

METHODS: We measured serial plasma citrulline levels in 18 clinically stable neonates (gestational age: ≤ 32 weeks; birth weight: 1000–1750 g) on days 2, 7, 14, 21, and 28. Quantitative analysis of plasma citrulline levels was performed by ion-exchange chromatography with postcolumn derivatization.

RESULTS: In the study population, mean plasma citrulline levels showed a statistically significant increase from $19 \pm 4 \mu\text{mol/L}$ on day 2 and $20 \pm 4 \mu\text{mol/L}$ on day 7 to $23 \pm 4 \mu\text{mol/L}$ on day 14, $29 \pm 5 \mu\text{mol/L}$ on day 21, and $31 \pm 5 \mu\text{mol/L}$ on day 28 ($P < .01$). The route of feeding did not seem to have an effect on plasma levels of citrulline (similar values were obtained from neonates who were fed enterally and parenterally on day 7).

CONCLUSIONS: Citrulline levels in normal preterm neonates seem to be age-related and may serve as reference values, which facilitates the evaluation of compromised intestinal function in preterm neonates with severe gastrointestinal problems.

SHORT-TERM AND LONG-TERM OUTCOME OF 596 INFANTS BORN TO MOTHERS WITH CARDIAC DISEASE

Submitted by Yumi Kono

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INTRODUCTION: The number of pregnancies of women with cardiac disease (CD) has been increasing. Previous studies on outcomes were reported mainly on maternal cardiac outcome.

OBJECTIVE: We focused on the outcome of infants who were born to mothers with CD.

METHODS: Study subjects consisted of 596 singleton live-born infants who were born at Tokyo Women's Medical University Hospital from 1991 to 2005. Women with maternal CD included 295 with congenital heart disease (CHD), 184 with arrhythmias, 84 with acquired valvular disease, 18 with cardiomyopathy, and 16 with miscellaneous CD. Gestational age, birth weight (BW), mortality rate, and complications in the subjects and long-term outcome of the preterm infants (< 37 weeks' gestation) were evaluated.

RESULTS: Preterm birth was found in 74 (12.4%) infants, 3 of whom were born at < 28 weeks' gestation. Low BW was found in 117 (19.6%) infants, 12 of whom weighed < 1500 g. Rates of preterm birth (61%) and low BW (61%) in the infants of mothers with cardiomyopathy were significantly higher than those with other maternal CD. The overall mortality rate was 0.7%; 3 died (1 with Down syndrome with CHD, 1 with neonatal

Marfan syndrome, and 1 extremely low BW infant born at 23 weeks' gestation) in the neonatal period, and 1 infant with CHD died at 1 year of age. Seven of the preterm infants (9.5%) had CHD. Other complications included anomalies/chromosomal disorders (5), cerebral palsy (1), mental retardation (2), borderline mentality (1), and hearing impairment (1). The prevalence of major neurologic handicap was 4%.

CONCLUSIONS: The rates of preterm birth and low BW were very high. Adverse outcome of infants born to mothers with CD was related to congenital disorders including CD of offspring and extremely preterm birth.

INVESTIGATION OF HEARING IMPAIRMENT IN POST-NEONATAL INTENSIVE CARE UNIT INFANTS BY USING AUTOMATED AUDITORY BRAINSTEM RESPONSE

Submitted by George Mitsiakos

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INTRODUCTION: Hearing impairment affects 2% to 4% of NICU graduates and is associated with several risk indicators.

OBJECTIVE: Our goal was to investigate the prevalence of hearing impairment in newborns hospitalized in an NICU and its association with risk indicators.

METHODS: Subjects consisted of 422 post-NICU infants who fulfilled 34 weeks of gestational age and were examined between March 2005 and December 2006. The following parameters were evaluated: perinatal asphyxia, craniofacial deformities, furosemide and aminoglycoside therapy (duration of administration), meningitis, duration of mechanical ventilation, and nursing duration in an incubator. Screening was performed with the last-generation automated auditory brainstem response (AABR) equipment, ALGO 3 (Natus Medical Inc, San Carlos, CA).

RESULTS: Results were considered normal when the newborn showed response to a 35-dBNA signal bilaterally. Newborns with hearing impairment were referred for early intervention. Multivariate analysis with logistic regression was used to identify the independent risk factors for hearing disturbances. The prevalence of AABR impairment was 2.84% (12 of 422 newborns); the impairment was unilateral in 7 of the infants and bilateral in 5 of them. These 12 infants were examined with conventional ABR with the following results: 6 of them showed normal responses, and in the other 6 infants the pathologic result was confirmed. Multivariate

analysis revealed a statistically significant association between hearing loss and craniofacial deformities, meningitis, and duration of mechanical ventilation ($P < .001$, $P = .001$, and $P = .038$, respectively).

CONCLUSIONS: Although the study sample was limited, the hearing-loss rate that we found was in accordance with that reported in the literature. The prevalence of hearing impairment found when using AABR is high. The only risk factors directly associated with hearing impairment proved to be craniofacial deformities, meningitis, and duration of mechanical ventilation.

INFANT OUTCOME AFTER ANTENATAL STEROIDS IN PRETERM PREGNANCIES WITH ABSENT UMBILICAL END-DIASTOLIC FLOW

Submitted by Florence Murila

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INTRODUCTION: Absence of the end-diastolic flow (EDF) is associated with adverse neonatal outcome. Administration of β -methasone to women with a pregnancy complicated by absent EDF is associated with the transient return of EDF in up to 70% of cases.

OBJECTIVE: We aimed to compare the hospital outcome of preterm infants for whom the absent EDF returned after antenatal administration of β -methasone with those for whom the absent EDF did not return.

METHODS: At Monash Medical Center, 80 pregnant women with absent EDF were given 2 intramuscular 11.4-mg doses of β -methasone 24 hours apart. In the majority of pregnancies, EDF returned after β -methasone treatment. The preterm infants born to these 80 pregnant women had their hospital outcome ascertained retrospectively. Statistical analysis was performed by using the χ^2 and Mann-Whitney rank-sum tests.

RESULTS: The 51 infants for whom the EDF returned were compared with the 29 for whom the EDF did not return. There were no significant differences in their gestational age, birth weight, or resuscitation and ventilation needs. The former group was less acidotic at birth (mean pH: 7.4 vs 7.3 [$P < .05$]; and mean base excess: -3 vs -5 mmol/L [$P < .05$]). There was no significant difference in the incidence of respiratory disease, intraventricular hemorrhage, necrotizing enterocolitis, and mortality rates.

CONCLUSIONS: Preterm infants born after return of an absent EDF after the administration of antenatal

β -methasone were less acidotic at birth, but their hospital morbidity and mortality rates were not significantly improved compared with those for whom the absent EDF did not return.

TOPICAL COCONUT OIL APPLICATION REDUCES TRANSEPIDERMAL WATER LOSS IN PRETERM VERY LOW BIRTH WEIGHT NEONATES: A RANDOMIZED CLINICAL TRIAL

Submitted by Sushma Nangia

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INTRODUCTION: Topical emollients have been shown to reduce transepidermal water loss (TEWL). Such an effect of coconut oil (often used in traditional massage of infants in India) has not been studied.

OBJECTIVE: Our goal was to determine the efficacy of topical coconut-oil application in reducing TEWL in preterm very low birth weight (VLBW) neonates.

METHODS: Seventy-four preterm VLBW infants were randomly assigned at 12 hours of age to either 4 mL of topical coconut-oil application every 12 hours for 7 days ($n = 37$) or no oil application ($n = 37$). TEWL was measured at 12 hours of age and thereafter every 12 hours for 7 days in both groups by using a Vapometer (Delfin Technologies, Kuopio, Finland), a portable closed-chamber evaporimeter. The ambient and skin-surface relative humidity and temperature were recorded simultaneously.

RESULTS: Birth weight (1213 ± 214 vs 1164 ± 208 g), gestation (32 ± 2 vs 31 ± 2 weeks), and other baseline variables were comparable between the 2 groups. TEWL was significantly lower in the infants in the coconut-oil group at each point of measurement. Although TEWL declined for those in both groups during the first week of life, proportional reduction in TEWL in the infants in the coconut-oil group was much greater compared with controls. Significantly lower TEWL in the infants in the coconut-oil group persisted after adjusting for differences in baseline variables by using a generalized estimating equation population-averaged model (an advanced form of regression analysis) (mean difference: 6.8 g/m² per hour all during first week of life [95% confidence interval: 3.5–10.2]; $P = .000$).

CONCLUSIONS: Coconut-oil application in preterm VLBW neonates reduced TEWL by as much as 46%. Such an impact is expected to be of clinical importance, because it could reduce initial weight loss, promote better growth, and reduce fluid requirements.

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