

## Anesthetic management of an insulinoma patient with recurrent hypoglycemic seizures

Dear Sir,

Insulinoma is a rare neuroendocrine tumor, mostly benign, confined to the pancreas.<sup>[1]</sup> The patients of insulinoma present with recurrent hypoglycemic episodes, rarely with hypoglycemic seizures which resolve after correcting hypoglycemia. Insulinoma is diagnosed by clinical, radiological, and biochemical studies.<sup>[1]</sup> The hypoglycemic episodes are reduced by using diazoxide and somatostatin analogs such as octreotide.<sup>[2]</sup> The clinical diagnosis is made by using Whipple's triad. Surgical resection of the tumor is the definitive treatment. The main emphasis of intraoperative management is to maintain blood glucose levels more than 60 mg/dL before resection of the tumor and less than 180 mg/dL after resection of the tumor. We are reporting a case of successful management of insulinoma with recurrent episodes of seizures along with anesthetic nuances to keep in mind while managing such a case.<sup>[3]</sup>

A 50 years old male presented with chief complaints of multiple episodes of altered sensorium for the past 2 years, the frequency being one in every 2–3 months, and for the past 1 month, the frequency increased. He also had multiple episodes of seizures. Imaging of the brain done, which was normal. His blood glucose level at the time of the episode was 40 mg/dL. Computed tomography of the abdomen demonstrated a mass of size  $2.2 \times 1.5$  cm in the pancreatic head suggestive of insulinoma. The patient was started on 10% dextrose at the rate of 50 mL/h and continuous blood glucose monitoring was done. Multiple endocrine neoplasias I was ruled out by the absence of pituitary tumor (normal imaging of the brain) and normal serum calcium levels (ruling out primary hyperparathyroidism). Due to recurrent severe episodes of hypoglycemia leading to life-threatening seizures, the patient was planned for emergency enucleation of the tumor.

In the operation theater, under all aseptic precautions, the epidural catheter was inserted at T12-L1 interspace and the catheter fixed at 10 cm from the skin. The patient was induced with propofol 2 mg/kg, fentanyl 2 mcg/kg, and rocuronium 0.6 mg/kg and the airway was secured using 8.0-mm endotracheal tube. A central line was secured in the right internal jugular vein (IJV). Anesthesia was maintained by using propofol (total intravenous anesthesia). The depth of anesthesia was monitored using the bispectral index (BIS) and its value maintained between 40 and 60. Epidural infusion of 0.5% ropivacaine started at a rate of

5 mL/h. Random blood glucose monitoring was done every half-hourly. Ringer lactate was used as maintenance fluid. No episodes of hypoglycemia observed during the whole intraoperative period.

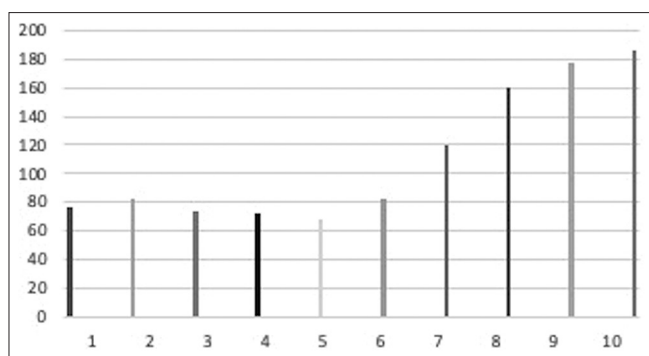
After completion of the surgery, a reversal of neuromuscular blockade was achieved with glycopyrrolate 0.6 mg and neostigmine 3 mg. The patient was shifted to a high dependency unit after extubation with stable hemodynamic parameters. Blood glucose was monitored every 2 h. Ropivacaine 0.2% was started through an epidural catheter at the rate of 5 mL/h for analgesia. Throughout the postoperative period, the patient was stable and discharged on the 8<sup>th</sup> postoperative day.

Maintaining blood glucose levels is the topmost priority in the anesthetic management of insulinoma. General anesthesia masks the symptoms of hypoglycemia. In general anesthesia, the symptoms of hypoglycemia are vague such as hypertension, sweating, and tachycardia. Even more so, such patients can have subclinical seizures recordable only on electroencephalogram (EEG) even under general anesthesia underscoring the importance of checking and maintaining blood sugar levels within the normal range. The symptoms of hypoglycemia can also be provoked in lighter planes of anesthesia, by hypovolemia and certain drugs.<sup>[4]</sup> The interval of blood glucose measurement in the intraoperative period is not well-defined in the literature. So, as suggested by Akhtaruzzaman *et al.*, blood glucose monitoring was done every 30 min intraoperatively.<sup>[5]</sup>

Duration of fasting can also affect intraoperative blood glucose levels. So, the patient was kept fasting for 8 h before surgery. Then, the patient was started on ringer lactate as maintenance fluid. Blood glucose monitoring was done hourly in the preoperative period.

As it is well-known that propofol does not increase insulin secretion,<sup>[6]</sup> total intravenous anesthesia with propofol was given with target-controlled infusion. Each mL of propofol has 1.1 kilocalories of energy.<sup>[7]</sup> Ringer lactate was used as a maintenance fluid. No incidence of hypoglycemia occurred during the intraoperative period.

Insulinoma is a tumor that secretes insulin in an erratic pattern. Figure 1 shows the blood glucose levels in the perioperative and intraoperative period. There may be



**Figure 1:** X-axis shows blood glucose measurement at different intervals and Y-axis shows blood glucose in mg/dL. 1-baseline 2-before induction 3-after intubation 4,5,6-at the time of tumor manipulation 7-after tumor removal 8,9,10-postoperative period

transient hyperglycemia after the resection of the tumor. Insulin infusion may be necessary if blood glucose is more than 180 mg/dL. Hypoglycemia can also occur if there is incomplete resection of the tumor.

To conclude, perioperative management of blood glucose levels is the topmost priority in the anesthetic management of insulinoma excision. Perioperative ringer lactate infusion, total intravenous anesthesia using a target-controlled infusion pump along with BIS monitoring will help in optimizing blood glucose levels in the perioperative and intraoperative period and successful management of a case of insulinoma posted for surgery.

#### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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#### Conflicts of interest

There are no conflicts of interest.

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