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INTERVENTIONAL RADIOLOGY

TECHNICAL NOTE

Percutaneous cryoablation of follicular thyroid carcinoma metastasis to the pancreas

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ABSTRACT

The following is a technical report of the successful cryoablation of pancreatic metastasis originating from follicular thyroid carcinoma. The patient was a 72-year-old female who underwent total thyroidectomy and radioiodine ablation for follicular carcinoma. One year after surgery, a positron emission tomography-computed tomography (PET-CT) examination, performed to demonstrate the source of the increased thyroglobulin, showed a fluorodeoxyglucose (FDG) avid mass located in the body of the pancreas. A percutaneous tru-cut biopsy was performed that revealed follicular thyroid carcinoma metastasis to the pancreas. Because of the patient's comorbidities, the patient underwent percutaneous cryoablation and made a successful recovery over the following 13 months. At the most recent follow-up, the thyroglobulin level was undetectable, and a PET-CT scan showed no FDG avid mass in the pancreas. To our knowledge, follicular carcinoma metastasis of the pancreas is extremely rare, and this is the first report of successful cryoablation of a metastatic tumor in the pancreas.

KEYWORDS

Ablation, cryoablation, metastasis, pancreas, thyroid

Metastases of differentiated thyroid cancers (papillary or follicular) to the pancreas are exceedingly rare. To date, only nine cases have been reported.[1] The majority of these cancers are papillary carcinomas, and follicular carcinoma metastasis to the pancreas has been reported in only two patients.[1,2] The surgical approach varies according to lesion location; however, a pancreaticoduodenectomy is the traditional treatment approach for differentiated thyroid cancers.[3] Some patients may be unfit for surgery due to comorbid conditions or may prefer to forego an operation, considering the relatively indolent course of differentiated thyroid cancers. Herein, we present a case of isolated follicular carcinoma metastasis to the pancreas that was successfully treated with percutaneous cryoablation. To our knowledge, percutaneous ablation of a metastatic pancreatic tumor has not been reported thus far in the literature.

Technique

A 72-year-old female patient was referred to us to evaluate options for nonsurgical treatment of a pancreatic mass. The patient had undergone a total thyroidectomy and radioiodine ablation for a follicular carcinoma two years earlier. During initial follow-ups, her thyroglobulin levels were normal, but over the last 11 months, a gradual increase in thyroglobulin had been observed, which reached 498 ng/mL at the latest control. A whole-body positron emission tomography-computed tomography (PET-CT) scan was performed to determine the source of the increased thyroglobulin. The scan revealed a 32 x 26 x 28 mm fluorodeoxyglucose (FDG) avid mass (SUV_{max}: 30) located in the pancreatic body and abutting the inferior surface of the liver (Figure 1). A percutaneous, ultrasound-guided tru-cut biopsy of the mass revealed follicular carcinoma metastasis to the pancreas. A pancreaticoduodenectomy was recommended by the referring surgeon; however, because of the patient's advanced age and comorbidi-

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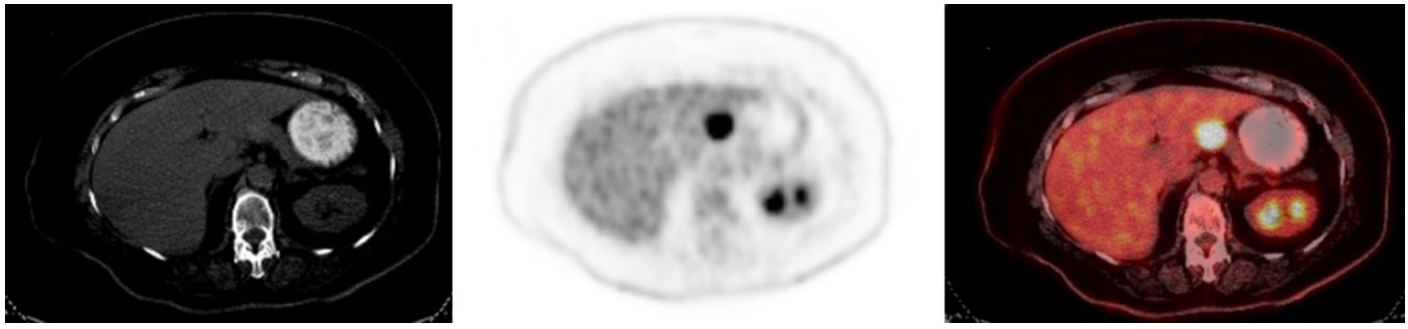

Figure 1. PET-CT scan; CT shows a mild hyperdense area in the pancreatic body barely distinguishable from the intact pancreas; a PET-CT image and fusion image show a 32 x 26 x 28 mm FDG avid mass (SUV_{max}: 30) localized in the pancreatic body and abutting the inferior surface of the liver. PET-CT, positron emission tomography-computed tomography; FDG, fluorodeoxyglucose.

ties, which included diabetes and congestive heart failure, an operation was considered high risk, and the patient was reluctant to undergo the procedure. Percutaneous ablation was considered feasible because the lesion was readily visible on ultrasound (US) and CT, located in a region of the pancreatic corpus that provided relatively easy access, and of a size that was within ablation limits. Based on the favorable results our team had had with cryoablation, we opted for cryoablation over other methods of thermal and non-thermal ablation.

The patient was informed about the possible risks and benefits of the cryoablation procedure, and dedicated informed consent was obtained. All the procedures performed on the patient were in accordance with the ethical standards and principles of the National Research Committee and the Helsinki Declaration of 1964. Percutaneous cryoablation was performed under local anesthesia and conscious sedation. A Siemens Acuson NX3 US device was placed in the CT room. The US examination was performed with a CH5-2 Convex US probe.

After a suitable access route was found on the US, the skin was numbed with a 1% lidocaine solution. After the skin punctured, 40 mL of 0.25% lidocaine solution was injected between the skin and the pancreatic mass for local anesthesia and also provide safe access to the mass. Next, a 14-gauge cryoablation probe (IceFORCE, Boston Scientific) was inserted through the skin and advanced slowly into the pancreatic mass. Because the size of the lesion was relatively large compared to the expected lethal ablation area of the cryoprobe, we performed two overlapping ablations by placing a single probe eccentrically (first, slightly caudally, then cranially) in the mass (Figure 2). Cryoablation was performed by using the 10 min freeze, 10 min thaw, and 10 min freeze protocol. After the procedure, the patient was observed overnight and discharged without incident.

Main points

- This is the first report showing the successful treatment by percutaneous cryoablation of a follicular thyroid carcinoma metastasis to the pancreas.
- Surgery is required in the case of metastasis to the pancreas.
- Cryoablation is a safe, effective, and less invasive alternative to surgery and thus preferable for patients with certain comorbidities and other special considerations.

Two months after the procedure, the patient developed abdominal discomfort and pain. Although thyroglobulin levels were normal, a PET-CT scan was requested by her surgeon to rule out any residual or recurrent tumor. A non-suspicious FDG avid lesion was observed on the scan; however, there was a 9 x 8 x 9 cm cystic lesion in the mid abdomen consistent with a pancreatic pseudocyst (Figure 3). An ultrasound-guided aspiration was performed, but the cyst recurred one month later at the same dimensions. An 8F multipurpose drainage catheter was placed into the cyst under US guidance and left on free drainage for three weeks, after which it was removed. The cyst did not subsequently recur. A follow-up PET-CT scan performed 13 months after the cryoablation showed almost complete disappearance of the pancreatic mass with no suspicious FDG uptake (Figure 4). Additionally, thyroglobulin levels were in the normal range, and the patient was asymptomatic.

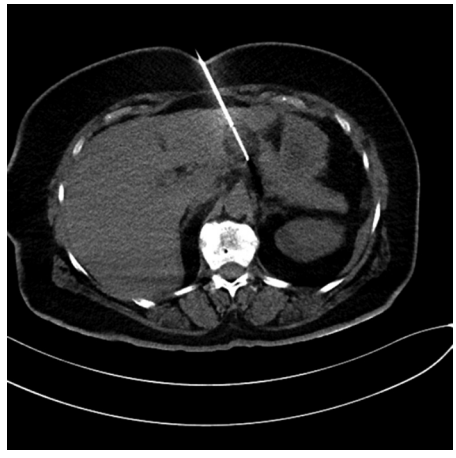

Figure 2. CT-guided cryoablation was performed by inserting a 14-gauge cryoablation probe into the pancreatic mass. The ice ball was monitored clearly on an axial plane. CT, computed tomography.

Discussion

Cryoablation is a well-established treatment option for kidney and prostate cancers.[4] Recently, it has also been used successfully in lung, breast, and pancreatic tumors.[4,5]

The mechanism of cryoablation involves tissue destruction by cycles of freezing (at –40 to –160 °C) and thawing. Compared to other thermal ablation techniques, such as radiofrequency (RF) and microwave (MW) ablation, cryoablation has several advantages. Firstly, since freezing causes much less pain than heating, cryoablation may be performed with local anesthesia and mild sedation, which may be of significant use in old or unfit patients. Secondly, since the ice ball formed is readily visible with US and CT, the operator can see the exact boundaries of the ablation zone and can thus easily avoid or protect critical surrounding structures, such as the bowels or stomach. And thirdly, since cryoablation is a less aggressive ablation method than RF and MW ablation, it better preserves collagen tissue, which may be significant for sensitive organs, such as the pancreas.[4,6]

Because of these considerations, our team favored cryoablation over other methods of ablation for our patient. Although irreversible electroporation, with its non-thermal aspect, may be another reasonable option, it is more expensive and requires general

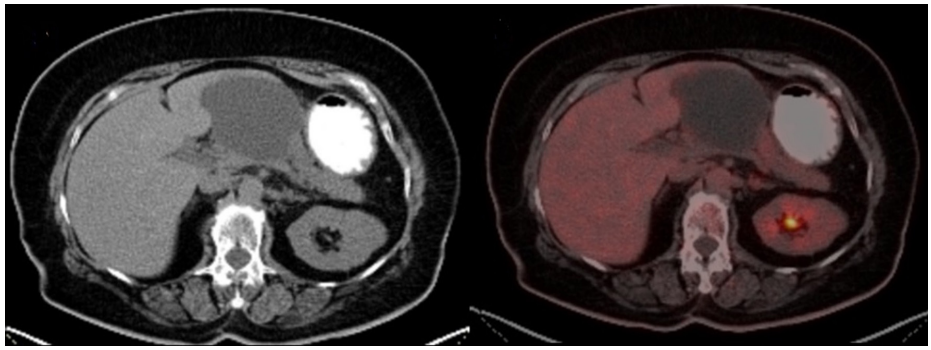

Figure 3. PET-CT; no suspicious FDG avid lesion observed; 9 x 8 cm cystic lesion consistent with a pancreatic pseudocyst observed in the mid abdomen. PET-CT, positron emission tomography-computed tomography; FDG, fluorodeoxyglucose.

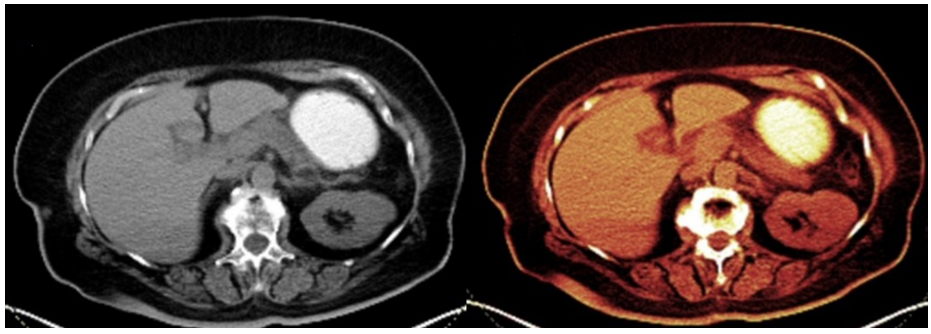

Figure 4. Thirteen months post-cryoablation, a follow-up PET-CT scan showed almost complete disappearance of the pancreatic mass with no suspicious FDG uptake. PET-CT, positron emission tomography-computed tomography; FDG, fluorodeoxyglucose.

anesthesia, and concerns remain around the safety and efficacy of its use in pancreatic tumors.[7,8]

Another advantage of cryoablation is its ability to ablate larger tumors by applying the use of multiple cryoprobes.[6] In the case of a 32 x 26 x 28 mm malignant tumor, such as the one in this report, the usual approach would entail using two or three cryoprobes simultaneously to produce a large ice ball and achieve complete ablation. However, the use of multiple probes simultaneously can produce more intensive ablation, which could theoretically increase the risk of complications, including fistulas and pseudocysts.[9] For this reason, we elected to treat the lesion with two overlapping ablations using a single cryoprobe. Despite this approach, the patient developed a pseudocyst, but this was treated successfully by simple catheter drainage.

In conclusion, the present case report may represent an exemplar of percutaneous ablation of pancreatic metastasis. If supported by further reports, percutaneous ablation may become an attractive alternative method in selected patients with metastatic tumors to the pancreas.

Conflict of interest disclosure

The authors declared no conflicts of interest.

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