ID: 54

TITLE: MYOCARDIAL FUNCTION IN LATE PRETERM INFANTS DURING THE TRANSITIONAL PERIOD: A COMPREHENSIVE APPRAISAL USING DEFORMATION AND ROTATIONAL MECHANICS

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CONTENT:

Reference ranges for myocardial deformation and rotational mechanics are becoming well-established in premature infants < 29 weeks gestation and in healthy term infants > 37 weeks gestation. However, to date, no data exists on later preterm infants between 30 – 34 weeks. We aimed to describe left (LV) and right (RV) longitudinal strain (LS) and systolic strain rate (SRs) in addition to LV rotational mechanics in this population over the first 48 hours of age.

Late preterm infants born between 30+0 and 34+6 weeks gestation were considered for this study. Infants were excluded if they developed other morbidities during their hospital stay or if there was evidence of chromosomal anomalies or dysmorphic features. LV and RV LS and SRs in addition to LV apical and basal rotation, twist, twist rate (LVTR) and untwist rate (LVUTR) were measures on Days 1 and 2. Indices of RV mechanics including pulmonary artery acceleration time (PAAT), RV ejection time (RVET), Tricuspid annular plane systolic excursion (TAPSE) and Fractional area change (FAC) were also measured.

Forty-five infants with a mean ± SD gestation of 32.7 ± 1.2 weeks and birthweight of 1894 ± 345 grams were included in this study. Twenty one (47%) were male, 42 (93%) were delivered via cesarean section, 32 (71%) received a complete course of antenatal steroids, and 15 (33%) received magnesium sulphate. There was no change in the majority of LV functional measurements with the exception of LVURT. There was an increase in PAAT, RVET and PAAT:RVET. TAPSE and FAC increased over the study period. RV longitudinal Strain and SRs did not change (Table).

This study establishes reference ranges for LV and RV functional parameters in uncomplicated late premature infants. LV function remains relatively preserved over the first 48 hours in this population. RV function measurements (TAPSE and FAC) increase in magnitude likely reflecting of the physiological decline in pulmonary vascular resistance with an observed increase in PAAT.

IMAGES:
https://www.eiseverywhere.com/eeselectv3/v3/events/351149/submission/files/download?fileID=1adeb23b4b82f601910dcce45927d6d-MjAxOS0wNSM1Y2UyNyY2YrMxNDRI

Functional Measurements

COI: None declared
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TITLE: FEASIBILITY AND REPRODUCIBILITY OF LEFT ATRIAL STRAIN IN PRETERM AND TERM NEONATES IN THE FIRST 48 HOURS OF LIFE

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CONTENT:

There is evidence of an early diastolic dysfunction in neonates, particularly when born prematurely. Moreover, important changes of left ventricular function and left ventricle filling pressure occur in the transitional period, likely related to changes in loading conditions, patent ductus arteriosus size and pulmonary vascular resistance.

In adult patients, left atrial strain has recently been proposed as a novel marker of diastolic dysfunction due to its strong correlation with left ventricular filling pressure.

Our aims were to assess the feasibility and repeatability of left atrial strain measurement in a cohort of healthy term and preterm neonates in the first 48 hours of life.

This was a multicenter prospective observational cohort study enrolling healthy term and preterm neonates. Preterm infants < 32 weeks of gestational age were excluded if they required FiO2 >30% or mechanical ventilation. Each infant underwent one echocardiogram in the first 48 hours of life. Atrial strain was calculated off-line (Q-Lab 10.2 Philips) from a “standard” 4-Chambers (4C) and 2-Chambers (2C) apical views. Measurements of atrial deformation, namely peak positive (ε pos) and peak negative (ε neg) atrial strain, were calculated for both the standard 4C and 2C views (Fig. 1). Intraobserver and interobserver repeatability were calculated according to Bland-Altman and intraclass correlation coefficient (ICC).

Images quality was classified according to the Colan grading system. Only images rated as excellent or good were considered applicable.

Twenty-eight patients were studied. Median (range) birth weight and gestational age were 2030 g (620-3690 g) and 34 (25 – 42), respectively. Atrial strain imaging was feasible from 96% of the acquisitions from both 4C and 2C views.

Peak positive atrial strain from 4C views showed high intraobserver and interobserver repeatability: bias 0.2%, coefficient of variation (CV) 2.17%, ICC 0.97 and bias -0.5%, CV 3.7%, ICC 0.94 respectively. Peak negative atrial strain from 4C views showed high intraobserver and interobserver repeatability: bias -0.5%, CV 3.7%, ICC 0.97 and bias -0.5%, CV 3.7%, ICC 0.94 respectively.

From 2C views both peak positive and peak negative atrial strain showed high intraobserver (bias -0.5%, CV 3.1%, ICC 0.97 and bias 0%, CV 3%, ICC 0.97) and interobserver repeatability (bias -0.4%, CV 4.7%, ICC 0.97 and bias -0.7%, CV 5.7%, ICC 0.97).

This study demonstrates high clinical feasibility and reproducibility of peak positive and peak negative atrial strain measurements from 4C and 2C views by 2D speckle-tracking echocardiography in term and preterm neonates in the first 48 hours of life and provide a new promising tool that may be used for the assessment of left diastolic function.
Atrial deformation measured in 4 chambers apical view (A) and in 2 chambers apical view (B). $\varepsilon_{\text{pos}}$ = (Peak positive atrial strain deformation). $\varepsilon_{\text{neg}}$ = (Peak negative atrial strain deformation).

COI: None declared