

Drug-eluting bead transarterial chemoembolization with immunotherapy and targeted therapy for advanced clear cell renal cell carcinoma: A case report

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Abstract. Abdominal wall metastasis is a rare metastatic pattern of clear cell renal cell carcinoma and is typically associated with advanced disease and poor prognosis. Due to its unique anatomical location and complex vascular supply, conventional systemic therapies have limited efficacy in controlling these metastases, and surgical resection is often challenging due to the deep-seated location of the tumor and its proximity to vital structures. Drug-eluting bead transarterial chemoembolization (DEB-TACE) is a promising locoregional therapeutic option for patients with refractory metastases. The present case report described a multi-modal treatment strategy centered on DEB-TACE combined with an immune checkpoint inhibitor and a tyrosine kinase inhibitor in the treatment of this rare clinical scenario.

Introduction

Clear cell renal cell carcinoma (ccRCC) accounts for 75-80% of all renal cancer cases and is characterized by aggressive biological features and high metastatic potential (1). Abdominal wall metastasis is a rare metastatic pattern of ccRCC and is typically associated with advanced disease and poor prognosis (2). Unlike more common metastatic sites such as the lungs, liver and bones, abdominal wall metastases occur in anatomically complex regions adjacent to key neurovascular structures, posing unique therapeutic challenges (3,4).

From a vascular anatomical perspective, tumors arising in the posterolateral abdominal wall may recruit blood supply from multiple arterial territories. The posterior abdominal wall is supplied in part by the lumbar arteries arising from

the abdominal aorta (5), while the iliolumbar artery, a branch of the internal iliac system, and the deep circumflex iliac artery, typically arising from the external iliac artery, also contribute to the perfusion of the lower lateral abdominal wall and iliac region (6). Furthermore, collateral communication may exist among the aortic, internal iliac and external iliac arterial systems (7). Therefore, abdominal wall metastases in this region may demonstrate a complex and variable multi-source arterial supply rather than a dependence on a single dominant feeder, which provides an anatomical basis for angiography-guided, superselective drug-eluting bead transarterial chemoembolization (DEB-TACE) (8).

Conventional systemic therapy often provides suboptimal control of abdominal wall metastases. Although combinations of immune checkpoint inhibitors and multi-target tyrosine kinase inhibitors (TKIs) have become the standard of care for advanced ccRCC; however, their efficacy remains limited in patients with a high tumor burden or refractory lesions (9-11). Surgical resection of deep-seated lesions adjacent to vital structures can be challenging because these tumors may be closely associated with surrounding muscles, neurovascular structures and major vessels. Furthermore, abdominal wall metastases may exhibit complex anatomical relationships and variable collateral vascular networks, increasing the risk of bleeding, incomplete resection and postoperative functional impairment (12-14).

DEB-TACE has been increasingly investigated in solid tumors, including emerging combinations with programmed cell death protein-1 (PD-1) blockade (15,16). This technique involves superselective arterial catheterization to deliver DEBs directly to tumor-feeding arteries, achieving sustained intratumoral drug concentrations with sustained release while simultaneously occluding the arterial blood supply, thereby producing a dual antitumor effect (16). The most common adverse events include post-embolization syndrome (namely, pain, fever and nausea/vomiting), transient liver dysfunction, and less commonly, non-target embolization, liver abscess, bile duct injury, pulmonary embolism or renal dysfunction (17).

Selective internal radiation therapy (SIRT), also referred to as transarterial radioembolization, represents another catheter-based locoregional option for liver-dominant malignancies; in contrast to DEB-TACE, it delivers cytotoxic radiation using intra-arterially administered radioactive microspheres and has been used in both primary and metastatic hepatic tumors,

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including hepatocellular carcinoma, intrahepatic cholangiocarcinoma, and liver metastases from colorectal cancer, neuroendocrine tumors and other solid malignancies (18-20).

The integration of locoregional intervention therapies with systemic treatment has exhibited notable synergistic potential. Immune checkpoint inhibitors restore antitumor immune activity, whereas multi-target TKIs inhibit tumor angiogenesis and proliferation-associated signaling pathways, including the vascular endothelial growth factor (VEGF)/VEGF receptor (VEGFR), platelet-derived growth factor (PDGF)/PDGF receptor and fibroblast growth factor (FGF)/FGF receptor signaling axes, as well as downstream pathways involved in tumor cell proliferation and survival, such as the RAS/RAF/MEK/ERK and PI3K/AKT/mTOR pathways (21,22). Local therapy-induced tumor necrosis may promote the release of tumor antigens, potentially enhancing the efficacy of immune checkpoint inhibitors. The anti-angiogenic effects of TKIs can suppress hypoxia-induced neovascularization following TACE, further reinforcing the therapeutic effects of embolization (23,24). The present study reports a detailed case of a patient with advanced ccRCC and abdominal wall and liver metastases, who was successfully treated with DEB-TACE in combination with axitinib and pucotenlimab, highlighting the potential effectiveness of this multimodal therapeutic strategy in the future.

Case report

A 65-year-old man was admitted to the Department of Oncology, The Affiliated Hospital of Yanbian University (Yanbian Hospital) (Yanji, China) in September 2024 with a painless, progressively enlarging mass in the left abdominal wall that had been present for ~2 years. At presentation, the Eastern Cooperative Oncology Group (ECOG) performance status of the patient was 1, indicating that the patient was ambulatory and capable of light work (25). The patient underwent radical left nephrectomy at The First Hospital of Jilin University (Changchun, China) in June 2017 because of a renal mass detected during routine medical examination. Postoperative histopathological examination confirmed ccRCC, classified as pT3aN0M0, grade 1 according to the World Health Organization/International Society of Urological Pathology nuclear grading system (26). No lymphovascular invasion was identified and the surgical margins were negative. In August 2022, the patient incidentally noticed a painless mass on the left flank of the body and subsequently commenced oral therapy with pazopanib (0.8 g/day). Pazopanib treatment was administered for ~2 years. During outpatient evaluation at The Affiliated Hospital of Yanbian University (Yanbian Hospital) in September 2024, disease progression was confirmed based on enlargement of the abdominal wall lesion and the development of multiple liver metastases.

At initial evaluation in September 2024, physical examination revealed a hard, poorly defined, immobile mass measuring ~8x7 cm in the left abdominal wall. Laboratory testing demonstrated elevated tumor marker levels, including carcinoembryonic antigen (CEA; 38.5 ng/ml; reference range, 0-5 ng/ml) and carbohydrate antigen 19-9 (CA19-9; 52.1 U/ml; reference range, 0-37 U/ml).

Baseline contrast-enhanced computed tomography (CT) imaging performed in September 2024 revealed multiple hypervascular hepatic nodules and a large, irregularly enhancing mass in the left abdominal wall (Fig. 1A and B). To establish a definitive diagnosis, a CT-guided core needle biopsy of the left abdominal wall mass was performed. Histopathological examination was performed on formalin-fixed, paraffin-embedded tissue sections. For hematoxylin and eosin staining, the sections were deparaffinized, rehydrated through graded ethanol solutions, stained with hematoxylin and eosin, dehydrated, cleared and mounted according to standard procedures. For immunohistochemistry, the sections were deparaffinized and rehydrated, followed by antigen retrieval, blocking of endogenous peroxidase activity and nonspecific binding, incubation with primary antibodies, incubation with the corresponding secondary antibody/detection reagent, chromogenic visualization, hematoxylin counterstaining, dehydration, clearing and mounting, as described previously (27-31). Histopathological examination of the biopsy specimen (Fig. 1C) revealed nests and alveolar structures of clear cells with abundant pale to clear cytoplasm and delicate fibrovascular stroma, consistent with metastatic clear cell carcinoma. Immunohistochemical staining revealed positive expression levels of the CD10 (Fig. 1D) and RCC(glycoprotein 200) markers (Fig. 1E), supporting a renal origin. Ki-67 exhibited scattered nuclear positivity (Fig. 1F), indicating a relatively low proliferative activity in the sampled tissue. Combined with the oncological history of the patient, imaging findings and pathological evidence, these findings supported the diagnosis of abdominal wall metastasis from ccRCC. The final diagnosis confirmed advanced ccRCC with metastasis to abdominal wall and liver.

Before initiating second-line therapy in September 2024, International Metastatic Renal Cell Carcinoma Database Consortium (IMDC) risk stratification was performed at The Affiliated Hospital of Yanbian University (Yanbian Hospital) according to the established IMDC prognostic model (32). The interval from the initial diagnosis of ccRCC in 2017 to initiation of second-line systemic therapy in September 2024 was >1 year. The patient had a Karnofsky performance status of 90%, corresponding to an ECOG performance status grade of 1 (33), corrected serum calcium of 2.40 mmol/l (reference range, 2.25-2.75 mmol/l), neutrophil count of $4.5 \times 10^9/l$ (reference range, $2.0-7.7 \times 10^9/l$), platelet count of $210 \times 10^9/l$ (reference range, $100-300 \times 10^9/l$) and hemoglobin of 112 g/l (reference range, 110-160 g/l). None of the six IMDC adverse prognostic factors were present. According to the IMDC risk model, the patient had an IMDC score of 0 and was classified as having favorable-risk disease.

The multidisciplinary team considered surgical resection and stereotactic body radiotherapy; however, these options were not selected because of the anatomical complexity of the lesion, surgical risk and patient preference. Consensus was subsequently reached to proceed with DEB-TACE combined with systemic therapy. Written informed consent was obtained from the patient after providing a detailed explanation of the treatment plan. In September 2024, the patient underwent the first DEB-TACE procedure under fluoroscopic guidance and local infiltration anesthesia using 5 ml lidocaine. The right femoral artery was accessed using the Seldinger technique. A 5F pigtail catheter (Terumo Corporation) was

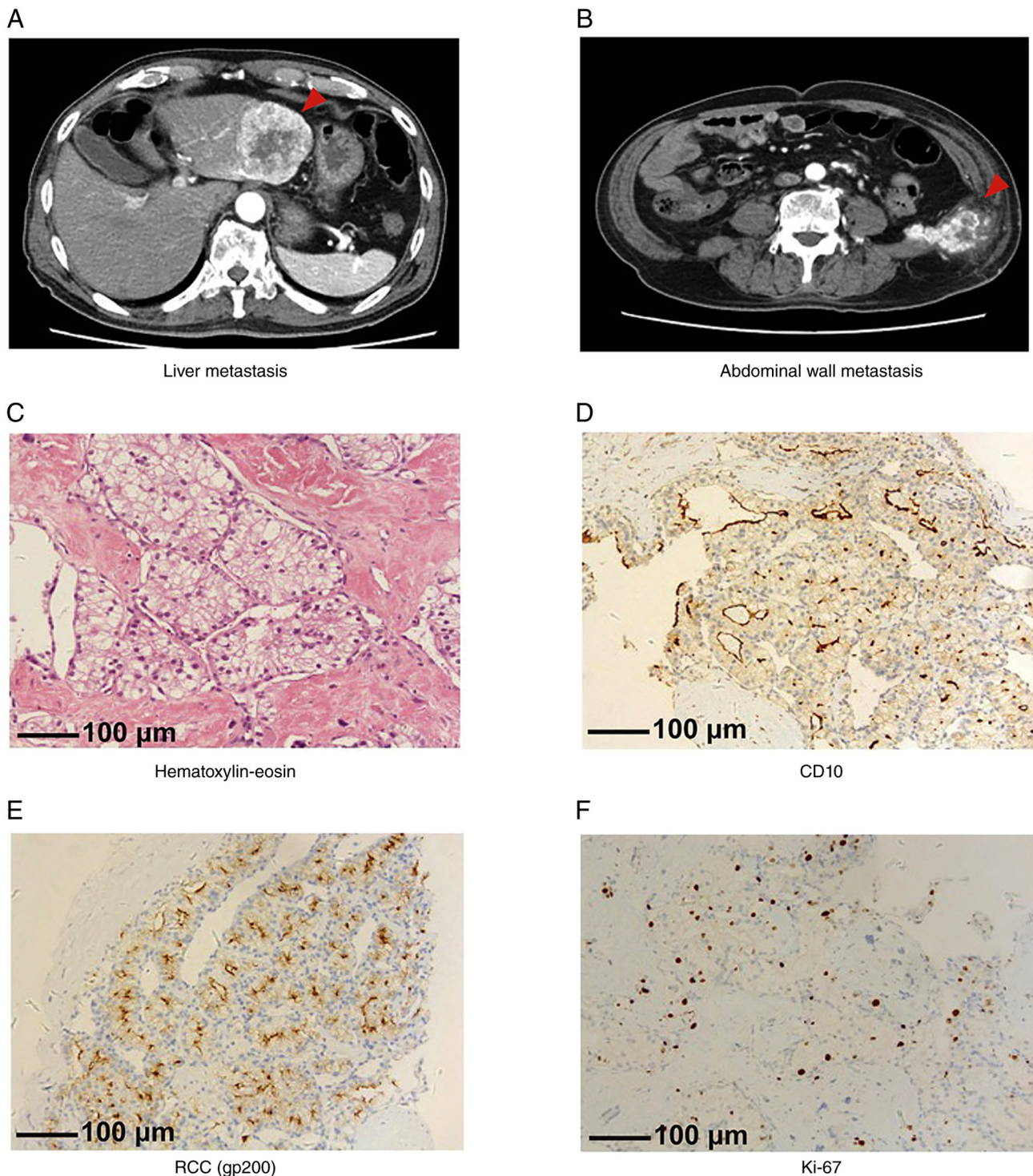


Figure 1. Imaging characteristics and pathological features of the abdominal wall metastasis. (A) Pre-treatment contrast-enhanced abdominal computed tomography presenting multiple hypervascular liver metastases (indicated by the red arrowhead) and (B) a large, irregularly enhancing metastatic mass in the left abdominal wall (indicated by the red arrowhead). (C) Hematoxylin and eosin staining reveals nests/alveolar arrangements of clear cells with delicate fibrovascular stroma. (D) CD10 and (E) RCC(gp200) immunostainings are positive. (F) Ki-67 exhibits scattered nuclear positivity (scale bars, 100 μ m in panels C-F). RCC, renal cell carcinoma; gp, glycoprotein.

used for angiography of the celiac trunk and its branches. Intraoperative digital subtraction angiography revealed a complex tumor vascular supply. Liver metastases were supplied by branches of the left and right hepatic arteries (Fig. 2A, D and E), whereas the abdominal wall metastasis received blood supply from two left lumbar arteries arising from the abdominal aorta (Fig. 2B), the iliolumbar artery

originating from the left internal iliac artery (Fig. 2C and F) and the deep circumflex iliac artery branching from the left external iliac artery (Fig. 2F). A microcatheter (2.0F-130 cm; APT Medical) was used to superselectively catheterize each tumor-feeding artery. Embolization was performed using CalliSphere® microspheres (300-500 μ m; Suzhou Hengrui Medical Devices Co., Ltd.) loaded with 50 mg epirubicin.

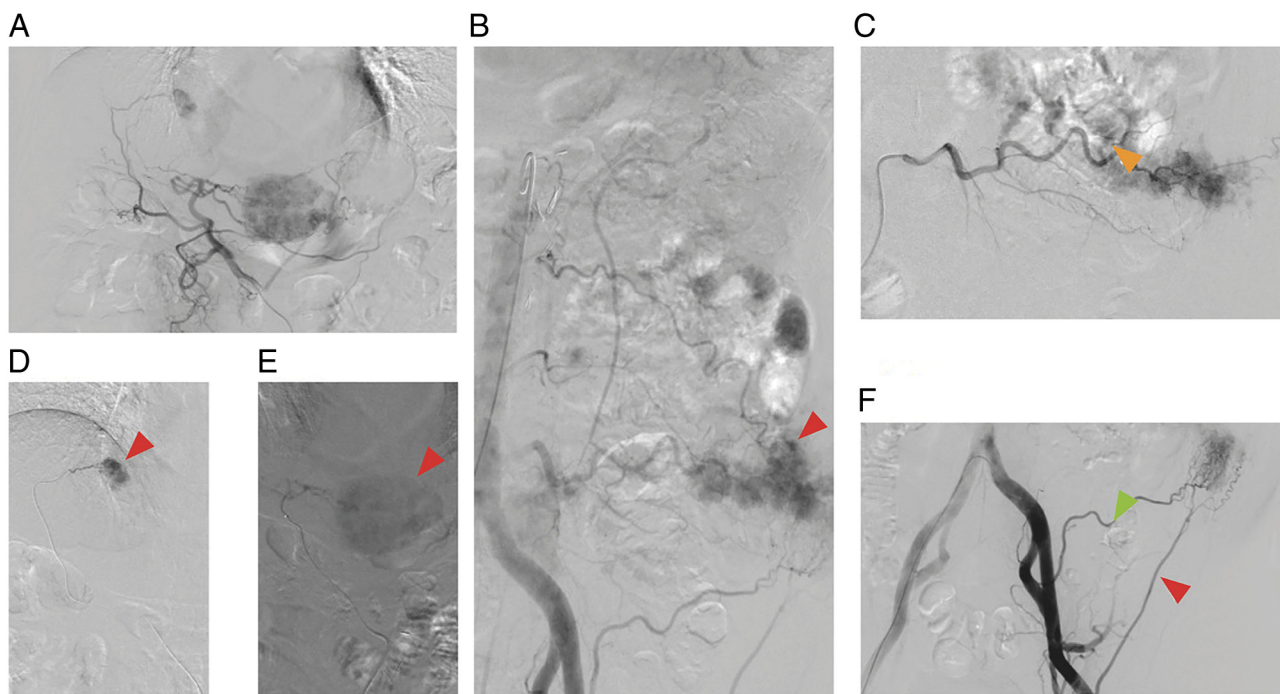


Figure 2. Intraprocedural digital subtraction angiography during drug-eluting bead transarterial chemoembolization. (A) Celiac trunk angiography presenting the overall blood supply to the liver. (D and E) Superselective angiography of the left and right hepatic artery branches, revealing distinct tumor staining (indicated by the red arrowheads). (B) Abdominal aorta angiography presenting the abdominal wall metastasis supplied by multiple vessels, including two left lumbar arteries (indicated by the red arrowhead). (C) Superselective angiography confirms the left lumbar artery (indicated by orange arrowhead) as one of the main feeding arteries. (F) Left common iliac artery angiography demonstrates that both the iliolumbar artery (indicated by the green arrowhead) arising from the internal iliac artery, and the deep circumflex iliac artery (indicated by the red arrowhead) arising from the external iliac artery, contribute to the tumor blood supply.

The beads were agitated every 5 min during loading, mixed with iodixanol at a ratio of 1:3, and slowly injected into the tumor-feeding arteries under fluoroscopic monitoring. The detailed treatment timeline is presented in Fig. 3A.

A total of 2 weeks after the first DEB-TACE session in October 2024, second-line systemic therapy with axitinib (3 mg orally, twice daily) and pucotenlimab (200 mg intravenously, every 3 weeks) was initiated after disease progression on pazopanib. The patient received 17 cycles of pucotenlimab by the last follow-up in November 2025, with axitinib maintenance therapy continued during follow-up. No treatment-related adverse events were observed during follow-up through to November 2025, based on regular outpatient assessments, including clinical evaluation, patient-reported symptoms, physical examination and laboratory tests. Therefore, no adverse-event grade was assigned according to Common Terminology Criteria for Adverse Events version 5.0 (34).

The first treatment response assessment was conducted in late October 2024. Comparison of contrast-enhanced CT scans (Fig. 3C and F) with baseline images (Fig. 3B and E) revealed a notable reduction in both the liver and abdominal wall metastases, consistent with a partial response (PR) according to the Response Evaluation Criteria in Solid Tumors guideline (RECIST; version 1.1) (35). The modified RECIST (mRECIST) guideline (36), which is not validated as the standard response criterion for metastatic RCC, was retained only as an exploratory complementary assessment of viable enhancing tissue after embolization and was not used as the primary efficacy criterion. By this exploratory assessment, the lesions revealed

notable internal necrosis and were classed as PR, with one intrahepatic lesion achieving a complete response (CR). All serial CT scans, target-lesion measurements and RECIST version 1.1 classifications were independently evaluated and validated by a board-certified radiologist with 20 years of experience in oncological imaging. Clinically, the patient remained asymptomatic during follow-up and no new tumor-related symptoms were reported. CEA and CA19-9 were measured as part of routine clinical laboratory assessment. However, neither CEA nor CA19-9 has been validated as a biomarker for treatment-response assessment in ccRCC; therefore, treatment response in this patient was evaluated primarily according to radiological criteria (RECIST version 1.1) rather than changes in serum tumor marker level (37,38). Accordingly, treatment response was determined radiologically according to the RECIST version 1.1 guideline and was not inferred from changes in serum CEA or CA19-9 levels. Baseline CEA and CA19-9 levels were 38.5 ng/ml and 52.1 U/ml, respectively. The CEA and CA19-9 levels subsequently decreased to 2.53 ng/ml and <2.0 U/ml in September 2024, to 1.95 ng/ml and <2.0 U/ml in October 2024, and to 1.85 ng/ml and <2.0 U/ml in November 2024, respectively. To provide a quantitative assessment of treatment response, target lesion measurements were recorded according to RECIST version 1.1 at baseline before treatment (September 2024), first radiological assessment after treatment (October 2024) and the last follow-up assessment (November 2025). Hepatic segment (S) 6 metastasis decreased from 65 mm at baseline to 32 mm at the first follow-up and 18 mm at the last follow-up, corresponding

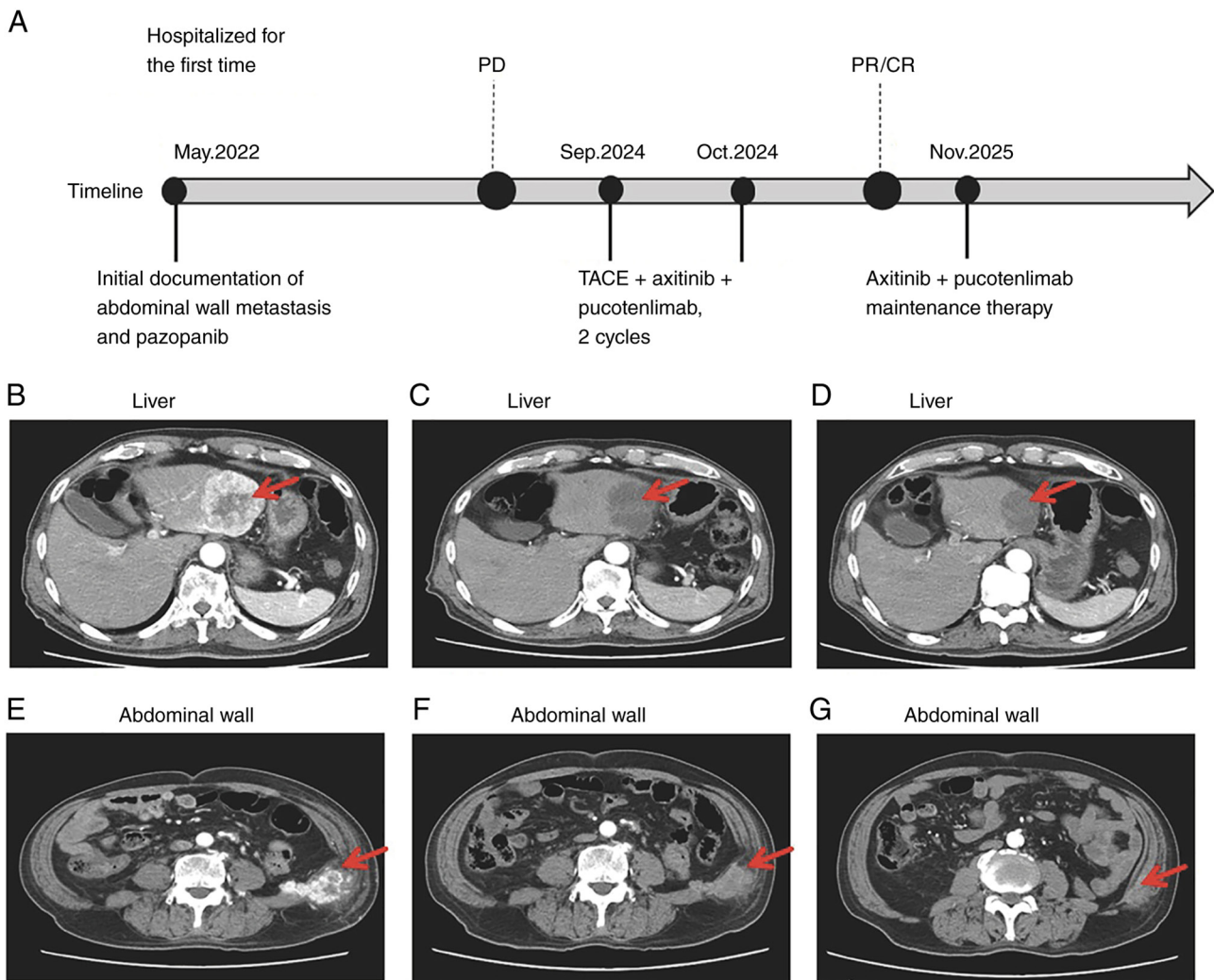


Figure 3. Imaging follow-up before and after treatment, and treatment timeline. (A) Detailed timeline of the treatment course of the patient. (B and E) Pre-treatment (September 2024) contrast-enhanced CT indicating liver and abdominal wall metastases (indicated by the red arrows). (C and F) Post-treatment (October 2024) contrast-enhanced CT after two TACE sessions and combined systemic therapy, demonstrating reduced tumor volume and extensive internal necrosis (PR) in the indicated lesions (indicated by the red arrows). (D and G) Contrast-enhanced CT during maintenance therapy (November 2025), exhibiting sustained lesion control in the indicated lesions (indicated by the red arrows). PD, progressive disease; PR, partial response; CR, complete response; CT, computed tomography; TACE, transarterial chemoembolization.

to a 72.3% reduction. The hepatic S4 metastasis decreased from 38 to 19 mm and subsequently disappeared completely (0 mm), corresponding to a CR of the lesion. Abdominal wall metastasis decreased from 73 to 35 mm and then to 20 mm, corresponding to a 72.6% reduction. Overall, the sum of the target lesion diameters decreased from 176 mm at baseline to 86 mm at the first follow-up and 38 mm at the last follow-up, representing a 78.4% reduction from baseline and meeting the RECIST guideline for PR (Table I).

Maintenance immunotherapy and targeted therapy were continued from October 2024 to November 2025 (~13 months), with sustained disease control observed during follow-up. After >1 year of follow-up, the quality of life of the patient had improved markedly, with the ECOG performance status improving from 1 at presentation to 0 at the most recent follow-up (November 2025). Follow-up evaluations were performed through regular outpatient assessments, including clinical examination, ECOG performance status evaluation, laboratory testing and contrast-enhanced CT imaging. In

November 2025, a repeat contrast-enhanced abdominal CT (Fig. 3D and G) demonstrated sustained disease control.

Discussion

Therapeutic options for ccRCC with abdominal wall metastasis are limited due to its rarity. Stereotactic body radiotherapy (SBRT) is an effective and well-established local option for metastatic RCC (39,40), and SIRT represents another catheter-based locoregional approach that has been investigated mainly for hepatic malignancies, including hepatocellular carcinoma, intrahepatic cholangiocarcinoma and selected liver metastases (18-20). However, the relatively high cost and limited financial accessibility of SIRT markedly restrict its routine clinical use. Therefore, it was not a feasible option for the patient in the present case. The multidisciplinary team discussed surgery and SBRT; however, further surgery was not recommended due to the prior radical nephrectomy performed in the patient, the intricate anatomical relationship of the abdominal wall lesion and to avoid another

Table I. Changes in target lesion size and RECIST response assessment.

Lesion site	Baseline (September 2024) ^a	First follow-up (October 2024) ^a	Last follow-up (November 2025) ^a	Change, %	RECIST version 1.1	
						mRECIST
Hepatic S6 metastasis	65	32	18	-72.3	PR	PR
Hepatic S4 metastasis	38	19	0	-100.0	CR	CR
Abdominal wall metastasis	73	35	20	-72.6	PR	NA
Sum of diameters	176	86	38	-78.4	PR	-

^aLesion diameters are reported in mm. -, not available; NA, not applicable; PR, partial response; CR, complete response; RECIST, Response Evaluation Criteria in Solid Tumors; mRECIST, modified RECIST; S, segment.

procedure as per the request of the patient. Similarly, SBRT was not selected after considering the anatomy of the lesion and patient preference. DEB-TACE may be particularly useful in selected patients with bulky, hypervascular and anatomically complex lesions with multiple tumor-feeding arteries (41-43). In the present case, angiography demonstrated a multi-source arterial supply to the abdominal wall metastasis from two left lumbar arteries, the iliolumbar artery and the deep circumflex iliac artery, permitting superselective treatment of the identified feeding vessels. Therefore, rather than implying an advantage over SBRT, the present case emphasizes DEB-TACE as a technically appropriate local treatment option for this specific lesion pattern and clinical context. In contrast to systemic therapy alone, the rapid and effective local tumor debulking achieved by DEB-TACE in the aforementioned protocol may have created a more favorable tumor microenvironment providing an opportunity for subsequent immunotherapy and targeted therapy to exert their effects. The precision and high efficacy of DEB-TACE are key to its successful implementation. The complex vascular network of the abdominal wall metastases, spanning the abdominal aorta and both the internal and external iliac arteries, is a major contributor to the failure of conventional treatments (12-14). Using angiographic analysis and superselective catheterization, DEB-TACE successfully addressed all tumor-feeding arteries. The strategy of superselective embolization targeting multiple tumor-feeding arteries enabled comprehensive devascularization of the metastatic lesions.

To further contextualize the magnitude of response observed, the present case was compared with previously published outcomes of axitinib-based immune checkpoint inhibitor regimens in advanced RCC. As current research on axitinib plus pucotenlimab in RCC is limited, the most relevant benchmarks are derived from other axitinib-based immune checkpoint inhibitor combinations. This regimen was selected because axitinib is an established second-line treatment after prior anti-angiogenic therapy, VEGF/PD-1 co-inhibition is biologically rational in RCC, and pucotenlimab is locally available (44-47). By contrast, standard VEGF-immuno-oncology combinations, such as pembrolizumab plus axitinib were developed mainly for previously untreated advanced RCC. In the phase III KEYNOTE-426 trial, pembrolizumab plus axitinib achieved an objective response rate (ORR) of 59.3% and a median progression-free survival (PFS) time of 15.1 months in previously untreated advanced ccRCC; in the 5-year update, the ORR remained 60.6% (48).

Similarly, in the phase III JAVELIN Renal 101 trial, avelumab plus axitinib achieved an ORR of 55.2% and a median PFS time of 13.8 months (49). In patients with previously treated disease, a retrospective multicenter study of second-line axitinib plus toripalimab after prior VEGFR-TKI failure reported an ORR of 31.6% and median PFS time of 11.7 months (50). Compared with this background, the patient in the present case, who had already progressed on pazopanib, experienced a rapid radiographic PR, marked intratumoral necrosis by mRECIST, complete radiological response of one hepatic lesion and durable disease control for >1 year after DEB-TACE followed by axitinib plus pucotenlimab. Although causality cannot be established from a single case report, the depth and speed of the local response suggested that DEB-TACE may have provided additional benefits beyond systemic therapy alone, particularly by rapidly reducing tumor vascularity and burden.

No tumor microenvironment or immune biomarker assessment was performed in the present case report; therefore, it remains to be elucidated if local tumor devascularization or debulking affected the tumor microenvironment or systemic therapy. The abnormal rapid and notable response observed in the present case may reflect a biologically plausible interaction between locoregional and systemic therapies rather than the isolated effect of any single treatment component. DEB-TACE likely contributed not only through immediate devascularization and localized cytotoxic drug delivery, but also by inducing extensive tumor necrosis, which may promote the release of tumor antigens (for example, tumor-associated antigens and neoantigens) and damage-associated molecular patterns, such as high mobility group box 1, heat shock proteins and extracellular ATP, together with proinflammatory cytokines including interleukin (IL)-1 β , IL-6, IL-8 and tumor necrosis factor- α , thereby enhancing antitumor immune priming (51-53). This finding provides a potential mechanistic rationale in combining locoregional therapy with PD-1 blockade in the future. In parallel, anti-angiogenic treatment with axitinib may help suppress hypoxia-driven neovascularization after embolization, thereby reinforcing the local effects of TACE and contributing to systemic antitumor activity (54). Therefore, in the present case, the observed benefit may be further understood as the result of complementary local tumor control and systemic immune-targeted therapy acting in combination, rather than as separate and disconnected therapeutic effects. Furthermore, locoregional

Table II. Selected published reports relevant to abdominal wall metastasis and DEB-TACE in renal cell carcinoma.

First author, year ^a	Clinical setting/disease site	Treatment strategy	Key reported findings	Relevance/limitation	(Refs.)
Kumar <i>et al</i> , 2015	Isolated abdominal wall metastasis from ccRCC 2 years after nephrectomy	Wide excision	Surgical management of a rare delayed isolated abdominal wall metastasis	Illustrates rarity and presentation; no transarterial treatment	(58)
Yu <i>et al</i> , 2025	Abdominal wall metastasis as the initial presentation of otherwise occult ccRCC	Excision of abdominal wall mass followed by radical nephrectomy	Case report of abdominal wall involvement at initial presentation	Illustrates variable presentation; no transarterial treatment	(59)
Bi <i>et al</i> , 2022	35 patients with unresectable RCC	Doxorubicin-loaded CalliSphere® DEB-TACE	1-month ORR, 47.1%; disease control rate, 94.1%; no treatment-related grade ≥3 adverse events	Series supports feasibility of DEB-TACE in selected RCC; population and disease setting differ from the present case	(8)
Qiu <i>et al</i> , 2024	RCC with liver and retroperitoneal lymph node metastases after systemic treatment failure	DEB-TACE	Complete response reported in a single case	Supports potential local activity after systemic treatment failure; single-case evidence	(15)
Present case	ccRCC with abdominal wall and liver metastases; complex multi-source arterial supply; progression on pazopanib	Superselective DEB-TACE followed by axitinib plus pucotenlimab	RECIST version 1.1, PR; sum of target diameters, 176 to 38 mm; sustained disease control observed during >1 year of available follow-up	Multimodal treatment contributions cannot be separated; no mechanistic synergy can be inferred	-

^aAs the previously published case reports differ markedly in patient population, disease site, systemic treatment and response assessment, direct cross-study efficacy comparisons are not appropriate. -, not available; RCC, renal cell carcinoma; ccRCC, clear cell RCC; DEB-TACE, drug-eluting bead transarterial chemoembolization; ORR, objective response rate; PR, partial response; RECIST, Response Evaluation Criteria in Solid Tumors.

therapies can induce antigen and proinflammatory cytokine release. Anti-VEGF/TKI strategies have been proposed to counter post-embolization angiogenic rebound (55), providing a biologically coherent framework for the multimodal treatment strategy used in the present case.

In the comprehensive management of ccRCC, particularly in cases refractory to systemic therapy, DEB-TACE may represent a notable adjunctive treatment with rapid tumor-debulking capability. The principal advantage of DEB-TACE lies in the precise targeting of lesions. By embolizing tumor-feeding arteries and locally delivering a sustained local concentration of chemotherapeutic drugs, DEB-TACE can efficiently induce tumor ischemia and necrosis, resulting in rapid tumor reduction. In the present case, multimodality treatment was associated with rapid tumor shrinkage and complete radiological CR of the treated abdominal wall lesion, resulting in a marked reduction of

the local tumor burden. This observation should be interpreted cautiously; however, it is broadly consistent with emerging evidence suggesting that DEB-TACE may provide meaningful local control in selected RCC cases, including unresectable disease and rare reports of complete response (8,15). This rapid local control creates a key therapeutic window, enabling improved control of oligometastatic activity and enhancing the potential benefit of subsequent systemic therapies. Therefore, as a notable adjunctive modality in the comprehensive treatment of advanced ccRCC, DEB-TACE offers marked clinical value in potentially overcoming treatment resistance and improving patient outcomes in the future (56,57).

Previously published case reports relevant to the present case remains limited and heterogeneous (Table II). A 2015 case report described an isolated abdominal wall metastasis from ccRCC occurring 2 years after nephrectomy treated

with wide excision (58), whereas a 2025 case report described an abdominal wall metastasis as the initial presentation of an otherwise occult ccRCC, followed by excision of the abdominal wall mass and radical nephrectomy (59). These case reports emphasized the rarity and variable presentation of abdominal wall involvement; however, neither study evaluated transarterial treatment. Regarding DEB-TACE in RCC, Bi *et al* (8) reported a 35-patient series of unresectable RCC in which the 1-month ORR was 47.1% and the disease control rate was 94.1%, with no treatment-related grade ≥ 3 adverse events. Qiu *et al* (15) reported a CR after DEB-TACE in a patient with hepatic and retroperitoneal lymph node metastases from RCC after systemic treatment failure. Compared with these case reports, the present case is distinguished by the abnormal complex multi-source arterial supply of the abdominal wall metastases and the use of DEB-TACE within a multimodality regimen after pazopanib progression. As patient populations, disease sites, systemic treatments and response methods differ markedly among case reports, direct comparisons of treatment efficacy should be interpreted with caution.

In conclusion, the present case highlighted the potential role of DEB-TACE as part of a multimodal treatment strategy for patients with advanced ccRCC. However, further validation in larger prospective clinical studies is warranted. Future research should focus on optimizing the timing of combination therapy (for example, concurrent vs. sequential administration), comparing the efficacy of different drug combinations, and identifying predictive biomarkers to guide individualized treatment strategies and potentially improve patient outcomes.

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Availability of data and materials

The data generated in the present study may be requested from the corresponding author.

Authors' contributions

YG and QX contributed to the acquisition and analysis of clinical data, interpreted the clinical findings and drafted the manuscript. DK contributed to the interpretation of imaging and clinical data and critically revised the manuscript. LP conceptualized and designed the study, supervised the treatment strategy, interpreted the data and critically revised the manuscript. YG and LP confirm the authenticity of all the raw data. All authors read and approved the final manuscript.

Ethics approval and consent to participate

Not applicable.

Patient consent for publication

Written informed consent was obtained from the patient for the publication of their clinical data and any associated medical images.

Competing interests

The authors declare that they have no competing interests.

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