

Anaesthetic management of excision of a functioning pancreatic beta cell tumour

INTRODUCTION

Insulinomas were first described by Harris.^[1] They are usually small (<2 cm), solitary and benign (approximately 90%). Patients with insulinoma usually develop neuroglycopenic and sympathoadrenal symptoms due to hypoglycaemia. Severe hypoglycaemia can lead to seizures, permanent neurological deficits and coma. Weight gain is a common finding in 20–40% and is primarily due to overfeeding to overcome hypoglycaemia. Insulinoma is diagnosed by clinical, biochemical and imaging modalities. Clinically it is diagnosed by Whipple's pathognomonic triad^[2] of symptoms which includes; repeated attacks of hypoglycaemia, documented hypoglycaemia (plasma glucose levels <50 mg/dl) and relief of symptoms by glucose administration. Definitive treatment is surgical removal of the adenoma or either subtotal or total pancreatectomy. Major focus during surgery is prevention and control of wide swings in blood glucose levels. We report a successful anaesthetic management of a case of insulinoma.

CASE REPORT

A 22-year-old gentleman presented with the chief complaint of episodic difficulty in awakening from sleep in the morning for the past last 6 years. Frequencies of such episodes had increased for the

last 2 to 3 months. He used to recover after being given sugar syrup and had a history of seizures and weight gain. Computed tomography imaging revealed a 2.4 cm × 1.8 cm tumour in the uncinate process of the pancreas suggestive of insulinoma.

The patient was started on 10% dextrose infusion at the rate of 50 ml/h on the night before surgery and continued till tumour resection. General anaesthesia with epidural block was planned. Under local anaesthesia epidural catheter was inserted at T10-T11 intervertebral space. In addition to American Society of Anaesthesiologists standard monitoring central venous pressure, urine output and blood glucose were monitored during surgery. Blood glucose monitoring was obtained every 30 min using point of care glucometry (Free style, optium H®, Abbott Diabetes Care Ltd., O × 29 OYL, UK). Tracheal intubation was facilitated with 0.1 mg/kg vecuronium after anaesthesia induction with propofol 1.5 mg/kg and 2 µg/kg of fentanyl. Anaesthesia was maintained with oxygen, air and isoflurane. In addition to Ringer Lactate as maintenance fluid, 10% dextrose bolus of 50–100 ml was given during tumour manipulation. There was a single episode of hypoglycaemia (blood glucose of 35 mg/dl) immediately after tracheal intubation which was corrected with 25% dextrose (100 ml) and for the rest of the intraoperative period, the mean blood glucose value was 129 ± 42 (mean ± SD) mg/dl.

After completion of surgery neuromuscular block was reversed with injection neostigmine 2.5 mg and atropine 1.2 mg. Patient was extubated and shifted to high dependency unit with stable haemodynamics. Post-operative analgesia was achieved with epidural infusion of a mixture of 0.1% bupivacaine and fentanyl 2 µg/ml at the rate of 5 ml/h. Post-operative maintenance fluids comprised of Ringer lactate and dextrose normal saline. Post-operative blood glucose was monitored every second hourly for the first 48 h and then 4 times daily for the next 48 h. The mean blood glucose levels were 186.5 mg/dl (minimum - 159 mg/dl and maximum - 214 mg/dl) and 140.5 mg/dl (minimum - 118 and maximum - 156 mg/dl) on the first and second post-operative days respectively. Post-operative period was otherwise uneventful and patient was discharged on 10th post-operative day.

DISCUSSION

The perioperative maintenance and avoidance of wide fluctuations in blood glucose levels is of prime

importance in the anaesthetic management of a patient with insulinoma. Under general anaesthesia, signs of hypoglycaemia will be of sympathetic stimulation causing sweating, tachycardia, and hypertension and dilated pupils which can also occur due to hypovolemia, surgical stimuli, lighter surgical planes and drugs. Hence, detecting hypoglycaemia under anaesthesia is difficult. The only certain sign of hypoglycaemia is low blood glucose level which emphasises the importance of frequent monitoring of blood glucose levels. However, the time interval at which blood glucose levels need to be checked is not very much evident from the available literature. We chose to check blood glucose sampling every 30 min as suggested by Akhtaruzzaman *et al.*^[3] Patients can have hypoglycaemic attacks if they are kept fasting for long hours during the preoperative period. There are studies supporting the effect of fasting on deprivation of blood glucose level in insulinoma.^[4] Hence, 10% dextrose at the rate of 50 ml/h was started from 12:00 midnight the day before surgery and second hourly blood glucose monitoring was done in the preoperative period. General anaesthesia with propofol and epidural block was considered as previous case reports^[5,6] have suggested similar regimen for the patient undergoing surgical removal of insulinoma as propofol has no effect on insulin release and glucose regulation. Theoretically enflurane has been recommended^[7] as the inhalation of choice due to its advantage of increasing blood glucose levels by inhibiting insulin release. However, enflurane is no more available in the Indian market, and moreover it has inherent seizure-inducing potential. Hence, we chose to use isoflurane for maintenance of anaesthesia. Normocapnia was maintained thorough out the surgery as hypocapnia decreases cerebral blood flow and glucose delivery and hypercapnia causes symptoms similar to hypoglycaemia. As there are chances of severe hypoglycaemia during tumour handling, continuous infusion of 10% dextrose and blood glucose level monitoring every 10 min was done. Since the tumour was small, intraoperative ultrasound was performed to locate the tumour. Intraoperative ultrasound has a success rate of 86–90% in identifying small insulinomas. Total duration of anaesthesia lasted for 300 min. Blood glucose values measured during this period is depicted by a graph [Figure 1]. Normally tracheal intubation causes high sympathetic discharge which should increase the blood glucose levels. Decrease in blood glucose levels after tracheal intubation in our case could have been due to adrenocortical suppression or due to defective

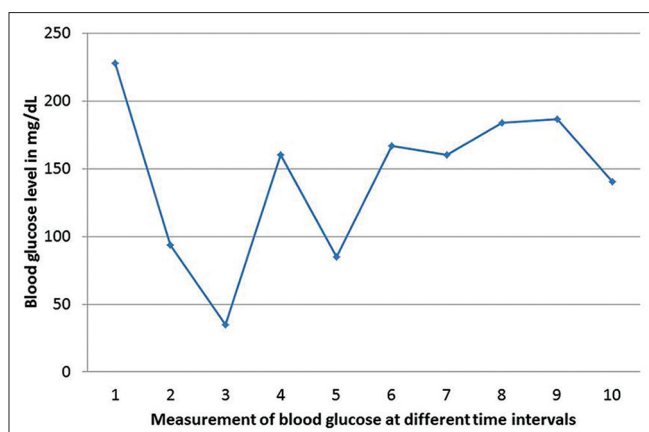


Figure 1: The values indicate trends in perioperative blood sugar in mg/dl at different time points. 1, baseline (in the morning); 2, before anaesthesia induction; 3, after tracheal intubation; 4, before tumour manipulation; 6, after tumour removal; 7, immediately after tracheal extubation; 8, 2 h after extubation; 5, 9, 10, mean blood glucose value during tumour manipulation, on the 1st post-operative day and 2nd post-operative day respectively

counter regulatory hormones.^[8] The drop in blood glucose levels (35 mg/dl) could also have been due to insulin release by insulinoma, which secretes insulin in an erratic oscillatory pattern, sometimes with large bursts of secretion, which could have coincided with tracheal intubation thus causing hypoglycaemia. Steroids have also been advised for refractory hypoglycaemia in insulinoma.^[9] Glucocorticoids increase insulin resistance, reduce glucose utilisation and increase hepatic gluconeogenesis. However, usefulness of steroid is doubtful and may lead to post-operative hyperglycaemia and increased chances of infection. In our patient, adequate blood glucose levels were maintained with dextrose infusion in the intra-operative period which was discontinued immediately after tumour resection as suggested by Chari *et al.*^[10] There may be transient hyperglycaemia in the post-operative period due to counter regulatory hormones and may require additional insulin therapy. Surgically missed tumour cells may also be a cause of post-operative hypoglycaemia. Hence, blood glucose monitoring should be continued in the post-operative period. In our patient, the mean blood glucose levels were 186.5 mg/dl (minimum - 159 mg/dl and maximum - 214 mg/dl) and 140.5 mg/dl (minimum - 118 and maximum - 156 mg/dl) in the 1st and 2nd post-operative day respectively.

CONCLUSION

Perioperative dextrose infusion with frequent blood glucose level monitoring helps in successful management of insulinoma posted for excision of the tumour.

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**Pasupuleti Hemalatha, R Sri Devi,
Aloka Samantaray, N Hemanth,
Mangu Hanumantha Rao**

Department of Anaesthesiology and Critical Care, Sri Venkateswara Institute of Medical Sciences, SVIMS University, Tirupati, Andhra Pradesh, India

Address for correspondence:

Dr. Pasupuleti Hemalatha,
Department of Anaesthesiology and Critical Care,
Sri Venkateswara Institute of Medical Sciences,
SVIMS University, Tirupati, Andhra Pradesh, India.
E-mail: madhugastro@gmail.com

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