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Case Report

Anaesthetic challenges in surgical enucleation of pancreatic insulinoma

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ABSTRACT

Insulinoma is a very rare tumour occurring in 1-4 persons per million per year. It is a functional endocrine tumour of the pancreas characterized by repeated attacks of hypoglycaemia presenting as adrenergic or neuroglycopenic symptoms. Surgical management of insulinoma is the mainstay of treatment which can be done by either laparoscopic or open approach. There is occurrence of rapid and wide fluctuations of blood glucose levels in the intraoperative as well as perioperative period. Intraoperative hypoglycaemia is critical due to masking of symptoms by the effect of anaesthesia and if not detected and treated promptly may lead to permanent neurological insult. We here-in describe the challenges of anaesthetic management in a case of functional pancreatic insulinoma undergoing open surgical enucleation with the help of intraoperative ultrasonography.

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1. Introduction

Insulinoma is a functional endocrine tumour of the pancreas. It is a very rare tumour occurring in 1-4 persons per million per year.[1] Majority of the lesions are benign, solitary, intra-pancreatic, less than 2cm in diameter (>90% cases) and are managed by surgical excision. Usual presentation is repeated hypoglycaemic episodes manifested by adrenergic or neuroglycopenic symptoms resulting from intermittent secretion of insulin by the tumour. The neurological and autonomic features of hypoglycaemia are masked under general anaesthesia and may lead to unwanted neurological sequelae. The disturbances in blood glucose level are more common during tumour handling intraoperatively and following tumour removal. The anaesthetic management during resection of insulinoma is mainly focussed on the detection and prevention of the rapid and wide fluctuations of blood glucose level in the perioperative period. Use of intra-operative ultrasound (IOUS) and palpation helps in localisation of insulinoma and ease the surgical removal.[2,3] Here we describe the anaesthetic management of a case of insulinoma enucleation via open approach.

2. Case Presentation

A 26-years-old man presented with history of repeated attacks of hypoglycaemia in the last one month and was diagnosed as having a small (1.4 cm) well defined hyper enhancing lesion in the anterior border of the body of the pancreas, suggestive of neuroendocrine tumour and likely to be insulinoma in view of the clinical picture. Patient was planned for enucleation of the tumour by open surgical approach. Initial serum insulin level was 6.63 μU/ml, c- peptide 1.93 ng/ml, thyroid stimulating hormone 1.13 mIU/ml, cortisol 12.1 μg/dl and HbA1C was 4.1%. Complete blood count, renal function test, liver function test, coagulation profile all were unremarkable. Patient had his dinner at 8pm the night prior to surgery and was kept nil

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by mouth thereafter. Pre-operative sedatives were not given so as to prevent the masking of hypoglycaemic symptoms. Patient was started on 5% dextrose normal saline @ 100 ml/hour and blood sugar was monitored at every 2 hours. Patient was planned for analgesia by thoracic epidural along with general anaesthesia. Two wide bore intravenous cannulas (18G and16G) were secured in both upper extremities, epidural catheter was placed at T_{10-11} level followed by induction of general anaesthesia using injection propofol 120 mg and fentanyl 100 μg iv. Patient's trachea was intubated with 8 mm cuffed endotracheal tube orally following relaxation using injection rocuronium 50 mg iv. Anaesthesia was maintained using oxygen with air and isoflurane. Analgesia was maintained intraoperatively using injection bupivacaine 0.125% + fentanyl 1μg/ml via epidural catheter @ 6 ml/ hour. Injection paracetamol 1 gm, injection. diclofenac 50 mg was administered slowly intravenously at the end of the procedure. Intravenous fluid was given @ 100 ml/hour using 10% dextrose normal saline. Blood sugar was monitored using glucometer sticks (Accu-chek active, Roche Diabetes Care, Inc. Indianapolis, Indiana) every 30 minutes, frequency increased to every 15 minutes during the period of tumour handling. Blood sugar level was in the range of 110-160 mg/dl all throughout the procedure with an exception during tumour localisation and handling when one value of blood sugar reached 48mg/dl. Fifty ml of 25% dextrose was used for that period and no further fall in blood sugar was noticed. Intraoperatively the tumour was located using palpation and ultrasound and enucleated successfully. Serum insulin sent half an hour following excision was 7.3 μU/ml. Extubation was done on table at the end of procedure following complete reversal of neuromuscular blockade using intravenous injection neostigmine 2.5 mg and injection glycopyrrolate 0.4 mg. C-peptide and serum insulin level monitored daily for next 2 days were found to be within normal range. Blood sugar measured every 2 hourly for 24 hours and 4 hourly for next 2 days were in the range of 100-185 mg% with only one value of 223 mg% in the first postoperative day. Patient was doing well postoperatively with normoglycemia on daily blood glucose measurements and was discharged on 12th day.

3. Discussion

The classical presentation of Insulinoma includes episodes of hypoglycaemia, central nervous system manifestations of hypoglycaemia like confusion, anxiety, convulsion, coma etc. and reversal of the symptoms with administration of glucose (Popularly known as Whipple's triad). Gold standard of diagnosis is 72 hour fasting test. Continuous glucose monitoring, glucose variation co-efficient, imaging etc. are useful ion confirming the diagnosis.[4,5] The definitive management of insulinoma is surgical removal of the tumour. Diazoxide, somatostatin, phenytoin, glucocorticoids along with frequent feeds are medical management options for symptomatic relief in patients who are unfit for undergoing definitive surgery or waiting for planned surgery. Intraoperatively, most of the tumours may be easily detected using both intra operative ultrasound (IOUS) and palpation technique.[1] Hiramoto found a success rate of 95% for IOUS in detecting insulinoma.[2] In addition to detecting both palpable and non-palpable tumour, IOUS may help guide the surgeon regarding the location of pancreatic and biliary duct in relation to the tumour.[6] The anaesthetic management in insulinoma enucleation is mainly focussed on the prevention of hypoglycaemia during tumour handling prior to removal of the tumour and rebound hyperglycaemia thereafter. General anaesthesia with epidural analgesia was used in this patient. Pre-operatively, 10% dextrose infusion should be started the night before surgery with a target blood sugar of more than 50 mg% to prevent hypoglycaemic events that may happen during preoperative fasting. Pre-operative sedatives and anxiolytics may mask any hypoglycaemic symptoms and should preferably be avoided. For patients on diazoxide and somatostatin, drugs should be continued till the day of surgery. Patient should be placed as a first case on the list for surgery. Though there is no standard recommended anaesthetic agent for induction, propofol is commonly used as it reduces cerebral metabolic rate of oxygen consumption and is devoid of any effect on insulin and glucose homeostasis. Amongst the inhalational agents, enflurane and halothane are avoided owing to their influence on insulin secretion and sensitivity.[7] Any adrenergic or neurological symptoms of hypoglycaemia occurring intra-operatively especially during tumour handling may go undetected under general anaesthesia leading to neuronal damage. So, it is essential to start an infusion of 10% dextrose with blood sugar monitoring every 15-30 minutes.[8] Normalisation of blood insulin level within 20 minutes of tumour resection is a better indicator of surgical outcome than measuring blood glucose level.[9] When enucleation is performed laparoscopically, rise in intra-abdominal pressure (IAP) may result in cortisol release causing disturbances of glucose metabolism along with hemodynamic and respiratory fluctuations.[10] So, it is wise to keep the IAP up to a maximum of 12 mmHg. Post operatively, blood sugar level may rise above 200 mg% and remain elevated for a variable duration requiring even insulin infusion.

4. Conclusion

Enucleation of insulinoma requires closed intra-operative monitoring of blood sugar level and a prompt correction of any rapid and wide fluctuations Care should also be taken in managing hypoglycaemia in the preoperative fasting period and hyperglycaemia which may occur post-operatively.

5. Source of Funding

None.

6. Conflict of Interest

None.

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