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Case Report

A case report of sarcoma recurrence treated with a balloon-occluded combined approach (b-MWA + b-TAE) ☆

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ABSTRACT

Sarcomas present challenges in management due to their aggressive nature. Interventional radiology, utilizing ablation and embolization, offer promising alternatives for recurrent cases. In recent years, combined techniques (ablation + embolization) and the use of balloon-microcatheter have been introduced to enhance the necrotic effect in HCC treatment. This paper presents the case of a 47-year-old female with recurrent abdominal sarcoma treated with balloon-occluded microwave ablation (b-MWA) and balloon-occluded transarterial embolization (b-TAE). Post-treatment imaging revealed a significant reduction in lesion size and absence of pathological contrast enhancement. This study highlights the potential of balloon-catheter-assisted combined therapies (b-MWA + b-TAE) in managing sarcomas, expanding the applicability of interventional radiology for inoperable cases that are too large for ablative therapy alone or requiring multiple antennas. Further research is warranted to refine protocols and enhance patient outcomes in sarcoma management.

Introduction

Sarcomas are rare malignancies from mesenchymal tissues, often presenting challenges in management due to their aggressive behavior and high tendency for recurrence. Traditional treatment modalities include chemotherapy, surgery, and radiation therapy, but recurrent cases may necessitate alternative approaches [1]. Interventional radiology techniques, such as ablation (e.g. radiofrequency ablation, RFA; microwave ablation, MWA) and transarterial embolization (TAE), have emerged as valuable options in the management of recurrent sarcomas [2], providing minimally invasive alternatives with promising outcomes.

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Fig. 1 – Pretreatment CT. In the arterial phase, 2 sarcomatous (arrows) lesions characterized by strong contrast enhancement and sharp margins are clearly identifiable.

The synergistic effect of ablation and embolization (ablation + TAE) has been well-documented in the literature, particularly in treatment of liver tumors [3]. In recent years, the use of a balloon microcatheter has been introduced [4,5] to enhance the necrotic area produced by a novel combined technique known as "percutaneous thermal segmentectomy" (b-ablation + b-TAE). To our knowledge, there is no experience in literature of this technique in tumors different from hepatic ones.

In our paper, we tried to apply the advantages of the balloon-microcatheter in the combined treatment of a sarcoma recurrence.

Case presentation

Clinical background

We report the case of a 47-year-old female with a history of recurrent abdominal sarcoma [6]. Following surgical resection of the primary sarcoma, follow-up CT scans revealed the appearance and subsequent rapid growth of 2 pathological lesions characterized by intense contrast enhancement and well-defined margins: one in the subhepatic area (70 × 50 × 63 mm; APxLLxCC; 114.6 cc) and the other in the left iliac fossa (39 × 33 × 41 mm; 27.4cc) (Fig. 1). After multidisciplinary consultation, considering the lack of response to adjuvant chemotherapy and the patient's reluctance to undergo further surgery, interventional radiology treatment was considered [2]. Due to the size of the lesions, thermal ablation alone was deemed inadequate to ensure sufficient necrosis volume, thus a combined approach of balloon-occluded microwave ablation (b-MWA) [7] and balloon-occluded transarterial embolization (b-TAE) [8] was proposed.

Procedure

The patient underwent 2 treatment sessions (2 weeks apart); the first session targeted the larger perihepatic nodule (114.6 cc), while the second session targeted the smallest lesion in the left retroperitoneum (27.4 cc). Both treatments followed a standardized protocol (Figs. 2,3):

1. Right femoral arterial access and selective catheterization of feeder vessels (the 12th right intercostal artery for the first lesion and the left iliolumbar artery for the second lesion) using a coaxial technique (5 Fr diagnostic catheter and 2.8 Fr microcatheter with an occlusion-balloon on the tip).
2. Inflation of a balloon-microcatheter according to the vessel diameter (1:4 solution of contrast medium/saline).
3. Ultrasound and/or cone-beam CT (CBCT)-guided antenna (14G) insertion.
4. Balloon-occluded microwave ablation (b-MWA) of the lesion.
5. Balloon-occluded transarterial embolization (b-TAE) using 70-micron microparticles.
6. Deflation of the balloon after the end of embolization.

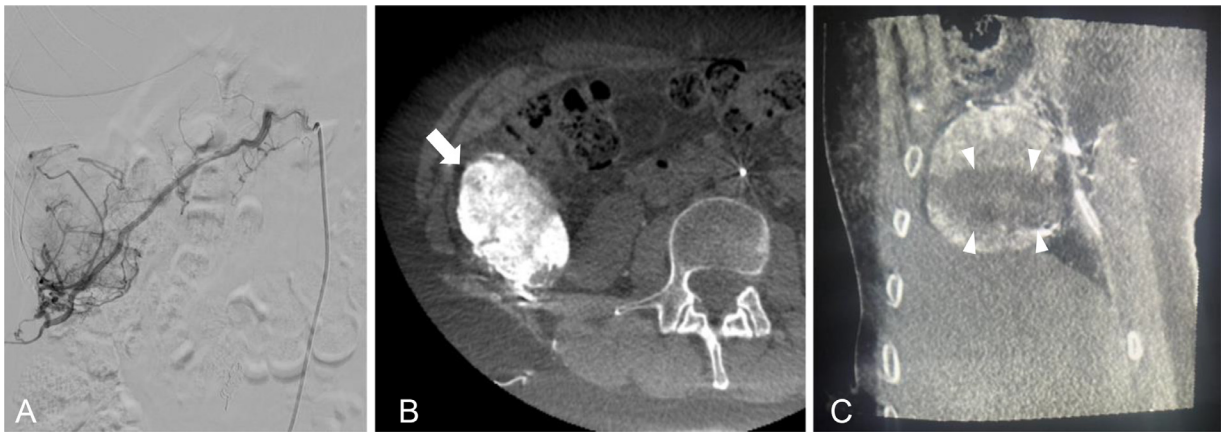

Fig. 2 – First treatment. (A,B) Pretreatment angiography (A) and CBCT with contrast medium (B) showing significant vascularization of the subhepatic lesion (arrow). (C) Final CBCT without contrast agent, displaying a positive 'huge sign' (arrowheads).

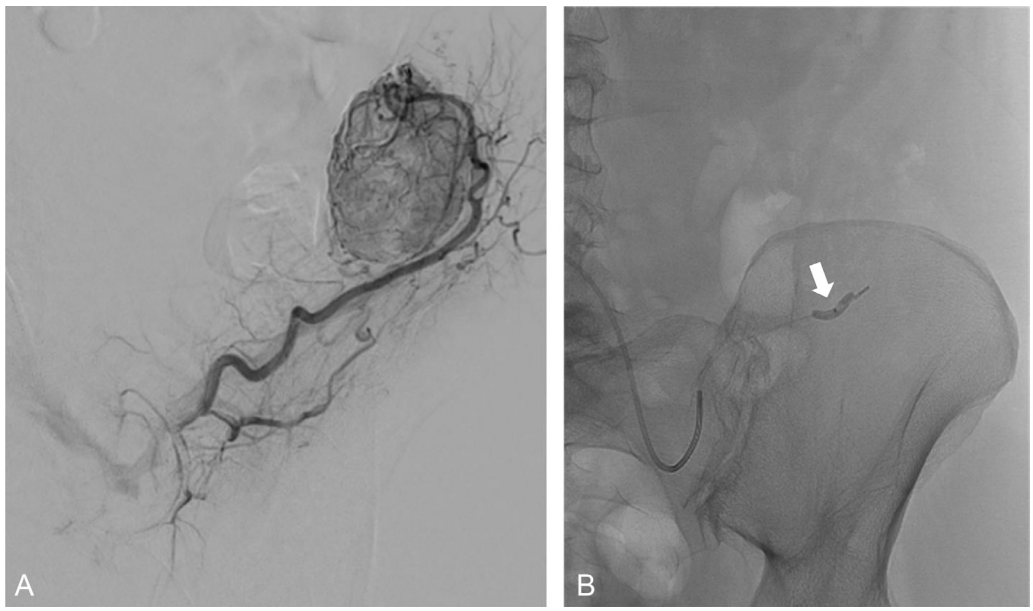

Fig. 3 – Second treatment. (A) Pretreatment angiography, showing an extensive vascular network. (B) Inflation of a balloon-microcatheter (arrow) according to the vessel diameter (0.6 cc of 1:4 solution of contrast medium/saline).

7. Final angiographic check to exclude bleedings or vascular complications and nonenhanced CBCT to evaluate the bead distribution.

Results

Post-treatment CBCTs demonstrated complete bead deposition surrounding the ablative-related central necrosis (positive hug sign; Fig. 2C) [4]. The patient tolerated the procedures well without immediate complications; pain control was achieved with the intravenous administration of common anti-inflammatories and the patient's temperature was monitored to exclude the onset of post embolization syndrome. The patient was discharged 4 days after each of the 2 procedures.

CT scan 1 month after the second treatment documented mild peripheric hyperdensity in the precontrastographic phase, absence of pathological contrast enhancement and initial reduction in lesion size (lesion 1: APxLLxCC 65 × 47 × 60 mm vs 70 × 50 × 63 mm; volume of 95.3 cc vs 114.6 cc) (lesion 2: APxLLxCC 33 × 29 × 32 mm vs 39 × 31 × 41 mm; volume of 15.9 cc vs 27.4 cc) (Fig. 4). A follow-up CT scan at 3 months showed further reduction in lesion size; lesion 1 dimensions were reduced to 61 × 37 × 50 mm (58.7 cc vs 114.6 cc), and lesion 2 dimensions were reduced to 26 × 22 × 22 mm (6.5 cc vs 27.4 cc), leading to volume reduction of 48.78% and 76.28% respectively (Fig. 5).

Fig. 4 – Noncontrast CT scan performed 1 month after the treatments reveals a mild hyperdensity of the 2 lesions (arrows).

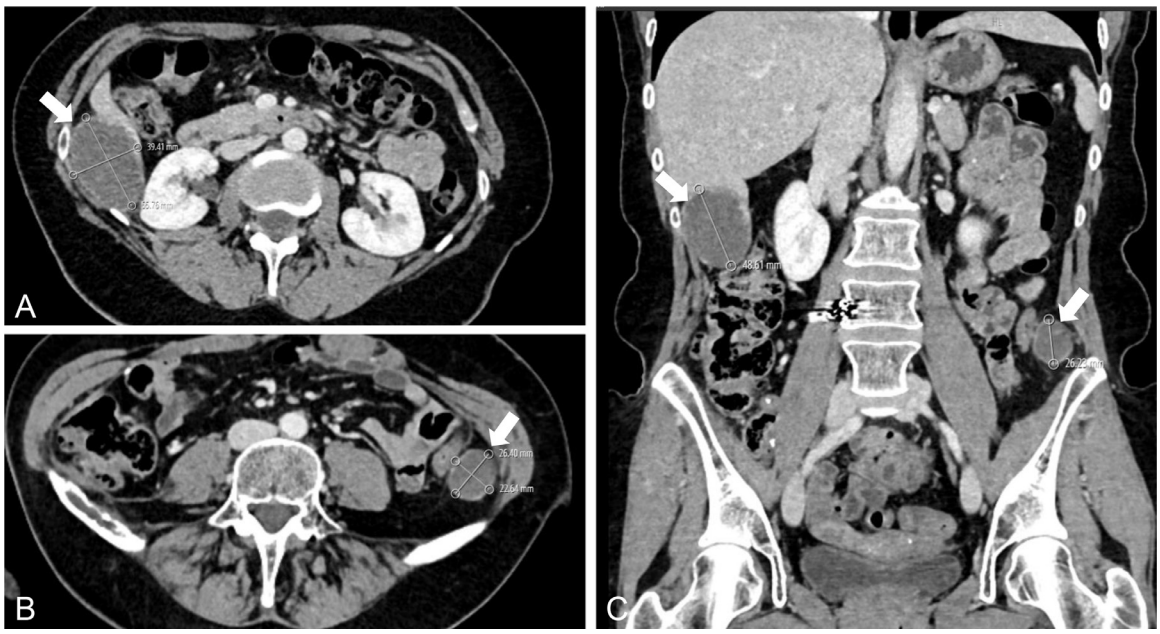

Fig. 5 – Three-month follow-up CT scan: these images reveal a reduction in size of the lesions (arrows); peripheral hyperdensity is already present in noncontrast CT scan.

Discussion

The synergistic effect between arterial embolization and ablative techniques (ablation + TAE) has been extensively documented in the literature [9,10]. Additionally, the utilization of balloon-microcatheters in combined treatments (b-MWA + b-TAE) has shown promising results in terms of necrotic volume in HCC treatment [5]. The inflation of the balloon-microcatheter serves a dual purpose: 1. creating blood stasis to facilitate microwave transmission [4,5] and 2. maximizing recruitment of afferent collaterals to the lesion, thereby en-

hancing both ablative and embolization effects [11]. Additionally, the choice of 70-micron particles aimed to ensure maximum ischemic effect on the nonablated peripheral area [10].

To our knowledge, there is no experience in literature of this technique in tumors different from hepatic ones. We exploited the known rationale of hepatic percutaneous thermal segmentectomy in a patient with recurrent sarcoma, obtaining complete necrosis of a 7 cm lesion using a single MW antenna. We believe that our combined approach (b-MWA + b-TAE) provided a greater volume of necrosis not only compared to ablative treatment alone but also compared to combined treatment without balloon-microcatheter (ablation + TAE).

While literature experiences regarding combined therapies with balloon-catheters on organs other than the liver are limited, our case demonstrates the effectiveness of this strategy in other anatomical locations, such as sarcomas. The proposed treatment extends the applicability of interventional radiology to inoperable sarcomas too large for ablative therapy alone or requiring multiple antennas. Further research and longer follow-up are necessary to refine treatment protocols and optimize patient outcomes.

Patient consent

I confirm that I have obtained consent from the patient for the publication of their case report titled "A case report of sarcoma recurrence treated with a balloon-occluded combined approach (b-MWA + b-TAE)'' in Radiology Case Report.

I have explained to the patient that the case report may include details of their medical condition, treatment, and outcomes. The patient understands that the purpose of publishing this case report is for scientific and educational purposes, and their personal information will be kept confidential to the best of the journal's abilities.

The patient has been informed that their identity will be protected, and any identifying information will be removed or altered to ensure anonymity. They have also been made aware that their participation in this publication is voluntary, and they have the right to withdraw their consent at any time before the publication of the case report.

I confirm that the patient has been given the opportunity to ask questions and seek clarification regarding the publication process, and they have freely given their consent for the publication of their case report.

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