Perioperative management in Diabetes Mellitus

Introduction

- Diabetics undergo surgery at higher rate than non-diabetics
- peri-operative morbidity and mortality are greater in diabetics
- Result partly from controllable factors such as regulation of perioperative bloodglucose concentration
- therefor the most important aspect of disease considered in surgery and anaestesia is

  CONTROL OF THE DISEASE !

The metabolic challenge of surgery in diabetic patient

The immediate perioperative problems facing the diabetic patient are:

- surgical induction of the stress response with catabolic hormone secretion which is normally antagonised by insulin.
- interruption of food intake which may be prolonged → resulting catabolic response with ketoacidosis more severe in diabetics
- altered consciousness which masks the symptoms of hypoglycaemia and necessitates frequent blood glucose estimations

Aims of perioperative management :

1. Avoid hypoglycaemia (irreversible cerebral damage)
2. avoid excessive hyperglycemia→osmotic diuresis and severe dehydration
3. avoid large swings in glucose; maintain bloodglucose in range of 6-10mmol/l
4. prevent ketoacidosis
5. avoid electrolyte disturbances eg hypokalaemia

Insulin…

therefor:

perioperative insulin is needed for transport of glucose into cells and counter catabolic effects of increased stress hormones

Preoperative assessment

- Aimed at:
  - presence of complications
  - treatment regimes
  - evaluating blood glucose control

Preoperative assessment: Presence of complications

- Complete history and physical examination
- Focus on :
  - Cardiovascular function: ?silent ischemia
  - Renal: ? proteinuria
  - Autonomic neuropathy: look for presense of orthostatic hypotension,resting tachycardia,loss of heart rate variability during respiration
  - Presence of infection

Preoperative assessment: Presence of complications

- Side-room investigations:
  - Urine dipstix: ?ketonuria,?proteinuria,?glucosuria,?infection
  - Random blood glucose with fingerprick: good control? poor control?
- Special investigations:
  - CXR: infections? heartsize?
  - ECG: ?still miocardial infarction or ischemia
  - U+E: ?kidney function
  - ?HbA1c: >9% poor control ~ 3weeks
  - ? Bloodglucose: >11mmol/l poor control

Preoperative assessment: Treatment regimes

- **Sulphonylureas:**
  - Long-acting sulphonureas: Chlorpropamide has very prolonged duration of action(t½=35h)
  - Can cause hypoglycaemia
  - Stop 2-3days before surgery
- **Biguanides/metformin**
  - raise blood lactate levels
  - can precipitate lactic acidosis
  - stop 1week before Ø esp in patients with
  - liver and kidney pathology (lactate degraded in liver and kidneys therefor longer halflife)
  - acceptable to stop 1-2days before Ø in others

In both cases change to shortacting sulphonylureas eg.glibenclamide,glicazide

Preoperative assessment: Treatment regimes

- **Insulin:**
  - intermediate and short acting insulins:
    - can continue
  - long-acting insulin:
    - stop days before if possible and substitute with intermediate of shorter acting insulin

Preoperative assessment: Control of bloodglucose

- urine testing: ?Ketones,
- random bloodglucose measurements: >11mmol/l is not under control
- HbA1c:±3weeks, >9% inadequate control

Perioperative management:

Pre operative

Day of surgery

Postoperative

Preoperative management:

- measure blood sugar preoperatively,4hly for IIDM& 6hly for NIDDM
- test urine for ketones
- place first in operating list: period of npo minimised
- avoid lactate containing fluids eg. Ringer's lactate
- If Good control:
  - replace metformin and chlorpramide with shorter acting agent
  - terminate all agents 24hrs preop
- If poor control:
  - with ketonuria: delay none urgent surgery and control
  - without ketonuria: earlier hospitilisation,start sliding scale insulin regime
  - insulin must be administered Subcut every 6 hrs acc to sliding scale
  - the dose variation if the sliding scale will depend upon the severity of the diabetes

Preoperative management: Sliding Scale example

Bloodglucose(mmol/l)	Insulin(units)
8-10	5
10-15	10
15-20	15
>20	20

- If ketonuria additional 5U

Day of Surgery:

- management depends upon the magnitude of surgery including the estimated time to resumption if oral intake
  - minor surgery: if pt can be expected to eat and drink within 4 hours of surgery
  - major surgery: if Pt NPO > 4hrs

Day of surgery:
Minor Ø:

- omit oral hypoglycaemic drug
- measure blood glucose
  - 1hrly pre-op
  - once during operation
  - post op 2hly until eating
  - then 8hrly
- restart oral hypoglycemics (type2) / normal SC insulin regime (type1) with 1st meal

Day of surgery:
Major Ø

- check blood glucose and K preop
- omit oral hypoglycaemics/normal SC insulin
- start iv infusion with glucose,insulin & K(GIK)
  - add 10-15units Actrapid plus 10mmol KCl
  - infusion of 500ml 10% dextrose
  - Infuse at 100ml/h
  - provides: insulin 2-3 u/h, glucose 10g/h & K+ 2mmol/h
- Measure bloodglucose 2hly
- if infusion not maintaining glucose within normal limits →increase rate

Post operative management:

- NIDDM(Type2)&minor Ø
  - stop infusion and restart oral hypoglycemics when eating
- IDDM &major Ø:
  - check glucose 2-6hrly
  - continue infusion sliding scale until oral diet re-established
  - when oral diet resumed give daily dosage of insulin as preoperative divided into tds
  - adjust doses until levels stable
  - once requirements stable restart normal regime

References:

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Thank you!