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MEETING ABSTRACT Open Access

Hypoglycemia and hyperglycemia in extremely low-birth-weight infants

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Background

Glucose metabolism disorders are common in extremely low birth weight (ELBW) infants and are associated with high morbidity and mortality [1-9]. This study was conducted to evaluate the prevalence and risk factors associated with both hypo and hyperglycemia in ELBW infants.

Materials and methods

All inborn ELBW neonates admitted to our NICU during a 5-year period were eligible for this retrospective analysis. Exclusion criteria were: birth weight (BW) <400 grams, major congenital malformations, death during the first 24 hours of life. Hypoglycemia was defined as blood glucose level (BGL) ≤45 mg/dL; hyperglycemia as BGL>240 mg/dL in a single determination or >180 mg/dL in two determinations at 2-hour intervals. Continuous intravenous insulin infusion was started after an ineffective glucose restriction.

Results

Of 195 ELBW infants, 29 (14.8%) were excluded and 166 (GA 26.7 2.1 weeks, BW 751 152 grams) were analyzed and grouped to their BGL. Normoglycemia was observed in 79 neonates (47.6%) (N-Group); 80 neonates (52.4%) showed abnormal BGL: 21 (12.7%) were hypoglycemic (Hypo-Group), 53 (31.9%) hyperglycemic (Hyper-Group) and 13 (7.8%) showed both hypoglycemia and hyperglycemia (Hypo&Hyper-Group). Clinical characteristics of the groups are reported in Table 1. Hypo-Group respect to N-Group showed a higher rate of small for gestational age (SGA) neonates (p=0.03). Hyper-Group in comparison to N-Group showed a tendency toward a lower GA (p=0.05), lower BW (p<0.001), higher sepsis rate (p<0.001), higher rate of treatment with inotropic agents (p=0.02), corticosteroids (p=0.006) and nonsteroidal antiinflammatory drugs (p=0.01). Hypo&Hyper-Group respect to N-Group showed similar GA, lower BW (p<0.001), higher sepsis rate (p<0.01), higher rate of inotropic treatment (p=0.04). Insulin was administered in 35 neonates (66%) of Hyper-Group and in 8 neonates (61.5%) of Hypo&Hyper-Group. Intraventricular Hemorrhage (IVH) rate was higher in Hyper-Group and Hypo&Hyper-Group respect to N-Group (p=0.002) as well as IVH grade3 (p=0.001 and p=0.02, respectively).The rate of both Retinopathy of Prematurity (ROP) and ROP ≥stage 2 in survived neonates was higher in Hyper-Group respect to N-Group (p=0.008 and p=0.002, respectively). Mortality was similar among the groups (Table 2).

Conclusions

Among ELBW infants, hypoglycemia occurs more frequently in SGA neonates, while hyperglycemia alone or a marked variability of BGL (hypo and hyperglycaemia) is more common in sick neonates. High rate of glucose homeostasis disorders highlights the importance of carefully monitoring BGL in order to a prompt management. Continuous glucose monitoring recently used in neonates [10] might be a useful tool for monitoring glucose changes also in ELBW neonates.

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Table 1 Demographic data and risk factors in the study groups

	N-Group N=79	Hypo-Group N=21	Hyper-Group N=53	Hypo&Hyper-Group N=13
GA (wks), *mean±SD*	26.8±2.0	27.7±2.4	26.1±2.1	26.8±1.8
BW (g), *mean±SD*	808±136	719±140	695±146	692±140
Male, n (%)	17 (21.5)	10 (47.6)	26 (49.0)	8 (61.5)
SGA, n (%)	22 (27.8)	11 (52.3)	16 (30.1)	4 (30.7)
Apgar[1] <6, n (%)	39 (49.3)	9 (42.8)	34 (64.1)	8 (61.5)
Apgar[5] <6, n (%)	8 (10.1)	0	9 (16.9)	2 (15.3)
Intubation, n (%)	47 (59.4)	11 (52.3)	37 (69.8)	10 (76.9)
Antenatal Steroid, n (%)	64 (81.0)	17 (80.9)	41 (77.3)	12 (92.3)
RDS, n (%)	66 (83.5)	19 (90.4)	49 (92.4)	13 (100)
Sepsis, n (%)	16 (20.2)	4 (19.0)	32 (60.3)	7 (53.8)
Inotropic Agents, n (%)	26 (32.9)	6 (28.5)	28 (52.8)	8 (61.5)
Xanthines, n (%)	70 (88.6)	20 (95.2)	50 (94.3)	13 (100)
Postnatal Steroid, n (%)	11 (13.9)	3 (14.2)	18 (33.9)	3 (23.0)
NEC, n (%)	6 (7.5)	2 (9.5)	5 (9.4)	4 (30.7)
Medical treatment for PDA, n (%)	34 (43.0)	8 (38.0)	34 (64.1)	9 (69.2)
Surgical Procedures, n (%)	5 (6.3)	3 (14.2)	7 (13.2)	2 (3.7)

RDS: Respiratory Distress Syndrome; PDA: Patent Ductus Arteriosus; NEC: Necrotizing enterocolitis

Table 2 Complications and outcome in the study groups

	N-Group N=79	Hypo-Group N=21	Hyper-Group N=53	Hypo&Hyper-Group N=13
IVH, n (%)	17 (21.5)	7 (33.3)	25 (47.1)	8 (61.5)
IVH (grade 3, n (%)	5 (6.3)	1 (4.7)	15 (28.3)	4 (30.7)
ROP all stages in the survivors, n (%)	49 of 61 (80.3)	10 of 16 (62.5)	35 of 35 (100)	7 of 8 (87.5)
ROP > stage 2 in the survivors, n (%)	35 of 71 (57.3)	9 of 16 (56.2)	35 of 35 (100)	6 of 8 (75)
Mortality, n (%)	18 (22.7)	5 (23.8)	18 (33.9)	6 (46.1)

IVH: IntraventricularHemorrhage; ROP: Retinopathy of Prematurity

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