Percutaneous Image-Guided Cryoablation of Metastatic Colorectal Adenocarcinoma to the Abdominal Wall

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Abstract

Abdominal wall metastases are rarely seen in primary colorectal cancer; the majority of cases are attributed to seeding from previous procedures. We report a case of percutaneous cryoablation of metastatic colorectal cancer to the abdominal wall with no evidence of recurrence 1 year later.

Keywords

- abdominal wall
- cryoablation
- metastasis

Introduction

Abdominal wall metastasis is a rare manifestation of colorectal adenocarcinoma. Through lymphatic and hematogenous spread, the common metastatic locations include liver, lung, thorax, lymph nodes, and peritoneum. In literature, abdominal wall metastasis has been attributed most frequently to seeding from open, laparoscopic, or percutaneous procedures.[1] Seeding has been reported at various locations including the surgical incision site, postresection anastomotic site, drain site, and puncture site.[2–4] Historically, these lesions have frequently been treated with resection and chemotherapy. However, resection, reconstruction, and primary closure of abdominal defects may not be an option for patients due to extent of disease, location, and poor surgical candidacy. Cases of cryoablation of soft tissues lesion and metastases from various primary histologies, including sarcomas and hepatocellular carcinoma, have been reported to be safe and efficacious in pain and local tumor control.[5,6] However, there is limited literature on the minimally invasive treatment of abdominal wall metastases, specifically from primary colorectal cancer. The case reported is the successful percutaneous cryoablation of abdominal wall metastases of colorectal adenocarcinoma.

Case Presentation

A 52-year-old male with a past medical history of stage IV, pT3N0M1 adenocarcinoma of the right colon presented for newly identified metastatic disease to the right rectus muscle on surveillance imaging. Initially, he was found to have adenocarcinoma of the cecum with biopsy-proven hepatic metastases. He underwent a laparoscopic right hemicolectomy, six cycles of adjuvant FOLFIRI chemotherapy, and two procedures of yttrium-90 radioembolization for treatment of hepatic lesions. Afterwards, he resumed oral chemotherapy and surveillance imaging. A year and half post-biopsy and resection, magnetic resonance imaging (MRI) of the abdomen demonstrated three new peripherally enhancing lesions with diffusion restriction in the right rectus abdominus muscles, with the largest measuring 3.3cm $\times$ 1.7 cm in maximum axial dimensions (►**Fig. 1A** and **B**). The location of the lesions was suggestive of seeding from a previous procedure. After discussion with the patient, the decision was made to pursue cryoablation of the abdominal wall lesions with interventional radiology.

Under moderate sedation, a limited ultrasound of the upper abdominal wall demonstrated three hypoechoic lesions in the right rectus muscle; the largest was located

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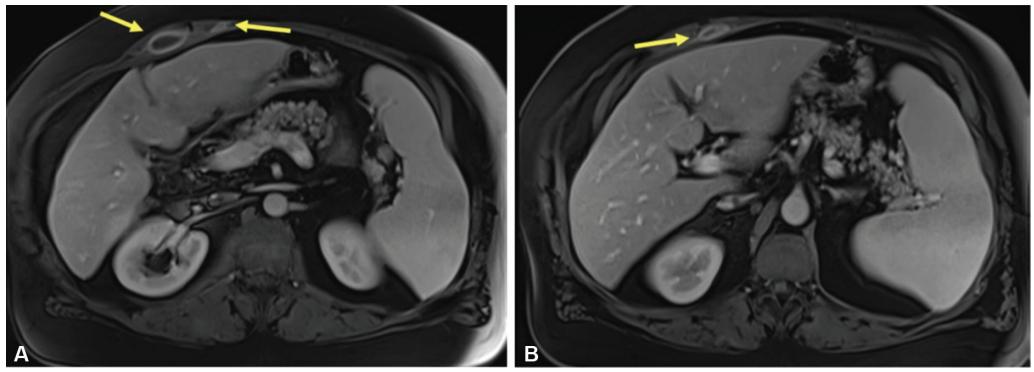

Fig. 1 (**A**) Axial magnetic resonance imaging (MRI) venous phase demonstrating two of three peripherally enhancing lesions in right rectus muscle (yellow arrows). (**B**) Axial MRI venous phase showing remaining third peripherally enhancing lesion in right rectus muscle (yellow arrow).

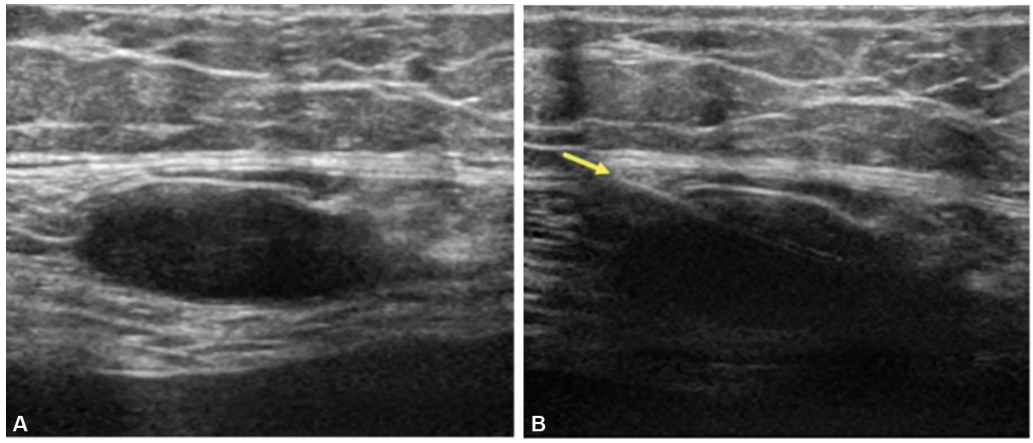

Fig. 2 (**A**) Ultrasound showing largest hypoechoic lesion in right rectus muscle. (**B**) Ultrasound showing cryoablation needle positioned through largest lesion (yellow arrow).

in the lateral inferior aspect (►**Fig. 2A**) and smaller lesions were medial. The right superior epigastric artery was identified medial to the larger lesion. Limited computed tomography (CT) with and without contrast confirmed the findings. Local anesthesia was provided with 1% lidocaine. An Endocare 2.4-mm right angle V-probe cryoprobe was advanced in stages under CT guidance and deployed across the first lesion. Proper positioning was confirmed via ultrasound (►**Fig. 2B**) and CT (►**Fig. 3A**), followed by 10 minutes of freezing, 10 minutes of passive thaw, and 10 minutes of freezing and active thaw. During the entire cryoablation process, the size and extent of the ice ball was monitored by frequent CT imaging (►**Fig. 3B**). Once there was a satisfactory ablation zone and thaw, the probe was removed. The same process was repeated for the remaining two lesions. A postprocedure limited noncontrast CT showed postprocedure inflammatory changes with no evidence of immediate complications (►**Fig. 4**).

Follow-up MRI 2 months later demonstrated the three rectus abdominus lesions decreased in size with associated

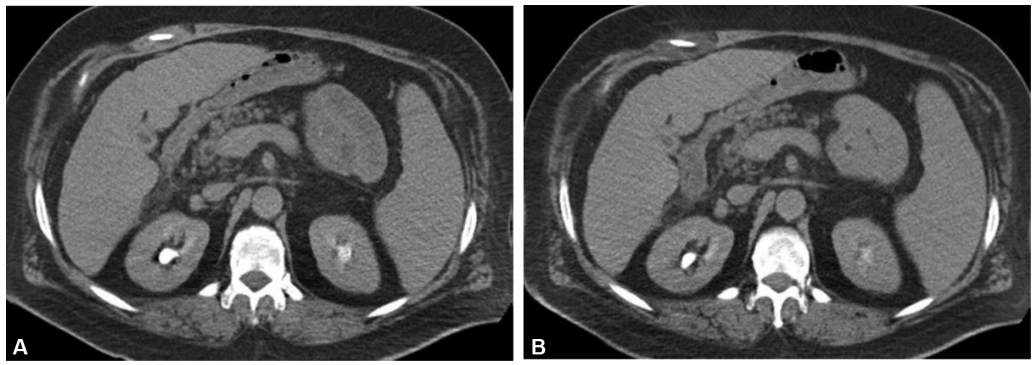

Fig. 3 (**A**) Axial computed tomography (CT) demonstrating cryoablation needle positioned through largest lesion. (**B**) Axial CT showing ice ball treatment zone.

Fig. 4 Axial noncontrast computed tomography (CT) demonstrating postprocedure inflammatory changes with no evidence of immediate complications.

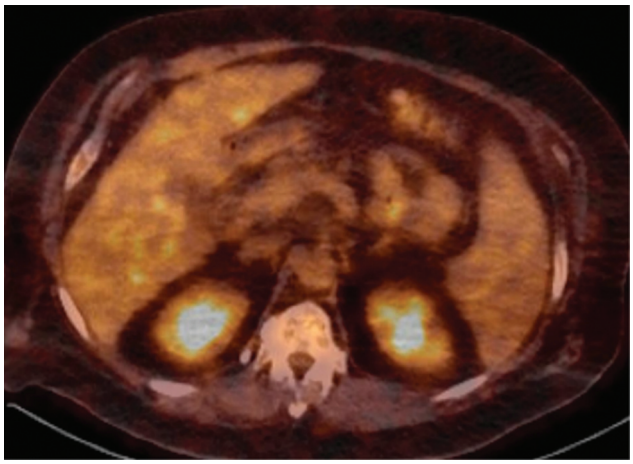

Fig. 5 Positron emission tomography (PET) showing no abnormal fluorodeoxyglucose (FDG) uptake in the abdominal wall.

surrounding treatment changes. Four months later, a positron emission tomography scan showed no suspicious lesions or abnormal fluorodeoxyglucose uptake in the abdominal wall (►**Fig. 5**), and a MRI scan showed complete resolution of the lesions with T1 hyperintensities in the right rectus muscle representing hematomas in the sites of previously treated metastatic lesions (►**Fig. 6A** and **B**).

Discussion

Abdominal wall metastasis is a rare manifestation of colorectal adenocarcinoma, frequently attributed to seeding from previous procedures.[3] Treatment options have been previously limited to local surgical resection, chemotherapy, and radiation. Systemic therapy and targeted radiation risk toxicity and damage to healthy tissue; surgical resection limitations include difficulties with primary closure due to extent and location of disease, close proximity to critical structures, poorly defined margins, and poor surgical candidacy. Cases of cryoablation of soft tissue metastatic lesions have been demonstrated to provide short-term pain and local tumor control in retrospective studies.[2,5,6] There is limited literature on treatment of metastases to musculature, particularly in colorectal adenocarcinoma. Cryoablation induces necrosis of tumors through various processes including intracellular ice formation, free radical release, vascular stasis, cellular swelling, and apoptosis.[5,7] Benefits of cryoablation include the ability to use imaging to visualize the ice ball during the procedure avoiding adjacent critical structures, use of conscious sedation due to anesthetic effect of cryoablation, abscopal effect, and the use of multiple ablation probes when needed. This case supports the safety and efficacy of cryoablation in metastatic soft tissue lesions, specifically colorectal cancer in the abdominal wall; the patient had no procedural complications and has had no evidence of residual or recurrent disease in 1 year. Follow-up imaging is important to monitor for tumor progression, recurrence, or residual disease. Additionally, continued follow-up is necessary to evaluate the long-term efficacy of cryoablation.

Conclusion

Minimally invasive percutaneous cryoablation demonstrates to be an efficacious option for the treatment of abdominal

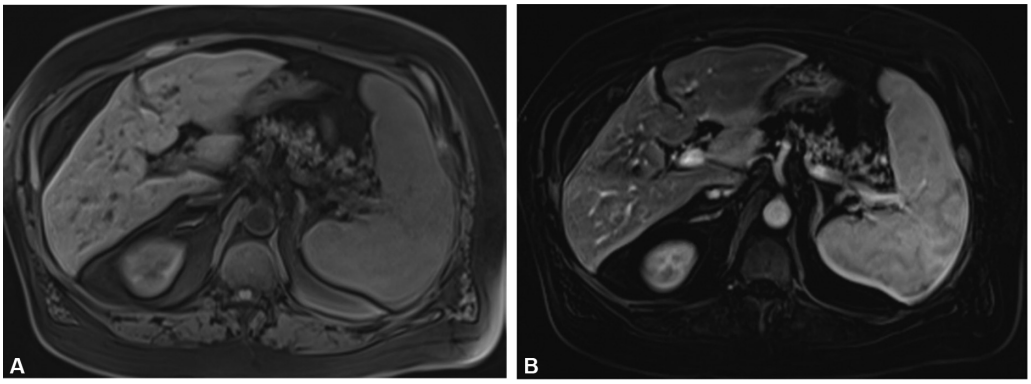

Fig. 6 (**A**) Axial magnetic resonance imaging (MRI) demonstrating an area of T1 hyperintensity in the right rectus muscle consistent with hematoma in the site of previously treated lesion. (**B**) Axial MRI venous subtraction showing no enhancement in right rectus muscle.

wall metastases from primary colorectal cancer. By using imaging during the procedure, adequate treatment zones are easily visualized.

Conflict of Interest
None declared.

References

1 Riihimäki M, Hemminki A, Sundquist J, Hemminki K. Patterns of metastasis in colon and rectal cancer. Sci Rep 2016; 6:29765
2 Bang HJ, Littrup PJ, Currier BP, et al. Percutaneous cryoablation of metastatic lesions from colorectal cancer: efficacy and feasibility with survival and cost-effectiveness observations. ISRN Minim Invasive Surg 2012;2012:942364
3 Koea JB, Lanouette N, Paty PB, Guillem JG, Cohen AM. Abdominal wall recurrence after colorectal resection for cancer. Dis Colon Rectum 2000;43(05):628–632
4 Kaikaus J, Makiewicz K, Millikan K. Colorectal cancer recurrence isolated to the abdominal wall recurring 11 years after right hemicolectomy. ACS Case Reviews in Surgery 2018;2(02):10–13
5 Wallace AN, McWilliams SR, Connolly SE, et al. Percutaneous image-guided cryoablation of musculoskeletal metastases: pain palliation and local tumor control. J Vasc Interv Radiol 2016;27 (12):1788–1796
6 Littrup PJ, Bang HJ, Currier BP, et al. Soft-tissue cryoablation in diffuse locations: feasibility and intermediate term outcomes. J Vasc Interv Radiol 2013;24(12):1817–1825
7 Baust JG, Snyder KK, Santucci KL, Robilotto AT, Van Buskirk RG, Baust JM. Cryoablation: physical and molecular basis with putative immunological consequences. Int J Hyperthermia 2019;36 (sup1):10–16

