Controlled Hypertension in Infusion Post-operative Treatment of Newborn

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Background: The incidence of newborns with congenital intestinal malformations (CIM) and necrotizing enterocolitis (NEC) in recent years has not reduced. Often the surgical treatment of these patients does not bring the desired results due to inefficient post-operative treatment.

Objective: The aim of our study was to improve the outcomes of infants with NEC and CIM.

Methods: Since 2004 year, we treated 137 children with CIM. Seventy-four patients were operated due to NEC. To ensure adequate perfusion pressure in all patients after surgery, we used of the minimal controlled hypertension (MCH) (dose dopamine 4.5 - 5 mg / kg / min.) with constant control of heart rate, blood pressure and hourly urine output. Infusion volume for TPN in the early postoperative period was reduced by 10 - 12% relative to the required daily volume. Ratio of protein and carbohydrate components of infusion - 1: 4 (in calories), and if was needed the volume of infusion was reduced to ratio 1:3.5. Risk of iatrogenic hiperhydration due to the high hydrophilicity of newborn tissues, especially premature babies with low and extremely low birth weight predetermined the need to reduce the volume of infusion.

Results: After the introduction into post-operative treatment the method of MCH in combination with a moderate decrease of the volume of fluid infusion in the early postoperative period, decreased incidence of renal dysfunction by 11% in patients with CIM and 6.5% - in patients with NEC, resulting in reduced mortality by 2.8% and 1.5% respectively.

Conclusions:
1. Use of the MCH in combination with a moderate decrease of the volume of fluid infusion in the early postoperative period reduces the risk of renal dysfunction.

2. The need to reduce the risk of hyperhydration has precedence over the desire to introduce the perfect amount of fluid to provide energy needs.
Objective: Nitric oxide, that plays essential role in lung development and maturation, is synthesized from the amino acid arginine by the action of NO-synthases (NOS). Asymmetric dimethylarginine (ADMA) is an endogenous inhibitor of NOS. Preterm infants have higher plasma ADMA concentrations than term infants, which could cause inhibition of NO synthesis and deterioration in pulmonary functions. We aimed to investigate the first day serum ADMA and L-arginine levels of infants with severe respiratory distress syndrome (RDS) that needs surfactant treatment and the relationship between 28th day serum ADMA and L-arginine levels and bronchopulmonary dysplasia (BPD).

Methods: A prospective cohort study was conducted including 73 preterm infants born with gestational age 32 weeks and birthweight 1500 g. Blood samples were obtained from all infants immediately after birth, and at postnatal 28th days of age. Severe RDS was defined as RDS with surfactant requirement and BPD as oxygen requirement at 36 weeks postmenstrual age.

Results: Mean birth weight and gestational age for the total cohort was 1138.69± 227.30 g and 28.33 ± 1.88 weeks respectively. The first day ADMA levels were significantly higher in infants with surfactant requirement (1.16 ±0.18 vs 1.00±0.22, p=0.002). First day L-arginine levels were similar between infants with and without surfactant requirement (22.84±2.33 vs 27.71±2.46, p=0.142). Plasma ADMA concentrations at 28th day was significantly higher in infants with BPD (1.01± 0.15 vs 0.89±0.17, p=0.007). Plasma L-arginine concentrations at 28th day were not different among infants with and without BPD (10.93± 7.92 vs 11.70 ±1.6, p=0.302). Using the ROC curve, the cut-off level of 0.875 µmol/ for ADMA at 28th day offered the best predictive value for oxygen requirement at postnatal 36 weeks of age with a sensitivity of 88%, a specificity of 54%.

Conclusion: ADMA levels are increased in preterm infants with RDS and BPD. Higher levels of ADMA can reduce NO synthesis, which could interfere with postnatal lung development and function, leading to BPD.
Background: Congenital pyloric atresia (CPA) is very rare with variable presentation. Commonly, it occurs as an isolated lesion which has an excellent prognosis, but it can also be familial or seen in association with other hereditary conditions.

Patients and methods: 20 patients with CPA were reviewed.

Results: 20 patients (9M:11F) with CPA were treated. 7 were full term and the remaining were prematures. Their mean birth weight was 2.1 kg (1.1 - 3.9 kg). Polyhydramnios was seen in 13 (65%). 2 were brothers and 4 were members of the same family. Isolated CPA was seen in 7 (35%), associated with epidermolysis bullosa in 8 (40%) and in 5 it was associated with hereditary multiple intestinal atresias (HMIA). All were operated on except 2 who died preoperatively. Intraoperatively, 11 had pyloric diaphragms, 4 had pyloric atresia with a gap and 3 had pyloric atresia with no gap. 11 with pyloric diaphragms had excision of diaphragms and pyloroplasty. 5 had gastro-duodenostomy. One of them also had duodeno-jejunostomy for associated distal duodenal atresia and excision of duplication cyst. One had reduction duodenoplasty, gastroduodenostomy, and duodeno-jejunostomy. 3 patients with associated esophageal atresia, one of them had gastrostomy and gastrojejunostomy, another had ligation of the fistula, gastrostomy and colostomy for associated anorectal malformation while the 3rd had ligation of fistula, end to end esophageal anastomosis, gastroduodenostomy and anoplasty for anterior ectopic anus. Post-operatively, all did well initially, but subsequently, 12 died giving an overall survival of 40%. Sepsis was the main cause of death.

Conclusions: CPA is very rare and can occur as an isolated lesion which has a good prognosis. The association of CPA with epidermolysis bullosa and HMIA has a poor prognosis. Sepsis continues to be the main cause of death in these patients and an associated combined immunodeficiency should be excluded.
Outcomes of Prophylactic Indomethacin for Extremely Low Birth Weight Preterm Infants:
Experience in a Single Institution

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Background: Prophylactic indomethacin (PI) used in extremely low birth weight infants (ELBWI) has been shown to decreased severe intraventricular hemorrhage (IVH) and the need for surgical ligation of Patent ductus arteriosus (PDA). The long-term benefit of PI has been debated.

Objective: The aim of this study was to report the short-term and long-term outcomes of PI (Indo group) in our NICU, by comparing them with a retrospective, historical cohort (Control group).

Methods: We performed a retrospective review of all patients born ≤28 weeks gestation and weighing 1000g admitted to the Hsinchu Mackay Memorial Hospital NICU, Taiwan from 2006-2009. We used logistic regression to assess the short-term outcomes between two groups. Neurodevelopmental and composite outcomes at 24 months of age were assessed by Bayley II, cerebral palsy, blindness, and deafness.

Results: Data for 85 babies (Indo group=40, Control group=45) were analyzed. Infants in these two groups were comparable in intrapartum and demographic characteristics including GA, BW, mother’s age and education level, antenatal steroids, chorioamnionitis, PROM, inborn, mode of delivery, singleton births, gender, Apgar scores, and delivery room resuscitation. 12% of babies from Indo group need surgical ligation for PDA vs. 35.6% of babies from Control group (p=0.03). IP did not significantly decrease severe IVH, pulmonary hemorrhage, and mortality. There were no statistical differences in other short-term outcomes including RDS, NEC, CLD, sepsis, days of ventilation and hospitalization. Neurodevelopmental and composite outcomes at two years old also did not differ between groups.

Conclusion: PI decreased the need for surgical ligation of PDA. However, PI did not result in any improvement of other short-term outcomes and long-term neurodevelopmental outcomes at 2 years old in our population.
Difficulties Prolonging the ’30 second-rule’; An Audit of the Implementation of a ‘Delayed Cord-Clamping’ Guideline

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Background: ILCOR guidance recommends the use of delayed cord clamping as part of routine neonatal care but it is still not routine practice in all UK hospitals. After consultation with UK based colleagues an algorithm was developed that assigned infants a cord-clamping time according to their resuscitation needs. Well term infants have 2 minutes delayed cord-clamping, whilst those in need of resuscitation had cord clamping delayed for 30 seconds if there was no history of foetal distress or thick meconium

Objective: We audited the compliance of practice with the ‘cord-clamping’ protocol and subsequent jaundice readmission rates.

Methods: A total of 740 records were analysed of term babies born in the 3 months after the introduction of the policy. Data were collected for time of cord clamping, reason for not following the policy and readmission data for babies with jaundice.

Results: The data showed that 84% of well babies correctly had delayed cord-clamping of 2 minutes. 63% of babies in need of resuscitation but not in distress had an appropriate 30 second delay. 91% of babies in foetal distress did not have cord clamping as recommended. Jaundice readmission rates remained stable.

Conclusion: There is a significant variation regarding compliance after the introduction of this policy. For well babies compliance was high (84%) but there appears to be greater reluctance to implement delayed cord-clamping when there is a need for resuscitation with a lower compliance rate (64%). Documented reasons for non-adherence included ‘Doctors decision’, ‘anticipation of resuscitation’ and ‘emergent delivery’ (without the need for emergent post-partum care). We suggest greater clarity and guidance is required for delayed cord clamping, particularly when babies appear to need resuscitation, if this evidence based practice is to become routine practice in all delivery rooms.

Image Reference:(1)
Countess of Chester Cord-Clamping Guideline

Inform mother about timings of cord clamping

Well baby

Well baby

Caesarean birth

Vaginal birth

Dry with sterile towel and keep warm on mother’s legs

Skin to skin and keep warm

Do not clamp cord for at least 2 minutes

Appears to need resuscitation

Prolonged fetal Bradycardia or thick grade 3 meconium?

No

Maintain baby no higher than level of placenta. Keep dry and warm. Assess heart rate, breathing, tone. Clamp and cut cord after 30 seconds. Transfer to resuscitaire

Yes

Immediately clamp and cut cord and transfer to the resuscitaire
Introduction: The association of Hirschsprung’s disease (HD) and anorectal malformation (ARM) is rare association. The aim of this study is to highlight the frequency and co morbidity that may be related to this association.

Patients and methods: over a period of ten years eight cases with ARM found to have HD association. All cases were diagnosed by histopathology. Complete clinical and radiological assessment was done to all cases before correction.

Results: Their age at presentation ranged from 3 days to 10 years. The diagnosis started early during neonatal period only in three cases while in the remaining five cases was delayed either because of atypical symptoms or unsuspected association. Fecal fistula after closure of stoma and wound dehiscence are evident associated co morbidity.

Conclusions: routine rectal biopsy is important after ARM correction and before stoma closure.
Impact of Hypoalbuminemia in First Day of Life on Morbidity and Mortality in Preterm Infants

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Aim: Hypoalbuminemia in newborns is associated with morbidity and mortality in some specific diseases, however there are limited number of studies concerning the effect of hypoalbuminemia on mortality and morbidity in preterm infants. In our study we aim to investigate the impact of plasma albumin levels in first day of life on morbidity and mortality in preterm infants.

Material and Method: 147 infants born 32 weeks of gestation between 2010-2012 are included in the study. Maternal and neonatal demographics and postnatal morbidity and mortality rates are recorded. Hypoalbuminemia is considered as 3 gr/dl.

Results: Mean birth weight of the babies enrolled in the study was 1136±328.8 and mean gestational age was 29.0±2.0. Mean plasma albumin level in first day of life was found to be 2.8±0.52 gr/dl, albumin level was lower than 3 gr/dl in %54.4 (n=80) and lower than 2.5 gr/dl in %27.9 (n=41) of babies. Gestational age and birth weight is found to be significantly lower in hypoalbuminemic infants compared to infants with normal plasma albumin levels. Bronchopulmonary displasia rate was significantly increased in hypoalbuminemic babies. Plasma albumin level was lower less than 3 gr/dl in %46.2 and less than 2.5 gr/dl in %56.1 among babies who died; there was a significant correlation between mortality and low plasma albumin levels. Furthermore, it was found that babies with lower albumin levels died significantly earlier.

Conclusion: In our study we have found significantly increased rates of BPD in hypoalbuminemic infants. Mortality rate and time of death is found to be associated with plasma albumin levels.
Brain Reactive Oxygen Levels as Factor of Adaptation and Mental Retardation Damages in the Early Postnatal Period

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The background: Is studying intensity of Reactive Oxygen Species (ROS) generation in brain tissues at newborn rats, transferred intra-uterine hypoxia.

Objective: White not purebred pregnant rats at 2 weeks of gestation (n=8) and its offsprings (n=32).

Methods: Pregnant rats were exposed to chronic hypobaric hypoxia at 308 mm Hg 10 times daily. Concentration of malondialdehyde (MDA) and total superoxide dismutase (SOD) activity were evaluated on 1,3,5 days of life in total brain homogenates.

Results: It is established, that in norm in a brain of newborn rats the ROS production gradually amplifies by 5 day of life, making 123% from a similar parameter at birth. SOD activity in these terms is authentically increased, making 145% from a parameter at birth. Chronic intra-uterine hypoxia promotes accumulation of MDA in brain tissues already to the moment of birth (138% from the control) and to 5 day of life (189% from the control). SOD activity at birth was increased up to 180% from the control, and by 5 day is sharply reduced, making only 50 % from the control.

Conclusion: Changes of redox status of brain tissues in early postnatal period may be considered as a risk factor of disturbances of adaptation and mental development.
Changes of Reactive Oxygen Species Levels in Brain as the Factor of Adaptation and Mental Retardation Damages in the Early Postnatal Period

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Diagnostics of Cytomegalovirus Infection in Newborns

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Objective: Study of immune status indices in newborns in cases of late detection of cytomegalovirus (CMV) DNA in blood and urine.

Methods: 122 newborns with non-specific clinical symptoms were studied. Typing of lymphocytes relating to different clusters CD3+, CD3+CD28+, CD40, using monoclonal antibodies produced by IMMUNOTECH (France) have been performed. Expression of membrane markers of immunocompetent cells was measured on a laser flow cytfluorometer Beckman COULTER Epics XL II. In 102 newborns CMVI has been confirmed by the positive result of PCR, while in 20 newborns the negative result was obtained. In 20 three-month old babies, who had a negative result following DNA diagnostics in the first month of their life, cytomegalovirus in blood and urine and increase of anti-CMV IgG have been found, which allowed to diagnose CMVI.

Results: Analysis of multidimensional non-linear relationships using PolyAnalyst 3.5 Pro package revealed factors which are significant for the diagnosis of CMVI, namely CD3+, CD3+CD28+, CD40. The following formula reflecting the dependence of CMVI on CD3+, CD3+CD28+, CD40 content in newborns having non-specific clinical symptoms in cases of late detection of CMV DNA has been offered: (CD3+) 69,3. In case the inequality is valid then ((CD3+CD28+)*0,008*CD40 - 0,08*(CD3+CD28+)+0,726)/(CD40 -0,733). In the reverse case then (0,086*CD40 -0,131) / (CD40 -7,333). If the result of calculation is more 0,4671 we can prognosticate the presence of CMVI. Accuracy 87%. If the result of calculation is less 0,4671 we can prognosticate the absence of CMVI. Accuracy 89%. p  0,00001. Sensitivity – 87%, specificity – 89%. Prognostic value of the positive result is 8, that of the negative result is 6,9.

Conclusions: The above formula is an early marker of CMVI in newborns.