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Percutaneous cryoablation for local control of metachronous inguinal lymph node metastases

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Traditional options for management of inguinal lymph node (ILN) metastases include surgery, radiation therapy or chemotherapy, often in combination [1]. However, patient prognosis and outcomes may be more dependent upon cancer biology than the type and extent of treatment. Over time, nodal disease in the groin may either cease to respond to chemotherapy or maximal radiation treatment doses may be reached without achieving complete local control. Surgical options, including ilio-inguinal or combined superficial and deep groin dissections, can carry a complication rate as high as 50% [2-4]; mainly related to wound dehiscence. Repeated surgical interventions may induce regional scarring, limiting the efficacy of subsequent procedures [5].

Percutaneous thermal ablation is a treatment option that has recently shown promise for local tumor control in musculoskeletal structures and soft tissues as alternatives or adjuncts to surgery, radiation or chemotherapy [6]. However, the literature examining the role of ablation in the management of lymph node metastases is limited [7; 8]. In this report we describe successful palliation of pain associated with numerous recurrent inguinal nodal metastases over time using image guided percutaneous cryoablation.

A 62 year-old man initially presented with palpable bilateral inguinal masses and painful constipation. Imaging studies revealed lymphadenopathy and a 4 cm tumor of the anal canal. Diagnosis of a high grade neuroendocrine carcinoma was confirmed by a colonoscopic biopsy, which showed chromogranin positivity, partially TTF1 positivity, and negative staining for CK20 and CDX2 markers. Subsequent PET-CT imaging confirmed a

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hypermetabolic 4cm tumor (SUV 11) of the anal canal with presacral (SUV 12.7), perirectal (SUV 9.8) and bilateral inguinal (SUV 13.5) lymphadenopathy. The patient was initially treated with chemotherapy (14 cycles of carboplatin; 3 doses cisplatin and 1 dose of irinotecan) but progressed when adverse effects of irinotecan (diarrhea) developed and chemotherapy was discontinued. Radiation was subsequently delivered to the pelvis (and bilateral inguinal lymph nodes (50.4 Gy) in combination with systemic capecitabine. Fifteen months after radiotherapy, an abdominoperineal resection and left groin dissection was performed in an attempt to palliate a painful recurrent tumor in the anal canal and enlarged left inguinal lymph nodes. Surgical pathology revealed high grade neuroendocrine carcinoma with 1/15 positive regional lymph nodes and 0/8 positive left ILN.

A 6-month postoperative PET-CT demonstrated an FDG avid (SUV 6.5) right ILN that was subsequently surgically resected. However, CT two months later revealed a new enlarged right ILN. Further surgery was not recommended due to anticipated procedural difficulty related to scarring. Additional radiotherapy was contraindicated due to cumulative radiation dose and chemotherapy options were limited due to previous adverse effects and expected toxicity.

Percutaneous ablation was proposed to address the patient's groin pain associated with a growing right inguinal lymph node. The first cryoablation procedure was performed under Computed Tomography (CT)-guidance and general anesthesia two months after the last surgical lymph node dissection. A single 2.4 mm percutaneous cryoprobe (Endocare PCS-24, Healthtronics, Austin, TX, USA) was introduced into the mass. Prior to freezing, the external iliac artery and vein were displaced from the ablation zone by percutaneous CT-guided injection of a dilute mixture of normal saline and omnipaque 350 contrast dye. For superficial nodes, normal saline was injected subcutaneously to prevent ice ball contact with the skin surface. Intermittent low-dose CT was performed during the cryoablation cycles (10 minute freeze, 6 minute active thaw, 10 minute freeze and 6 minute active thaw), showing good coverage of the targeted lymph node by the ice ball without imaging evidence of ice extension to the skin. No complications occurred and the patient was observed in the hospital prior to same day discharge.

A few weeks later, the patient again reported bilateral groin swelling from additional nodes. A second cryoablation procedure was performed on both sides of the pelvis, treating 2 new distinct metastatic sites 2 months after the first ablation (figure 1 - representative intraprocedural image). PET-CT imaging follow-up 8 months later showed reduction in size of the treated nodes and minimal low-level FDG uptake at each ablation site (SUV<2.5). New sites of nodal disease on both sides were observed 10 months after the first procedure (SUV 4.7; 6.0) (figure 2A and 2B), treated again with 3 successive cryoablation sessions (for 1, 5 and 3 nodes, respectively, all less than 3 cm) under ultrasound and CT guidance using the same ablation parameters previously described. The 2 last cryoablations were performed under monitored anesthesia care. Neither residual nor new FDG uptake suggestive of metastases were observed on 3 and 6 months post-procedure PET-CT studies, rendering the patient free of nodal disease in the pelvis 13 months after the first ablation procedure (figure 2C and 2D).

Two lymph nodes ablated during the final two sessions had grown to within a few millimeters of the skin. Chemical warming packs were applied to the skin surface and subcutaneous normal saline injections (between nodes and skin) were used in an attempt to protect the skin from thermal injury. Despite these efforts, within 3 weeks of the final ablation the patient developed a 2cm skin erosion communicating with a deeper pocket containing necrotic ablated tissue. Over the course of 1 month, the necrotic material spontaneously expressed from the ablation bed and the overlying skin healed completely.

The patient also developed bilateral lower extremity and pelvic lymphedema following each of his multiple inguinal procedures. To address these symptoms, he was referred to a specialized lymphedema clinic to be fitted with compression stockings and to coordinate ongoing manual lymphedema treatments. At the time of the last follow-up, 19 months after the first procedure and 9 months after the last treatment, the patient's swelling had largely resolved.

Cryoablation appears therefore promising in the management of lymph node metastases, although other mini-invasive local techniques have been proposed such as RFA [9] or 125I seeds implantation [10]. Cryoablation may be achieved accurately either under CT or US guidance [11]. Post-procedural pain, recovery time, and complications are reduced after soft tissue cryoablation compared with surgery [12]. As a minimally invasive and targeted therapy, injuries to surrounding tissues during ablation can often be mitigated by adjunctive techniques such as percutaneous organ displacement or carbodissection [13; 14].

Cryoablation was initially intended for palliative pain management in this case, though iterative treatments resulted in local control of ILN metastases for more than 9 months. Longer term prognosis may be most closely correlated with the biology of disease. In this patient, aggressive biology necessitated repeated procedures. Compared to patients with unresectable primary disease or distant extranodal metastasis, solitary ILN metastasis from anal malignancies (both synchronous and metachronous) have been shown to have a more favorable prognosis [15; 16]. Control of inguinal disease is important to prevent pain, skin ulceration, infection, and in rare cases femoral artery rupture. Ablative approaches may be discussed during multidisciplinary conferences where tumor size, location and extent are evaluated. In general, tumors over 4 cm exhibit higher recurrence rates after ablation, though good results have been achieved when options are few [17; 18].

In summary, we report successful and safe repeated palliative treatment of small recurrent ILN metastases by image-guided percutaneous cryoablation. Percutaneous ablation in complex anatomic regions, such as the pelvic soft tissues, can be effective if injury to surrounding structures is avoided and lymphedema management is initiated.

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Figure 1.

A: Axial fused PET-CT showed a cryoprobe inserted into a metabolically active left ILN metastasis.

B: Intraprocedural axial CT-scan obtained during cryoablation. A hypodense ice ball encompasses the inguinal node metastasis (arrowheads).

Figure 2.

A: Axial FDG PET-CT showed multiple metabolically active inguinal lymph node (ILN) metastases.

B: Corresponding coronal FDG PET-CT image demonstrating bilateral ILN metastases.

C: Axial FDG PET-CT imaging 6 months after the final ablation session demonstrating only minimal residual FDG uptake around the previous ablation zones with no evidence of residual disease.

D: Coronal FDG PET-CT image corresponding to (C) showing no residual FDG uptake in the pelvis after multiple cryoablation procedures.