

## Anaesthetic Management during Surgery in a Patient of Gastrointestinal Perforation with Diabetic Ketoacidosis

Sudhir Kumar Bisherwal<sup>1</sup>, Hiranmay Barman, Arundhati Dalai and Ravi Shankar Prasad

*Institute of Medical Sciences, Banaras Hindu University, India*

**Corresponding author:** Sudhir Kumar Bisherwal, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh 221005, India, Tel: +917379167800; E-mail: [sudhir.bisherwal@gmail.com](mailto:sudhir.bisherwal@gmail.com)

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### Abstract

Patients with diabetes are often encountered for anaesthesia and surgery. Diabetic ketoacidosis is a common condition which is caused by production of ketones because of deficient insulin. Its prevalence can be as high as 30% in diabetic patients. Elective surgery is to be postponed in patients of DKA. Mortality is increased in patients of ketoacidosis undergoing surgery and hyperglycemia associated with diabetes is associated with increased hospital stay and increased incidence of wound infection. In this case, we present anaesthetic methods used for a patient in DKA undergoing exploratory laparotomy for peritonitis secondary to bowel perforation.

**Keywords** Diabetes mellitus; Diabetic ketoacidosis; Emergency laparotomy; Perforation peritonitis

### Introduction

Diabetes is fast gaining the status of an epidemic in world. By the year 2030, the world prevalence of diabetes may increase to 7.7% in adults [1,2]. Diabetic ketoacidosis is a known complication of diabetes and needs prompt treatment. It often presents as acute abdomen, cellulitis or diabetic foot which might require emergency surgery. It is a condition in which the attending physician has to be on his toes as any delay in treatment may lead to increase in morbidity and mortality of patient. The case report highlights management related to disease, anaesthesia and associated complications.

### Case History

A 48-year-old male patient, mechanical labourer by profession, with moderate built, came to surgery emergency with chief complaints of pain in abdomen since 10 days and abdominal distension since 5 days. On further work up and investigations he was diagnosed as a case of gastro intestinal perforation and it was decided to take up the patient for exploratory laparotomy. On further history taking it was found that the patient is a diagnosed case of diabetes mellitus and was on oral hypoglycaemic drugs. He stopped taking his medicines 1 month back when he started having mild abdominal discomfort which got relieved by taking medicine from a local practitioner. There was no history suggestive of hypertension/ asthma/ seizure/ or heart disease.

On arrival in operation theatre, patient was having sunken eyes and dry oral mucosa. Patient had heart rate of 140 beats/min and Blood Pressure was 116/72 mmHg. His respiratory rate was 25 per minute and oxygen saturation was WNL. On ABG of previous night, his S. potassium was 3.45 mmol/L, HCO<sub>3</sub> was 17.2 mmols/L and his anion gap was 22.2 mmols/L. On measuring blood sugar by strip method it came to be 370 mg/dl. Urine was sent for urine ketones which subsequently came positive. Erect X ray film showed air under diaphragm. Patient was taken as case of gastro intestinal perforation with known diabetes mellitus and presenting with features suggestive

of diabetic ketoacidosis with abdominal septic foci as precipitating factor.

Insulin was started as infusion through 100 ml pipet. Patient was premedicated with midazolam 1.5 mg and fentanyl 200 micrograms. Rapid sequence induction was performed with Propofol 120 mg and Succinylcholine 100 mg IV with continuous cricoid pressure. An 8.0 mm endotracheal tube was inserted and was fixed after auscultating bilateral air enter and confirmation of etco [2]. Patient was handed over to surgeons for surgery. Surgery lasted 1hr 45 minutes in which total of 4 litres of normal saline was infused and serial monitoring of blood sugar was done and target was to reduce the blood sugar by not more than 75 mg per hour. Supplemental potassium was given at the rate of 20 meq per hour during intraoperative period. Intra operative urine output was 50 ml. Intraoperative findings were appendicular perforation with gangrenous cecum and ascending colon up to hepatic flexure. Necrotic segment was removed with right hemicolectomy and end ileostomy was made.

Patient was extubated after attainment of adequate power and consciousness. Patient was managed according to GKI regimen in surgery ward. ICU call was made on POD<sub>2</sub> and the patient was taken to ICU with tachypnoea. Patient was intubated because of respiratory distress and insulin was started as continuous infusion. Subsequently his surgical stitch line got infected while in ICU and had to be opened up for secondary healing. Ileostomy started working and Ryle's tube feed was started. He was subsequently extubated and later sent back to ward on POD28.

### Discussion

The prevalence of diabetes is steadily increasing over the past few decades. The growing population of diabetics poses a challenge to anaesthetist for their perioperative management. A good glycaemic control in perioperative period has been associated with better outcomes in terms of mortality and morbidity.

Diabetic ketoacidosis is less common in type II than type I diabetics. It is an emergency and requires prompt treatment and carries a mortality of up to 5 % [3]. Diabetic ketoacidosis is precipitated by

inappropriate insulin therapy and concurrent illness, infection being the most common. Other factors include cerebrovascular accidents, myocardial infarctions. American diabetes association defines DKA as blood glucose >250 mg/dl, plasma (HCO<sub>3</sub>) <18 mEq/L, plasma pH <7.30, an elevated anion gap, and evidence of ketones in blood or urine [4]. Raised blood glucose level causes osmotic diuresis and dehydration is almost universal. There can be a volume deficit of up to 100 ml/kg [4]. Ketoacidosis is treated with rehydration and insulin infusion with frequent electrolytes and blood gas monitoring. Elective surgery should be postponed in a patient of diabetic ketoacidosis.

DKA patients often present as acute abdomen [5] so it is necessary to do appropriate radiological investigations before a decision to cut open the abdomen is taken. In most cases, symptoms of acute abdomen will subside once DKA starts resolving.

Rapid correction of glucose levels should be avoided and it should not be more than 50-75 mg per hour [6] as rapidly reducing glucose would lead to brain edema and can further increase the mortality and morbidity.

Giving insulin would also cause a decrease in potassium levels and hence serum potassium needs to be monitored. The average deficit of potassium is 3 to 5 mEq/Kg [7]. If initially serum potassium is less than 3.3 meq/lit then potassium should be supplemented first and after that only insulin should be infused. Since laparotomy with closure of perforation needs to be performed to as soon as possible in perforation peritonitis, waiting for correction of hyperglucemia or ketosis is not

advisable and hence we took our patient for surgery and started the corrective measures side by side to the surgery.

## Conclusion

Diabetic ketoacidosis is a challenge not only for the anaesthetist when its patient presents for emergency surgery but also to physician when it comes to emergency. Management of fluid, electrolytes and blood glucose is the key for successful outcome.

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