Case Report

Successful mechanical thrombectomy and stent exclusion of sacral chordoma tumor thrombus

Valeria Gioioso, MD¹, David Duncan, MD², Jeet Minocha, MD, Jonas Redmond, MD*

University of California San Diego Health, 200 W Arbor Dr, San Diego, CA 92103 USA

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A B S T R A C T

A 77-year-old man with history of sacral chordoma and pulmonary embolism presented to the emergency room with a 1-day history of diffuse left flank and lower extremity swelling. The patient was found to have thrombus in the left common and external iliac veins. The patient was brought to Interventional Radiology for mechanical thrombectomy using the Inari ClotTriever and a sample of extracted thrombus was sent to pathology. Analysis on the sample was positive for sacral chordoma, consistent with tumor thrombus. The patient returned after 6 weeks with similar symptoms and repeat mechanical thrombectomy was performed with the Inari ClotTriever and stent placement through the left common and external iliac vein with an Ovation IX stent graft. The patient remained asymptomatic following the second procedure at repeat follow-up at 6 weeks.

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Introduction

Arising from notochord remnants, chordomas are rare, slow-growing malignancies that have varied clinical presentations due to gradual invasion and destruction of adjacent structures [1]. Vascular involvement is associated with poorer overall survival of sacral chordoma [2]. As in other malignancies with vascular involvement, presence of bland, or tumor thrombus may guide treatment options. Imaging studies (eg, contrast-enhanced MRI) may help differentiate bland from tumor thrombus [3]. This case report describes the use of the Inari ClotTriever (Inari Medical, Irvine, CA) device for extraction of initially unknown tumor thrombus, the repeat use of the device for known tumor thrombus, and the subsequent placement of a stent-graft to prevent future intravascular tumor ingrowth. This report was exempted from institutional review board approval.

Case report

A 77-year-old man presented to the emergency room with a 1-day history of diffuse left flank and lower extremity swelling. The patient denied symptoms of neurovascular compromise.

✩ Competing Interests: The authors have no competing interest to report.

¹ Corresponding author.

E-mail address: jredmond@health.ucsd.edu (J. Redmond).

¹ Present address: North Coast Imaging, 8605 Santa Monica Blvd, PMB 25192, West Hollywood, CA 90069

² Present address: Vanderbilt University Medical Center, Department of Radiology, Medical Center North, 1161 21st Ave. South, Nashville, TN 37232

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but endorsed left lower extremity tightness and difficulty with movement. He had a history of sacral chordoma which was diag-
nosed 5 years prior to presentation, for which he underwent 2 partial surgical resections within 6 months following diag-
nosis and 4 courses of proton beam radiation therapy, the last of which was completed 7 months prior to presentation. The
patient’s history was also significant for pulmonary embolism diagnosed 5 months prior to presentation, for which he was on apixaban.

Ultrasound of the lower extremities was negative for acute deep venous thrombosis (DVT) in the bilateral lower extre-
mities. CT of the abdomen and pelvis demonstrated near-
occlusive thrombus in the left common iliac vein (CIV) with
extension of thrombus into the left external and internal iliac veins (EIV, IV). An MRI could not differentiate between bland
and tumor thrombus due to lack of definite enhancement, al-
though tissue invasion from the chordoma was noted (Fig. 1).

Interventional radiology (IR) was consulted for evaluation
and management. Following a complete discussion regarding
the risks, benefits, and alternatives of intervention, the patient
consented to percutaneous left iliac vein thrombectomy for
symptomatic relief and inferior vena cava (IVC) filter place-
ment for presumed failure of anticoagulation.

For the procedure, the left greater saphenous vein was ac-
cessed and diagnostic venography confirmed near-complete
occlusion of the left EIV and CIV with absence of reflux into
the left IIV, compatible with prior imaging. After upsizing the
percutaneous vascular access sheath, the Inari ClotTriever de-
vice was positioned through the area of occlusion and into the
IVC. Two passes were made, passing the coring element of the
device from the IVC through the area of occlusion and into the
left EIV. Mixed bloody, tan, and white fibrinous material
was captured in the collection bag of the ClotTriever catheter.
Follow-up venography demonstrated resolution of the pre-
vious filling defect in the left CIV with no underlying stenosis.
The extracted specimens were placed into formalin and sub-
mitted to pathology (Fig. 2). Following thrombectomy, a Denali
IVC (Bard Peripheral Vascular, Inc, Tempe, AZ) filter was de-
ployed in the infrarenal IVC. The patient tolerated the proce-
dure well and reported significant improvement in symptoms
by postprocedure day 5. The final pathologic diagnosis of the
specimen obtained from the left CIV was conclusive for sacral
chordoma (Fig. 3).

Six weeks later, the patient experienced recurrent left
lower extremity swelling (Fig. 4). Lower extremity Doppler
was again negative for DVT, but a CT abdomen and pelvis dem-
onstrated recurrent occlusion of the left CIV and EIV. Suspect-
ing recurrent tumor thrombus on account of the pathology
result from the first procedure, the patient agreed to and
underwent repeat percutaneous thrombectomy with stent-graft
placement to decrease the risk of recurrent vascular ingrowth
of tumor and improve the lifestyle limitations resulting from
the lower extremity swelling. The second procedure was per-
formed in a similar manner. Venography confirmed throm-
bus in the left CIV and EIV (Fig. 5). To prevent entanglement
with the indwelling IVC filter, right internal jugular access was
also obtained, allowing deployment of the ClotTriever device
within a 16 Fr jugular sheath positioned with the tip immedi-
ately below the IVC filter. Thrombectomy was performed with
a total of 5 passes of the ClotTriever device. Via the right in-
ternal jugular vein access, a tapered 18 mm to 14 mm diam-
eter × 80 mm length Ovation IX stent graft (Endologix, Irvine,
CA) was then deployed within the left CIV and EIV and an-
gioplastied with 16 and 18 mm balloons. Completion veno-
graphy demonstrated a patent stent-graft without evidence of
residual filling defects or stenosis (Fig. 6). The patient was dis-
charged on postprocedure day 3. Pathology on the submit-
ted specimen again confirmed sacral chordoma. At follow-
up 6 weeks after the second procedure, the patient remained
symptom-free.

Fig. 1 – Coronal LAVA postcontrast demonstrating thrombus
in left common iliac vein with lack of internal
enhancement.

Fig. 2 – Extirpated matter from the first mechanical
thrombectomy procedure using the Inari ClotTriever
catheter.
Fig. 3 – Hematoxylin and eosin staining of submitted specimen under 100x microscopy demonstrating myxoid matrix with nests of tumor cells with a physaliphorous, or bubbly and vacuolated, appearance. In the background there is fibrin and necrosis. Sample conclusive for sacral chordoma.

Fig. 4 – Picture of patient’s legs with recurrent symptoms of swelling and pain, prior to second thrombectomy with stent placement.

Fig. 5 – Image during second mechanical thrombectomy and stent placement. Initial venogram demonstrating recurrent occlusion in left CIV/EIV.

Discussion

Prior to the first procedure and pathologic confirmation on the extracted material, the differential etiology for this patient’s thrombus included malignancy-associated hypercoagulable state, postradiation vascular occlusion, or tumor-in-vein. Each is treated according to their underlying pathophysiology. Bland thrombus may be treated with anticoagulation or thrombolysis whereas post-radiation vascular occlusion may be treated with stenting. However, successful treatment
of tumor thrombus is often unrealized, whether from non-response to anticoagulation, prior lack of sufficient tools for thrombectomy, or the concern for tumor embolization during manipulation and stenting.

In the present case, the patient’s recurrent thrombus development despite anticoagulation suggests an underlying tumor etiology, though the MRI was inconclusive. For this reason, during the first mechanical thrombectomy procedure, the removed material was sent to pathology and was diagnostic for malignancy. In a similar, previously described case, the Inari ClotTriever device was used for extraction of IVC thrombus. The extracted material in that case was confirmed by pathology to be liposarcoma, compatible with the patient’s history [4]. These cases demonstrate the utility of specialized mechanical thrombectomy devices such as the Inari ClotTriever for both diagnostic and therapeutic purposes.

The Inari ClotTriever device, described for its safety, efficacy, and ease of use in DVT, may serve a role in restoring flow and improving patients’ symptoms from malignant venous occlusion. Suspicion of tumor thrombus should not deter an interventional radiologist from attempting to achieve clinically significant quality of life improvements. The addition of covered stent placement following thrombectomy can additionally extend patients’ relief from symptoms by preventing recurrence due to tumor ingrowth.

**Patient consent**

This report was exempted from institutional review board approval. Informed consent was obtained. All submitted images have been de-identified.

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