Center For Advanced Fetal Care Newsletter

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INSIDE THIS ISSUE

Matters of the Heart...

It all starts with a heartbeat. We ascertain fetal viability at seeing that heartbeat: the undeniable signal of life. That tiny being's heart carries the essence of life and embodies life's inherent complexity...That tiny heart is the most difficult organ to image, the most susceptible organ to congenital malformations, and the most likely to impact fetal and neonatal growth and survival. Even today, with the rapidly evolving sophisticated sonographic machinery that we have, it remains our ultimate challenge to go beyond just seeing that first heartbeat in order to improve our prenatal diagnoses of congenital heart defects. And for all those matters of the heart, we dedicate our 1st anniversary issue to "matters of the heart". We bring to you the latest in fetal cardiovascular adaptation to placental insufficiency. We share with you practical guidelines and pearls to aid those interested in incorporating fetal echocardiograpghy into their routine scans, using the most recent guidelines of the American Institute of Ultrasound in Medicine. We present to you the futuristic e-book on 4D Fetal Echocardiography available globally for free download. We introduce to you Lebanon's own "Heartbeat", a humanitarian organization and member of the worldwide "Chain of Hope", whose mission is making the unaffordable, cardiac surgical and medical interventions, a reality to our affected children in needy families. We present to you a unique cardiac case prenatally diagnosed and treated, in addition to our quarterly announcements. With this, we aspire to shed the light on this most urgent matter of the heart and to stress the importance of our role as sonograpghers in learning the basics and adhering to the guidelines in order to properly recognize those affected hearts so that we may be able to refer them to cardiac specialists and to get them in the right "chain of hope" in order to maximize their chances for a healthy life with strongly beating hearts... In all those "matters of the heart", it all starts with a heartbeat...

Fetal Cardiovascular Adaptation to Placental Insufficiency
By Khalil Abi-Nader, MD

Placental insufficiency (PIF) presents unique challenges to the fetal cardiovascular (CV) system. In face of scarce blood flow, the fetus redistributes its cardiac output in favour of essential organs (Jensen 1991). Redistribution, which is the hallmark of cardiovascular adaptation in PIF-related fetal growth restriction (FGR), can be clinically measured as well as the events that precede and follow it. In this way, the longitudinal progression of FGR can be defined (Baschat 2001, Turan 2008) and used to optimize the timing of delivery. PIF can be predicted with a good sensitivity using uterine artery (UtA) Doppler (Cnossen 2008). As FGR becomes biometrically established, an increase in umbilical artery (UA) Doppler resistance is usually evident. It is important to stress that this discussion involves severe FGR occurring at <33-34 weeks GA since, late FGR does not usually involve significant uteroplacental Doppler abnormalities (Todros 1999) and requires a modified follow-up strategy (Hershkovitz 2000). Although major studies have assessed UA Doppler in relation with neonatal outcome (GRIT 2004), physiology dictates that placental resistance is not but an expression of the afterload faced by the fetal heart. Some fetuses are able to compensate better than others and thus, measures of CV adaptation are more reflective of fetal health. Under these circumstances the fetus starts to redistribute its blood flow, most notably towards the brain, and the cerebroplacental resistance ratio decreases. This is accomplished through central and peripheral baro- and chemo-reflexes (Hanson 1988), ventricular remodelling (Tsyvian 2002), enhancement of the right to left cardiac shunt, and a lower limb vasoconstrictive reflex (Akalin -Sel and Campbell 1992). Thus, diastolic dysfunction secondary to ventricular remodelling is evident relatively early. Frank brain sparing occurs as the middle cerebral artery resistance falls below normal, at a median of 4 weeks after the onset of early FGR (Turan 2008). The fetal CV system has now reached its maximum compensatory ability but will withstand the next 1-2 weeks (Arduini 1992). As the few days before final deterioration approach, fetal ventricular systolic dysfunction sets in (Rizzo 1995) resulting in congestive heart failure which manifests as an increase in the resistance of the ductus venosus (DV). The DV flow becomes abnormal around 48 hours prior to the onset of an abnormal biophysical profile (BPP), spontaneous decelerations and fetal death (Baschat 2001). Fetuses with brain sparing have a significant degree of hypoxemia but are not acidemic until an abnormal DV flow appears (Baschat 2007). Importantly, the neonatal outcomes of fetuses with compensated brain sparing are excellent compared to those fetuses with an abnormal DV Doppler (Baschat 2000). The question then is: what is the optimal time to deliver? At less than 32 weeks GA and in the presence of established brain sparing, DV Doppler assessment would be the most useful guide to deliver a healthy baby while safely prolonging gestation. At 32-34 weeks GA, the onset of frank brain sparing would be enough in my opinion to justify delivery notwithstanding the risks associated with close fetal cardiac decompensation. Of course, the estimated weight of the fetus and the available neonatal care remain important in such decision making (Garite 2004, Baschat 2007). RCTs based on fetal cardiovascular parameters will be of much help in providing an ultimate answer.

Practical Guidelines to Assist in Performing a Second Trimester Fetal Echocardiographic Exam

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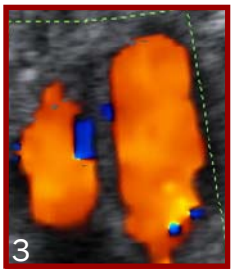
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Introduction

Congenital heart disease (CHD) continues to be the most common congenital malformation with an incidence of 8.8/1000 (Hoffman 1978). Though there are well known fetal and maternal risk factors, 90% of those with CHD are in those without any risk factors (Allan 1995). For this reason, we must screen the general population. Inspite of all the technological advances available today, our detection rates are suboptimal with a recent study showing 28% prenatal detection in a population where 99% where scanned prenatally (Freidberg 2009). Our challenge is to improve our detection rates in order to improve the outcomes of those neonates by being prepared, delivering at tertiary care centers equipped for handling these infants, not to mention preparing the families and minimizing the psychological trauma of the undiagnosed cardiac malformation.

Current Recommendations

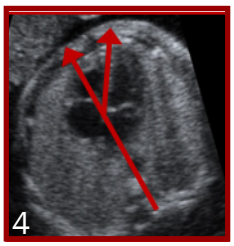
Throughout the years, guidelines are constantly under revision as technology advances and enables better visualization of different structures within the fetal heart. The most recent comprehensive guidelines were issued by a task force of the American Institute of Ultrasound in Medicine (AIUM) under the direction of Professor Wesley Lee (AIUM Practice Guidelines-Fetal Echocardiography, J Ultrasound Med 2011 30: 127-136). These guidelines call for a segmental approach of 3 basic areas including atria (LA and RA), ventricles (LV and RV), great arteries (Ao and PA) and their connections. Using grey scale, check for the 4 chamber view, outflow tracts: aorta and pulmonary artery, 3 vessel view (3VV), aortic and ductal arches as well as superior and inferior venae cavae (SVC and IVC). Use of Doppler is recommended in case of a suspected anomaly. M-Mode is recommended for rate or rhythm abnormalities. Cardiac biometry is recommended in the presence of structural abnormalities. Other modalities such as 3D, 4D, speckle–tracking modalities may be used for more advanced parameters and measurements of myocardial performance.

Anatomical Landmarks and Pearls

- RV is most anterior, below the sternum (1)
- LV forms the apex of the heart (1,4,5)
- LA is closest to the spine (1)
- LA is the most central structure in the chest (1)
- Ao is just anterior to the spine and to the left (1)
- Thymus is bright anterior to 3VV (2)
- Use Doppler to check intactness of IV septum (3)
- Cardiac axis should be <45 degrees (4)
- IV septum is 1/3 membranous (red) (5)
- IV septum is 2/3 muscular (white) (5)
- Mitral valve is more apical than the tricuspid (4)
- Moderator Band is the thickened area in RV (1,5)
- LA and Ao occupy center of the chest (1)
- Aorta points to right shoulder as it exits (6)
- Aorta heads posteriorly towards the spine (6)
- Ascertain intact continuous medial wall of LVOT (6)
- PA points to the left shoulder as it exits (7)
- Outflow tracts cross over (superimpose 6,7)
- Post bifurcating, PA continues as ductus arteriosus
- PA is more anterior than the LVOT (2)
- Post PA bifurcation, Ao almost parallel to PA
- Ductal and aortic arches form 'V' as they merge (8)
- Tip of the 'V' is the descending aorta (DA) (8)
- Aortic arch appears like a cane sagittally (9-11)
- Ductal arch appears like hockey stick sagittally (12)
- Sagittal SVC & IVC into RA appear like a seagull (13)

Practical Tips

Learn the anatomy and the landmarks. Start by optimizing your machine settings with the help of an application specialist. At the beginning, select patients with a low BMI and a supine fetus at 20 to 24 weeks. Practice obtaining the 4 chamber view, outflow tracts and 3VV. Primary focus should be to recognize the normals which will aid in identifying an abnormal. Your goal should not be a final diagnosis, rather identification of an abnormality and referring to a specialist to help plan antenatal, peripartum and postnatal care. Patience, a ready mind and practice make perfect!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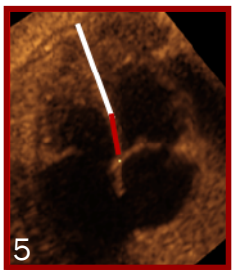
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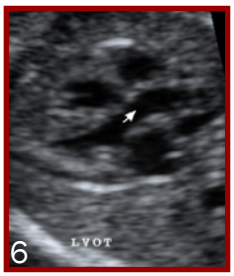

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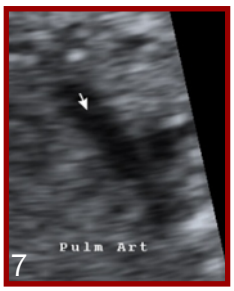

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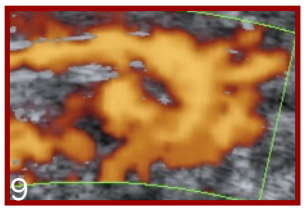
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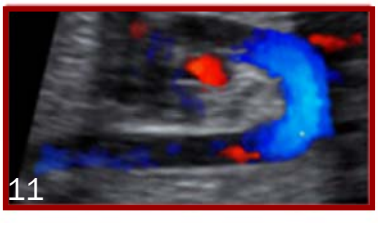
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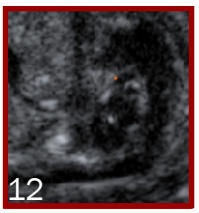
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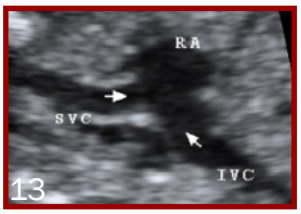

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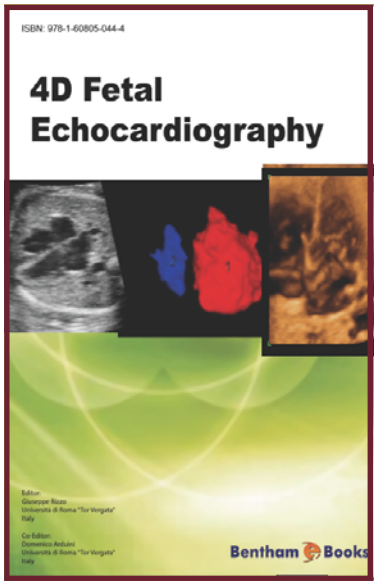
CFAFC's Literary Recommendation
4D Fetal Echocardiography (Available for free online download)



Editors: Guiseppe Rizzo & Domenico Arduini.

Publisher: Bentham Science Publishers LTD. 1st Edition, 18 Chapters, 202 pages.

eISBN:978-1-60805-044-4

Available for free download at: http:www.bentham.org/ebooks/9781608050444/index.htm

An innovative futuristic approach (e-book) to a comprehensive textbook on the use of 4D sonography in the evaluation of the fetal heart. This e-book is written by world experts on the field such as Abuhamad, Arduini, Chaoui, DeVore, Espinoza, Lee and Rizzo among many others and reviewed by Professor Benacerraf. It addresses the use of 4D sonography, in all its aspects, in the evaluation of the fetal heart. Concise, well illustrated and easy to carry on all of our USB's anywhere we go, it is available as a free download to all! CFAFC would highly recommend this textbook to all those using volume sonography irrespective of their level of expertise. The text is methodical and thorough allowing one to improve on his techniques and to maximize the use of his machine's volume sonographic capabilities...

THIS AND THAT

Introducing Lebanon's "Heartbeat"

It is with much pride that we introduce you to Lebanon's very own "Heartbeat" on its 6th Anniversary. "Heartbeat", a not-for-profit organization, is the brainchild of an astute group of cardiothoracic surgeons and physicians at Hotel Dieu de France in Beirut.

"Heartbeat" was born in 2005 and is a member of the worldwide "La Chaine de L'Espoire" (Chain of Hope) . In the past 6 years, Heartbeat" has been actively fulfilling its mission of providing financial assistance to needy families with children born with congenital heart disease. In addition to being highly skilled surgeons and humane physicians, its founders are also gifted musicians in charge of planning and performing in Heartbeat's yearly concerts that are held as fundraisers for the organization.

In Lebanon, it is estimated that there are approximately 600 children born with congenital heart disease each year. Over the past 6 years, Heartbeat, with its 50 dedicated volunteering members, has helped treat over 650 children with heart disease. Its main two sources of funding are donations as well as the annual fundraising concert, planned to be held in May of this year.

For more information e-mail: heartbeat@idm.net.lb

For your donations :
HEARTBEAT
Bank Audi
Account in LBP 325179/01
Account in USD 325179/02

FMF Abstract Submission

The 10th World Congress of the Fetal Medicine Foundation is planned to be held in Malta June 26-30, 2011. Abstract submission is now open to all those who are interested in participating in one of the most intensive and comprehensive courses in fetal medicine. More information at: www.fetalmedicine.com.

The First World Congress on Ultrasound In Medical Education

With the ever evolving role of ultrasound further enhanced by the portable technology that is available in the fields, as well as at the bedside, the uses for ultrasound, clinically and educationally, are on the rise. Today, ultrasound is playing a major role in medical education through facilitating the understanding of human anatomy and physiology . As a consequence, the First World Congress on Ultrasound in Medical Education is being held on April 29 - May 1, in Columbia, South Carolina. For those interested, abstract submission is now open till Feb 15, 2011 at www.wcume.org.

ISUOG Abstract Submission

The 21st World Congress of the ISUOG is to be held in Los Angeles, California, September 16-20. Abstract submission in now open through March 18, 2011 at: www.isuog.org.

Fetal Echocardiography

Fetal echocardiography remains a major challenge for the sonographer, but a must have skill to improve our prenatal diagnostic rates, minimize fetal acidosis at birth, and improve neonatal outcome. And in keeping with its noble educational mission, the Fetal Medicine Foundation has a free web-based course given by Professor Lindsey Allen with a post test available at:
http://www.fetalmedicine.com/fmf/online-education/04-fetal-echocardiography/.

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CFAFC would like to thank Drs. Khalil Abi-Nader, Issam El-Rassi and Guiseppe Rizzo for their contributions to this issue.

www.cfafc.org

As CFAFC celebrates its First Anniversary on February 24, 2011, CFAFC would like to thank our referring physicians for their support, and the 1016 global visitors from 72 countries who accessed our website for their interest in our "matters of the heart"...

Prenatal Therapy for a Cardiac Diverticulum Complicated by a Massive Pericardial Effusion

Adapted from: Abi-Nader K et al. Fetal Diagn Ther 2009; 25: 148–152. (S. Karger AG, Basel, Switzerland)

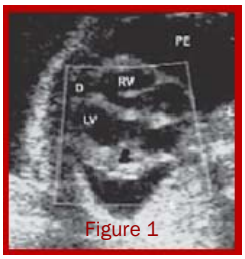

Figure 1


Figure 2

Congenital ventricular cardiac diverticula are rare and may be developmental, or secondary to an in utero insult. They are often associated with a pericardial effusion which, if large enough, can compromise fetal circulation and lung development. A literature review shows that in isolated non-hydropic cases diagnosed in the first trimester, the associated effusion often regresses spontaneously. Cases that persist into the second trimester carry a higher risk of hemodynamic deterioration and possibly, lung hypoplasia. We present a case referred at 21 weeks of gestation with a 5x5mm right apical ventricular diverticulum (Figure 1) in which bidirectional blood flow was evident on color Doppler (Figure 2). Fetal cardiac function studies showed diastolic dysfunction. The lungs were significantly compressed by the massive pericardial effusion (Figure 1). The parents were counseled and ultrasound-guided fetal pericardiocentesis was performed at mid-gestation. Ten mls of yellow fluid were retrieved, and the lungs expanded immediately. TORCH studies were negative and the karyotype was normal. A healthy fetus was delivered at term, post-natal growth was normal and the diverticulum could not be identified on echocardiography at the age of one year.

Images published with permission:
S. Karger AG, Basel, Switzerland.

Upcoming Congresses

COURSE TITLE	DATES	LOCATION	WEBSITE ADDRESS
34rd Annual Advanced Ultrasound Seminar	Feb 16-19, 2011	Orlando, Fl, USA	www.wfubmc.edu/ultrasound/
7th International Scientific Meeting of ISUOG	Feb 25-27, 2011	Macau, China	www.isuogmacau2011.com/
Advances in Obstetrical Management 2011	March 4-6, 2011	Fort Lauderdale, Fl, USA	www.smfm.org/Courses%20Page.cfm?ht=me
7th International Symposium on Diabetes and Pregnancy	March 24-26, 2011	Salzburg, Austria	www.kenes.com/dip2011/
Doppler Ultrasound in Clinical Obstetrics	April 1-2, 2011	London, UK	www.isuog.org
Effective Prenatal Screening of Congenital Heart Disease	April 7-9, 2011	London, UK	E-Mail: c.lim@rbht.nhs.uk
Annual Convention of the American Institute of Ultrasound in Medicine	April 14-17, 2011	New York, USA	ww.aium.org/cme/events/ann2011/ann2011.aspx
First World Congress on Ultrasound in Medical Education	April 30-May 1, 2011	Columbia, SC, USA	www.wcume.org/
The Fetus As A Patient Meeting	May 26-28, 2011	Taormina, Italy	www.fetusasapatient2011.org/
Advances in 3D/4D Ultrasound	June 3-5, 2011	Cleveland, Ohio, USA	www.iame.com/conferences/td9/
Perinatal Medicine 2011	June 15-17, 2011	Harrogate, UK	www.perinatalmedicine2011.ukevents.org
10th World Congress in Fetal Medicine	June 26-30, 2011	Portomaso, Malta	www.fetalmedicine.oom