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A Case Report Of Persistent Neonatal Hyperinsulinism Successfully Treated With A Trial of Diazoxide

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Case study

A near-term infant was born at 36 weeks and 4 days' gestation. Birth weight was 2.7kg, just below the 75th centile. Baby required resuscitation, intubation and ventilation. There was no history of diabetes in pregnancy. Blood gas at 45 minutes of age showed pH 7.3, pCO2 5.6, HCO3 19.9, BE -5.4, Glucose <1 mmol/L

Dextrose 10% bolus at 2.5 ml/kg was administered followed by Dextrose 10% infusion at 60 ml/kg/day. IV Benzylpenicillin and Gentamicin were also administered.

Dextrose 10% infusion has to be increased to 90ml/kg/day as glucose was low at 2 hours of age.

Investigations and further management

The results of the hypoglycaemia screen were as detailed below. Insulin levels were 91 pmol/L. Cortisol levels were 143 nmol/L. Growth hormone levels were 14 ng/ml. Ammonia was 47 micromol/L. Genetic tests showed no ABCC8 or KCNJ11 abnormality. These results confirmed hyperinsulinism. Management of this case was undertaken liaising closely with paediatric endocrinology team at the regional tertiary hospital.

Glucagon was used initially at 10mcg/kg/hour. Chlorothiazide was used at 5mg/kg/day in 2 divided doses. Octreotide 1mcg/kg 4 hourly as per regional guidelines. In addition, 2.5% polycal was used. Diazoxide was added after 1 month.

Summary

We present a case of a near-term newborn infant with persistent neonatal hypoglycaemia secondary to hyperinsulinism. First blood gas in the first hour (see below) showed satisfactory gas exchange albeit with very low blood glucose.

Blood gas result: pH 7.3, pCO2 5.6, HCO3 19.9, BE -5.4, Glucose <1 mmol/L

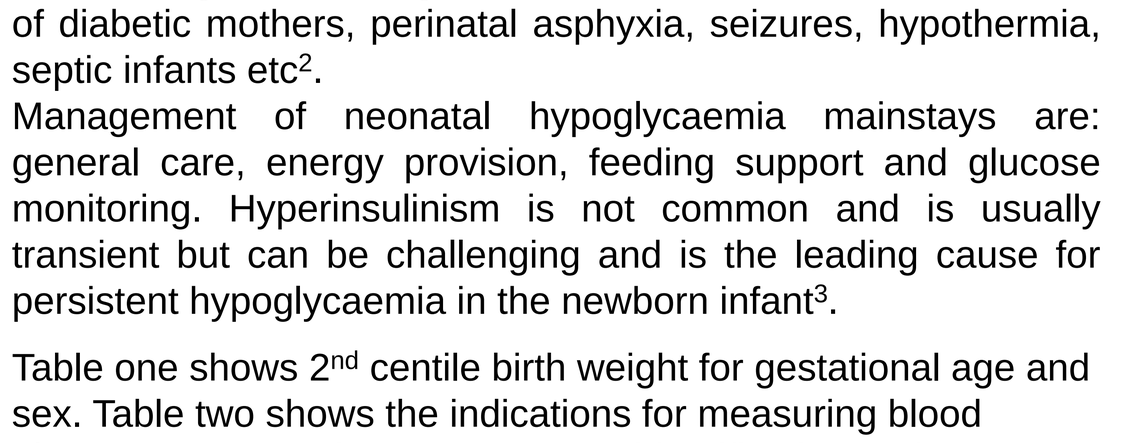
Dextrose 10% bolus at 2.5 ml/kg was administered followed by Dextrose 10% infusion at 60 ml/kg/day. First line antibiotics were also administered to cover presumed neonatal sepsis. Dextrose 10% infusion has to be increased to 90ml/kg/day as glucose was low at 2 hours of age (1.8 mmol/L). The results of the hypoglycaemia screen as detailed above in the stem confirmed hyperinsulinism.

Discussion

Hypoglycaemia is the commonest metabolic abnormality in the neonatal period[1]. There are several risk factors for neonatal hypoglycaemia where monitoring blood glucose is required e.g. IUGR, prematurity, maternal B-Blocker use in the 3rd trimester or at the time of delivery, birth weight below or equal to 2nd centile for gestational age and sex, macrosomic infants, infants of diabetic mothers, perinatal asphyxia, seizures, hypothermia, septic infants etc[2].

Management of neonatal hypoglycaemia mainstays are: general care, energy provision, feeding support and glucose monitoring. Hyperinsulinism is not common and is usually transient but can be challenging and is the leading cause for persistent hypoglycaemia in the newborn infant[3].

Table one shows 2nd centile birth weight for gestational age and sex. Table two shows the indications for measuring blood glucose concentration as per BAPM identification and management of neonatal hypoglycaemia in the full term Infant: framework for practice[4]. Table 3 shows BAPM indications for intervention in managing a term infant with neonatal hypoglycaemia.



Tab. (1): BAPM, Birth weight centile chart, 2nd centile for age and sex

Birth weight on 2nd centile / kg		
Gestational age / weeks	Boys	Girls
37	2.10	2.00
38	2.30	2.20
39	2.50	2.45
40	2.65	2.60
41	2.80	2.75
42	2.90	2.85

Tab. (2): BAPM Indications for measurement of blood glucose concentration in newborn infants

1. Perinatal acidosis: perinatal acidosis (cord arterial or infant pH < 7.1 and base deficit ≥ -12 mmol/L
2. Hypothermia: <36.5°C not attributed to environmental factors
3. Suspected or confirmed early onset sepsis.
4. Cyanosis
5. Apnoea
6. Altered level of consciousness
7. Seizures
8. Hypotonia
9. Lethargy
10. High pitched cry

Tab. (3): BAPM Identification and Management of Neonatal Hypoglycaemia in the Full-Term Infant: Indications for intervention.

1. A value < 1.0 mmol/L at any time.
2. A single value <2.5 mmol/L in a neonate with abnormal clinical signs.
3. A value < 2.0 mmol/L and remaining < 2.0 mmol/L at next measurement in a baby with a risk factor for impaired metabolic adaptation and hypoglycaemia but without abnormal clinical signs.

Conclusion

Awareness of hyperinsulinism as a cause of neonatal hypoglycaemia, arranging appropriate investigations, referrals and commencing on appropriate treatment regimen is crucial to ensure a good outcome. Liaising with regional endocrinology and applying regional and national guidelines should be followed in the management of this rare but serious cause of persistent neonatal hypoglycaemia which can be resistant to standard treatment.

Arranging neurodevelopmental follow up is warranted following persistent or severe hypoglycaemia[5].

References and further reading

1.Tin W. Defining neonatal hypoglycaemia: a continuing debate. Semin Fetal Neonatal Med. 2014 Feb;19(1):27-32. doi: 10.1016/j.siny.2013.09.003. Epub 2013 Oct 19. PMID: 24148999.

2.Stomnaroska O, Petkovska E, Jancevska S, Danilovski D. Neonatal Hypoglycemia: Risk Factors and Outcomes. Pril (Makedon Akad Nauk Umet Odd Med Nauki). 2017 Mar 1;38(1):97-101. doi: 10.1515/prilozi-2017-0013. PMID: 28593892.

3.Lord K, De León DD. Hyperinsulinism in the Neonate. Clin Perinatol. 2018 Mar;45(1):61-74. doi: 10.1016/j.clp.2017.10.007. Epub 2017 Dec 6. PMID: 29406007.

4. https://www.bapm.org/resources/40-identification-and-management-of-neonatal-hypoglycaemia-in-the-full-term-infant-2017.

5. Cresto, J., Abdenur, J., Bergada, I. and Martino, R., 1998. Long term follow up of persistent hyperinsulinaemic hypoglycaemia of infancy. *Archives of Disease in Childhood*, 79(5), pp.440-444.