Diagnosis and treatment of insulinoma: report of 105 cases

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Objective: To study the methods for diagnosis and treatment of insulinoma.

Methods: Clinical data from 105 patients with insulinoma who had been admitted to our hospital from July 1966 to December 1999 were retrospectively reviewed.

Results: Fasting blood glucose values were less than 2.75 mmol/L in all the patients. Fasting serum insulin values in 60 patients were higher than 25 mU/L, average 65 mU/L. Before operation, carcinoma was detected in 2 of 45 patients by ultrasound scan, and in 10 of 35 by CT. Enucleation of insulinoma was performed in 60 patients. Operations included insulinoma resection (35 patients), distal resection of the pancreas (8), and biopsy (2).

Conclusion: Whipple's triad and the index of insulin release > 0.3 are the major variables for diagnosis. Intraoperative exploration and ultrasound scan are the methods for the localization of insulinoma. Enucleation of benign insulinoma is preferred, but proximal or distal resections of the pancreas are required only for large, deep or multiple tumors.

(HBPD Int 2002; 1: 137-139)

Key words: insulinoma; localization of tumor; B cell; fasting blood glucose

Introduction

Insulinoma is originated from B cells of the islet of the pancreas, and accounts for 70% - 75% of tumors of islet. From July 1966 to December 1999, 105 patients with insulinoma were treated in our hospital. In this paper, we described the diagnosis and management of these patients.

Methods

Patients

This study included 105 patients (74 men and 31 women), aged from 14 to 69 years. They had the disease for 3.5 months to 15 years (mean 3.8 years). All the patients experienced Whipple's triad. 55 of them had been misdiagnosed as having hysteria, psychosis or epilepsy. 53 patients had simple obesity because of over eating.

Laboratory examination

Fasting blood glucose values of the patients were less than 2.75 mmol/L or between 0.8 mmol/L and 2.6 mmol/L, average 2.1 mmol/L. Fasting serum insulin values of 60 patients were higher than 25 mU/L or between 27 mU/L and 196 mU/L (average 65 mU/L).

Fasting test was performed in 44 patients. Typical symptoms of low blood glucose occurred in 40 patients at 17 hours to 37 hours, and the blood glucose values varied from 0.7 mmol/L to 1.9 mmol/L. At the same time, serum insulin values in 8 patients were higher than 25 mU/L.

Results

Tumor localization

Before operation, tumors were detected in 2 of 45 patients by ultrasound, and in 10 of 35 by CT. They were confirmed surgically. Of 8 patients receiving intraoperative B-ultrasound examination, 6 had the results similar to those of intraoperative exploration. Untouchable tumor was found in one patient and was confirmed pathologically

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as islet cell hyperplasia.

Pathology

Among the 105 patients, 97 had single tumor, 4 multiple tumors, and 4 islet cell hyperplasia. 32 tumors were located at the head of the pancreas, 26 at the body of the pancreas, 41 at the tail of the pancreas, and 2 heterotopic. The diameter of these tumors was 0.5-1.0 cm in 17 patients, 1.1-2.5 cm in 88, and 2.6-5.5 cm in 5. 97 patients had benign tumors, 4 malignant tumors, and 4 islet cell hyperplasia.

Treatment

Enucleation of insulinoma was performed in 60 patients. Distal resections of the pancreas and splenectomy included resection of insulinoma in 35 patients, distal resection of the pancreas in 8, and biopsy in 2.

Of the 97 patients, 96 had the low blood glucose symptoms disappeared and one had the symptoms remained after the first operation but disappeared after the second operation. In the 4 patients with malignant tumors, 3 had the symptoms disappeared after operation and one died in 1.5 months after biopsy. Of the 4 patients with islet cell hyperplasia, 2 had symptoms disappeared and 2 relieved.

Eighteen patients developed pancreatic fistula, 12 healed uneventfully after drainage for 21-110 days, 1 died of peritoneal infection, and 4 were cured by operation after 3-6 months. One patient developed acute pancreatitis and was cured by debridement and drainage.

Discussion

Diagnosis

The complex symptoms and signs of insulinoma especially the psychic symptoms often causes misdiagnosis. But the disease is not difficult to diagnose if adequate attention is paid to its symptoms such as Whipple's triad. If the fasting blood glucose value of the patient is < 2.75 mmol/L consistently, and the fasting serum insulin value is > 25 mU/L and the index of insulin release > 0.3, insulinoma could be diagnosed. Insulinoma can be diagnosed definitely if the fasting serum insulin value of the patient is higher than that of the control when low blood glucose symptoms appear. In this group, the fasting blood glucose value was less than 2.75 mmol/L, the fasting serum insulin value was higher than that of the control, and the index of insulin release was higher than 0.3 (0.7-4.5). Fasting test should be given to the suspected patients. Excitation test of D_{860} or glucagon should be made only if typical symptoms of low blood glucose do not appear after fasting test.

Tumor localization

Tumor localization is essential to operation. In theory, localization of tumors, single or multiple and metastatic or non-metastatic, should be elucidated before operation. But it is not easy to detect the tumors less than 2.5 cm in diameter. The bigger ones can be found by ultrasound and CT. Selective arteriography, percutaneous transhepatic portography, and venous sampling for insulin assay may be of considerable value in locating the tumor. Untouchable tumors could be located by intraoperative ultrasound, which is also helpful to select operation, avoiding the pancreatic duct, bile duct and splenic vein. [1,2] Conjugating intraoperative exploration with intraoperative ultrasound could ensure a rate of correct diagnosis of 90% -100%. Other methods for localization of tumors include endoscopic ultrasound, [3] laparoscopic ultrasound [4] and intra-arterial stimulation with calcium. [5]

Treatment

Resection is the best way to cure insulinoma. In the advanced stage, some symptoms of injuries to the cranial nerves wouldn't disappear, although the tumor is resected and the low value of fasting blood glucose is corrected. [6] If the diagnosis of insulinoma is established, operation should be performed as early as possible.

Enucleation should be performed if the tumor can be resected especially for those located at the head of the pancreas. If the tumor is located at the tail of the pancreas, distal resection of

the pancreas is required for large or multiple tumors. In this study, pancreatic fistula of 18 patients developed during enucleation for large or deep tumors, but not in distal resection of the pancreas under the same condition. If the tumor is benign, located at the head of the pancreas, deep and near to the superior mesenteric vessels, wedge shape resection should be preferred. If the pancreatic duct is damaged, the head of the pancreas is resected with the reservation of the bile duct. If the pancreatic duct and bile duct are all damaged and the tumor is malignant without metastasis, Whipple's procedure should be performed. In patients with islet cell hyperplasia but heterotopic tumors, distal resection is attempted.

References

1 Zhu Y. Progresses in diagnosis and treatment of pancreatic endoscrine tumor. Practical Surg 1992; 12: 651-654.

2 Owans LV, Huth JF, Cance EG, et al. Insulinoma: pitfalls in preoperative localization. Eur J Surg Oncol 1995; 21: 326-328.

3 Zimmer T, Stolzel U, Liehr RM, et al. Somatostatin receptor scintigraphy and endosxcopic ultrasound for the diagnosis of insulinoma and gastrinoma. Dtsch Med Wochenschr 1995; 120: 87-93.

4 Pietrabissa A, Shimi SM, Vander VG, et al. Localization of insulinoma by laparoscopic infragastric inspection of the pancreas and contact ultrasonography. Surg Oncol 1993; 2: 83-86.

5 Doppman JL, Chang R, Fraker DL. Localization of insulinoma to regions of the pancreas by intra-arterial stimulation with calcium. Ann Inter Med 1995; 123: 269-273.

6 Zeng XJ, Zhong SX, Zhu Y, et al. Experiences of diagnosis and treatment for 110 patients with insulinoma. Chin J Surg 1987; 25: 129-132.

(Accepted October 15, 2001)