

AngioVac extraction of intra-atrial hepatoma masquerading as PICC-associated thrombus

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ABSTRACT

Thrombus associated with peripherally inserted central catheterization is not uncommon. Treatment is typically conservative; however, more aggressive therapies can be considered in patients with tenuous medical condition. The authors present a patient with metastatic hepatocellular carcinoma masquerading as peripherally inserted central catheter-associated intra-atrial thrombus, subsequently removed via vacuum-assisted mechanical thrombectomy.

Hepatocellular carcinoma (HCC) is a common, aggressive tumor, usually occurring in patients with underlying chronic liver disease and cirrhosis. The most common metastases are to lung, lymph node, bone, adrenal gland, and peritoneum/omentum (1). Treatment options comprise interventional liver-directed therapies such as bland/chemo/radioembolization and transcutaneous thermal/chemical ablation, as well as resection, transplantation, and more systemic therapy such as sorafenib (2). Peripherally inserted central venous access is a similarly common procedure, with indications for peripherally inserted central catheter (PICC) placement ranging from administration of noxious medications and short-term outpatient antibiotic therapy to poor peripheral venous access. The most common delayed complications of indwelling PICC include infection, catheter migration, catheter embolization, and venous thrombosis (3). The incidence of PICC-related venous thrombosis of the upper extremities ranges from 3%–58%, with the risk increasing with larger catheter lumen size (4). Embolization of such thrombus is a cause of subsequent morbidity or mortality. Treatment options traditionally are more conservative, including systemic anticoagulation or, on select occasions, catheter-directed fibrinolysis. For larger thrombi, or those in patients with tenuous medical status, vacuum-assisted mechanical thrombectomy with bulk thrombus removal can be achieved via the AngioVac device (Angiodynamics). Herein, we report a case of right atrial HCC metastasis masquerading as PICC-associated thrombus.

Case presentation

A 70-year-old man, well known to our medical center due to a history of HCC with osseous metastases, was in the midst of a prolonged hospitalization initiated for coagulopathy and acutely worsening back pain. Computed tomography scan of the spine revealed a right psoas abscess and vertebral osteomyelitis. A PICC was placed for difficulty with intravenous access on the general medical ward.

Investigation into a source of infection was commenced and included transesophageal echocardiography (TEE) for evaluation of endocarditis. The TEE revealed a 3.3×2.1 cm hyper-echoic multilobulated mass in the right atrium that appeared to be attached to the distal terminus of the PICC (Fig. 1). There was concern that this presumed clot may embolize to the pulmonary circulation. Given the significant clot size and tenuous clinical condition, interventional radiology was consulted as part of a multidisciplinary approach to determine the optimal removal strategy. The patient was not considered to be a good cardiac surgery candidate and therefore was referred to interventional radiology for vacuum-assisted mechanical thrombectomy.

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Technique

Real-time TEE was performed by the anesthesiology service for procedural guidance. Right common femoral vein access was obtained, and a 26 F Dry-Seal sheath (Gore Medical) was placed. Via this access, the 22 F AngioVac device was advanced to the right atrium. The left common femoral vein was accessed and a 20 F return cannula was placed. The AngioVac extracorporeal circuit was completed in the standard fashion and vacuum-assisted mechanical thrombectomy was performed. Though the intra-atrial mass was repeatedly engaged, no substantive material could be removed. The existing PICC was withdrawn and the intra-atrial mass was noted to remain in place with an apparent attachment to the atrial wall visualized via TEE. Through a second, separate left common femoral vein access, a 16 mm intravascular balloon was advanced to the right atrium and the inflated balloon was advanced and withdrawn repeatedly across the atrial mass attachment site resulting in successful release of the mass from the atrial wall and subsequent extraction of the mass into the AngioVac circuit. Upon completion of the procedure, TEE revealed no further atrial mass (Fig. 2). The access sheaths were removed and hemostasis was achieved with a combination of manual compression and vertical mattress suture placement.

The mass fragments were noted to be yellow to white-pink friable material (Fig. 3a) not consistent with the suspected thrombus. Sectioning revealed a heterogeneous white to yellow to brown cut surface. Microscopic examination demonstrated metastatic hepatocellular carcinoma (Fig. 3b, 3c)

Discussion

The AngioVac system comprises a venous drainage cannula, a filtered external circuit, and a return blood flow cannula. The venous drainage cannula itself requires a large caliber entry site (26 F sheath compat-

Main points

- HCC metastases can seed within the vena cava or right atrium.
- AngioVac can be used to extract tumor thrombus in fragments.
- Adjunctive mechanical techniques may be needed for complete intravascular material removal.

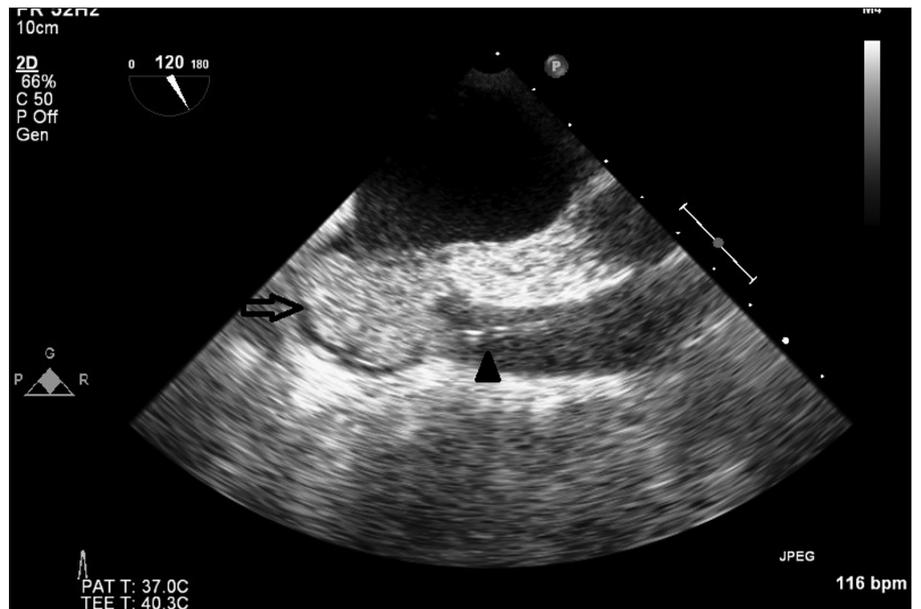


Figure 1. Preprocedural TEE shows an hyperechoic lobulated mass (arrow) associated with PICC tip (arrowhead), suspected to represent a thrombus.

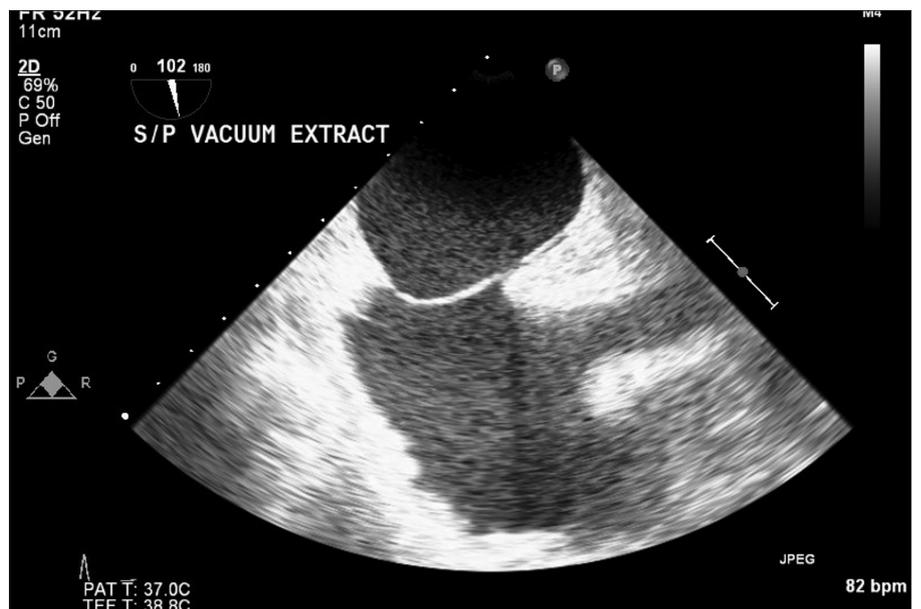


Figure 2. Intraprocedural TEE demonstrates empty right atrium post AngioVac.

ible), which is amenable to percutaneous placement and hemostasis in the low pressure venous system. Return of the aspirated and subsequently filtered blood occurs through a 16–20 F return cannula placed via any acceptably large access vein closing a veno-venous bypass circuit. The catheter is advanced with fluoroscopic guidance to the desired location and the balloon-actuated funnel tip is deployed. The proprietary funnel-shaped tip is designed to minimize clogging and enhance venous drainage

flow. Upon completion of the procedure, the catheters are withdrawn. Particular attention is paid to the venous drainage large caliber access site. Options for establishing hemostasis include external compression with or without mattress suture tissue apposition. The AngioVac is a relatively early generation device, first used in a human patient in 2009. It is approved for the removal of soft thrombi or emboli; it is not intentionally designed (nor FDA approved) for the removal of vegetations or tumorous

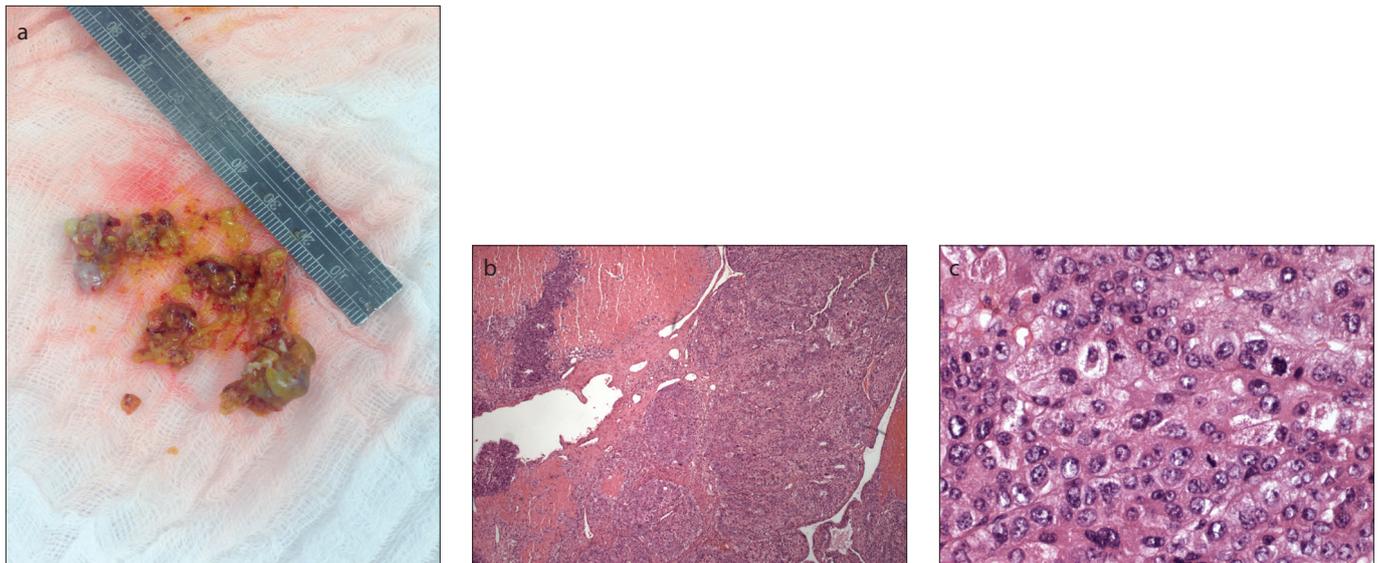


Figure 3. a–c. Gross specimen of mass fragments (a) revealed white-pink friable material. Low power image (b) shows some blood and fibrin at the top left corner, consistent with a thrombus, but the majority of the slide consists of eosinophilic tumor cells in a trabecular/cord-like architectural pattern. Higher power image (c) again shows a trabecular pattern consisting of polygonal cells with granular eosinophilic (pink) cytoplasm and round nuclei with prominent nucleoli and coarse chromatin. Mitoses are seen demonstrating that the HCC is high grade.

growths (5). Despite this, there are very few reported cases in the literature of removal of endocarditis vegetations or vena caval obstructing intravascular tumors (6–8). As demonstrated in our patient, if the stalk of the intravascular growth can be disrupted and the device successfully engaged, a growth of up to 3 cm can be withdrawn into the external circuit, albeit in fragments. Further investigation could delineate the range of masses that can be successfully removed.

Conflict of interest disclosure

The authors declared no conflicts of interest.

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