

## Case Report

# Unique position of a pancreatic head insulinoma during laparoscopic enucleation: case report

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## ABSTRACT

Insulinomas are benign pancreatic neuroendocrine tumors that require surgical intervention as a therapeutic measure. We describe an 18-year-old male patient who presented to the emergency department with a history of syncope, blurred vision, and diaphoresis. His blood sugar level was low upon admission, and a 72-hour fasting plasma glucose test showed low serum glucose, high serum insulin, and high C-peptide. An abdominal computed tomography scan and magnetic resonant imaging revealed a solitary tumor in the pancreatic head with no sign of ductal dilatation. Laparoscopic enucleation was performed, and a histopathological examination revealed findings consistent with insulinoma. The patient's postoperative course was uneventful, and his follow-up examination was unremarkable. In conclusion, physicians should have a high clinical suspicion index for insulinomas, especially in young patients with a history of syncope, blurred vision, and diaphoresis, in order to avoid delayed diagnosis.

**Keywords:** Insulinoma, Laparoscopy, Pancreatic insulinoma

## INTRODUCTION

An insulinoma is a pancreatic beta-cell tumor that causes hypersecretion of insulin and typically presents as a small, well-circumscribed, solitary nodule that may develop in any part of the pancreas.<sup>1</sup> Patients with insulinoma experience hypoglycemia due to neuroglycopenia and catecholamine response with the highest incidence reported in the fifth decade of life.<sup>1,2</sup> Although the majority of insulinomas are benign and surgically treatable, a small proportion of patients with insulinomas (5-10%) have Wermer's syndrome, with increased risk of developing malignant tumors.<sup>1,3</sup>

Imaging modalities and endoscopic ultrasound have facilitated the preoperative evaluation of these tumors, allowing physicians to plan and offer an appropriate surgical treatment. In most cases, tumor enucleation is

preferred.<sup>4</sup> One of the benefits of tumor enucleation is the preservation of healthy pancreatic tissue with a decreased risk for postsurgical exocrine pancreatic insufficiency, albeit the procedure is associated with high risk for postsurgical complications.<sup>5</sup> We report a case of pancreatic head insulinoma that was successfully managed with laparoscopic enucleation.

## CASE REPORT

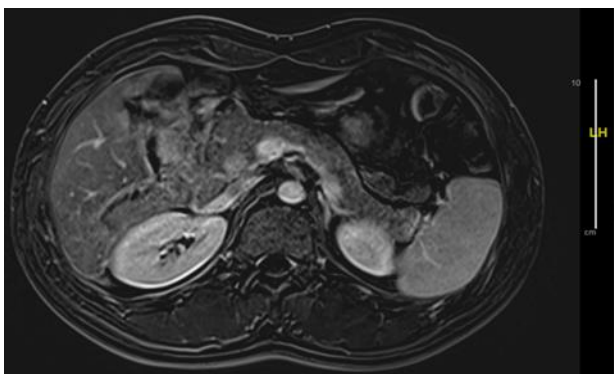
An 18-year-old male presented to the emergency department with a history of syncope, blurred vision, and diaphoresis. He was not known to have any chronic medical illness and had no history of drug intake or insulin injection. He had a family history of diabetes mellitus and a one-year history of recurrent visits to the emergency department for syncope; however, his surgical history and systemic review were unremarkable.

His initial vital signs were as follows: blood pressure, 110/65 mmHg; heart rate, 66 bpm; oxygen saturation, 100% room air; and temperature, 36.2°C. His blood sugar level upon admission was 2.9 mmol/L. An abdominal examination was unremarkable. Laboratory investigations revealed the following: insulin, 28.6 mIU/L; serum glucose, 2.9 mmol/L; and C-peptide, 2688 ng/mL. The results of other laboratory investigations were within the normal levels.

A provisional diagnosis of hypoglycemia was made, and the patient was admitted to the endocrinology ward where a 72-hour fasting plasma glucose test showed low serum glucose, high serum insulin, and high C-peptide. A computed tomography (CT) scan of the abdomen was performed, and it revealed a hypervascular lesion 1.7 cm in diameter in the pancreatic head (Figure 1). The pancreatic parenchyma was unremarkable, with no sign of ductal dilatation. The findings were suggestive of a pancreatic head insulinoma without nodal disease or metastasis. The results of an abdominal magnetic resonance imaging (MRI) scan were consistent with the abdominal CT scan findings. The pancreatic head lesion measured 1.8×1.8 cm in diameter and showed a slightly high T2 signal intensity and low T1 signal intensity with avid arterial enhancement (Figure 2). No other pancreatic lesion was identified. The pancreatic duct was not dilated, and no peripancreatic fat stranding, lymphadenopathy or metastatic hepatic lesions were observed. Overall, the MRI findings were highly suggestive of a pancreatic endocrine tumor, most likely an insulinoma.

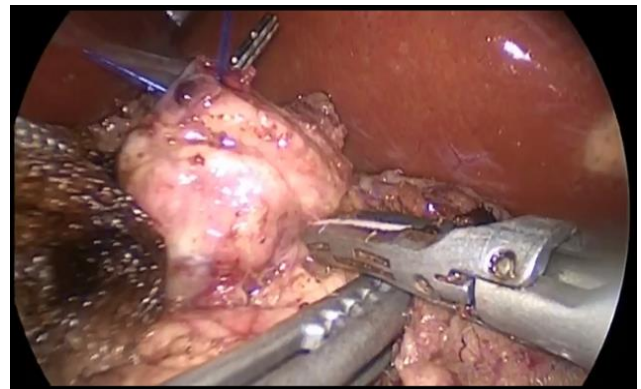


**Figure 1: Abdominal CT scan.**



**Figure 2: Abdominal MRI scan.**

The hepatobiliary team was consulted, and the patient and his family were informed of the need to perform the Whipple procedure if enucleation was not possible; they were also informed of the possible complications associated with the intervention. After obtaining informed consent, a laparoscopic exploration for enucleation of the insulinoma of the pancreatic head (Figure 3). The mass was completely excised laparoscopically (Figure 4). The mass was located superiorly near the CBD and hepatoduodenal ligament making the surgery very challenging to achieve complete enucleation. Cholecystectomy was performed as prophylaxis against the development of chronic gallbladder cholecystitis.



**Figure 3: Intra-operative image showing a tumor in the pancreatic head.**



**Figure 4: Image of the resected specimen.**

A histopathological examination showed the pancreatic head lesion was completely resected with a margin of surrounding normal pancreatic parenchyma. Histopathological findings revealed a neuroendocrine tumor consistent with insulinoma.

The patient's postoperative course was uneventful, and he was normoglycemic. Follow-up laboratory investigations showed a normal serum insulin level (9 mIU/L), normal C-peptide (720 ng/mL), and normal fasting glucose (5.6 mmol/L). He was discharged on day 3 and examined at the outpatient clinic one week later. His follow-up examination was unremarkable.

## DISCUSSION

Patients with insulinoma typically present with unspecific symptoms, making it difficult for physicians to recognize the condition. The nonspecific signs and symptoms are due to the inappropriate secretion of insulin, with patients presenting neuroglycopenic signs (such as confusion, vision disorders, changes in behavior, dizziness, convulsions, and loss of consciousness) and autonomic signs (such as anxiety, weakness, diaphoresis, and tremors)<sup>6,7</sup>. The median time to diagnosis is variable and ranges between 12 and 18 months (or longer) after symptom onset.<sup>8</sup> In our patient's case, the diagnosis was probably delayed for one year because his symptoms of syncope were misinterpreted and inappropriately attributed to other disorders, such as neurological or cardiac disease.

Clinically, insulinomas are characterized by the Whipple triad, which consists of neuroglycopenic symptoms, low serum glucose level at the time of symptoms, and reversal of hypoglycemic symptoms after the administration of glucose.<sup>1,2</sup> Our patient had a history of syncope, blurred vision, diaphoresis, and low random blood sugar upon admission. Further investigations revealed a low insulin level, low serum glucose level, and high C-peptide concentration, which suggested the diagnosis of insulinoma. The classic biochemical diagnosis of insulinoma is established with a 72-hour supervised fasting test, which demonstrates high insulin levels ( $\geq 6 \mu\text{U/mL}$ ), low serum glucose ( $< 40 \text{ mg/dL}$ ), and high C-peptide ( $\geq 0.2 \text{ nmol/L}$ ).<sup>9</sup>

In 95% of patients, insulinomas can be accurately localized by performing bimanual palpation in conjunction with intraoperative ultrasonography, but this procedure necessitates complete pancreatic mobilization.<sup>10</sup> The procedure is associated with a high success rate, especially when performed by an experienced surgeon. Thus, some investigators have suggested that preoperative localization examinations are unnecessary.<sup>11</sup> Nevertheless, the availability of noninvasive imaging techniques facilitates preoperative topographic assessment and helps clinicians to avoid blind resection.

Current available imaging modalities include CT, MRI, ultrasound examination of the abdomen, <sup>111</sup>In-pentetreotide scintigraphy, and positron emission tomography. However, the selection of any of these imaging modalities is based on the availability of the modality and personnel with the skills required to perform the examination.<sup>9</sup> At our institution, an abdominal CT and MRI scan are the preferred initial preoperative investigations. In our case, an MRI was performed to visualize and confirm the location of the mass and allow for a more accurate surgical strategy. An intraoperative ultrasound is usually performed in cases where the tumor cannot be localized on imaging scans.

Surgical resection is the standard of care in patients with insulinoma, given that these tumors are solitary and have a low risk of malignancy.<sup>12</sup> Laparoscopic enucleation can be performed if the tumor is localized, not deep-seated, and located  $> 2\text{--}3 \text{ mm}$  from the duct of Wirsung.<sup>13</sup> In cases where it is not possible to perform complete enucleation, a distal pancreatectomy or Whipple procedure is recommended. While our patient's imaging scans suggested performing the Whipple procedure (based on the location of the tumor), the unique position intraoperatively near CBD and hepatoduodenal ligament make the surgery challenging to preserve nearby structure and achieve complete enucleation, an enucleation was attempted after taking into consideration the patient's age and the morbidity and mortality associated with the Whipple procedure. The patient's postoperative course was uneventful, and his follow-up examination was unremarkable.

## CONCLUSION

Insulinomas are non-malignant, solitary tumors. The non-specificity of symptoms may contribute to delayed diagnosis, as patients with chronic hypoglycemia due to an insulinoma typically present with autonomic and neuroglycopenic symptoms that physicians can easily overlook. Physicians should have a high clinical suspicion index for insulinomas, especially in young patients with a history of syncope, blurred vision, and diaphoresis. Complete enucleation and preserved nearby structure during surgery need solid decision and expert hepatobiliary surgeon onboard.

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