Perioperative fasting and the management of type 2 diabetes

Type 2 diabetes is the most common form of diabetes, affecting approximately 90 per cent of people with the condition. The global incidence of diabetes is rising and the number of people affected is projected to exceed 300 million by the year 2025 (World Health Organization, 2003). Type 2 diabetes results from insulin resistance and/or a relative lack of insulin production. It is progressive and many patients may require dietary modifications, oral hypoglycaemic medication, and/or insulin to obtain good glycaemic control. Good control has been shown to reduce the complications of diabetes (UK Prospective Diabetes Study Group, 1998).

Surgery and type 2 diabetes The care of people with diabetes in hospitals is often inadequate (Audit Commission, 2000). This is highlighted as a standard for improvement in the National Service Framework for Diabetes: Standards (Department of Health, 2001).

Pre and postoperative fasting and management of type 2 diabetes present problems that this article will address. However, the evidence base for this topic is limited and practice is based largely on best clinical opinion. Because of this, practice differs between trusts and it is important that readers consult local policies when caring for patients with diabetes.

Effects of fasting and surgery Surgery induces a complex series of hormonal and metabolic changes including the secretion of ‘stress’ hormones such as catecholamines, glucagon, growth hormone, and cortisol. This sympathetic response raises hepatic glucose production. People without diabetes counteract this effect by an increase in insulin secretion. However, patients with type 2 diabetes are unable to respond in this way, which may lead to dangerous hyperglycaemia (Gill, 1997).

Patients who are prescribed insulin or insulin-secretion stimulating medication such as sulphonylureas may experience hypoglycaemia as a result of perioperative fasting. When these patients are anaesthetised, it is difficult to identify the usual warning signs of hypoglycaemia and this is potentially life threatening. Metformin should be discontinued the evening before surgery. Interpretation of these results cannot be taken in isolation and depends on the patient’s assessment.

Methods used to manage pre and postoperative fasting and type 2 diabetes depend on:

* The severity and nature of the surgery or procedure;
* The amount of endogenous insulin (insulin produced by the body) present in the patient;
* Whether the patient is treated with insulin.

In general, treatment regimens should not aim for the normal blood-glucose level (4–7 mmol/L) in the immediate pre and postoperative period. Blood-glucose levels between 7–11 mmol/L are preferred so that the risk of hypoglycaemia can be avoided.

Minor surgery or procedures The following recommendations can be used for patients whose diabetes is well controlled on diet alone, or diet and oral medication. If diabetes control is poor and surgery is necessary, recommendations listed in the section ‘major surgery’ should be followed.

Diabetes treated with diet only A patient whose diabetes is well controlled by diet and who requires planned minor surgery or investigations will not need special preparation. It is advisable, as a minimal measure, to monitor blood glucose before and after surgery (Nattrass, 1996).

Oral hypoglycaemic agents Patients who are prescribed oral hypoglycaemic agents and have good diabetic control can normally take their medication up to and including the day before surgery. They should omit their dose on the morning of surgery. Patients taking longer-acting sulphonylureas such as chlorpropamide, glibenclamide or glimepiride should omit these drugs several days before surgery due to the risk of hypoglycaemia. These drugs may temporarily be replaced by doses of insulin or short-acting oral hypoglycaemic agents (Krentz and Bailey, 2001). Oral hypoglycaemic agents can usually be reintroduced with the first postoperative meal.

Metformin, an oral hypoglycaemic drug, may provoke lactic acidosis (British Medical Association and Royal Pharmaceutical Society of Great Britain, 2004). Metformin is contraindicated in renal impairment as there is reduced clearance of lactate. Contrast mediums used in radiological procedures can cause impairment of renal function (contrast medium-induced nephrotoxicity). Metformin should be discontinued the evening before surgery or investigation if renal function is normal, and insulin should be given if required. After investigations

**KEY WORDS**

Type 2 diabetes

Surgery

Fasting

**REFERENCES**


BOX 1. THE USE OF IV INSULIN

A patient with type 2 diabetes controlled normally with soluble insulin before meals and isophane insulin before going to sleep at night has returned from theatre. His blood glucose is now 13.7mmol/L, he feels better and able to eat but he has an insulin infusion. What should you do for this patient?

IV insulin is very quickly utilised by the body but subcutaneous soluble insulin takes approximately 30 minutes to be absorbed. Therefore, 30 minutes before his meal his normal dose of subcutaneous soluble insulin should be given. If the patient eats his meal without vomiting, the IV insulin can be discontinued.

Example, 10 units are added to the bag if the capillary blood glucose is low, and this is increased up to 20 units if the capillary blood glucose is more than 11mmol/L. The dextrose infusion needs to be changed each time the dose of insulin is changed. This is considered to be the simpler and more effective method of delivering insulin intravenously.

When an insulin infusion is used, the patient does not need to be first on the surgical list. It may be beneficial to go later as this allows a period of time when the blood glucose can be stabilised on the infusion (Nattrass, 1996).

Following surgery, patients who are normally controlled on subcutaneous insulin will usually have subcutaneous injections when they are able to eat. Patients whose diabetes is controlled by oral hypoglycaemic agents may need to be prescribed subcutaneous insulin until their glycaemic control is stable.

IV insulin is quickly utilised by the body and should not be discontinued until after the subcutaneous insulin is administered, and following the first postoperative meal (Box 1).

It is important to remember that the stress response to surgery may lead to hyperglycaemia so insulin doses may need to be increased for several days after surgery until satisfactory control is achieved.

Monitoring To maintain safety and stability of glycaemic control, careful blood-glucose monitoring should occur. Capillary blood-glucose measurements should be made at least every two hours on the day of surgery (or hourly if the patient is receiving IV insulin). This can be reduced when the patient is stable (Gill, 1997).

Bowel preparation Patients may have a low residue or clear fluid diet for 24 hours or more before bowel investigations such as a colonoscopy. Patients whose type 2 diabetes is treated with oral hypoglycaemic agents or insulin should be encouraged to liaise with their local diabetes centre for specific individual advice.

In most cases patients can continue their normal medication. They should replace carbohydrates with sugary fluids and monitor their blood glucose to ensure they do not become hypoglycaemic. Patients whose diabetes is controlled on insulin should be told to halve their insulin dose on the evening before the investigation.

Conclusion Patients with diabetes are subject to specific risks when they undergo surgery. Collaboration is required between professionals caring for these patients. They must share knowledge, experience and expertise, and develop an appropriate evidence base that will lead to improvements in care and clinical outcomes.