

MEETING ABSTRACT

Open Access

# Hemodynamically significant ductus arteriosus: a new targeted approach

Rosa Maria Cerbo<sup>1\*</sup>, Martina Borellini<sup>1</sup>, Margherita Pozzi<sup>1</sup>, Savina Mannarino<sup>2</sup>, Mauro Stronati<sup>1</sup>

From XXI Congress of the Italian Society of Neonatology  
Palermo, Italy. 24-26 September 2015

Debate on hemodynamically significant ductus arteriosus (hsDA) in premature infants remains unresolved.

The association between patent ductus arteriosus (PDA) and the most adverse outcomes and comorbidities in preterms (peri-intraventricular haemorrhage, necrotizing enterocolitis, chronic lung disease, pulmonary haemorrhage and mortality) has led to the integration of ductal closure into neonatal intensive care.

The recent theory that describes PDA as “an innocent bystander” is supported by the lack of evidence of significant benefits on long-term outcomes with therapeutic interventions. So, the causal relationship between PDA and comorbidities is questioned. Moreover, PDA can close spontaneously in a significant proportion of preterms [1].

Both the traditional assumption that all PDA are pathological and the most recent theory in favor of a conservative attitude are oversimplifications [2].

The current management of PDA does not take into account the wide range of effects attributable to a ductal shunt. A more logical approach should consider the ductus as a clinical continuum, from the physiological PDA to the pathological hsDA. Placing the patient in the spectrum of “ductal disease” seems to be possible through a continuous evaluation of the hemodynamic and clinical consequences of ductal patency [3].

The current definition of an hsDA is almost entirely based on size [4]. However, the magnitude of transductal shunt relates not only to the transductal diameter, but also to the pulmonary and systemic vascular resistance and to the compensatory ability of the immature myocardium [3].

New echocardiography markers have been evaluated to estimate the impact of transductal flow on both pulmonary over circulation (left atrial/aortic ratio, antero-grade pulmonary artery diastolic flow) and systemic blood flow (retrograde diastolic flow in descending aorta, left ventricular output/superior vena cava flow ratio) [5].

The possibility to evaluate flows in the middle cerebral artery, renal and superior mesenteric artery with Doppler ultrasound, allows an early and plausible detection of regional hypoperfusion due to the “ductal steal” [3].

Other technologies that enable direct measurement of tissue oxygenation, such as Near Infrared Spectroscopy (NIRS), may also be useful to unveil the hemodynamic effects of PDA [6,7].

We are becoming increasingly aware of the role of patient's characteristics (such as genetic profile [8], BNP levels [9], antioxidant status [10]) in PDA evolution.

According to the current understanding, it seems appropriate to propose a more tailored approach to the management of PDA in preterms, based on the integration between clinical and hemodynamic status.

## Authors' details

<sup>1</sup>Neonatal Intensive Care Unit, Department of Pediatrics, IRCCS Fondazione Policlinico San Matteo, Pavia, Italy. <sup>2</sup>Pediatric Cardiology, Department of Pediatrics, IRCCS Fondazione Policlinico San Matteo, Pavia, Italy.

Published: 24 September 2015

## References

1. Schena F, Ciarmoli E, Mosca F: Patent ductus arteriosus: wait and see? *J Matern Fetal Neonatal Med* 2011, **24**(Suppl 3):2-4.
2. Evans N: Preterm patent ductus arteriosus: A continuing conundrum for the neonatologist? *Semin Fetal Neonatal Med* 2015.
3. McNamara PJ, Sehgal A: Disease Staging. 424-427.
4. Evans N: Current controversies in the diagnosis and treatment of patent ductus arteriosus in preterm infants. *Adv Neonatal Care* 2003, **3**(4):168-177.
5. Sehgal A, McNamara PJ: Does echocardiography facilitate determination of hemodynamic significance attributable to the ductus arteriosus? *Eur J Pediatr* 2009, **168**(8):907-914.

\* Correspondence: rm.cerbo@smatteo.pv.it

<sup>1</sup>Neonatal Intensive Care Unit, Department of Pediatrics, IRCCS Fondazione Policlinico San Matteo, Pavia, Italy  
Full list of author information is available at the end of the article

6. Lemmers PM, Toet MC, van Bel F: **Impact of patent ductus arteriosus and subsequent therapy with indomethacin on cerebral oxygenation in preterm infants.** *Pediatrics* 2008, **121**(1):142-147.
7. Cerbo RM, Cabano R, Di Comite A, Longo S, Maragliano R, Stronati M: **Cerebral and somatic rSO<sub>2</sub> in sick preterm infants.** *J Matern Fetal Neonatal Med* 2012, **25**(Suppl 4):97-100.
8. Dagle JM, Lepp NT, Cooper ME, Schaa KL, Kelsey KJP, Orr KL, Caprau D, Zimmerman CR, Steffen KM, Johnson KJ, Marazita ML, Murray JC: **Determination of genetic predisposition to patent ductus arteriosus in preterm infants.** *Pediatrics* 2009, **123**(4):1116-1123.
9. Kulkarni M, Gokulakrishnan G, Price J, Fernandes CJ, Leeflang M, Pammi M: **Diagnosing Significant PDA Using Natriuretic Peptides in Preterm Neonates: A Systematic Review.** *Pediatrics* 2015, **135**(2):e510-e525.
10. Inayat M, Bany-mohammed F, Valencia A, Tay C, Aranda JV, Beharry KD: **Antioxidants and Biomarkers of Oxidative Stress in Preterm Infants with Symptomatic Patent Ductus Arteriosus.** *Am J Perinatol* 2015, Feb 25 [Epub ahead of print].

doi:10.1186/1824-7288-41-S1-A2

**Cite this article as:** Cerbo et al.: Hemodynamically significant ductus arteriosus: a new targeted approach. *Italian Journal of Pediatrics* 2015 **41**(Suppl 1):A2.

**Submit your next manuscript to BioMed Central  
and take full advantage of:**

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at  
[www.biomedcentral.com/submit](http://www.biomedcentral.com/submit)

