Hypoglycaemia of the neonate

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Why is glucose important?

• It provides 60-70% of energy needs

• Utilization obligatory by red blood cells, brain and kidney as major source of energy

• Other tissues: Glucose uptake under the influence of insulin
Glucose in the newborn

• Almost all fetal glucose comes from mother via transplacental facilitated transport

• Severing of the umbilical cord interrupts source of glucose
Glucose in the newborn

- Newborn must rapidly respond with hepatic glycogenolysis
  - In response to adrenaline
  - Facilitated by falling insulin levels
Definition of hypoglycaemia

- Blood glucose < 2.0 mmol/l
- Serum glucose < 2.5 mmol/l
Etiology

↓ Glucose

↓ Supply

↓ Production

↑ Use
↓ stores
  - Prematures
  - SGA
  - IUGR
  - Chronic intra-uterine asphyxia
• Inborn errors of metabolism
• Endocrine disorders
• Maternal oral hypoglycaemic drugs
• Hypothermia
• Delayed onset of feeding
↑ insulin

- Infant of diabetic mother
- Beckwith-Wiedemann syndrome
- Perinatal asphyxia
- Abrupt interruption of glucose infusion
- Umbilical artery catheter tip near celiac or superior mesenteric artery
- Nesidioblastosis
- Erythroblastosis fetalis
• Normal insulin
  – Sepsis and shock
  – Respiratory distress
  – Polycythaemia, hyperviscosity
  – Anaerobic glycolysis due to decreased tissue perfusion
Symptoms and signs of hypoglycaemia

• Due to deranged cerebral metabolism

• Non-specific, difficult to recognize

• Must monitor risk groups
Symptoms and signs of hypoglycaemia

- Lethargy, irritability
- Hypotonia
- Poor feeding, poor suck
- Apnoea attacks
- Bradycardia
- Hypothermia
- Jitteriness and/or tremors
- Convulsions
Who should be monitored?

• Prematures
• LGA/SGA
• Infants of diabetic mothers
• Erythroblastosis fetalis

• Infants requiring NICU, e.g. sepsis, birth asphyxia
• Infants of mothers treated with beta adrenergic or hypoglycaemic drugs
• Those receiving TPN
When should glucose levels be checked?

- 1 hour after birth in at-risk infants
- Thereafter 2 hourly for first 8 hours
- 6 hourly for rest of the 24 hours
Management

• FEED!

• Commence feeds within 2 hours of birth in at-risk infants

• Low blood sugar in asymptomatic baby may be managed by an oral feed and monitoring of blood sugar
Management: Intravenous glucose

• Indication
  • Not tolerating oral feeds/unable to feed
  • Symptoms of hypoglycaemia
  • Oral feeds not maintaining glucose >2.2mmol/l
  • Glucose <1.4mmol/l
Management: Intravenous glucose

- Hypoglycaemia <2.0 mmol/l
  - 10% glucose at 6-8mg/kg/min
    - Glucose still <2.0 mmol/l
      - 12.5-15% glucose infusion (requires central line or UVC)
    - Glucose >2.0 mmol/l
      - Wean IV glucose slowly while introducing oral feeds
  - Still poor control: Diazoxide, glucagon, steroids
    - Investigate further
Management: Intravenous glucose

• Bolus infusions are generally not recommended

  – Hyperosmolar solution

  – Effects on insulin levels

  – Unacceptable metabolic stress
Special categories

Infant of diabetic mother
Persistent hypoglycaemia
Infant of the diabetic mother (IDM)

- Prevent with good pre-conceptual glucose control
- Good diabetic control in pregnancy decreases the risk of majority of problems
IDM: Pathogenesis

• Maternal hyperglycaemia

• Continuous hyperinsulinism and accelerated growth

• Relative immaturity for gestational age
IDM: Complications

Congenital malformation (5-13%)

- Neural tube or vertebral defects
- Sacral agenesis
- Cardiac malformations
  - VSD
  - Transposition
  - Coarctation
IDM: Complications

- Birth injuries
  - Brachial plexus injuries
  - Humerus fractures (due to shoulder dystocia)

- Hypoglycaemia

- Poor feeding and sucking

- Jaundice

- Hypocalcaemia

- Respiratory distress syndrome

- Polycythaemia

- Cardiomyopathy

- Small left colon syndrome

- Renal vein thrombosis – Macroscopic haematuria
Persistent hypoglycaemia

• Requires >8-10mg/kg/min infusion to maintain >2.8mmol/l

• Longer than 1 week
Persistent hypoglycaemia

Investigate for rare causes

- Insulin
- Growth hormone
- Cortisol
- ACTH
- T4, TSH
- Glucagon
- Plasma amino-acids
- Urine
  - Ketones
  - Reducing substances
  - Organic acids