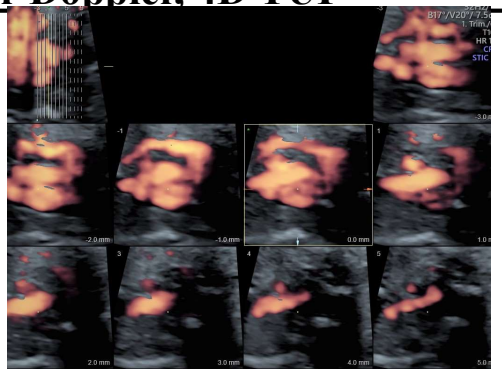
Methods: LBCV was assessed using 2D, Colour Doppler and STIC.

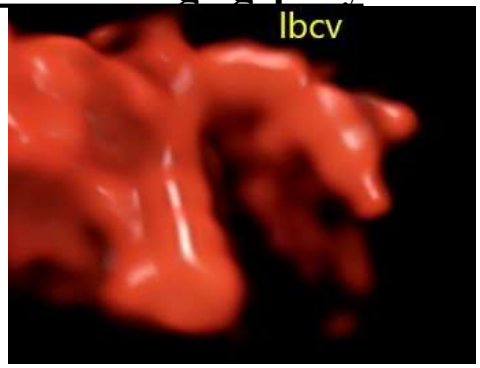
Results: Scan of LBCV was done at the level of its drainage into SVC in transverse view. Abnormal curved course through Thymus seen instead of coursing straight posterior to thymus. It was not associated with any cardiac/ extra cardiac anomalies.

Normal LBCV course **Intrathymic course 2D ,Colour Doppler, 4D TUI** **STIC Angiogrpahy**









Conclusion: Abnormal intrathymic course of LBCV is very rare, but it is usually not associated with other anomalies. Whereas sub aortic course (ASLBV) is associated with cardiac anomalies. Other deviants of LBCV are absent LBCV, dilated LBCV in TPAVR and Hyper perfusion anomalies like Aneurysm of Vein Galen/ AVMs.

The knowledge of LBCV and its course helps in further management and proper counselling of parents.

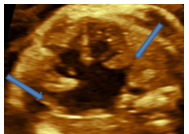
LEFT ATRIAL ISOMERISM WITH COMPLETE AND BALANCED AVSD – A RARE CASE OF COMPLEX CHD

Dr Samarendra Mahapatra (MS, O & G)

Consultant -Saifae scan, saintala, Odisha- India

Background :

- Left atrial isomerism (LAI) is characterized by a rather **symmetric arrangement** of otherwise asymmetric thoraco-abdominal structures , with the presence of **double left sided structures** & under development or absence of right sided structures [(1)].
- A **wide spectrum** of **cardiac and noncardiac defects** are associated in most cases of LAI, including Interrupted IVC in > 70%, Common atrium/ASD in 80%, AVSD, Dextrocardia, Bilateral SVC in 40%, LVOT obstruction, Conotruncal abnormalities in 15-30%, PAPVR, Single ventricle, polysplenia, biliary atresia, bowel malrotation, primary ciliary dyskinesia etc.[(2)]
- Most cases are **sporadic** in nature.
- Isomerism (including RAI and LAI) is clinically and genetically **heterogeneous,** and found in between 2.2% and 4.2% of infants with CHD [(1)].
- LAI is a rare condition occurs in approximately **1 per 10 000–40 000** live births. [(3)] In fetal series LAI is **more common** than RAI.
- The Natural disease history & prognosis depends on type and severity of associated cardiac and extra-cardiac malformation.[(5)]
- The worst prognostic indicator is association of complete heart block with AVSD.
- **Early embryonic life insult** between days 28-35 resulting in midline developmental field defect or laterality sequence and arrest in sequence of cardiac development in 5th-week has been suggested as etiology.[(2)]
- The complete prenatal diagnosis is often **challenging** due the complex cardiac malformation and usually made by fetal Echo, with use of 3D & 4D USG as a advanced tool
- However, about 3%–18% of LAI cases demonstrated **normal cardiac anatomy**.[(4)]



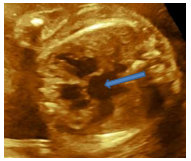


Figure 1: 4-CV in Diastole showing large AVSD with apex pointing to left , both atria are of morphologically left atrium with LAA (left atrial appendage) (blue Arrow)

Figure 2: 4-CV in Systole - showing common AV valve is closed appearing a linear line across, doming towards ventricles .

Case :

- A 22-year-old healthy primigravida visited at 26 weeks of gestation to our clinic for routine checkup. Medical & family history were unremarkable, no consanguinity.
- Routine 2nd trimester USG examination - revealed a 26 week 05 day old fetus with fetal biometry **consistent with LMP.**
- Fetal Cardiac examination revealed a large AVSD in 4 chamber view- **(*Crux defect*)** – combination of ASD (I) , deficient atrioventricular septum and a contiguous large inlet VSD with an abnormal common dysplastic AV valve, during diastole (Figure 1).
- In systole - Common AV valve is closed appearing a linear line across, **doming** towards the ventricles (Figure 2).
- Globular heart , **cardiac apex pointing to left** & normal cardiac axis.
- **Cardiomegaly** (*CT ratio – 0.8*) heart extending lateral thoracic wall to wall & thickened myocardium seen (Figure 3). Systolic Regurgitation seen.(figure – 8)
- "*Double vessel" sign* seen in the area behind the heart in 4 CV. No significant ventricular disproportion was seen ***(balanced AVSD)*** (Figure 1).
- Both atria were -morphologically left atrium with **LAA (** left atrial appendage) (Fig-1)
- M-mode - **ventricular bradyarrythmia** (Figure 4) with heart rate ranging from 52 to 74 beats / minute **(*Complete Heart Block*)** with regular atrial rhythm.
- AC plane- showed **stomach on left side** with interruption of intrahepatic portion of IVC and ***"Double vessel sign"*** (Figure 5).
- Ventricular outflow tracts showed ventriculoarterial **concordance.** On 3 VT view **slight dilated** pulmonary artery in comparison to aorta seen, with SVC on right (Figure 6).
- Longitudinal view of aortic arch was normal (Figure 7).
- **Coronal plane** of the chest and abdomen showing - azygos vein running parallel & posterior to descending aorta (Ao) (Figure 9).
- **LAI with complete AVSD and complete Heart Block** was considered with the present findings. Extra cardiac malformation- single umbilical artery and agenesis of right kidney.
- The family was informed and Prognosis was explained. The family preferred for continuation & a baby was born at 37 weeks vaginally.
- Diagnosis confirmed after birth. The infant died in neonatal ICU on 2nd day of birth.

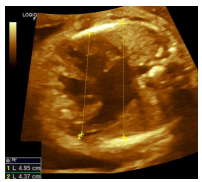


Figure 3: Cardiomegaly (*CT ratio – 0.8*) & thickened myocardium .

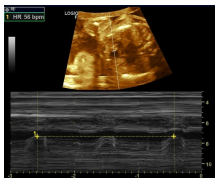


Figure 4: M-mode shows ventricular brady-cardia (HR- 56 beats per minute)

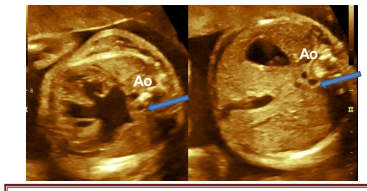


Figure 5 : A. 4-CV - showing heart extending lateral thoracic wall to wall - Cardiomegaly & thickened myocardium . B. Axial plane of upper abdomen showed stomach on left side with interruption of intrahepatic portion of IVC and Dilated azygos vein **(blue arrow)** running parallel and slightly posterior to aorta (Ao) in front of spine *"Double vessel sign"*

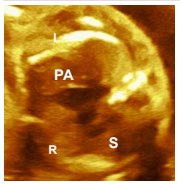


Figure 6: 3 VT view - showing slight dilatated pulmonary artery in comparison to the aorta, with normal arrangement & alignment of Aorta, Pulmonary artery &SVC.

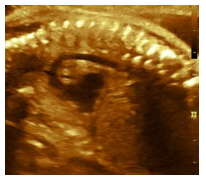


Figure 7: Longitudinal view of the aortic arch.

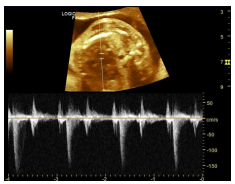


Figure 8: PW Doppler- shows Regurgitation during systole at Common AV Valve

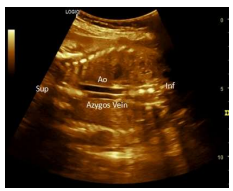


Figure 9: Coronal plane of the chest and abdomen showing the azygos vein running parallel and posterior to the decending aorta(Ao)

Result :

.1. Double vessel sign – in both AC Plane & 4 CV.

2. Both stomach and cardiac apex to the left side of fetus in this case, in contrast to Viscero-cardiac heterotaxy generally associated with LAI (54 %), [(5)]
3. This case presented with balanced AVSD, in contrary to Unbalanced AVSD typically found in association with heterotaxy syndrome. [(6)]
4. Ventriculo-arterial concordance with Normal Great artery crossover
5. Normal arrangement & alignment of vessels in 3VV.
6. Slight dilated Pulmonary artery - might be due to preferential blood flow into PA or mild pulmonary stenosis in early phase.

Conclusion :

- LAI is a **rare** syndrome with **multisystem** abnormalities with **complex** presentation making prenatal diagnosis challenging.
- However, with **sequential segmental analysis** during fetal echocardiography with careful evaluation of **vessel arrangement** in the upper abdomen and analysis of atrial morphology focusing on **appendages**, will enhance accurate prenatal diagnosis.
- **Timely consultation** to family help in making informed choices regarding pregnancy continuation and preparation for a complicated postnatal phase.
- LAI associated with congenital heart block that results in hydrops, leads to intrauterine demise and early neonatal mortality.
- In presence of complex cardiac defect with extra-cardiac malformations of varing severity, delivery at equipped tertiary health care center with intensive pediatric cardiac **intervention** during postnatal life is mandatory to improve the neonatal outcome.

References:

1. Alfred Abuhamad, Rabih Chaoui. Fetal Heterotaxy with Left and Right Atrial Isomerism- *A practical guide to Fetal Echocardiography- 3rd Edition, Wolters Kluwer, 485-500.*
2. Woodward, Kennedy, Sohaey, Bryne, Oh, Puchalski. *Diagnostic Imaging Obstetrics 3rd Edition, Amirsys Elsevier,380-382.*
3. Lambert T, Kuller J, Small M, Rhee E, Barker P: *Abnormalities of fetal situs: an overview and literature review. Obstet Gynecol Surv* 2016;71(1):33–38.
4. Berg C, Geipel A, Kohl T, et al. *Fetal echocardiographic evaluation of atrial morphology and the prediction of laterality in cases of heterotaxy syndromes.* Ultrasound Obstet Gynecol 2005; 26: 538–45.
5. Dario Paladini, Paolo Volpe. Heterotaxy syndromes, *Ultrasound of congenital fetal anomalies- Differential Diagnosis and Prognostic Indicators; 2nd Edition,* 214-218.
6. Alfred Abuhamad, Rabih Chaoui. Atriventricular Septal Defect- *A practical guide to Fetal Echocardiography- 3rd Edition, Wolters Kluwer,* 269-278.

Abbreviation: AVSD- Atrioventricular septal defect, AV Valve - Atrioventricular Valve, CHD- Congenital Heart disease, CT Ratio- Cardio-thoracic Ratio, LAA- Left Atrial appendages, LAI – Left Atrial Isomerism, PAPVR-Partial anomalous pulmonary venous return, RAI-Right Atrial isomerism.

"GO WITH THE RHYTHM"- FETAL ECHOCARDIOGRAPHY IN EVALUATION AND MANAGEMENT OF RHYTHM ABNORMALITIES

Suman T P, Purvi Agrawal, Ashwini A, Varun A Thakur, Aveen, Adinarayana Makam
Adi Advanced Centre for Fetal Care, Bengaluru

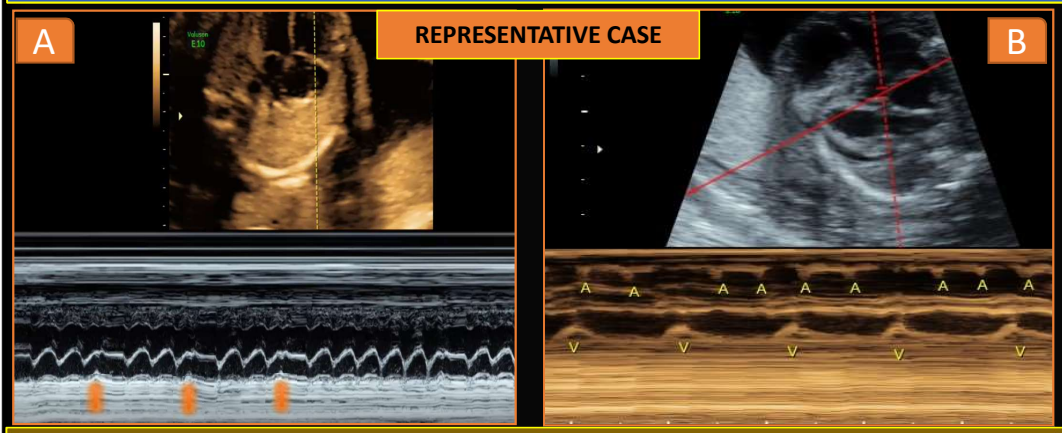
INTRODUCTION

- The atrioventricular synchrony and myocardial contraction begins at 3-6 weeks. Fetal rhythm abnormalities occur in up to 2% of pregnancies.[1] Fetal arrhythmias may lead to fetal cardiac failure, hydrops and death.
- In our study vast majority had isolated premature atrial contractions which spontaneously resolved. Prenatal diagnosis with timely management is critical. This educational exhibit is targeted to fetal medicine trainees with review of fetal rhythm abnormalities, its evaluation and management.

STUDY

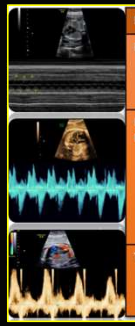
- We retro-prospectively evaluated 50 cases of fetal cardiac rhythm abnormalities from 2014 to 2020 and encountered following cases of rhythm abnormalities with their follow up and management:
- Bradyarrhythmia (<100bpm)/ Tachyarrhythmia(>180bpm); Atrial - Heart block, Premature atrial contractions(PAC), SVT, Flutter; Ventricular – Fibrillation, PVC.
- We assessed rhythm abnormalities using M-mode, Pulsed doppler and Tissue doppler as described. Rate, morphology and chronology of atrial and ventricular electrical events along with PR interval were documented. PR interval was assessed between start of A wave and start of V wave (normal <150ms).
- Most of the cases were PAC, Bradyarrhythmia's and heart blocks. Most of the cases had benign outcome with /without medical management. One case had associated cardiac anomaly with poor outcome.

REPRESENTATIVE CASE



A - M Mode demonstrating blocked PAC's (orange Arrows), monitored twice weekly with good outcome,
B - M Mode demonstrating 2:1 heart block with bradyarrhythmia as depicted, treated with steroids with favorable outcome.

ASSESSMENT OF RHYTHM

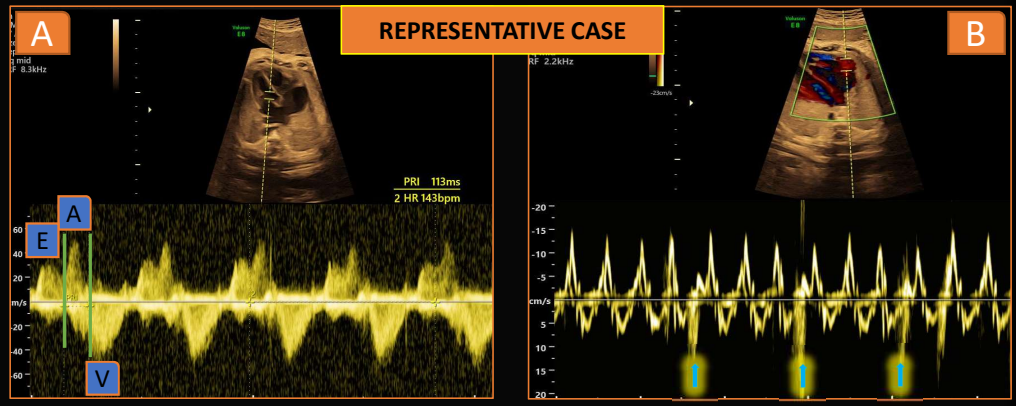


Modalities	Technique	Advantages	Disadvantages
Fetal M-Mode	Align the M-mode Cursor simultaneously through the atrial and ventricular walls	High temporal relationship between atrial and ventricular contractions	Mechanical events are not well-defined, therefore, not possible to achieve precise measurements of time intervals.
Pulsed Wave Doppler	Simultaneous recording of the: 1. Superior vena cava and the ascending aorta 2. Mitral valve inflow and outflow 3. Pulmonary vein-branch pulmonary artery 4. Renal artery and vein	Mechanical events are better delineated PR interval can be assessed	Needs expertise and accurate placement oif cursor
Tissue Doppler	Measures myocardial velocity	Motion of the atriums and ventricles can be assessed PR interval can be assessed	Needs post processing

CONCLUSION

Fetal echocardiography utilizing various doppler techniques and assessing mechanical PR interval is essential for characterization of arrhythmias, their management and risk assessment for better outcomes. Isolated arrhythmias usually have better outcomes when compared to those with associated cardiac anomalies.

REPRESENTATIVE CASE



35 weeks primigravida with history of SLE, A - PW at mitral valve and outflow, PR interval of 113ms (green lines), B- Tissue doppler demonstrating conducted PAC of <4 to 5 per minute (blue arrows). Patient was managed conservatively with close monitoring and had good outcome.

References: Srinivasan S, Strasburger J.. Bravo-Valenzuela NJ, Rocha LA. Fetal cardiac arrhythmias: Current evidence [Ann Pediatr Cardiol. 2018;11(2):148-163. 2. Overview of fetal arrhythmias. Curr Opin Pediatr. 2008;20(5):522-531

A Case Report Of Cardiac Rhabdomyoma With Cortical Tubers

AUTHORS: DR. KULBHUSHAN VISHNOI, DR. VARUN THAKUR, DR. VARUN SOOD, DR. ADINARAYAN MAKAM

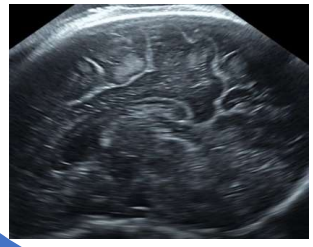
INSTITUTION: ADI ADVANCED CENTRE FOR FETAL CARE, BENGALURU

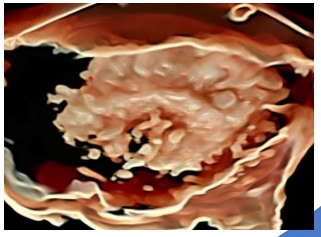
INTRODUCTION

•Cardiac rhabdomyomas are usually benign with an incidence of 1.4 : 1000 [1],and may involve both ventricles and ventricular septum. They are usually isolated, with no chromosomal association except tuberous sclerosis, which show a very high association (75% to 90%)[2]

Discussion

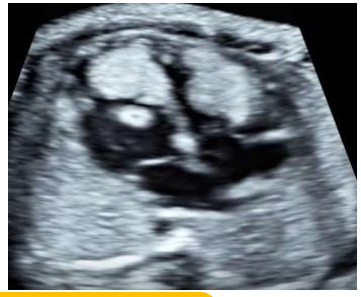
•Prenatally, cardiac tumors are usually detected in the third trimester. They are typically multiple homogeneous and hyperechoic masses within the myocardium or chordae tendineae[1].Most keep on growing during pregnancy without hemodynamic consequences. Tuberous sclerosis is a rare multisystemic neuroectodermal condition which requires genetic testing to identify a known pathogenic mutation in either *TSC1 or TSC2*.

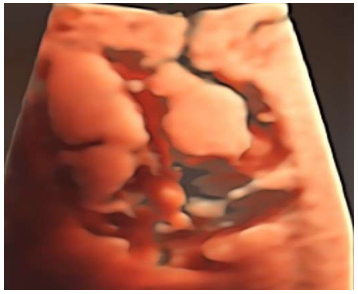




CASE REPORT:

•26yr primi gravida came to our Centre for third trimester screening at 33wks with normal anomaly scan. On USG we found multiple rhabdomyoma of varying sizes in both ventricles and multiple varying sizes iso-hyperechoic cortical tubers on neurosonogram.





CONCLUSION:

- Rhabdomyomas tend to regress in early childhood, whereas cerebral lesions tend to progressively increase in size and number over time.
- Presence of multiple rhabdomyomas suggests tuberous sclerosis
- Strict follow-up is warranted to look for outflow tract obstruction and arrhythmias.

REFERENCES:
Paladini D, Palmieri S, Russo MG, et al. Cardiac multiple rhabdomyomatosis:prenatal diagnosis and natural history. *Ultrasound Obstet Gynecol.*1996;7:84-85.
Isaacs H. Perinatal (fetal and neonatal) tuberous sclerosis: a review. *Am J Perinatol. 2009;26:755-760*