

N-TERMINAL PRO-BRAIN NATRIURETIC PEPTIDE AND PATENT DUCTUS ARTERIOSUS IN PRETERM INFANTS

Submitted by Pracha Nuntnarumit

Pracha Nuntnarumit, Pichaya Thanomsingh, Anant Khositseth

Department of Pediatrics, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

INTRODUCTION: N-terminal pro-brain natriuretic peptide (NT-proBNP) in adults has been reported to be a diagnostic marker of ventricular enlargement and volume overload. However, clinical studies using NT-proBNP in premature infants have been very limited.

OBJECTIVE: We sought to determine whether plasma NT-proBNP in premature infants can identify hemodynamically significant patent ductus arteriosus (hsPDA) and determine the correlation between serial plasma NT-proBNP level and echocardiographic assessment of PDA.

METHODS: Thirty-nine preterm infants underwent clinical and echocardiographic examinations for PDA on days-of-life 2, 4, and 7 and simultaneous blood sampling to measure plasma NT-proBNP concentrations. When ≥ 2 clinical features of PDA were detected along with left-to-right ductal shunting demonstrated by echocardiogram, hsPDA was diagnosed and the patient treated with indomethacin or ibuprofen.

RESULTS: On day 2, the mean NT-proBNP concentration in the hsPDA group ($n = 12$) was significantly higher than that in the non-hsPDA group ($n = 23$) (3160.3 ± 3104.9 vs 618.1 ± 490.7 pmol/L; $P \leq .05$). Eight infants (72%) in the hsPDA group became asymptomatic after an initial course of indomethacin or ibuprofen, and their NT-proBNP levels concomitantly declined. NT-proBNP concentrations were significantly correlated with the magnitudes of the ductal shunt, such as left-atrium/aorta ratio and left-atrium volume index ($r = 0.753$ and 0.596 , respectively). The cutoff of NT-proBNP concentration at 1204 pmol/L on day 2 gave the best predictive values for hsPDA with 100% sensitivity, 91% specificity, 86.7% positive predictive value, 100% negative predictive value, and a likelihood ratio of 11.5.

CONCLUSIONS: The plasma NT-proBNP level on day-of-life 2 is a sensitive marker for predicting hsPDA in preterm infants. Successful closure of PDA corresponds with a decline in plasma levels of NT-proBNP.

PREDICTIVE VALUE OF AMPLITUDE-INTEGRATED ELECTROENCEPHALOGRAPHY ON OUTCOME IN NEONATAL EXTRACORPOREAL MEMBRANE OXYGENATION

Submitted by Athina Pappas

Athina Pappas, Seetha Shankaran, Paul Stockmann
Children's Hospital of Michigan, Wayne State University, Detroit, Michigan

INTRODUCTION: The early and accurate assessment of cerebral function in neonates who undergo extracorporeal membrane oxygenation (ECMO) may identify high-risk infants who are amenable to neuroprotective strategies or, at least, in need of more detailed neuroimaging and neurodevelopmental follow-up.

OBJECTIVE: The specific aims of this study were to assess the clinical utility and long-term predictive value of amplitude-integrated electroencephalography (aEEG) in neonatal ECMO.

METHODS: Thirty-four infants who required ECMO for respiratory failure were enrolled in the study prospectively. Serial aEEGs were recorded before, during, and after ECMO and classified by 2 independent interpreters on the basis of background pattern and amplitude criteria. Surviving infants were followed up to 18 to 22 months and assessed with a structured neurologic examination and formal developmental testing by using the Bayley Scales of Infant Development II. The primary outcome was death or neurodevelopmental impairment (defined as moderate-to-severe cerebral palsy and/or a Mental Developmental Index or Psychomotor Development Index score of <70).

RESULTS: Preliminary data analysis on the first 20 patients was performed. Thirteen patients survived, 3 died while on ECMO, and 4 died before discharge. All surviving infants were evaluated at follow-up. A severely abnormal aEEG predicted death or moderate-to-severe neurodevelopmental impairment with a sensitivity of 0.85 (95% confidence interval [CI]: 0.70–0.95), a specificity of 0.57 (95% CI: 0.3–0.76), a positive predictive value of 0.79 (95% CI: 0.65–0.88), and a negative predictive value of 0.67 (95% CI: 0.35–0.88).

CONCLUSIONS: aEEG is a useful neuromonitoring tool during neonatal ECMO.

FREEDOM OF BREATH, FOUNDATION OF LIFE

Submitted by Hongmao Ye

Hongmao Ye^a, Renjie Yu^b

^aThird Hospital, Peking University, Beijing, China; ^bFirst Hospital, Tsinghua University, Beijing, China

Perinatal asphyxia is the leading cause of neonatal mortality, cerebral palsy, and mental retardation worldwide and accounts for ~ 1 million of the 4 million neonatal deaths that occur each year (World Health Organization, 2005). According to China's national maternal and children's health surveillance in 2005, neonatal mortality was 19 per 1000 live births. In China, the first top 3 causes of infant mortality are preterm birth and low

birth weight, birth asphyxia, and pneumonia. In 2005 asphyxia accounted for 20.5% of deaths in children under the age of 5 years. On the basis of a national sample survey from China Disabled Persons' Foundation in 2003, there are 199000 disabled children between 0 and 6 years old each year, 54.2% of whom are mentally disabled, primarily related to birth asphyxia.

The Neonatal Resuscitation Program (NRP) was introduced to China in the 1990s to reduce mortality and morbidity caused by asphyxia. NRP training was held in cities such as Beijing and Shanghai, which helped to build the foundation of the NRP in China. To disseminate the NRP throughout China, a multidisciplinary partnership was established among the Chinese Ministry of Health, Chinese Perinatal Society, Chinese Nursing Association, American Academy of Pediatrics, and Johnson and Johnson Pediatric Institute. In July 2003, a task force that consists of representatives from all partners made a 5-year commitment to set up "Freedom of Breath, Foundation of Life: China Neonatal Resuscitation Program." The objective was to ensure the presence of at least 1 trained health care professional at every delivery. It has been 3 years since the program launched, and many key accomplishments have been made:

1. The Chinese version of the fourth and fifth editions of the NRP manual (created by American Academy of Pediatrics and American Heart Association) was published.
2. Chinese NRP editions were made with Chinese cultural considerations to guide neonatal resuscitation practices in China.
3. Since July 2004, many training sessions have been organized, including a national instructors training, provincial instructors training(s) in 30 provinces (there are a total of 30 provinces in China), and cascading trainings in cities, counties, and townships. To date, 18 240 health care professionals have been trained, among them obstetricians, pediatricians, nurses/midwives, and anesthetists. By the end of 2006, NRP training had covered 99.1% of health care institutions in cities and 59.8% in 20 target provinces.
4. On September 20–23, 2006, the NRP Science Updates and Experience Sharing conference was held in Xian, capital city of Shaanxi in the northwest part of China. One hundred fifty health care professionals from 20 target provinces attended to learn of scientific updates from Drs Keenan and Niemeyer. Each province presented their training reports and summaries; a few of them were rewarded for their excellence of performance.
5. Since the launch of the NRP, many provincial health bureaus included neonatal resuscitation skills into midwifery service licensing. By the end of 2007, it will become a nationwide regulation in midwifery

service licensing. Starting in 2007, the Chinese NRP expanded its program elements to add neonatal mortality and morbidity evaluation. We believe the data collected from this evaluation would be valuable, not only to the Chinese NRP but also to the international NRP.

ELECTRON MICROSCOPIC ANALYSIS OF BACTERIAL BIOFILM ON TRACHEAL TUBES REMOVED FROM INTUBATED NEONATES AND THE RELATIONSHIP BETWEEN BACTERIAL BIOFILM AND LOWER RESPIRATORY INFECTIONS

Submitted by Jialin Yu

Yu Jialin, Chen Boman, Liu Guanxin, Hu Linyan, Li Luquan

Department of Neonatology, Children's Hospital, Chongqing Medical University, Chongqing, China

INTRODUCTION: Recurrent neonatal lower respiratory infections caused by endotracheal tubes (ETTs) may be related to the bacterial biofilm on them.

OBJECTIVE: We aimed to investigate the microbial biofilm on the surface of ETTs removed from neonates with intubated ventilation to explore the relationship between ETT biofilm and the lower respiratory infections.

METHODS: Twenty ETTs used in intubated neonates were examined for the presence of biofilm on their surface by scanning electron microscopy, and bacteria harvested from the surface of ETTs and the secretions of lower respiratory tracts were isolated, identified, and assessed for antimicrobial susceptibility.

RESULTS: Scanning electron microscopy showed that the incidence of microbial colonization was 60% (12 of 20) when the use of tubes exceeded 2 days, biofilm formation was observed ~3 days after intubation, and its architecture became more mature and complex when the duration exceeded 3 days. There were 14 positive cultures from ETTs (70%, including 4 normal flora), in which 7 kinds of pathogens were isolated; in 13 cultures from the secretions of lower respiratory tract (65%, including 1 normal flora), 10 kinds of pathogens were isolated. Seven samples had the same pathogen both on the surface of ETTs and in the secretions of the lower respiratory tract, which accounted for 50 of the positive cultures from ETTs. The Gram-negative bacteria isolated from the surface of ETTs and the secretions of lower respiratory tract presented multiresistance to antibiotics.

CONCLUSIONS: The ETT biofilm develops into a mature and complex form on the basis of the duration of tube use. There is a possible positive correlation between them. There is correlation between microbial biofilm formation on the surface of ETTs and lower respiratory tract infection in intubated neonates who are ventilated

FREEDOM OF BREATH, FOUNDATION OF LIFE

Hongmao Ye and Renjie Yu

Pediatrics 2008;121;S140

DOI: 10.1542/peds.2007-2022NNNNN

Updated Information & Services

including high resolution figures, can be found at:
http://pediatrics.aappublications.org/content/121/Supplement_2/S140.3

Subspecialty Collections

This article, along with others on similar topics, appears in the following collection(s):

Pulmonology

http://www.aappublications.org/cgi/collection/pulmonology_sub

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:

<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:

<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

FREEDOM OF BREATH, FOUNDATION OF LIFE

Hongmao Ye and Renjie Yu

Pediatrics 2008;121;S140

DOI: 10.1542/peds.2007-2022NNNNN

The online version of this article, along with updated information and services, is located on the World Wide Web at:

http://pediatrics.aappublications.org/content/121/Supplement_2/S140.3

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2008 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

