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INSULINOMA: A CASE STUDY

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ABSTRACT

Insulinomas are rare endocrine tumors with a prevalence of around 1 per 100,000 persons per year. Insulinomas accounts for approximately 40% of pancreatic endocrine tumors. Majority of the insulinomas are located in the pancreas or are attached directly to the pancreas. Fasting hypoglycemia in a healthy, well-nourished adult should raise the suspicion of insulinoma and trigger further investigation. Localization of the tumor is a challenge to clinicians. Surgical resection is the curative treatment with a high success rate. A 30-year-old Indian female, Mrs. X, experiencing hypoglycemic attacks characterized by dizziness, fatigue, sweating, and period of confusions associated with weight gain for 3 years, was admitted in selected Hospital of Punjab. She also had 2 episodes of tonicclonic seizures in past 10 months. Blood test revealed, a high plasma insulin level, and raised C- Peptide level. 72-hours fast test was introduced, which produced symptomatic hypoglycemia with hyperinsulinemia. Thyroid-stimulating hormone, liver function tests, creatinine, and electrolytes were normal. Abdomen CT scan didn't present any lesions in pancreas whereas abdomen MRI revealed presence of the tumor, 1.5 cm in diameter, located in the tail of pancreas. She underwent successful distal pancreatectomy due to insulinoma, in March 2017 preserving the spleen and and splenic vessels. Six month follow up of patient shown subsided symptoms and no episode of Tonic Clonic Seizures post operatively. Insulinomas are neuroendocrine tumors are diseases of rare occurrence. It is difficult to have location conformed diagnosis with the readily available imaging methods because of borderline small size of lesions. Surgical resection is highly successful curative treatment.

INTRODUCTION

Insulinomas are rare endocrine tumors with a prevalence of around 1 per 100,000 persons per year [1]. Insulinomas accounts for approximately 40% of pancreatic endocrine tumors. Insulinoma is usually described to be small, solitary, benign and surgically curable (Seale Harris, 1924)[2]. The onset of insulinomas can occur at any age with an equal gender distribution. As

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per type 90% of insulinomas have been reported to be benign, 90% to be solitary, with > 90% originating at intrapancreatic sites, and 90% of diameter < 2 cm [3-5]. Majority of the insulinomas are located in the pancreas or attached directly are to the pancreas. Extrapancreaticinsulinomas causing hypoglycemia are generally found in the duodenal wall, and are extremely rare (incidence < 2%) [6]. Fasting hypoglycaemia in a healthy, well-nourished adult should raise the suspicion of insulinoma and trigger further investigation. These hypoglycaemic episodes may be non-specific, remain unrecognized and occasionally misdiagnosed [6].



CASE STUDY

30-year-old Indian female, Mrs. X. Α experiencing hypoglycemic attacks characterized by dizziness, fatigue, sweating, and period of confusions associated with weight gain for 3 years, was admitted in selected Hospital of Punjab. Most of the episodes used to occur at evening with worsening of symptoms during religious fasting days. She also had 2 episodes of tonicclonic seizures in past 10 months. She was admitted in the emergency department with complains of psychomotor agitation, tremors of the upper limbs, sweating and disorientation to time and space. Blood test revealed, hypoglycemia with glucose level of 40 mg/dl, a high plasma insulin level of 54 µIU/ml (2.6-24.9 µIU/ml), and raised C- Peptide level of 5.04 ng/ml (0.8-4.2 ng/ml). She did not report any family history of endocrine disease. Being a case of hypoglycemia, she was shifted to endocrinology department of the hospital.

Afterwards supervised 72-hours fast was introduced, which produced symptomatic hypoglycemia with hyperinsulinemia. Thyroid-stimulating hormone, liver function tests, creatinine, and electrolytes were normal. Routine monitoring of Blood glucose levels during evening hours revealed levels fluctuating between 30-50 mg/dl, with increase of blood glucose levels following juices or meals. Abdomen CT scan didn't present any lesions in pancreas whereas abdomen MRI revealed presence of the tumor, 1.5 cm in diameter, located in the tail of pancreas. Thus, endoscopic ultrasonography (EUS) was suggested presenting a rounded hypoechoic mass of pancreatic head.

She underwent successful distal pancreatectomy due to insulinoma, in March 2017 preserving the spleen and and splenic vessels. Postoperatively, her fasting blood glucose concentrations returned to within normal limits with 98mg/dl on 1stPost operative day. Six month follow up of patient shown subsided symptoms and no episode of Tonic Clonic Seizures post operatively.

DISCUSSION

Insulinomas are the most common cause of hypoglycemia related to endogenous hyperinsulinism. The episodic nature of the hypoglycemic attack is due to the intermittent secretion of insulin by the tumor [6]. Common autonomic symptoms of an insulinoma include palpitations, diaphoresis, tremor, and whereas neuroglycopenenic symptoms include confusion, behavioral changes, personality changes, visual disturbances, seizures and coma [7,8]. Mrs. X presented with complains of psychomotor agitation, tremors of the upper limbs, sweating and disorientation to time and space, with history of hypoglycemic attacks, weight gain and tonic-clonic seizures.

The classical diagnosis of insulinoma relies on

satisfying the criteria of Whipple's triad, which remains the cornerstone of the screening process: (1) hypoglycemia (plasma glucose < 50 mg/dL); (2) neuroglycopenic symptoms; and (3) prompt relief of symptoms following the administration of glucose [9, 11]. Routine monitoring of Blood glucose levels of Mrs. X during evening hours revealed levels fluctuating between 30-50 mg/dl (Hypoglymia), with increase of blood glucose levels following juices or meals and presence of psychomotor agitation, satisfying Whipple triad for diagnosis.

In adults with symptoms of neuroglycopenia or documented low blood glucose levels, the gold standard for biochemical diagnosis remains measurement of plasma glucose, insulin, C-peptide, and proinsulin during a 72-h fast. This prolonged fasting test can detect up to 99% of insulinomas [12]. The Blood test of Mrs. X carried in emergency department reveled her to be hypoglycemic with glucose level of 40 mg/dl, having a high plasma insulin level of 54 µIU/ml (2.6-24.9 µIU/ml), and raised C- Peptide level of 5.04 ng/ml (0.8-4.2 ng/ml). Supervised 72-hours fast also produced symptomatic hyperinsulinemia, hypoglycemia with enhancing suspicion of insulinoma.

The availability of proinsulin assays has led to the use of serum proinsulin thresholds as a diagnostic tool: it has been recommended that a cut-off level of 20 pmol/L proinsulin at the time of hypoglycemia < 45 mg/dL is indicative of the presence of an insulinoma [13]. However; proinsulin was not assessed for Mrs. X.

Preoperative localization of insulinoma can be confirmed using computed tomography (CT) magnetic resonance imaging (MRI)[14], endoscopic ultrasonography (EUS)[15], intra-arterial calcium stimulation test with hepatic venous sampling[16], and/or angiography and arterial stimulation venous sampling (ASVS)[17]. The sensitivity and specificity of MRI is more to that of CT, as is the detection of extrapancreatic extensions. Abdomen CT scan of Mrs. X didn't present any lesions in pancreas whereas abdomen MRI revealed presence of the tumor, 1.5 cm in diameter, located in the tail of pancreas. Endoscopic ultrasonography (EUS) presented a rounded hypoechoic mass of pancreatic head. However, intra-arterial calcium stimulation test with hepatic venous sampling, and/or angiography and arterial stimulation venous sampling (ASVS) were not carried out for Mrs. X due to non availability of the tests in hospital.

Delays in the diagnosis of insulinoma are common because the symptoms usually precede detection of a tumor and there may be misattribution of the symptoms to psychiatric, cardiac, or neurological disorders. Once a diagnosis of insulinoma is considered, it is important that patients are managed in a timely and safe manner. Patients with insulinoma are successfully



reported to be cured by surgical resection of the tumor [18].

Localisation of the tumour is utmost challenging job to the clinicians. However knowing site of the tumor before surgery is helpful as it allows one to determine whether enucleation (the surgical removal of a mass) of the neoplasm or pancreatic resection (partial pancreatectomy, or middle pancreatectomy) is needed. These days laparoscopic resection is commonly performed for insulinomas that are benign, small, and/or located in the body or tail of the pancreas Intraoperatively, ultrasound and surgical palpation are found to be helpful in confirming the site of tumour. Mrs. X underwent successful distal pancreatectomy due to insulinoma, in March 2017 preserving the spleen and and splenic vessels.

Intra-operative, maintenance of optimum glucose levels is a priority concern because there may be severe hypoglycemia while handling the tumour, symptoms of which remain masked under general anaesthesia. Mrs. X was kept on continuous glucose infusion and frequent plasma glucose monitoring to maintain plasma glucose level more than 60 mg/dL during intraoperative phase.

Most patients with benign insulinomas can be cured with surgery, however, other techniques such as injection of octreotide, EUS-guided alcohol ablation, radiofrequency ablation (RFA), or embolization of an insulinoma of the pancreas, are also been used for the management of insulinomas [19]. Medical management to normalize blood glucose is useful during the preoperative period, as well as for patients who cannot be cured by surgery, such as those with diffuse β -cell disease, multiple insulinomas, unresectable malignant insulinoma, those in whom surgery is contraindicated, or patients who refuse surgery[20]. Octreotide is a somatostatin analog that inhibits insulin secretion and the peripheral action of many gastrointestinal hormones, primarily via activation of somatostatin sst₂ receptors. Octreotide has been used for the treatment of insulinoma, with successful control of blood glucose level [21].

Nursing Management

Nursing Assessment of Mrs. X

Monitored routine vital signs which were in normal range with mild tachycardia (Pulse 110/min). Routine blood glucose monitoring showed evening hypoglycemia. Neurologic examination presented disorientation secondary to hypoglycemia. She was lethargic and was not able to mmet her daily needs. Mrs. X and her family were knowledge deficit regarding disease process and its management.

Nursing Diagnosis of Mrs. X

• Risk for altered cerebral perfusion related to

inadequate blood supply to brain.

- Imbalanced nutrition: less than body requirements related to inability of the body to adequately metabolize and use glucose and nutrients.
- Ineffective health maintenance related to knowledge deficiency in caring for disease condition secondary to inability to recognize symptoms of illness.
- Activity Intolerance related to imbalance of oxygen and nutrients supply and demand.
- Risk for infection related to chronic disease and decreased immunity secondary to imbalanced nutrition.

Nursing Interventions for Mrs. X

Monitored Vital Signs on routine basis.

• Monitored Random Blood Sugar every 2 hourly. Hypoglycemia was treated with fruit juices, meals and in between meal snacks.

• Encouraged her not to miss or delay the meals.

• Educated the client regarding blood glucose monitoring techniques.

• Established an IV access to administer bolus dextrose in case of severe hypoglycemic events.

• Assisted her in maintaining activities of daily living.

• Educated client and her family regarding disease process and possible surgeries available.

• Clarified queries of client and family regarding management process.

• Followed up the patient for six month post operatively to assess and manage complications.

CONCLUSION

Insulinomas are the most common neuroendocrine tumors of the pancreas and cause hypoglycemia related to endogenous hyperinsulinism. More than 90% of insulinomas are benign and usually small, well-encapsulated, solitary tumors. Localisation of the tumour is utmost challenging job to the clinicians. However knowing site of the tumor before surgery is helpful in taking decision related to surgery. Surgical resection is the treatment of choice for insulinomas and offers the successful chance for cure.

STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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CONFLICT OF INTEREST No interest

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