

# Undetectable pancreatic insulinoma during surgery

Cemalettin Koc, Volkan Ince, Emrah Otan, Cemalettin Aydın, Cuneyt Kayaalp

Inonu University School of Medicine Institute for Liver Transplantation, Malatya, Turkey

Copyright © 2018 by authors and Annals of Medical Research Publishing Inc.

## Dear Editor,

Insulinomas are rare, mostly solitary and 90% benign lesion of the pancreas. Clinical manifestation of the disease consists of the symptoms and findings of hypoglycemia. To prevent permanent cerebral damage due to hypoglycemia, annihilation of the insulinoma is the mean treatment and it is usually achieved by surgery. Fundamentals of surgical treatment consist of e-nucleation of insulinoma or pancreatic resection. Preoperative radiological determination of tumor location is mandatory, but despite preoperative well localized lesions they may not be identified intraoperatively by inspection palpation or ultrasound examinations (1). Here we presented a similar case, fortunately the clinical findings of the patient improved postoperatively following intraoperative pancreas manipulations and biopsies.

A 66 year-old male applied with complaints of palpitation, sweating and hunger without any abnormal physical examination finding. All complaints recovered following food intake. His fasting laboratory work-up detected that insulin level was >1000 mU/L (3-25 mU/L), C-peptide >20 ng/mL (0.9-4 ng/mL), glucose <50 mg/dL (80-115 mg/dL). Multislice computed tomography (CT) scan showed a normal pancreatic tissue. Magnetic resonance imaging demonstrated a 5 mm lesion in pancreatic corpus (Figure 1).

Histopathological diagnosis was provided by endosonography guided biopsy, it was compatible with insulinoma. Surgery was done by open surgery and the pancreas was explored along its length after dividing the gastrocolic ligament and making a Kocher maneuver. However, the appearance of the pancreas was in normal. Two experienced gastrointestinal surgeons were independently palpated the pancreas but could not find the preoperatively mentioned lesion. Two experienced radiologists examined the pancreas by intraoperative ultrasound and did not give a clear mass image. Some tissue samples from the suspicious parts of the pancreas that were pointed out by the intraoperative radiologists

were collected and sent for frozen section. However, they were not compatible with insulinoma. Further surgery was canceled and the operation was terminated. Postoperative course was complicated. Mechanical ventilation support was extended due to abdominal distention and he was extubated on day four. Drain amylase levels were elevated and a pancreatic fistula was diagnosed (2). The patient had one hypoglycemic episode during his hospitalization period (blood glucose level was 50 mg/dL) (Figure 2). Despite this unfavorable postoperative course, postoperative blood insulin level tended to decrease and the blood glucose levels become normalized in time (Figure 3). Fasting glucose levels were 75 to 126 mg/dL, insulin levels were 35-160 mU/L and C peptide levels were 5.2 to 6.1 ng/mL (Figure 4). Following resolution of the pancreatic fistula, the patient was discharged on postoperative day 25 and he was free of any hypoglycemic episode during a four month follow-up.



Figure 1. Magnetic resonance imaging showed a 5 mm lesion in the pancreas

Received: 03.04.2018 Accepted: 06.08.2018 Available online: 28.08.2018

Corresponding Author: Cemalettin Koc, Inonu University School of Medicine Institute for Liver Transplantation, Malatya, Turkey

E-mail: ckoc\_41@hotmail.com



Figure 2. Course of postoperative glucose levels

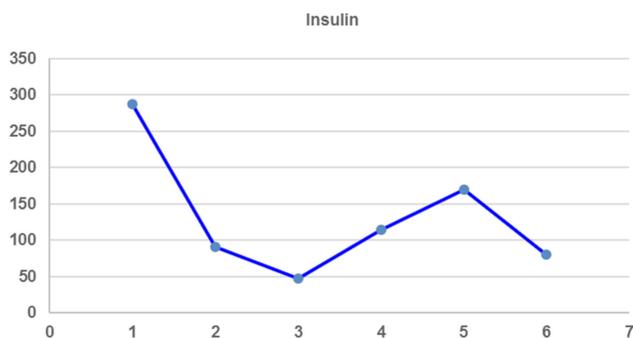


Figure 3. Course of postoperative insulin levels

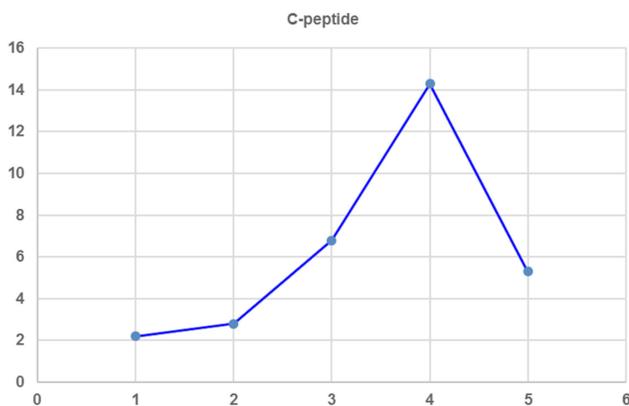


Figure 4. Course of postoperative C-peptide levels

Insulinoma is detected in all decades (5 days – 89 years), in both sexes (male/female: 1/1.4) with an incidence varying from 0,8 % to 10% in autopsy studies (3). Diagnosis is made by proving the presence of Whipple triad. Although a vast majority of the cases are incidental, 10% of them are a component of MEN-1 syndrome. In MEN-1 cases, co-existence of hyperkalemia secondary to hyperparathyroidism facilitates early diagnosis insulinomas. Insulinomas are located mostly in the pancreas 99%, where 1% of the lesions are located in an ectopic pancreatic tissue (3). Ectopic insulinomas are mostly located in duodenal wall, ileum, jejunum, gastric wall, splenic hilum, gastrosplenic ligament, lungs, cervix or ovaries (3). Mean diameter is 16.7 mm with a range of 1 to 120 mm (3). Localization of insulinoma can be done either preoperatively or intraoperatively. Preoperative diagnostic

methods may be either non-invasive (ultrasonography, CT, MRI) or invasive (EUS, stimulation tests). In cases which non-invasive methods fail to localise insulinoma, invasive procedures are indicated. Sensitivity of ultrasonography which is dependent to physician's experience is decreased in obese patients or masses localized in pancreatic head and tail, or small tumors (< 2 cm) (3). Standard screening procedure is CT scan. Depending on number of detector and scanning modality, localization success varies from 83% to 95.3% (3). The success rate for EUS is 92.6% for pancreatic head, 87.9% for pancreatic corpus and 40% for pancreatic tail (3). Preoperative methylen blue injection via EUS is a promising new method for intraoperative tumor localization (4).

Tumor is expected to be in red-brown color. Mobilization of pancreatic tail and making a Kocher's maneuver provides the tumor identification in 83.3% of the cases. Sensitivity of palpation for tumor localization depends on surgeon's experience and varies from 41.7% to 96.4% (3). Sensitivity of intraoperative ultrasound varies from 62.5% to 100% (3).

Treatment of insulinoma can be challenging cases when tumor was not located. Among published studies, intraoperatively undetermined tumors count for 10% to 27% of all the cases. Among pancreatic head insulinomas, 1/3 of tumors are non-palpable and independently of localization %10 of the tumors are neither visible nor palpable (3). In such cases, if the tumor cannot be localized by intraoperative ultrasound, most of the surgeons tend to finalizing surgery and repeating preoperative localization methods. Should be preferred blind pancreatic resections are currently not advised due to high morbidities (5).

In our case, tumor was not localized with either palpation or ultrasound despite consultation of experienced surgeons and radiologists specialists. Instead of blind resection, biopsy samples were taken from suspected sites and surgical exploration was terminated following negative results. Postoperative improved clinical and laboratory outcomes were surprising and fascinating. Surgical dissection, ultrasound manipulations, palpation attempts and multiple biopsies around or over the pancreas may result in pancreatic edema and decreased vascular circulation of the tumor resulting in resolution. A similar scenario was reported by Aziret et al (1). They reported a small case series related to insulinoma negative pancreatic surgery. Tumor was localized in three of the cases and enucleation was performed. In the remaining two cases tumors were not recognized and distal pancreatectomies with splenectomies were performed. Among the two pancreatic resection specimens, one of them was diagnosed as granulomatous lymphadenitis and the other one was diagnosed for normal pancreatic tissue. Insulinoma symptoms were resolved in all cases (1).

To sum up, insulinoma sometimes may not be localized despite all efforts. This situation may require sampling from suspected sites and to end up the operation instead

of blind pancreatic resections. Postoperative tumor localization studies and further surgical treatments when required may be more beneficial instead of a blind resection. There may be chance of resolving the symptoms following sampling biopsies around the pancreas; Lastly, preoperative detailed explanation of all possible clinical scenarios to patients and their relatives is essential.

*Competing interests: The authors declare that they have no competing interest.*

*Financial Disclosure: There are no financial supports*

## REFERENCES

1. Aziret M, Ercan M, Senturk A, Bostancı et al. Recovery of hypoglycemia symptoms after insulinoma negative pancreatic surgery: Case series. J Turgut Ozal Med Cent 2017;24:489-93.
2. Bassi C, Marchegiani G, Dervenis C, et al. The 2016 update of the International Study Group (ISGPS) definition and grading of postoperative pancreatic fistula: 11 years after. Surgery 2017;161:584-91.
3. Mehrabi A, Fischer L, Hafezi M, et al. A systematic review of localization, surgical treatment options, and outcome of insulinoma pancreas 2014;43:675-86.
4. Zografos GN, Stathopoulou A, Mitropapas G, et al. Preoperative imaging and localization of small sized insulinoma with EUS-guided fine needle tattooing: a case report. Hormones (Athens) 2005;4:111-6.
5. Tucker ON, Crotty PL, Conlon KC. The management of insulinoma. Br J Surg 2006;93:264-75.