Revision Lectures on General Principles of Surgery

A Guide for Surgical Trainees



Srinivasan Ravi

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Chapter 47

Diabetes and surgery

In terms of ward care, the get it right first (GIRFT) programme in the UK found that *people with diabetes undergoing surgery had an excess length of stay of 3 days.* This is related, at least in part, to suboptimal inpatient diabetes management. The implications of insulin resistance have been discussed in an earlier chapter.



The suboptimal level of inpatient care for diabetics increases the duration of their inpatient treatment.
The capillary blood glucose (CBG) in the perioperative period should be maintained between 6 and 12 mmol or 110 to 210 mg/dL.

The discussion here is based on the perioperative management of the surgical patient with diabetes 2015 (Nathanson MH, Dhatariya K) (Reviewed in 2020).

The following are some of their *key statements and recommendations:*

- Studies have shown that high preoperative and perioperative glucose and glycated haemoglobin (HbA1c) levels are associated with poor surgical outcomes. These findings have been seen in both elective and emergency surgery
- One study showed that the adverse outcomes may be due to *failure to identify diabetes* or hyperglycaemia, *polypharmacy* with unrecognised errors in prescription, as well as presence of *comorbidities* including *micro- and macrovascular disease.* The adverse outcomes in such patients include:
  - Greater than 50% increase in *mortality*
  - 2.4-fold increase in the incidence of postoperative *respiratory infections*
  - Doubling of *surgical site infections*
  - Threefold increase in postoperative *urinary tract infections*
  - Doubling in the incidence of *myocardial infarction*
  - Almost twofold increase in *acute kidney injury*

Paradoxically, there are data showing outcomes of patients with diabetes may not differ from non-diabetics if diabetes is recognised and addressed before surgery. The reasons for this may be due to increased vigilance surrounding glucose control for those with diabetes.

Recommendations

- Glycaemic control should be checked at the time of referral for surgery
- Information about duration, type of diabetes, current treatment and complications should be made available to the secondary care team
- Preoperative testing should include urea and electrolytes and ECG for all patients with diabetes; however, a random blood glucose measurement is not indicated

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- *Surgery should be scheduled at the start of the theatre list* to minimise disruption to the patient's glycaemic control
- With appropriate guidance, patients with diabetes should be allowed to retain control and possession of, and continue to self-administer, their medication. *Many patients will have several years' experience and be experts in self-medication*
- The aim is to avoid hypo- or hyperglycaemia during the period of fasting and the time during and after the procedure, until the patient is eating and drinking normally
- *All patients must have their CBG (capillary blood glucose) checked on admission on the day of surgery*

Guidelines for patients on *insulin* for operations with short starvation period with *no more than one missed meal*

Those on *once daily dose* with drugs like Lantus insulin:
- Reduce dose by 20% on the day before surgery
- Check blood glucose on admission
- If a patient requires *variable-rate intravenous insulin infusion (VRIII)* (see below) then continue at 80% of the usual dose

Those on *twice daily insulin*, short-acting, (Novorapid and humulin S), and long-acting insulin
- No dose change needed on the previous day
- Halve the usual morning dose; check blood glucose on admission; leave evening meal dose unchanged
- If VRIII is being administered, then stop the insulin

Guideline for perioperative adjustment of oral hypoglycaemic agents (short starvation period – no more than one missed meal) is also available on https://doi.org/10.1111/anae.14663

Drugs that require omission when fasting due to risk of hypoglycaemia:
- Drugs such as sulphonyl urea (e.g. glibenclamide, gliclazide and glipizide)
- Take normally on the day before surgery
- For *morning operations* if once daily dosage, then *omit the morning dose.* If on a twice daily dose, then omit the morning dose
- For *afternoon operations* omit the drug for the day
- If VRIII is being used, *stop* oral medications until eating and drinking normally

Drugs that require omission when fasting *due to risk of ketoacidosis*
- Sodium-glucose cotransporter-2 (SGLT-2)
- Similar to management of sulphonylurea

Drugs that may be continued when fasting:
- Metformin, acarbose, dipeptidyl peptidase IV (DPP-IV) inhibitor [e.g. sitagliptin, glucagon-like peptide-1 (GLP-1) analogue (e.g. exenatide, and pioglitazone)]

Use of a variable-rate intravenous insulin infusion

- Variable-rate intravenous insulin infusions are preferred in patients who will miss more than one meal
- Those with type 1 diabetes mellitus undergoing surgery who have not received background insulin

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- Those with poorly controlled diabetes (defined as a HbA1c > 69 mmol/mol, 8.5%)
- Most patients with diabetes requiring emergency surgery
- Variable-rate intravenous insulin infusions should be administered and monitored by appropriately experienced and qualified staff

Glycaemic control in patients with diabetes is a balance between their carbohydrate intake and utilisation (e.g. exercise). It also depends on what medication they take and how those medications work.

The time of day and the expected duration of the operation need to be considered, as well whether the VRIII will be needed.

Patients with continuous subcutaneous insulin infusions only missing one meal should be advised to maintain their CBG at 6–10 mmol/L. If longer periods of starvation are predicted, a VRIII should be used and specialist advice sought.

Further readings

1. Nathanson MH, Dhatariya K. Peri-operative management of the surgical patient with diabetes 2015. Anaesthesia 2019; 74:810.
2. Frisch A, Chandra P, Smiley D, et al. Prevalence and clinical outcome of hyperglycemia in the perioperative period in noncardiac surgery. Diabetes Care 2010; 33:1783–1788.
3. Kwon S, Thompson R, Dellinger P, et al. Importance of perioperative glycemic control in general surgery: a report from the surgical care and outcomes assessment program. Ann Surg 2013; 257:8–14.

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Revision Lectures on General Principles of SURGERY
A Guide for Surgical Trainees

"Revision Lectures on General Principles of Surgery: A Guide for Surgical Trainees" is a concise and high-yield revision guide tailored for Final MBBS and MRCS students. Derived from the bestselling *Snippets in Surgery* (Volumes 1 and 2), this edition presents essential surgical principles in a structured and accessible format. Designed for quick revision, it blends core concepts with engaging historical insights, clinical relevance, with self-drawn illustrations to enhance understanding and retention. With additional chapters on surgical nutrition, trauma response, and insulin resistance, the book also delves deeper into ethical principles, including transfusion medicine and damage limitation surgery. An ideal companion for Foundation and Core Trainees, this volume provides a logical and comprehensive approach to mastering key surgical topics.

Key Features

Key contents from *Snippets in Surgery*, (Volumes 1 and 2) have been chosen and condensed to enable rapid review for surgical examinations. Volume 2 is scheduled for publication shortly.

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- Expanded discussion on ethical principles including blood transfusion
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Srinivasan Ravi served as a Consultant General Surgeon at Blackpool Teaching Hospitals and is currently a visiting Professor of Surgery at KS Hegde Medical Academy, NITTE (Deemed to be University), Mangaluru, Karnataka, India. He has over 40 years of surgical experience in the the National Health Services (NHS) UK and is dedicated to medical education. He was the Head of the Department of General Surgery and established 'Paediatric' surgery alongside Alder Hey Paediatric Hospital in Liverpool. In 2008, he introduced minimally invasive colorectal surgery and local anesthetic hernia repairs at the Blackpool Teaching Hospital. He is a member of the Court of Examiners at the Royal College of Surgeons of England. A gold medalist graduate from Mysore University, he completed his undergraduate studies at KMC Manipal/Mangalore and earned an MS in General Surgery from Madras University at JIPMER, Puducherry. Additionally, Professor Ravi served as a Surgical Tutor for the Royal College of Surgeons of England, where he was instrumental in establishing the first Basic Surgical Skills course in the northwest of England. His role expanded as he became a STEP tutor and moderator for the Royal College and Postgraduate Tutor (Hospital Dean) at his institution. In this capacity, he managed the transition to the broad-based 'foundation programme', with his hospital being one of the select few chosen to pilot this initiative.

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