Intraoperative gamma probe detection of insulinoma in an elderly patient with pancreatic cystic lesions

Alain Rosière*, Yves J. Ernst‡, Véronique Roelants§, Thierry Vander Borght‡, Luc Michel* and Julian E. Donckier†
Departments of *Surgery, †Internal Medicine and Endocrinology and ‡Nuclear Medicine, University Hospital of Mont-Godinne, Université Catholique de Louvain, Yvoir, Belgium
(Received 25 February 2002; returned for revision 15 March 2002; finally revised 10 May 2002; accepted 14 May 2002)

Summary
Insulinoma is a rare endocrine tumour in the elderly. We report the case of an 81-year-old woman suffering from grand mal seizures. Insulinoma was suspected because plasma glucose and insulin levels were 1.5 mmol/l and 80.4 pmol/l, respectively. A pancreatic computerized tomography (CT) scan, magnetic resonance imaging (MRI) and arteriography were normal but $^{111}$In-DTPA-octreotide scintigraphy detected a hotspot in the pancreatic tail. Intraoperative pancreatic ultrasonography and palpation were non-contributory due to multiple pancreatic cysts and nodular lesions. However, a gamma-detecting probe localized a small tumour, labelled preoperatively with $^{111}$In-DTPA-octreotide. Intraoperative insulin measurements in portal venous blood confirmed the successful removal of an insulinoma that was 6 mm in diameter histologically. Pancreatic cystic lesions increase with age and make the intraoperative localization of the insulinoma difficult. Intraoperative gamma probe detection of the tumour labelled with $^{111}$In-DTPA-octreotide might therefore constitute a useful surgical tool.

Insulinoma is a rare endocrine tumour that is usually diagnosed at a median age of 50 years (Service et al., 1991). In the elderly patient it is still more uncommon and the diagnosis more difficult because the predominant neurogenic symptoms may be erroneously attributed to cerebrovascular diseases. In addition, localization of the tumour in an elderly patient is made more difficult because of the morphological changes of the pancreas that occur with age (Ikeda et al., 1994).

Therefore, we report on the difficulties in diagnosing and locating an insulinoma in an elderly patient and show the usefulness of a new intraoperative technique to perform the surgical resection in this age group.

Case report
A 81-year-old woman presented with recurrent episodes of confusion, abnormal behaviour and possible nocturnal hypoglycaemia. One month earlier, she had been admitted to another hospital with a diagnosis of cerebrovascular accident. During the first night after admission, she suffered ‘grand mal’ seizures provoked by a decrease in plasma glucose to 1.5 mmol/l. Concomitant plasma insulin and C-peptide levels were 80.4 pmol/l and 0.6 pmol/ml, respectively. Intravenous (IV) glucose and anti-epileptic drugs allowed a full recovery without neurological sequelae. Head computerized tomography (CT) scan was normal. Insulinoma was suspected following the results of insulin and C-peptide measurements. Abdominal echography, CT scan, magnetic resonance imaging (MRI) and selective pancreatic arteriography were unsuccessful in locating the tumour site. Only $^{111}$In-DTPA-octreotide scintigraphy detected a hotspot in the pancreatic tail (Fig. 1). Preoperative preparation consisted of diazoxide and IV glucose, which maintained normal glucose profiles. Intraoperative pancreatic ultrasonography and palpation were non-contributory due to multiple pancreatic cystic and nodular lesions. A hand-held gamma detecting probe was used to detect tumour binding of radiolabelled octreotide (injected 48 h before operation). This technique identified a neoplasm that was enucleated from the pancreatic tail. The results of intraoperative counting rates obtained from the tumour and surrounding tissue were 280 and 50 counts/s, respectively. However, an initial location was not possible due to the background noise coming from the normal tracer distribution in spleen, liver and kidneys. In order to perform a selective gamma probe examination of the left pancreas, the tail and the body were surgically mobilized. Intraoperative measurements of glucose and insulin in portal venous blood were performed using an electrochemiluminescence immunoassay. Initial glucose and insulin levels were 13.6 mmol/l and 178.6 pmol/l, respectively (with continuous administration of IV glucose). During tumour palpation, insulin levels increased to 477.8 pmol/l (glycaemia 10 mmol/l). After insulinoma...
excision, insulin levels fell to 60.3 pmol/l (glycaemia 7.8 mmol/l). These data suggest that the operation was curative. Histologically, the tumour was a well-encapsulated insulinoma of 6 mm in diameter. Ten days after operation, the patient was discharged with normal glucose profiles. One month later, she attended the outpatient department, where she was found to have recovered fully.

Discussion

Insulinomas have an incidence of one case per 250 000 patients/year and are extremely uncommon in octogenarian patients (Service et al., 1991). Clinical presentation can be misleading. Our patient presented with abnormal behaviour and ‘grand mal’ seizures, which occur, respectively, in 80% and 12% of patients with insulinoma (Service et al., 1976). Diagnosis was made upon the basis of a plasma glucose < 2.2 mmol/l with concomitant insulin levels > 43 pmol/l as established previously (Eastman, 1996). Conventional investigations were negative. This is not unexpected because sensitivity is 45–75% for CT and MRI, and 30–85% for selective pancreatic arteriography (Clark et al., 1985; Fraker & Norton, 1996). Octreotide scintigraphy was positive. However, a low sensitivity (40%) has also been reported for this technique to detect insulinomas due to the low density of somatostatin receptors of type 2 expressed on these tumours (Krenning et al., 1993). Selective intra-arterial injection of calcium during the arteriogram with measurement of hepatic venous insulin levels has also been used (Doppman et al., 1993). Localization was observed in 60% of cases, compared to 30% when using portal sampling only (Doppman et al., 1993).

Intraoperative palpation by a skilled surgeon and pancreatic ultrasonography are able to locate about 95% of insulinomas (Eastman, 1996) so that they are currently considered as the gold standard. When these techniques fail to identify the lesion, a sequential resection starting from the tail of the pancreas is often recommended (Cryer & Kenneth, 1998). Total pancreatectomy is not advisable because of its mortality and morbidity as well as the availability of medical therapy for hypoglycaemia.

Intraoperative palpation and ultrasonography failed to locate the tumour in our patient due to multiple pancreatic cystic and nodular lesions. Subclinical morphological changes of the pancreas, e.g. main pancreatic duct dilatation, cystic lesions and calcifications, increase with age (Ikeda et al., 1994). A study carried out in 312 patients with subclinical morphological changes of the pancreas showed that a majority of cystic lesions were not linked to any known pancreatic disease (Ikeda et al., 1994). In this series, cystic lesions were more common in women and increased with age. For elderly patients with pancreatic cystic lesions, a gamma detection probe can be useful for locating insulinomas, labelled preoperatively with 111In-DTPA-octreotide. Indeed, it can locate small lesions with a diameter of 5 mm whereas the tumours must be at least 10 mm in diameter to be detected by surgical palpation (Adam et al., 1998).

Thus, in our octogenarian patient with pancreatic cystic lesions as are more frequently encountered in the elderly, the gamma probe approach was found to be the only technique able to locate an insulinoma. Intraoperative measurements of portal insulin levels and clinical outcome confirmed the successful removal of the tumour.

References


© 2002 Blackwell Publishing Ltd, Clinical Endocrinology, 57, 547–549
