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Case report

Endoscopic ultrasound-guided radiofrequency ablation in a pancreatic neuroendocrine tumor: expanding access to minimally invasive therapies

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Abstract

Introduction: Pancreatic neuroendocrine tumors (pNETs) are uncommon neoplasms that originate in pancreatic islet cells and account for 1%-2% of all pancreatic tumors. **Case presentation:** We present the case of a 47-year-old man with multiple pathological conditions and previous abdominal surgical interventions who sought medical care because of persistent elevation of liver enzymes. Magnetic resonance cholangiography showed an 18 mm solid lesion in the pancreatic body. Endoscopic ultrasonography (EUS) identified a well-defined, hypoechoic, hypervascular nodule. Fine-needle biopsy (FNB) confirmed a well-differentiated grade 1 pNET (Ki-67 1%). PET-CT with 68Ga-DOTA showed focal uptake consistent with a pNET. After a multidisciplinary discussion, the team chose EUS-guided radiofrequency ablation (EUS-RFA) because of the high surgical risk associated with the patient's comorbidities and previous abdominal surgeries. Under general anesthesia, the team applied 30 W in continuous mode through a 19 G radiofrequency needle until achieving complete ablation. **Results:** No immediate complications occurred. Computed tomography one week later confirmed complete tumor ablation without residual enhancement. **Conclusions:** This case is consistent with international reports showing high efficacy and a low complication rate with EUS-RFA. However, the technique is not free of risks (pancreatitis, bleeding, perforation), which were not observed in this patient. As one of the first experiences in Latin America and, to the best of current knowledge, in Colombia, this case highlights that EUS-RFA is a promising minimally invasive alternative for selected pNETs. Regional cohorts are required to characterize risks and population-specific features, and comparative evaluations against active surveillance and surgery are justified.

Keywords

Endoscopic ultrasonography, neuroendocrine tumors, radiofrequency ablation.

INTRODUCTION

Pancreatic neuroendocrine tumors (pNETs) are uncommon neoplasms arising from the pancreatic islet cells and account for approximately 1%–2% of all primary pancreatic tumors[1]. Their incidence has increased over the past several decades, a trend associated with advances in diagnostic imaging techniques and population aging[1,2]. Pancreatic surgery, including pancreaticoduodenectomy and distal pancreatectomy, has historically been the standard of care. However, these procedures are associated with significant complications, including pancreatic fistula and the development of endocrine and exocrine insufficiency[1,2]. In this context, we report a case of endoscopic ultrasound-guided radiofrequency ablation (EUS-RFA) as a minimally invasive alternative for the management of a pNET at a referral center in Colombia[1,2].

CASE PRESENTATION

A 47-year-old man was evaluated. His medical history included stage IIIB Hodgkin lymphoma treated during childhood with splenectomy, chemotherapy, and radiotherapy, with complete remission since that time. He also had a history of right arm synovial sarcoma with pulmonary metastases that were resected in 2008, followed by prolonged clinical remission. Additional medical history included Barrett's esophagus and asymptomatic multiple cholelithiasis. He had also undergone multiple complex abdominal surgeries, resulting in a hostile abdomen. He was referred to the Gastroenterology Department because of persistent abnormalities in liver function tests. Contrast-enhanced abdominal computed tomography (CT) revealed a pancreas with moderate atrophic changes and a focal, hypervascular, oval lesion with well-defined margins. The lesion was located in the pancreatic body and was in close contact with the splenic artery and vein. It measured 17 × 15 mm on the axial plane (**Figure 1**). Magnetic resonance imaging confirmed a solid mass in the pancreatic body.

Based on these findings, endoscopic ultrasonography (EUS) was performed and showed a well-circumscribed, hypoechoic, hypervascular lesion. Fine-needle aspiration (FNA) confirmed a well-differentiated, grade 1 pancreatic neuroendocrine tumor, with a Ki-67 index of 1%. Gallium-68 DOTA positron emission tomography (68Ga-DOTA PET) showed focal uptake, confirming somatostatin receptor expression[3], with no evidence of metastatic disease. At the time of the initial diagnosis, the pancreatic lesion measured 12 mm in its greatest dimension. Given the expression of somatostatin receptors and the absence of metastatic disease, treatment was initiated with a long-acting somatostatin analog, octreotide LAR 30 mg administered intramuscularly once monthly, for approximately 17 months.

During clinical and imaging follow-up, progressive growth of the lesion was documented, reaching 18 mm in its greatest dimension. Following completion of a multidisciplinary evaluation, EUS-RFA was selected as a minimally invasive therapeutic alternative.

The procedure was performed under general anesthesia with the patient in the left lateral decubitus position. Ciprofloxacin 400 mg was administered intravenously. An aggressive hydration protocol with Ringer's lactate was also implemented, consisting of a 20 mL/kg bolus followed by 3 mL/kg/h for 8 hours and then 1.5 mL/kg/h until 24 hours were completed. Rectal diclofenac 100 mg for postprocedural pancreatitis prophylaxis, as supported by international cohorts[4], could not be administered because it was unavailable in the country.

A state-of-the-art EUS-RFA system equipped with a 19-gauge needle electrode (S Starmed; Taewoong Medical) and a 10-mm probe was used. Under endosonographic guidance, a solid, homogeneous, hypoechoic, hypervascular lesion was identified (**Figure 2A**). The lesion had well-defined borders, a greatest diameter of 18 mm, and peripheral and central vascularity (**Figure 2B**). The radiofrequency needle was introduced transgastrically, and ablation of the lesion was performed (**Figure 2C**). A continuous power setting of 30 W was applied, resulting in a hyperechoic bubbling-type thermal effect consistent with necrosis. Four applications were performed at different positions until ablation was completed. Post-ablation changes were observed on EUS (**Figure 2D**). No adverse events were documented.

Eight days later, follow-up CT showed expected postprocedural changes at the treatment site. A hypoattenuating area had replaced the previously described lesion, with no evidence of residual hypervascular tumor (**Figure 3**).

DISCUSSION

EUS-RFA has shown favorable results in international cohorts as a minimally invasive alternative for small

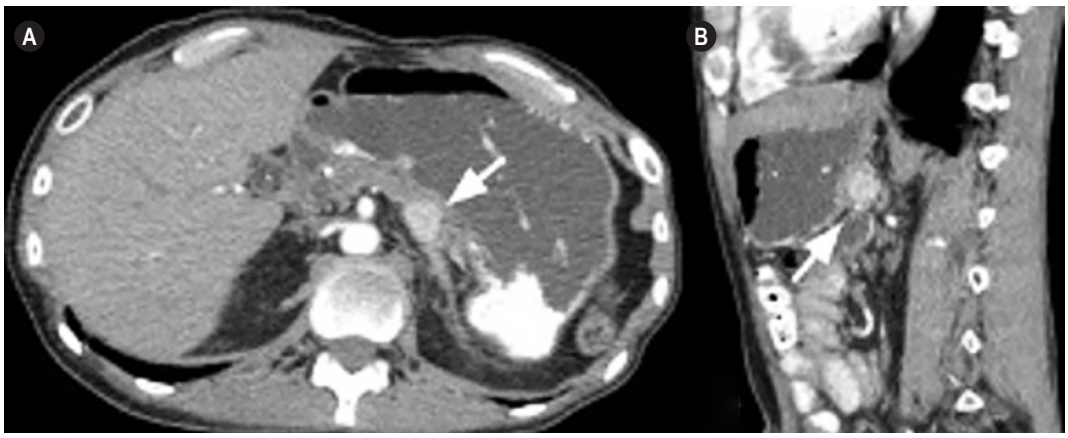


Figure 1. Axial (**A**) and sagittal (**B**) computed tomography (CT) images of the abdomen and pelvis obtained before ablation. Image courtesy of the authors.

pancreatic neuroendocrine tumors. Prospective series, such as that reported by Barthet et al., have described sustained long-term tumor control in 85.7% of cases with an initial complete response[4]. In this context, EUS-RFA represents a viable therapeutic option for selected pNETs ≤2 cm in size that are histologically well differentiated, as in the present case. It also expands the therapeutic options available beyond conventional pancreatic surgery.

Despite its clinical potential, this procedure is not without risks. In the multicenter RAFPAN study, the most frequent complications were acute pancreatitis and post-procedural pancreatic duct stenosis. A distance of ≤1 mm between the lesion and the main pancreatic duct was associated with a higher risk of complications, underscoring the importance of careful anatomic planning[5]. No adverse events were documented in the present case. Although no critical proximity between the lesion and the pancreatic duct was identified, cases such as this provide an opportunity to build local experience, refine the technique, and emphasize the need for regional cohorts to characterize the safety profile and risk factors associated with the procedure in Latin American populations.

In this case, tumor progression despite treatment with somatostatin analogs, together with the contraindication to conventional pancreatic surgery because of the hostile abdomen, prompted the multidisciplinary team to consider this therapeutic approach. EUS-RFA was considered a reasonable and proportionate alternative for the patient's

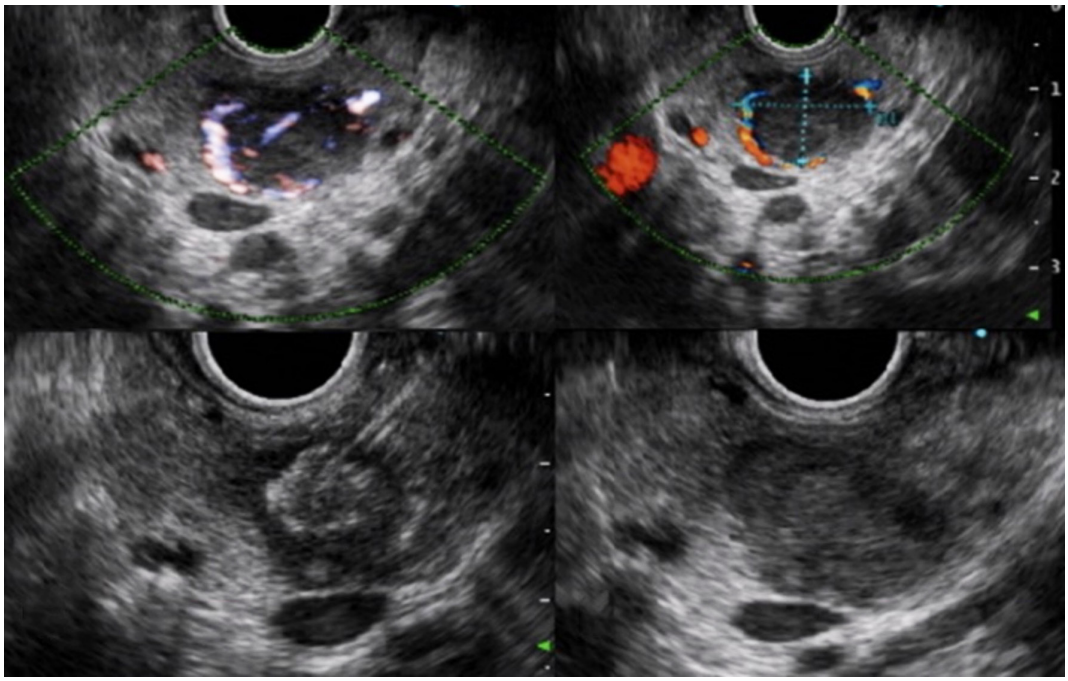


Figure 2. Endoscopic ultrasound-guided radiofrequency ablation. Images courtesy of the authors.

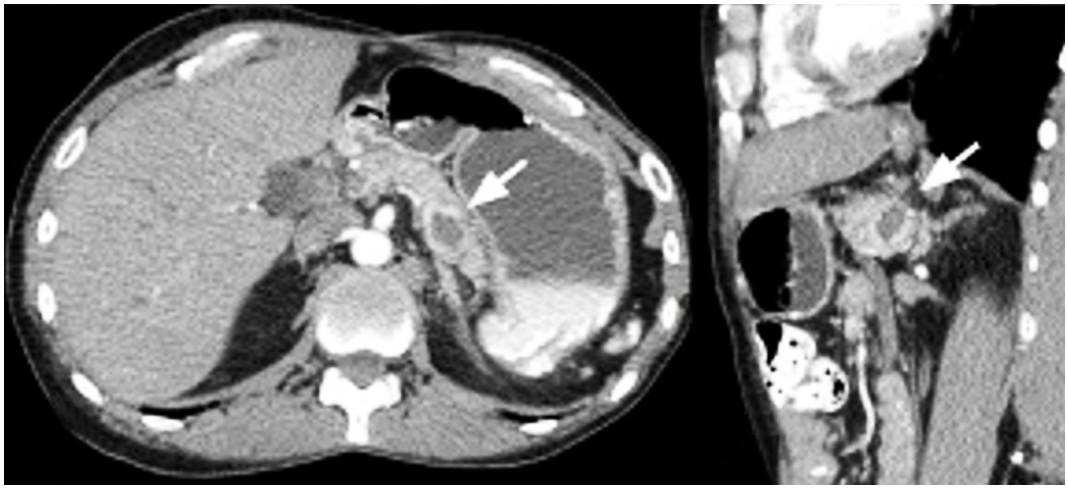


Figure 3. Axial computed tomography image obtained during follow-up after ablation. Images courtesy of the authors.

clinical profile, consistent with available evidence supporting its safety and efficacy in small pancreatic neuroendocrine tumors (≤2 cm)[4,6,7].

As one of the first reported experiences in Colombia, this case highlights the potential of EUS-RFA as a minimally invasive alternative for selected pNETs. The development of regional cohorts will help characterize its safety and effectiveness in our setting and allow comparisons with other therapeutic strategies, including active surveillance and conventional pancreatic surgery.

Ethical considerations

This case report was conducted in accordance with the ethical principles established in the Declaration of Helsinki. The study was approved by the Institutional Ethics Committee (CCEI-17927-2025).

Informed consent

Written informed consent was obtained from the patient for publication of the case and clinical images, with confidentiality of his personal information ensured.

Conflicts of interest

The authors declare no conflicts of interest.

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Use of artificial intelligence

No artificial intelligence tools were used.

Author contributions

- Study conception and design: Renzo Pinto Carta, María Alejandra Gómez Gutiérrez, Fernando Sierra Arango.
- Data acquisition: María Alejandra Gómez Gutiérrez and Laura Olarte-Bermúdez.
- Data analysis and interpretation: Renzo Pinto Carta, María Alejandra Gómez Gutiérrez, Fernando Sierra Arango, Camilo Humberto Soler, and Laura Olarte-Bermúdez.
- Manuscript drafting: Renzo Pinto Carta, María Alejandra Gómez Gutiérrez, Fernando Sierra Arango, Camilo Humberto Soler, and Laura Olarte-Bermúdez.
- Critical revision of the manuscript: Renzo Pinto Carta, María Alejandra Gómez Gutiérrez, Fernando Sierra Arango, Camilo Humberto Soler, and Laura Olarte-Bermúdez.

All authors made substantial and equitable contributions to the development of the manuscript, approved the final version, and agreed to its publication.

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