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IDENTIFICATION OF SHUNTS BASED ON THE SHAPE OF DILUTION CURVE

V. Kislukhin, N. Thuramalla, N. Krivitski

Trasonic Systems Inc., Ithaca, NY, USA

Background and aims: The shape of dilution curve will dramatically change after indicator passes through the cardiopulmonary system in the presence of intra-cardiac shunts and a PDA. The purpose of this study was to develop an accurate algorithm for shunt identification and apply it to archived clinical data.

Methods: A mathematical model of indicator movement through cardiopulmonary system for three situations was developed:

- 1) No shunts;
- 2) Right to left shunt;
- 3) Left to right shunt.

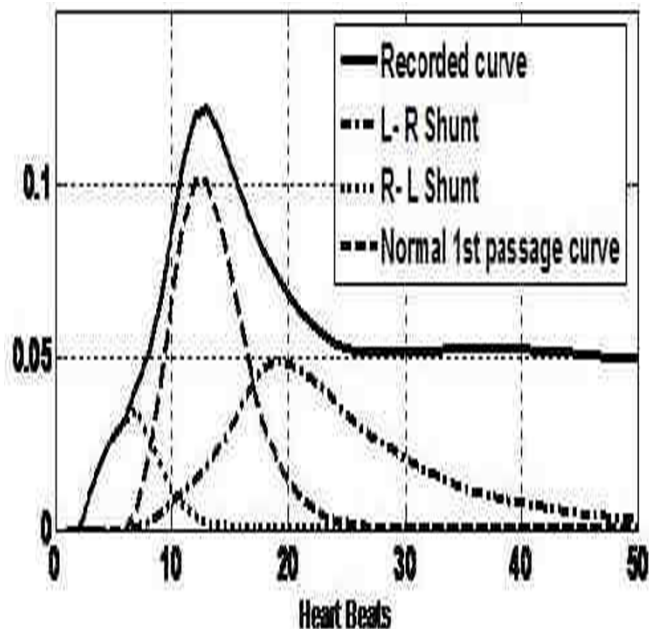
Three parameters of dilution curve were examined:

- 1) appearance time;
- 2) asymmetry;
- 3) curve width.

Three possible scenarios were defined based on the probability "P" of shunt identification:

- 1) No shunt, $P < 5\%$;
- 2) Possible shunt; $5\% < P < 90\%$;
- 3) Shunt identified $P > 90\%$ In the model, the values for cardiac output, heart size and heart rate were varied.

Results: In play-back mode the developed algorithm was applied to a clinical data archive of 1,188 dilution curves collected from adults ($n=131$) and from children ($n=112$) weighing between 0.9 - 130 kg. Sensitivity of the method was 94%, and false positive diagnostic was 0.9%.



[Dilution Curve Shunt Model]

Conclusions: Automatic identification of shunts and PDA yielded acceptable accuracy. New PICU monitor (COstatus, Trasonic Systems Inc., NY) in addition to measuring cardiac output and blood volumes, identifies the presence of intra-cardiac shunts based on developed algorithm. Next step will be to quantify the observed shunt flow value.

Grant support: NIH SBIR # R44 HL061994

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NT PRO-BNP, NGAL, AND H-FABP ARE INDICATORS OF HEMODYNAMIC RELEVANCE OF PATENT DUCTUS ARTERIOSUS IN PRETERM INFANTS

V. Tosse¹, B. Hadzik¹, H. Sabir¹, P.E. Verde², T. Hoehn¹

¹Neonatology and Pediatric Intensive Care,
²Coordination Center for Clinical Trials, University Hospital Duesseldorf, Duesseldorf, Germany

Background and aims: Patent ductus arteriosus (PDA) is the most common functional cardiovascular disease of preterm infants. Hemodynamic relevance for organs and circulation can neither be derived from clinical nor from echocardiographic criteria. The aim of the present study was to establish non-invasive parameters which reflect perfusion-dependent consequences of the ductus for the organism of the preterm infant.