



EDITORIAL

We are glad to present the August newsletter! We had a month of celebrations of IAP BLS-CPR Day, ORS Day and Breast-Feeding Week, very well participated by most of the centers. We extend our heartfelt gratitude and thanks to every member for their invaluable contribution.

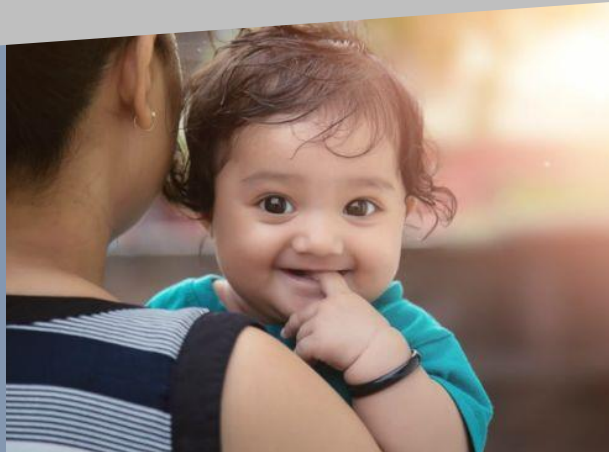
In this edition we are presenting 'Reading an ECG in children' which enumerates the basic salient features of ECG in children. ECG is a very useful tool which can help in management of a child in routine outpatient practice or in an ICU setting.

We look forward for interesting articles.
Happy reading!

Warm regards,

Dr Nandeesh

Dr Priya Shivalli



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Reading an ECG in children Dr. Sejal Shah, Pediatric Cardiologist

Electrocardiogram (ECG) is considered one of the three important basic tools for investigating a cardiac disease. Though there are challenges taking a pediatric ECG especially in infants, it is a noninvasive bedside tool which may provide guidance in the initial basic management. ECG may be requested as a part of investigation often in children with no clinical evidence of a cardiac disease or advised in critical situations with a strong suspicion of an abnormal heart.

ECG interpretation is as difficult for teachers to teach, as it is for students to learn. ECG interpretation is difficult to master and remember. Hence, commonly, there is an apprehension on the interpretation of the ECG once done or sometimes it is a skipped investigation in pediatric practice. However, ECG is one bedside tool which could help in not missing a cardiac abnormality in situations where echocardiogram is not available or in situations where a careful echocardiogram needs to be done.

The basic principles of ECG in children are the same as in adults. However, there are progressive changes happening in the cardiovascular anatomy and physiology between birth and adolescence which are reflected in the ECGs. Detail knowledge of these age dependent changes is crucial. ECG is a useful tool for narrowing down the differentials for critical structural heart diseases and arrhythmias. Most of the ECGs in children are normal. A normal ECG also provides invaluable assurance when a cardiac abnormality is ruled out. In a country like India, where majority of health care centers and providers do not have access to a Pediatric Cardiologist and a good echocardiogram, the knowledge of ECG interpretation could turn out to be invaluable either in ICU setting or routine out-patient practice.

There are few situations where in an ECG can change the management of a child. A routine practice of doing ECG in children in the out-patient department when they complaint of chest pain could unfold the mystery in one of them having acute pericarditis. A 2-month old baby noticed to have cardiomegaly with symptoms of failure clinically could be having an ECG with characteristic signs of anomalous coronary artery from pulmonary artery. Understanding the changes happening with electrolyte imbalance or certain drugs could turn out to be crucial for a pediatrician. Following are few salient features summarized to help better understanding of a Pediatric ECG.

- ❖ Leads II, III, aVF are oriented towards the inferior surface of the heart, leads I, aVL towards superior - left lateral wall, leads aVR, V1 towards the cavity, leads V1-V4 towards the anteroseptal wall and V5-V6 towards the lateral wall of the heart
- ❖ Frontal leads give an understanding of superior - inferior and left - right orientation whereas the chest leads give an understanding of anterior - posterior and left - right orientation
- ❖ 1 small square is 0.04 seconds and 1 large square is 0.2 seconds, 1 mV = 10 mm is normal standardization
- ❖ An estimate of heart rate can be obtained by dividing 300 by the number of large squares between two consecutive R waves
- ❖ Atrial activation happens longitudinally and by contiguity unlike the ventricular activation which spreads transversely from endocardial to epicardial surfaces
- ❖ In electrophysiological sense, heart has two chambers: Atria and ventricle
- ❖ Electromagnetic forces directed towards the positive electrode gives a positive deflection and that directed towards the negative electrode gives a negative deflection
- ❖ P wave is well studied in lead V1 and II
- ❖ Time required for atrial depolarization and the delay of impulse at the AV node is measured as the PR interval
- ❖ Normally, RS transition is at V3+/- V4
- ❖ R/S ratio is not affected by calibration factor
- ❖ Complete reversal of R/S progression is seen in neonates
- ❖ Q wave is the depolarization of the ventricular septum
- ❖ T wave happens in the same direction as QRS complex
- ❖ QT interval represents the sum of ventricular depolarization and repolarization
- ❖ Neonates have right ventricular dominance. However, pure R in V1 is rare, qR in V1 is uncommon but not necessarily abnormal if there is q in V6 (Pure R more than 10 mm, qR in V1 and inverted T wave in V1 after day 3 of life - usually suggestive of RVH)
- ❖ Leads I and aVF, II and aVL and III and aVR are perpendicular to each other

- ❖ Leads V2 and V6 are perpendicular to each other
- ❖ Vector of P wave / QRS complex / T wave is perpendicular to the lead with equiphasic deflection
- ❖ T wave axis moves away from the region of pathology whereas ST segment axis is directed towards the segment of injury
- ❖ Sinus rhythm is marked by P wave (only one) in front of QRS complex, P axis 0 to +90 degrees (P upright in II, usually upright in I, aVF)
- ❖ Pericardial diseases, myocardial diseases, electrolyte imbalance, drugs like Digitalis: all can have pathological ST alterations
- ❖ rR' in V1 indicates RV diastolic overload whereas rsR' in V1 indicates incomplete RBBB
- ❖ Complete RBBB is characterized by QRS width more than 0.14 sec with notched R' in V1 (rsR'/rSR') and delayed wide S in V5, V6, I (qRS in V6)
- ❖ Axis of the P wave decides the atrial localization
- ❖ LV is located on the same side as the precordial leads showing Q wave
- ❖ Absence of R wave progression in left precordial leads point towards dextrocardia
- ❖ Isolated pulmonary stenosis is characterized by dominant R waves in all precordial leads with deep inverted T waves in RPLs unlike Tetralogy of Fallot where there is tall R only in V1, though both have clockwise rotation
- ❖ Bizarre tall ragged P waves taller than QRS complexes with bizarre splintered low amplitude QRS complexes are characteristic of Ebstein's anomaly of tricuspid valve
- ❖ Tricuspid atresia and primum ASD have left axis deviation
- ❖ ECG findings of LV diastolic overload in mitral regurgitation is characterized by small magnitude S wave in V1, unlike other causes of LV dilatation, due to dilated left atrium pushing the heart forward
- ❖ Atrial arrhythmias are characterized by P waves of unusual contour and / or abnormal number per QRS complexes and QRS complexes of usually normal duration e.g. Premature atrial contraction, wandering pacemaker, atrial tachycardia, atrial flutter, atrial fibrillation
- ❖ Rhythms originating from the AV node are characterized by P waves either absent or present occurring after QRS complex and inverted, and QRS complexes usually of normal duration e.g. Nodal premature beat, nodal escape beat, accelerated nodal rhythm, nodal tachycardia
- ❖ In atrioventricular reentrant tachycardia, two pathways are involved, at least one of which is the AV node

- ❖ Rhythms originating from the ventricles are characterized by QRS complexes which are bizarre in configuration and long in duration, QRS complexes and T waves often pointing in opposite directions, QRS complexes randomly related to P waves e.g. Premature ventricular contraction, ventricular tachycardia, ventricular fibrillation
- ❖ When QRS duration is not wide, a supraventricular rhythm (sinus, atrial or nodal) is present. When QRS duration is wide, either ventricular arrhythmia or supraventricular rhythm with ventricular conduction disturbance is present

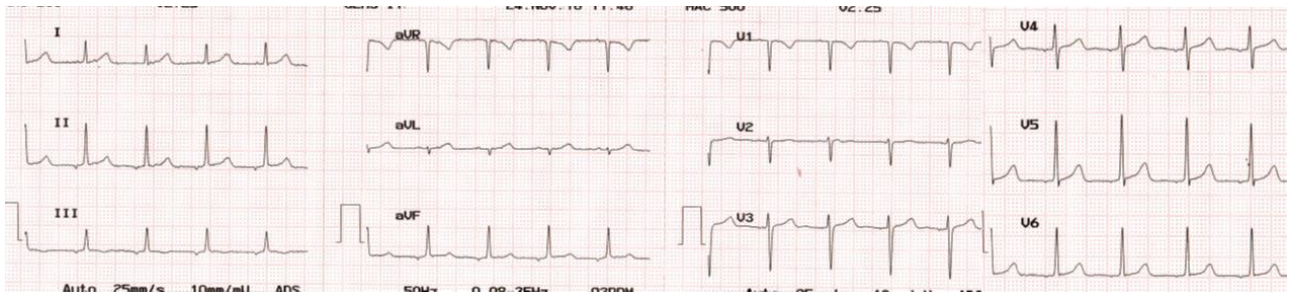


Figure 1. ECG showing P wave axis superior suggesting Ectopic P wave origin. Note the P waves negative in leads II, III and aVF.

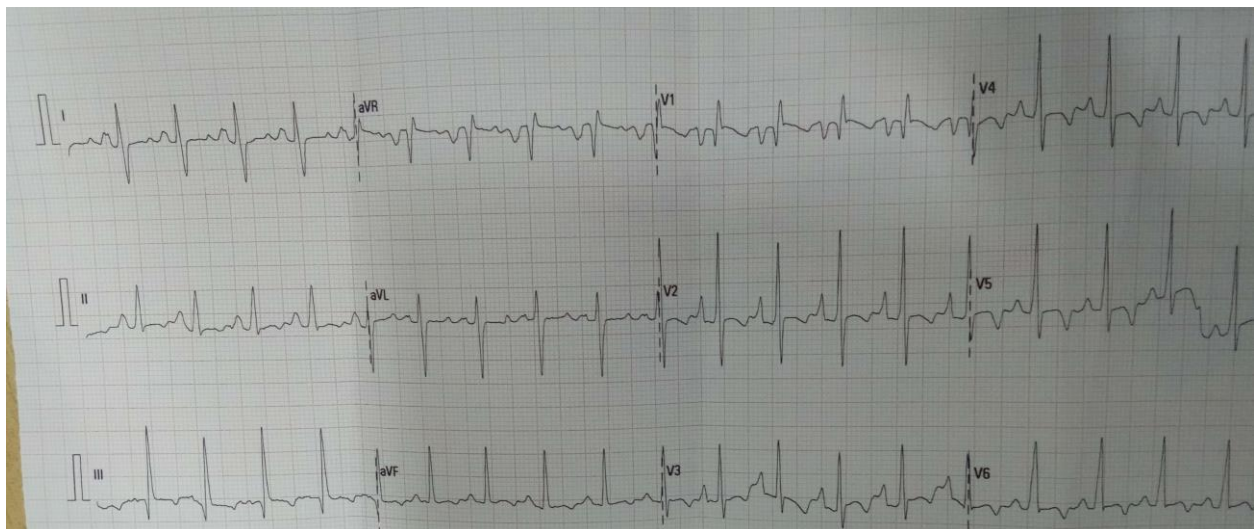


Figure 2. ECG showing qR pattern in lead V1 with inverted T wave in lead V1 suggestive of right ventricular hypertrophy

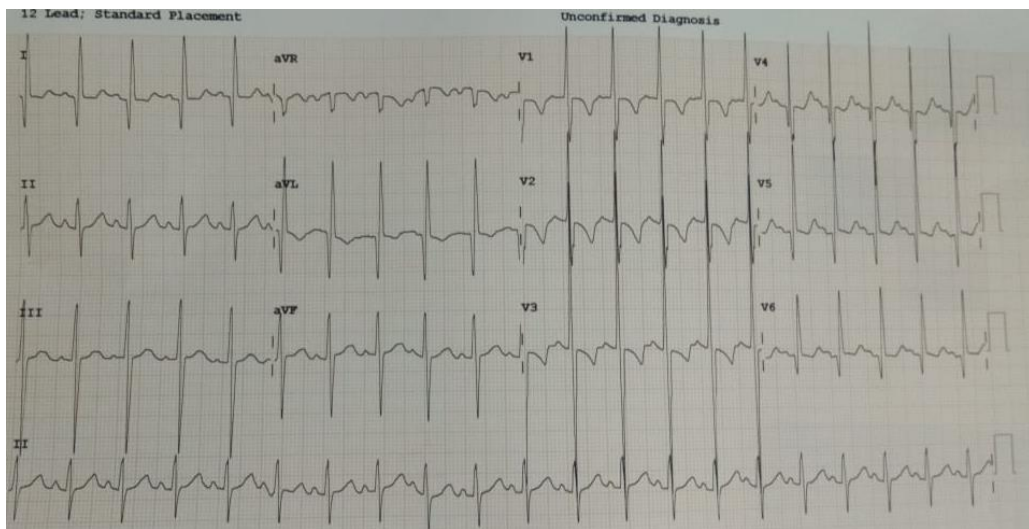


Figure 3. ECG suggestive of anterolateral myocardial infarction (anomalous left coronary artery from pulmonary artery). There are deep and wide Q waves in leads I, aVL, V6, the QRSi axis is away from the infarcted area and QRSt axis towards the infarcted area

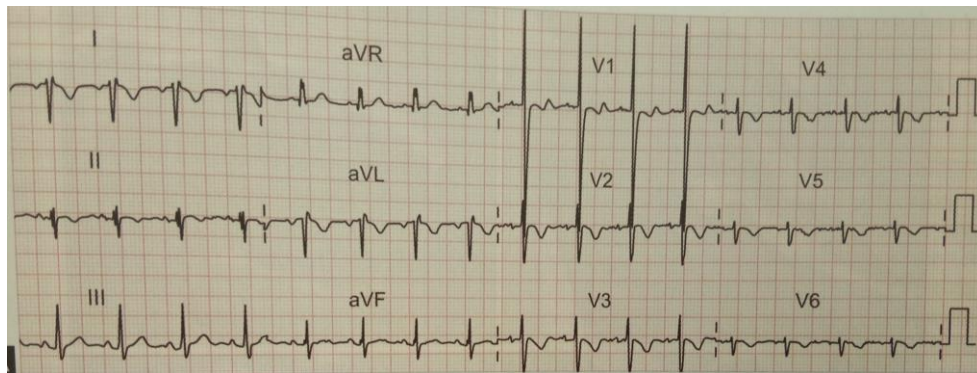


Figure 4. ECG of a child with Dextrocardia with situs inversus. Note the absence of R wave progression from leads V1 to V6

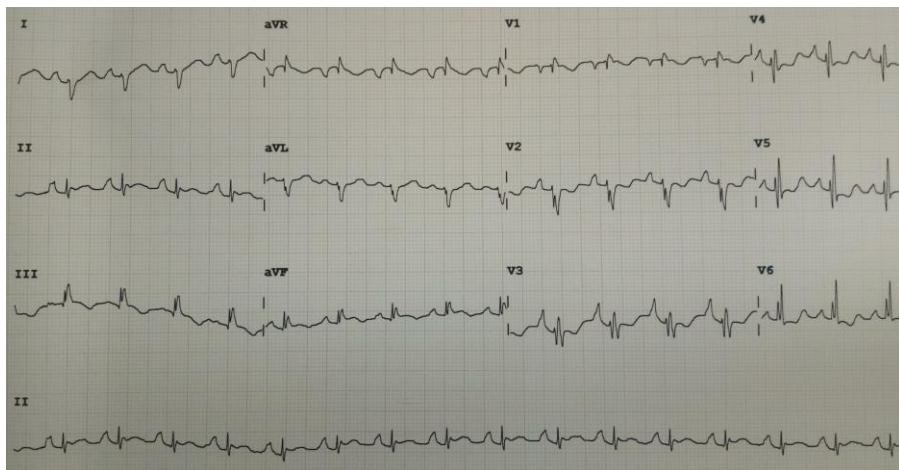


Figure 5. ECG of a child showing tall P waves, prolonged PR interval, prominent Q wave in lead V1 and splintered bizarre wide QRS complexes, all suggestive of Ebstein's anomaly.

Dr Sejal Shah, Senior Consultant Pediatric Cardiologist & Fetal Cardiologist, Hands on Heart, RxDx, Bangalore



**HEARTY
CONGRATULATIONS!**



Dr Bhaskar Shenoy has been awarded the **Dronacharya Award** for his exceptional CME efforts in Pediatrics on 8th August 2019 at New Delhi. Mr Ashwini Kumar Choubey (Minister of State for Health & Family welfare - GOI) was the Chief Guest. This award was presented to him in recognition of his efforts in Digital CME.

GUIDELINES FOR THE PEDITALENT COMPETITION - 2019

This competition is open to members of **IAP Bangalore BPS ONLY**.

Competition will be for original work in the area of :

1. Short story writing
2. Travelogue
3. Poetry
 - These may be written in English, Kannada or Hindi.
 - Each entry must be totally non -academic, with no reference to any medical case/ academic work. However medical stories of human interest may be entered.
 - The work should be sent in MS Word format, using Arial font no 12.
 - Word Limit for each entry: 2000 words.
 - The work should be original. In case it has been already published , please mention the name & date of the publisher.
 - The works will be judged by an independent jury, consisting of eminent writers and with no IAP affiliations.
 - The winners will be awarded with prizes and certificates.

Kindly send in your names before August 31, 2019 .

Your completed work should reach us on / before September 20, 2019.

Please email your details as follows:

Name:

Central IAP number:

Telephone no.

Email ID:

Send in all details to :

secretaryiapbps@gmail.com

PHOTO GALLERY



BAHA receiving certificate of appreciation at Adolescon inauguration



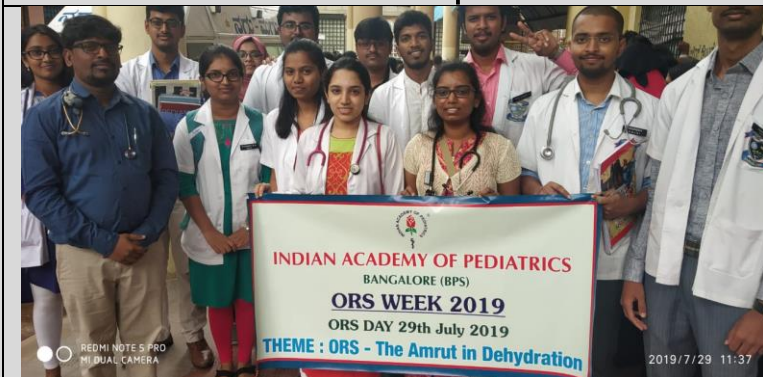
Breast feeding week celebration at IGICH



Breast-Feeding week celebration at Vani Vilas hospital



ORS week celebration at MS Ramaiah Medical College



ORS week celebration at BMC



BLS and CPR day celebration at People Tree Hospital

UPCOMING EVENTS

WORKSHOP ON RHEUMATOLOGY

Date: 8th September 2019 (5 - 8pm)

Venue: API Bhavan, Bengaluru

IAPNEOCON

National Conference of Neonatology Chapter of IAP

Date: 27, 28, 29 September, 2019

Venue: JW Marriott Hotel, Bengaluru

Registration details: www.iapneocon2019.com, rads.latha@gmail.com