Successful management of a sporadic pancreatic insulinoma by endoscopic ultrasound-guided radiofrequency ablation

Waung JA[1], Todd JF[1], Keane MG[2], Pereira SP[2]

[1] Imperial Centre for Endocrinology, Hammersmith Hospital, Imperial College Healthcare NHS Trust, London, UK and [2] UCL Institute for Liver and Digestive Health, University College London, London, UK.

Correspondence to:

Professor Stephen Pereira, UCL Institute for Liver and Digestive Health, Royal Free Campus, Pond Street, London, NW3 2QG, UK.

Email: stephen.pereira@ucl.ac.uk

A 70-year-old woman presented with an 18-month history of recurrent episodes of dizziness, alleviated by sugary drinks. During one of these episodes, a low blood glucose of 1.6 mmol/l was noted. Past medical history included atrial fibrillation and severe chronic obstructive pulmonary disease (COPD), necessitating long-term oxygen therapy. Given the high index of suspicion of spontaneous hypoglycaemia, further Investigations commenced with a supervised 72-hour fast which confirmed symptomatic hyperinsulinaemic hypoglycaemia (serum glucose of 1.8mmol/l (NR 3-7.8), insulin 17.3 milliunits/L, C-peptide 2418 pmol/L) at 34 hours. Serum sulphonylurea screen was negative. CT revealed a 18mm enhancing lesion in the uncinate consistent with a neuroendocrine tumour that was confirmed by endoscopic ultrasound with fine needle aspiration (EUS-FNA) [Figure 1]. The patient was prescribed diazoxide 50mg, but this discontinued due to acute fluid retention. She remained symptomatic but was a poor surgical candidate so was commenced on a low glycaemic index diet and octreotide. This was unsuccessful and she remained on a continuous infusion of 10% dextrose. The patient was therefore referred for EUS guided radiofrequency ablation (RFA).

RFA causes thermal coagulative necrosis through the administration of a high-frequency current. The technique is now part of standard therapy for several tumours including hepatocellular carcinoma.[1] Recently a new monopolar RFA probe has been developed that can be placed down the working channel of a linear echoendoscope, enabling RFA to be administered under EUS-guidance (Habib EUS-RFA catheter, Emcision Ltd, London). To date it has been used in the management of two neuroendocrine tumours worldwide and in both cases the tumour decreased in size.[2]

EUS-guided RFA was undertaken as a series of three treatments, each one week apart [Table 1]. The procedures were performed under deep propofol sedation or General Anaesthesia. During the first procedure, 3 applications were administered at 10W and directed into the central part of the tumour [Figure 3]. After the procedure glucose requirements initially decreased but increased back to pre-treatment levels within 24 hours. A Day 1 post-treatment CT showed no complications and some central necrosis within the tumour [Figure 3]. During the second treatment the probe was placed within the tumour in two different planes and 8 sequential treatments were administered at 10W. Glucose requirements immediately halved and repeat imaging showed a larger area of central necrosis but the edge of the tumour was unchanged. On the third occasion 14 sequential treatments were administered. After 10 treatments in 3 planes, a contrast-harmonic EUS with SonoVue (sulfur hexafluoride microbubbles; Bracco UL Ltd) was performed and revealed remaining tumour within the distal wall so 4 further RFA treatments were directed at this area. After the final EUS-RFA treatment glucose requirements ceased and octreotide

therapy was withdrawn [Table 1]. Before discharge, a 72-hour supervised fast was completed without hypoglycaemia consistent with biochemical remission. Post-procedural CT showed that the lesion had been almost completely replaced by necrotic tissue and Gallium 68 Dotatate PET-CT scan showed that the abnormal uptake within the uncinate process had resolved. The patient was discharged home and remained well and asymptomatic after ten months. This case supports the use of EUS-RFA in the management of patients with functional PNETs who have failed multiple medical therapies and cannot undergo surgery due to co-morbidities. Long-term outcomes and further experience is required but this novel approach should be considered for selected cases.

References

1. Llovet JM, Bru C, Bruix J. Prognosis of hepatocellular carcinoma: the BCLC staging classification. *Semin Liver Dis* 1999; **19**(3): 329-38.
2. Pai M, Senturk H, Lakhtakia S, et al. Endoscopic Ultrasound Guided Radiofrequency Ablation (EUS-RFA) for Cystic Neoplasms and Neuroendocrine Tumours of the Pancreas. *Gastrointest Endosc* 2013; **77(5S)**: AB143-AB4.

Figures and Tables

Figure 1:

a. Pre-treatment CT showing a 18mm round lesion with arterial enhancement, characteristic of a PNET

b. Pre-treatment MRI

c: Pre-treatment EUS showing a hypoechoic circular lesion

Figure 2:

a. EUS image of a 19G FNA needle at the edge of the insulinoma and the Habib EUS-RFA probe advanced across the length of the lesion
b. Fluoroscopic image of the Habib EUS-RFA probe within the insulinoma

Figure 3:

a. Pre-treatment CT - 18mm round arterial enhancing lesion
b. Post 1st EUS-RFA treatment - area of central low density necrosis
c. Post-final EUS-RFA treatment - larger area of central low density necrosis

Table 1. Treatment summary table

	Number of ablations	**Individual ablation Time (s)**	**Procedure time - first ablation to last (mins)**	**10% Dextose requirements (ml/Hr)**	**Tumour volume (cm^3)**
1st EUS-RFA Treatment	3	120	6	100 (Pre-treatment)	2.14
2nd EUS-RFA Treatment	8	90	33	15 (Post-treatment)	0.52
3rd EUS-RFA Treatment	14	90	55	0 (Post-treatment)	0