

Causes of Generalized QRS low voltage in newborn infants - 2008

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1) Neonatal hypoxia and myocardial ischemia¹.

2) **Myocarditis**²: Viral Myocarditis can manifest in varied ways in children and if treated adequately may lead to complete recovery. ECG changes of low voltage QRS complexes with ST depression. Peripheral edema is a plausible contributing mechanism of low voltage³ T wave inversion or signs of left ventricular dilatation. SGOT, SGPT, CPK, LDH are elevated significantly. Echocardiographic changes ranged from left ventricular dilatation to global hypokinesia and mild mitral incompetence. Viral studies show Coxsackie B1 in, B4, B5 and Dengue.

3) Congenital renal failure⁴.

4) Birth asphyxia⁵

5) **Hypoplastic left heart syndrome (HLHS)**: It is characterized by undeveloped aorta, aortal valve, mitral valve, the left ventricle and the left atrium with hypertrophy of right heart ventricle. Infants born with the HLHS often have a usual body weight, however, within a few hours of life the respiration becomes excessively rapid with symptoms of cardiac congestion.

6) **Critical aortic stenosis**: Neonates and young infants with critical aortic stenosis present with cardiogenic shock and need aggressive treatment with prostaglandin E1 infusion along with inotropic support. In experienced hands, balloon valvuloplasty is a safe procedure in neonates and infants with critical stenosis. tal aortic stenosis, left ventricle may be hypoplastic with low QRS voltage⁶.

7) **Perinatal myocardial infarction: Myocardial infarction** in a newborn infant in the absence of congenital heart disease and anomalous coronary artery anatomy (extremely rare)⁷.

8) **Ectopia cordis**: high fetal skin resistance due primarily to the vernix caseosa is responsible for the low amplitude and anomalous transmission properties of the normal fetal ECG, and demonstrate that the fetal MCG is relatively insensitive to conductivity inhomogeneities. Fetal f ECGs and fetal magnetocardiograms (fMCGs) were recorded in the 26th, 29th and 31st weeks of gestation from a fetus with ectopia cordis -a rare condition in which the heart lies outside the chest wall. This provided an opportunity to study fetal cardiograms uninfluenced by the insulating effects of the fetal skin and vernix caseosa. Unlike recordings from age-matched normal fetuses, recordings from this subject had very high signal-to-noise ratio and showed no anomalous signal transmission properties. In contrast, fMCGs recorded from the ectopia cordis fetus and normal fetuses were largely similar. Both showed high signal-to-noise ratio and signal transmission properties consistent with volume conduction.

9) **Congenital Neonatal hypothyroidism**: Thyroid problems are common in children. While serum thyroid function tests lead to an accurate diagnosis in most patients, unique patient situations can produce misleading results. Total T4 measurements can incorrectly suggest hypothyroidism in congenital thyroid binding globulin (TBG) deficiency and

hyperthyroidism in TBG excess, as seen in high estrogen states. Free T4 (FT4) measurement techniques involve either physical separation of unbound thyroxine from serum binding proteins or estimation of FT4 levels in the presence of binding proteins. These estimation techniques are susceptible to under -or over- estimation of FT4 levels when binding proteins are low or high. Other complicating factors arise in the setting of prematurity or systemic non-thyroidal illness (NTI), simulating central hypothyroidism. Thyroid stimulating hormone levels in children have a wider normal range than in adults and are affected by drugs and NTI. Additionally, heterophile and anti-T4 or anti-TSH antibodies can interfere with accurate T4 or TSH measurement.

References

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