infants exposed to labetalol ± $MgSO_4$ on day 1 (μ = 0.71) and 2 (μ = 0.82) than in non-exposed infants (μ = 0.23, p = 0.04 and μ = 0.55, p = 0.007, respectively). rFTOE was not influenced by MADs (p > 0.05), corrected for GA and $paCO_2$ of the first 48 hours.

CONCLUSIONS

We found a decreased cFTOE on days 1, 2 and 4, and an increased sFTOE on days 1 and 2. The decrease in cFTOE may be related to either increased cerebral perfusion or neurologic depression induced by the medication itself, or preferential brain perfusion associated with placental insufficiency (fetal brain-sparing). The latter is supported by the concomitant increase in sFTOE. rFTOE remained stable, which may be related to renal autoregulation.

ABS 15

SERUM NEUTROPHIL GELATINASE-ASSOCIATED LIPOCALIN AS AN EARLY MARKER OF ACUTE KIDNEY INJURY IN NEONATES WITH HYPOPLASTIC LEFT HEART SYNDROME

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INTRODUCTION

Acute kidney injury (AKI) is a primarily described complication after unbalanced systemic perfusion in neonates with congenital heart defects, including hypoplastic left heart syndrome (HLHS). Neutrophil gelatinase-associated lipocalin (NGAL) is postulated to be a potentially new and highly specific and sensitive marker of AKI.

The aim of the study was to compare umbilical as well as 24 hours after birth NGAL levels between neonates born with HLHS and healthy infants, and to analyze whether the determination of NGAL level could predict AKI in neonates with prenatally diagnosed HLHS.

PATIENTS AND METHODS

Prospective cohort study was conducted from January 2012 to May 2014 in a third degree reference neonatal care unit in Katowice, Poland. Fourty-seven neonates, with prenatally diagnosed HLHS, were enrolled as the study group and 30 healthy neonates served as controls. Perinatal characteristics and postnatal parameters were extracted from the hospital neonatal database. Blood samples were collected from umbilical cord blood and peripheral vein 24 hours after birth in all enrolled newborns. We assessed serum molality as well as serum NGAL, creatinine and lactate levels in all cases.

RESULTS

Elevated NGAL levels were observed among 9 neonates with HLHS and diagnosed AKI stage 1, in comparison to those newborns without AKI, both in umbilical cord blood (94.7 [58.6-130.9] ng/ml vs. 36.5 [26.9-46.0] ng/ml; p < 0.001) and 24 hours after birth (137.5 [81.9-193.1] ng/ml vs. 40.9 [32.5-49.2] ng/ml; p < 0.001). However, we observed a significant increase in the concentration of creatinine after 24 hours in neonates with AKI in comparison to healthy children (1.5 [1.2-1.7] mg/dl vs. 0.9 [0.8-0.9] mg/dl; p < 0.001). Furthermore, it was noticed that in newborns with HLHS and AKI, there was a significantly lower serum molality 24 hours after birth in comparison to umbilical cord blood molality (279.1 [275.0-283.2] mmol/kg H_2O vs. 284.0 [280.2-287.8] mmol/kg H_2O). Initial serum NGAL in umbilical cord blood and 24 hours after birth could predict, with high sensitivity and specificity, AKI in neonates with HLHS.

CONCLUSIONS

Elevated serum NGAL measured in umbilical cord blood and 24 hours after birth reliably indicate AKI in neonates with HLHS.

ABS 16

A PROSPECTIVE STUDY INTO THE GENERATION OF INDIVIDUALISED OPTIMAL MEAN ARTERIAL BLOOD PRESSURE (MABP) MEASUREMENTS USING NEAR-INFRARED SPECTROSCOPY (NIRS) IN THE PRETERM NEONATE

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INTRODUCTION

In the preterm neonate, disturbances in cerebral blood flow (CBF) are implicated in haemorrhagic and ischaemic pathology. Maintenance of a 'normal' mean arterial blood pressure (MABP) that ensures adequate perfusion of the brain is vital in the first hours of life. Previously, investigations into optimising adult cerebral perfusion pressure (CPP) have shown an

association between deviation from an individualised CPP level and bad outcome. Using a near-infrared spectroscopy (NIRS) sensor which measures a surrogate for CBF, the tissue oxygenation index (TOI), an optimal MABP (OptBP), where cerebral-vascular reactivity is strongest, can be computed. For OptBP to be clinically applicable, estimates need to be generated soon after monitoring is commenced.

PATIENTS AND METHODS

With informed parental consent, 33 preterm infants with a median (range) age of 26^{+6} (23^{+3}-31^{+0}) weeks gestation, and a median (range) weight of 793 g (540-1,350) were studied for the first 48 hrs of life. Using a NIRO®-200NX (Hamamatsu, KK, Japan), TOI was recorded continuously with MABP and stored using ICM+ (Cambridge, UK) software. Using Pearson's r between TOI and MABP over a 5-min window using 10-s averages an autoregulation index was constructed. Using a 4-hr sliding window, a histogram of MABP vs. TOI was constructed using a number of different parameters (**Tab. 1**) to generate 6 variations of the automatic U-shaped curve method where the curve's turning point was defined as OptBP (Aries et al., 2012). Percentage presence of OptBP over the whole study and in the first 6 hrs was analysed.

RESULTS

Optimal BP values were successfully calculated in 97% of subjects. In those where OptBP was calculated, mean percentage success (mean, SD; range) of detecting OptBP values was 31.0% (15.9; 2.1-63.8). When all methods were aggregated together using the median, percentage success increased to 51.2% (18.3; 18.6-86.3). No significance differences were found between any techniques (Kruskal-Wallis; p = 0.99) but significance was found when the aggregate OptBP was added (p < 0.001). In the first six hours of each study, OptBP was successfully calculated in 94% of subjects. The average OptBP percentage was 34.8 (27.9; 0.0-99.3) and when aggregated together OptBP value was 56.0 (31.8; 0.0-100.0). No significant differences were found between optimal MABP techniques (p = 0.99) and when adding the aggregate method (p = 0.064). Normality was determined by K-S test (p > 0.05), histogram and Q-Q plots.

CONCLUSIONS

Using a new aggregated technique of multiple histogram generating methods we have shown that the amount of continuous OptBP measurements made per patient can be increased by an average of 20% (**Fig. 1**). This method is successful in most

Table 1 (ABS 16). Parameters used to construct a histogram of mean arterial blood pressure (MABP) vs. tissue oxygenation index (TOI).

Method	Histogram Parameters			
	Min Value (mmHg)	Max Value (mmHg)	Number of Bins (k)	Bin Width (h)
1	12.0	80.0	24	2.0
1	12.0	80.0	$\left\lceil \frac{\max x - \min x}{h} \right\rceil$	2.0
2	Min of Data	Max of Data	$\sqrt{n}$	2.0
3	Min of Data	Max of Data	$\lceil \log_2 n + 1 \rceil$	2.0
4	Min of Data	Max of Data	$\left\lceil \frac{\max x - \min x}{h} \right\rceil$	$\frac{3.5\sigma}{n^{1/3}}$
5	Min of Data	Max of Data	$\left\lceil \frac{\max x - \min x}{h} \right\rceil$	$2\frac{IQR(x)}{n^{1/3}}$

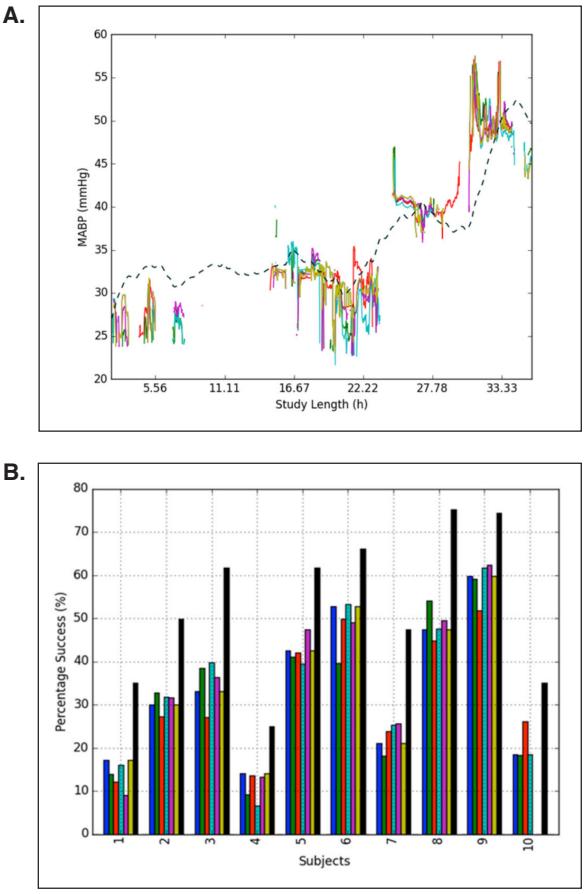

Figure 1 (ABS 16). Plot of Optimal BP (OptBP) plotted for different histogram variations (**A**) and the 4-hr rolling mean MABP (blue dotted line) of a single subject (**B**). Percentage success of OptBP measures across 10 subjects, black OptBP indicates the median grouping of all other OptBP measures (**B**).

patients and also is effective earlier in recording, which will add to the ability of continuous monitoring and calculation of OptBP to be performed earlier than previously reported.

Placenta and prenatal factors

ABS 17

THE EFFECTS OF SKIN-TO-SKIN ON PLACENTAL TRANSFUSION: A NONRANDOMIZED PILOT CONTROLLED TRIAL

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INTRODUCTION

The benefits of skin-to-skin and delayed cord clamping are two term birth practices endorsed by the World Health Organization. Skin-to-skin encourages bonding, improves thermoregulation and supports early initiation and duration of breastfeeding. Delayed cord clamping increases red cell volume and can boost infant iron stores during the first six months of life. Little is reported in the literature as to how these two practices interact. Placental transfusion is enhanced by gravity, time and contractions. When skin-to-skin, the infant is placed on the maternal abdomen above the level of the placenta. This may interfere with an infant receiving its full placental transfusion.

PATIENTS AND METHODS

A pilot controlled trial of 32 healthy term pregnant women and infants who were consecutively assigned to one of four umbilical cord clamping groups: immediate (< 10 seconds), delay of two minutes, delay of five minutes or cord milking (x 5). Infants were held skin-to-skin immediately after birth and remained for at least 30 minutes. Before delivery of the placenta, placental residual blood volume (PRBV) (the amount of blood left behind in the placenta and a proxy for the blood volume the infant did not receive) was drained into a blood collection bag and weighed. At 36-48 hours, infant capillary hematocrit and total serum bilirubin levels were measured. Infant well-being was assessed at 2, 7 and 14 days. The study was approved by the institutional review board.

RESULTS

No differences were reported in maternal and infant demographic and safety characteristics. Cord clamping time differed per assignment. Infants who received a five minute delay had a significantly lower PRBV (reported in ml/kg of birth weight) compared to infants who received immediate clamping ($p < 0.0001$) or a two-minute delay ($p < 0.005$). There was no significant difference in PRBV between the immediate and two-minute delay groups ($p = 0.14$). Total serum bilirubin levels did not differ across the four groups. Infants with a five-minute delay had a higher 36-48 hour hematocrit level compared to those receiving immediate clamping (49.7 + 6.2 vs. 60 + 3, $p = 0.013$). None of the infants had a hematocrit level > 65%. Two infants in the immediate group had a hematocrit level < 47%. None of the infants received phototherapy while in-hospital.

CONCLUSIONS

When the infant is placed skin-to-skin after birth, waiting to clamp the umbilical cord for five minutes can promote a significantly higher placental transfusion compared to a two-minute delay or immediate clamping. A five-minute delay is a simple intervention that allows the infant held skin-to-skin to receive a full placental transfusion with no apparent adverse outcomes.

ABS 18

ASSOCIATION BETWEEN INDUCED LABOR AND FETAL STRESS HORMONE RELEASE

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INTRODUCTION

Vaginal delivery evokes a dramatic surge in fetal stress hormones, including arginine vasopressin (AVP), which supports infant's transition from intra-uterine to extra-uterine life. Oxytocin is widely used for the induction of labor at term and a prophylactic approach to 'prime' the fetus before planned caesarean section (PCS) in order to reduce neonatal morbidity has been proposed. However,