Perioperative management of diabetic patients

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Introduction
Diabetes is very common amongst hospital inpatients, and both hypoglycaemia and hyperglycaemia can be associated with adverse outcomes. Glycaemic management is an important part of optimising perioperative patient care.

Case 1 – Miss Smith is a 30 year old female who presents to the emergency department with appendicitis, on a background of Type 1 diabetes mellitus. She is planned for an appendectomy and is now nil by mouth.

1. What are the key management principles?
   - A management plan to maintain normal metabolic state
   - Prevent ketosis
   - Keep blood glucose levels to appropriate target for an inpatient – this will prevent dehydration and electrolyte disturbances
   - Considerations:
     - Type of diabetes - this patient needs insulin as Type 1 diabetes is an absolute deficiency of insulin
     - Emergency versus elective surgery
     - Duration of fasting – patients on emergency lists may have unpredictable duration of fasting/meals
     - Short term in-hospital trend in glucose control
     - Biochemistry

2. What information do we need to ask regarding her diabetes?
   - Type of diabetes
     - Need to document her Type 1 diabetic status clearly and inform anaesthetics
   - Insulin type, timing and doses
   - HbA1c
   - Weight
   - Complications of diabetes e.g. chronic kidney disease

3. How does the approach differ between Type 1 and Type 2 diabetes?
   - Insulin deficient patients:
     - WHO: Diabetic patients who need a constant supply of exogenous insulin, ie:
       - Type 1 Diabetics
       - Patients with diabetes secondary to chronic pancreatitis and
       - Type 2 diabetics requiring basal bolus insulin in the community (often insulin deficient)
     - These patients must have insulin continued when nil by mouth
     - Involve the endocrine team, or general physician
     - Management:
       - Continue basal insulin e.g. Lantus
• Skip short acting/prandial insulin for the meal missed e.g. Novorapid
• If likely to be NBM for >2 meals, or emergency case, consider insulin dextrose infusion

• Type 2 diabetics
  o Not likely to become ketotic
  o If only on oral hypoglycaemicals – omit oral hypoglycaemicals
  o If usually on basal insulin and oral hypoglycaemicals – omit oral hypoglycaemicals, continue regular basal insulin

4. What investigations would you perform in a patient with diabetes preoperatively?
• UECs – check potassium, creatinine
• HbA1c – chase the result by asking patient, calling the GP or order the test

5. Approach to management of blood sugar levels whilst fasting
• Emergency cases/unwell patients will need IV insulin and dextrose infusion
  o Involve a senior to organise
  o Monitor BSL hourly if on IV insulin
  o Refer to hospital protocol for insulin/dextrose infusion
• If the patient is relatively well, continue basal insulin with additional corrective doses as needed e.g. novorapid
  o Monitor BSL 2-4 hourly preoperatively, hourly intraoperatively/ in recovery, then 2-4 hourly whilst transitioning, then QID when eating normally
• Consider if patient requires other fluids for their primary admitting diagnosis e.g. shock in septic patients
• Once recovered post operatively, recommence their usual insulin regime – basal insulin e.g. Lantus to start whilst on IV insulin, and then short acting/meal time insulin when ready to eat and take down insulin infusion 1hr later
• IV insulin has a short half-life and thus there needs to be overlap between the insulin infusion and subcutaneous insulin
• Consult the endocrine team, general physician and/or anaesthetics for advice

Case 2 – Mr Jones is a 70 year old gentleman who is planned for an elective total knee replacement. He has a background of Type 2 diabetes controlled with metformin and gliclazide MR.

1. How does your management strategy differ from the previous case?
• Mr Jones is not likely to be insulin deficient given he has been managed with oral agents in the community
• He is not likely to require insulin unless he has had poorly controlled diabetes in community or a perioperative event occurs
• In preadmission clinic, consider contacting the GP to obtain an HbA1c – this can help to identify problems and improve outcomes
• Q6hrly BSL preoperatively, 1-2hrly intraoperatively/in recovery, q4hrly until eating, then QID
• Metformin should be withheld from the night before due to the rare risk of lactic acidosis, and restarted when eating and eGFR shown to be unchanged
• Gliclazide to be withheld on the day, and restarted when eating
• Sodium dependent glucose transporter (SGLT2) inhibitors
  o New class of oral hypoglycaemic agents
  o Rarely associated with euglycaemic DKA, so restart cautiously only if sure patient is well hydrated, not nauseated or vomiting. Withhold the day before OT if planning for bowel prep
• Maintenance fluid – avoid IV glucose unless BSL<6
2. Would you consider starting insulin in the short term whilst in hospital?
   • Consider starting insulin if BSLs >10
   • Inpatient food, activity and stressors are different in hospital and can affect BSLs

3. This patient is found postoperatively to have a BSL of 21 pre-dinner. The procedure was uncomplicated. How should we manage this?
   • Clarify HbA1c prior to admission to determine if this is a new or ongoing issue
   • This is significant hyperglycaemia warranting insulin
   • Commence basal-bolus insulin regime in conjunction with senior advice
   • If the patient is not elderly and has preserved renal function start with total insulin of 0.4units/kg/day, split into: 0.2units/kg/day as a basal dose e.g. Lantus; and 0.2units/kg/day split 3 ways into pre-meal short acting insulin e.g. Novorapid
     (eg: If Mr Jones weighed 80kg, he could commence 16 units of Lantus, and 5 units TDS of Novorapid)
   • Could check ketones and venous blood gas if concerned regarding deteriorating vital signs, nausea, vomiting

4. Take home messages
   • Patients with Type 1 diabetes or other forms of insulin deficient diabetes need basal insulin continued whilst fasting
   • As diabetics transition across perioperative period, they need close monitoring and may need insulin adjusted daily
   • If on insulin-dextrose infusion, patients need overlap when transitioning between subcutaneous insulin and IV insulin
   • Type 2 diabetes on oral hypoglycaemics
     o Withhold oral hypoglycaemics and restart when eating again
     o If on oral hypoglycaemics plus basal insulin, continue basal insulin and withhold oral hypoglycaemics

Reference