Vascular Specialist International
Vol. 37, No. 1, March 2021
pISSN 2288-7970 • eISSN 2288-7989

Case Report

Intravascular Fasciitis in the Femoral Vein with Hypermetabolic Signals Mimicking a Sarcoma: The Role of Preoperative Imaging Studies with Review of Literature

Hyo Kee Kim, Ahram Han, Sanghyun Ahn, Sangil Min, Jongwon Ha, and Seung-Kee Min

Department of Surgery, Seoul National University College of Medicine, Seoul, Korea

Intravascular fasciitis (IVF) is a very rare disease that is difficult to diagnose preoperatively. Frequently, it can be misdiagnosed as a malignancy or deep vein thrombosis. A 26-year-old man presented with a 6-month history of intermittent cramping pain in the right calf. Duplex ultrasonography, computed tomography, magnetic resonance imaging, and positron emission tomography were performed in various hospitals. The work-up revealed a hypermetabolic mass in the femoral vein, suggestive of a malignancy, such as leiomyosarcoma. The tumor was located inside the femoral vein with no invasion, and the mass was resected en bloc with the vein wall. Intraoperative frozen section biopsy revealed no malignancy, and the final pathological diagnosis was IVF. Herein, we report a case of IVF and discuss the role of imaging studies in its preoperative diagnosis, with an extensive literature review.

Key Words: Intravascular fasciitis, Femoral vein, Positron emission tomography, Computed tomography, Magnetic resonance imaging

Received December 2, 2020
Revised March 9, 2021
Accepted March 15, 2021
Published online March 29, 2021

Corresponding author: Seung-Kee Min
Division of Vascular Surgery, Rm 5313, Biomedical Research Institute, Seoul National University Hospital, 101 Daehak-ro, Jongno-gu, Seoul 03080, Korea
Tel: 82-2-2072-0297
Fax: 82-2-766-3975
E-mail: skminmd@snuh.org
http://orcid.org/0000-0002-1433-2562

Vasc Specialist Int 2021;37(1):50-57 • https://doi.org/10.5758/vsi.200079

INTRODUCTION

Intravascular fasciitis (IVF) is a very rare disease characterized by the proliferation of myofibroblasts with the involvement of arteries or veins. IVF is a variant of the more common nodular fasciitis (NF), which does not present with vascular invasion [1,2]. NF is a benign, pseudosarcomatous, and self-limiting reactive process. It presents with a rapidly growing solitary tumor with high cellularity and mitotic counts [3]. The histologic features of IVF are similar to those of NF, but show multinodular or serpentine growth along the intraluminal, intramural, or extramural sides of small- to medium-sized arteries or veins. Fasciitis is inflammation of the fascia, which is composed of collagen and fibroblasts. Because of the similarity with myofibroblasts in the superficial and deep fascia, the confusing term IVF is applied, although there is actually no connection with the fascia itself.

Because of its rarity, preoperative diagnosis of IVF is extremely difficult, and it is usually mistaken for deep vein thrombosis (DVT) or sarcoma. Herein, we report a case of IVF in the femoral vein that was initially misdiagnosed, after a variety of imaging studies, namely duplex ultrasonography (DUS), computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography-CT (PET-CT), were performed. To the best of our knowledge, this is the first report showing images of IVF using CT, MRI, and PET-CT.

The case report was approved by the Institutional Review Board (IRB number: H-2011-118-1173) of Seoul National

University Hospital, and the need for informed consent was waived due to the retrospective design and minimal risk to the patient.

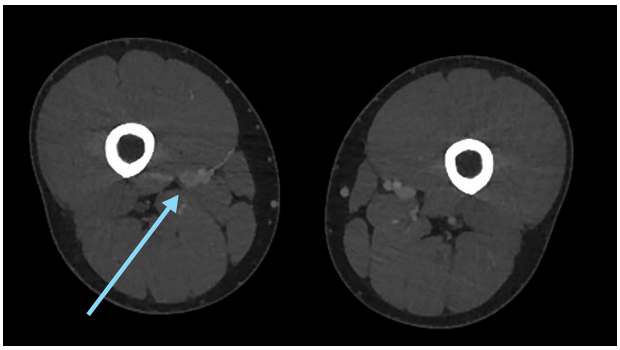

Fig. 1. Computed tomography showed an enlarged intravenous mass in the right distal femoral vein (arrow).

CASE

A 26-year-old man complained of a 6-month history of intermittent cramping pain and swelling in the right calf. He denied any trauma or medical history. In a local clinic, DUS was performed, and DVT in the right distal femoral vein was suspected. Rivaroxaban (Xarelto; Bayer AG, Berlin, Germany) was administered for 4 months, but the swelling and pain did not improve. Because there was doubt in the diagnosis and sarcoma was suspected, CT, MRI, and PET-CT were performed in another hospital for further evaluation. CT showed a focal intraluminal heterogeneous soft tissue mass in the right distal femoral vein (Fig. 1). The MRI revealed an intraluminal space-occupying lesion in the vein, with fusiform dilatation; a 1.1×1.0×2.1-cm heterogeneous hyperintense signal on T2 and mildly hyperintense signal on T1 was seen (Fig. 2). No extravascular or intramuscular tumor invasion was observed. PET-CT revealed a focal hypermetabolic lesion in the femoral vein, suggesting malignancy (Fig. 3). The patient was transferred to our or-

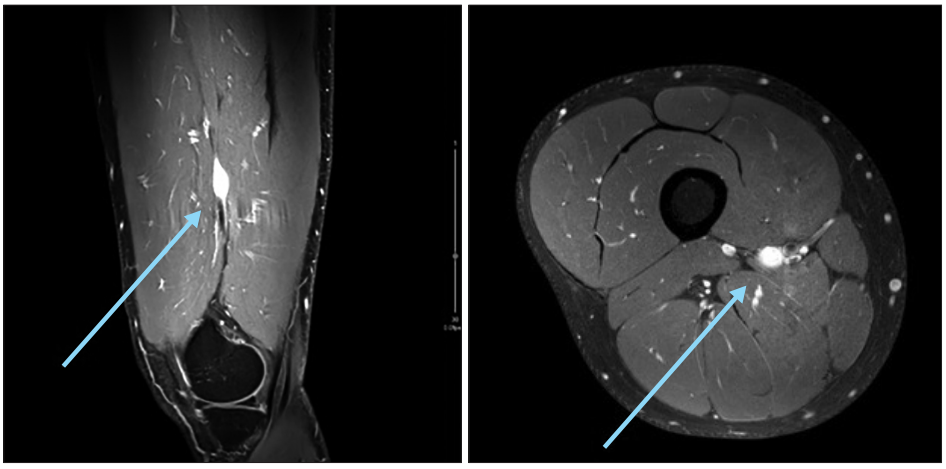

Fig. 2. Magnetic resonance images showed an intraluminal space-occupying lesion in the femoral vein of the right distal thigh with fusiform dilatation (arrows).

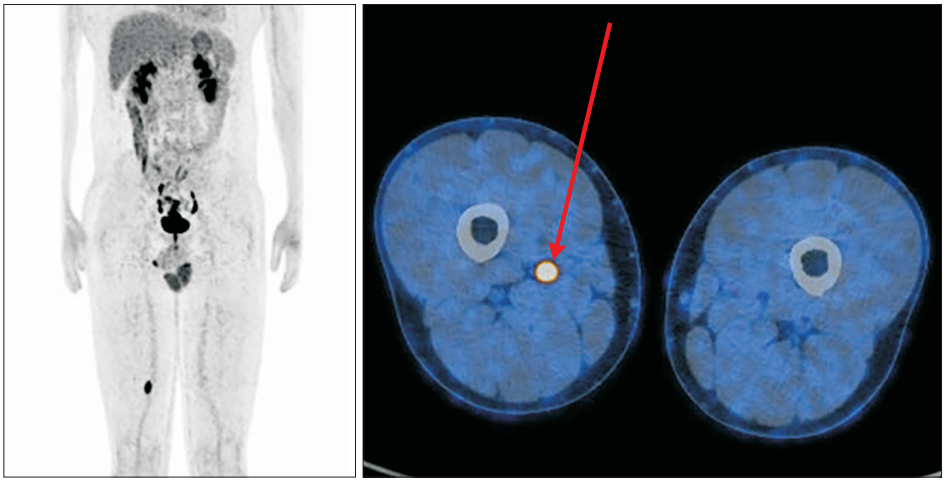

Fig. 3. Positron emission tomography showed a solitary hypermetabolic lesion in the right distal femoral vein (arrow).

https://doi.org/10.5758/vsi.200079

thopedic clinic, and the orthopedic oncologist interpreted that the tumor was confined inside the vein without invasion and referred him to a vascular surgery clinic for oncovascular surgery.

Elective surgery was performed to remove the lesion through a medial longitudinal incision above the knee (Fig. 4). A 1.5×1.2×7-cm mass was located in the distal femoral vein, obliterating the vein, and resulting in the development of multiple collateral veins. Invasion of the adjacent tissue was absent. The lesion was removed en bloc with the vein, and a frozen section biopsy was performed, which revealed numerous spindle cells without any evidence of malignancy (Fig. 5). There was mural, non-occlusive, fibrotic thickening along the popliteal vein distally, which was removed. Because of the well-developed collaterals, femoral vein reconstruction was not performed. The final pathologic report confirmed the diagnosis of IVF, with proliferative spindle cells, lymphocytic infiltration, and 1/10 mitotic cells per high-power field (Fig. 5). On postoperative day 4, the patient was discharged without any complications. Follow-up imaging after 1 year showed no recurrence.

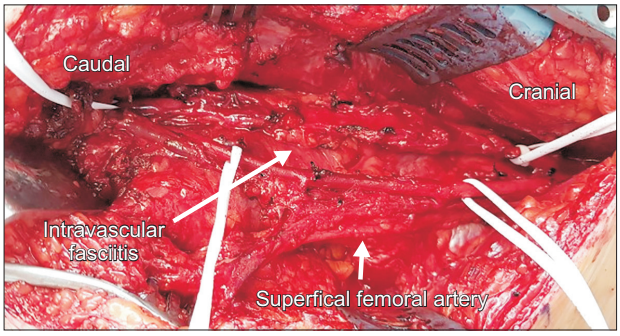

Fig. 4. Intravenous solid mass without invasion was dissected and removed en bloc. Because of the abundant collateral veins, venous reconstruction was not performed.

DISCUSSION

IVF is a rare benign disease that is considered to be a variant of NF. Since Patchefsky and Enzinger [1] reported the first 17 cases, a total of 50 cases of IVF, including the current case, have been reported in the English literature [4-6].

As described in Table 1, the mean age of patients was 27 years (range, 0.5-66 years) and the male-to-female ratio was 26:24 (52%:48%). IVF is most commonly found in the head and neck (17 cases, 34%), followed by the lower extremity (16 cases, 32%), upper extremity (10 cases, 20%), and trunk (7 cases, 14%). IVF originates from the small vessels in the majority of cases (n=39), followed by the major veins (n=9) and ascending aorta (n=2). Major venous involvement included five cases in the common femoral veins, and one each in the femoral vein, common iliac vein, inferior vena cava, and subclavian vein (Table 2).

IVFs in small vessels are common because of the early detection of superficial growing tumors in the buccal mucosa, eyes, lips, cheeks, tongues, and subcutaneous tissue of the extremities. The size of such masses is usually smaller (≤3 cm) than that affecting large vessels. IVFs in large vessels are of utmost interest to vascular surgeons; therefore, they were separately analyzed (Table 2). They tend to be large because of the delay in symptom occurrence and diagnosis. Two IVFs in the aorta presented as acute aortic dissection, and nine IVFs in large veins presented with acute swelling and pain, which were misdiagnosed as DVT or malignancy. Surgical resection was curative, and no recurrence was reported. Interestingly, among the 11 cases of

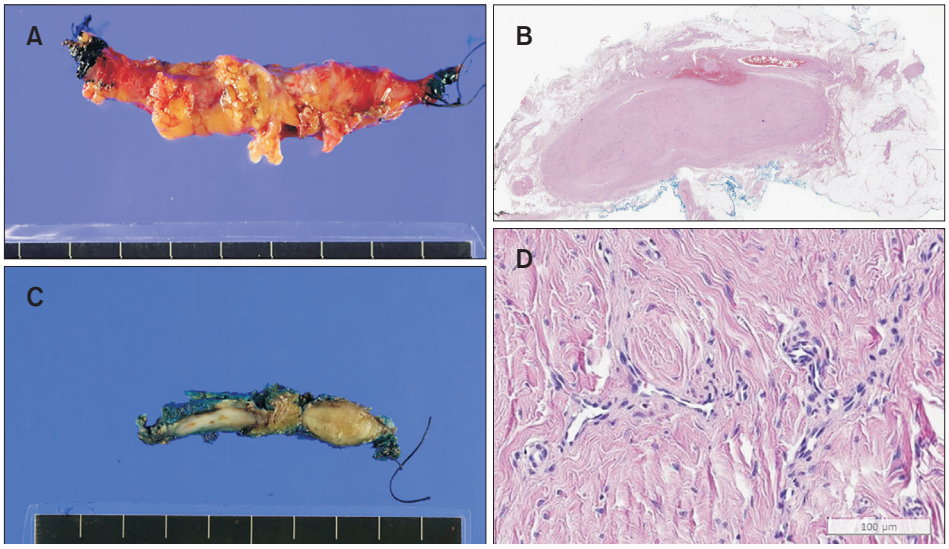

Fig. 5. Gross specimen (A, C) showed a well-circumscribed hard mass in the femoral vein. The indicated suture was located proximally. Microscopic examination of H&E-stained cells (B, D) showed proliferative spindle cells and lymphocytic infiltration in the vein. The mitosis number was 1/10 cells per high-powered field (magnification: B, ×16; D, ×400).

Table 1. Characteristics of the 48 cases of intravascular fasciitis reported in the English literature

Case no.	Year	First author	Age (y)	Sex	Site	Location	Max size (cm)	Treatment	Follow-up (mo)
1-17	1981	Patchefsky [1]	20.5 (0.5-57)	M 9, F 8	HN 5, UE 7, T 2, LE 3	NA	1.5	Excision	2 recurred, 7 NED, 4 f/u loss, 4 short f/u
18	1986	Freedman [2]	19	M	HN	Buccal	2.5	Excision	NED (several)
19			53	M	HN	Buccal	2.0	Excision	NED (several)
20	1987	Kahn [3]	20	F	HN	Buccal	1.5	Excision	NED (3)
21	1993	Price [4]	17	M	HN	Eye	2.0	Excision	NED (36)
22			20	M	HN	Eye	1.0	Excision	NS
23	1996	Samaratunga [5]	49	M	LE	Inguinal	3.0	Excision	NED (6)
24	1996	Beer [6]	18	F	LE	Thigh	2.0	Excision	NED (18)
25	1997	Sticha [7]	4	M	LE	Foot	3.0	Excision	Recur 10 wk - stationary 13 mo
26	1999	Ito [8]	26	M	UE	Forearm	NA	Excision	NS
27	2000	Gwan-Nulla [9]	26	M	T	Aorta	5.0	Excision	NS
28	2007	Anand [10]	20	F	UE	Hand	3.0	Excision	NED (24)
29	2007	Sugaya [11]	66	M	LE	Foot	1.0	Excision	NS
30	2008	Pantanowitz [12]	17	M	UE	Wrist	1.2	Excision	NS
31	2011	Wang [13]	28	F	LE	Leg	NA	Biopsy	NS
32	2012	Chi [14]	20	F	HN	Lip	0.6	Re-excision due to positive margin	F/u loss
33	2012	Reiser [15]	58	F	HN	Cheek	1.7	Excision	NED (12)
34	2013	Seo [16]	26	M	HN	Lip	1.0	Excision	NED (2)
35	2013	Hsiao [17]	24	F	HN	Scalp	3.0	Excision	NED (6)
36	2014	Zheng [18]	21	F	T	Flank	0.5	Excision	NS
37	2015	Min [19]	29	F	LE	CFV	4.5	Thrombolysis → excision	NS
38	2015	Lee [20]	41	F	LE	CFV	3.5	Excision	NED (48)
39	2016	Nanaiah [21]	56	M	LE	Toe	3.0	Excision	NS
40	2016	Kuklani [22]	25	F	HN	Tongue	1.0	Excision	NED (28)
41			26	M	HN	Tongue	1.0	Excision	NED (17)
42	2017	Takahashi [23]	30	F	LE	Inguinal	1.8	Excision	NED (11)
43	2018	Bártů [24]	61	F	T	Aorta	6.5	Excision	NED (1)
44	2018	Mendoza-Moreno [25]	45	M	T	IVC	14.0	Excision	Dead due to pancreatitis
45	2018	Kang [26]	44	F	HN	SCV	4.1	Excision	NED (24)
46	2020	Pan [27]	27	M	LE	CFV	NA	Excision	NS
47	2020	Lu [28]	19	M	T	CIV	2.3	Excision	NED (25)
48	2020	Li [29]	39	F	LE	CFV	5.0	Thrombolysis → excision	NS
49	2020	Le [30]	23	F	LE	CFV	NA	Excision	NED (24)
50	2021	Kim (current case)	26	M	LE	FV	7.0	Excision	NED (12)

Values are presented as mean (range) or number only. The references in the Table are listed in the Supplementary References.
M, male; F, female; HN, head and neck; UE, upper extremity; T, trunk; LE, lower extremity; NA, not available; NED, no evidence of disease; f/u, follow-up; NS, not significant; CFV, common femoral vein; IVC, inferior vena cava; SCV, subclavian vein; CIV, common iliac vein; FV, femoral vein.

https://doi.org/10.5758/vsi.200079

Table 2. Literature review of nine cases of intravascular fasciitis in large vessels

Case no.	Year	First author	Country	Age (y)	Sex	Location	Symptom	Max size (cm)	Imaging	Preop biopsy	Preop diagnosis	Treatment	Reconstruction	Follow-up (mo)
27	2000	Gwan-Nulla [9]	USA	26	M	Aorta	Weight lifter-ac AD chest pain	5	TEE	No	AD, stanford A	Ascending aortic replacement	Yes	NS
37	2015	Min [19]	Korea	29	F	CFV	Acute pain & leg swelling	4.5	MR	No	DVT	Thrombolysis → excision	Primary repair	NS
38	2015	Lee [20]	Korea	41	F	CFV	Leg swelling	3.8	CT	No	DVT	Excision	PTFE interposition	NED (48)
43	2018	Bártů [24]	Czech	61	F	Aorta	Ac AD/ sudden-onset chest pain	6.5	CT	No	AD, stanford A	Ascending aortic replacement	Yes	NED (1)
44	2018	Mendoza-Moreno [25]	Spain	45	M	IVC	No	14	CT	No	Sarcoma	Excision+IVC ligation+duodenal resection	No	Dead due to pancreatitis
45	2018	Kang [26]	Korea	44	F	SCV	Mass, left supraclavicular	4.1	DUS MR USG-guided Bx	Yes	Sarcoma	Excision	No	NED (24)
46	2020	Pan [27]	China	27	M	CFV	Swelling, pain	4	DUS, VG	No	DVT	Excision	No	NS
47	2020	Lu [28]	China	19	M	CIV	Swelling, pain	2.3	DUS, CT,	No	Sarcoma	Excision	Vein graft	NED (25)
48	2020	Li [29]	China	39	F	CFV	Swelling, pain	3	Venography MRI	No	DVT	Thrombolysis → excision	Primary repair	NS
49	2020	Le [30]	USA	23	F	CFV	Swelling, pain	NA	DUS, venography	No	DVT	Thrombolysis → excision	Bovine patch	NED (24)
50	2020	Kim (current case)	Korea	26	M	FV	Swelling, pain	7	DUS, CT, MRI, PET-CT	No	Sarcoma	Excision	No	NED (12)

The references in the Table are listed in the Supplementary References.

Preop, preoperative; M, male; ac AD, acute aortic dissection; TEE, transesophageal echocardiography; NS, not significant; F, female; CFV, common femoral vein; MR, magnetic resonance; DVT, deep vein thrombosis; CT, computed tomography; PTFE, polytetrafluoroethylene; NED, no evidence of disease; IVC, inferior vena cava; SCV, subclavian vein; DUS, duplex ultrasonography; USG, ultrasonography; Bx, biopsy; VG; venography; CIV, common iliac vein; MRI, magnetic resonance imaging; NA, not available; FV, femoral vein; PET-CT, positron emission tomography-CT.

large-vessel IVF, four cases were reported from South Korea and three from China. As shown in Table 2, the mean age of these patients was 35 years, and the male-to-female ratio was 5:6.

The etiology and pathogenesis of IVF remain unknown. Possible explanations include stimulation and proliferation of myofibroblasts in the adventitia as a reactive response to local injury. The causes of injury include trauma, DVT, and viral infection. Lymphocytic infiltration in the lesion gave rise to a viral etiology, but there was no evidence supporting viral cytopathic effects. The cause and exact mechanisms need to be investigated in future studies. In two cases of aortic dissection, a possible explanation is that IVF focally weakens the aortic wall and causes intimal injury, resulting in dissection [7,8]. Lu et al. [6] reported a novel *CTNNB1-USP6* fusion in IVF, showing that IVF is a *USP6*-induced neoplasm and should be included in *USP6*-rearranged lesions.

The most common clinical presentation is a painless, slowly growing mass. Most cases were small, with a mean diameter of 1.5 cm, but they can grow to a significant size in large vessels, such as the vena cava (15 cm) and ascending aorta (6 cm), as well as elongate along the vessel axis up to 7 to 11 cm. Two cases in the aorta presented with acute chest pain due to aortic dissection. Five cases in the large veins of the lower extremities presented with leg swelling and pain. IVF in the subclavian vein presented with a supraclavicular mass, and IVF in the vena cava was asymptomatic.

IVF rarely recurs elsewhere and can be eliminated following simple surgical excision. However, the diagnosis of IVF is difficult, and it is often misdiagnosed as DVT or sarcoma. In fact, 6 out of 15 cases reported by Patchefsky and Enzinger [1] were initially diagnosed as malignancy. Our patient was initially misdiagnosed with DVT, and subsequent anticoagulation therapy failed. The patient was again misdiagnosed with malignancy, resulting in multiple expansive imaging studies such as CT, MRI, and PET-CT, which were also not helpful in determining the correct diagnosis.

The CT, MRI, and PET-CT findings of IVF are not pathognomonic, and a misdiagnosis of sarcoma is common. Fortunately, in the current case, many imaging studies were performed; thus, we are able to report the images in detail for future research.

However, despite performing multiple imaging studies, the preoperative diagnosis remained as sarcoma confined to the femoral vein, suggestive of leiomyosarcoma.

In general, for the diagnosis of IVF, venography is not recommended because it is invasive and cannot differentiate a thrombus from a tumor. CT shows an intravascular filling defect with linear contrast filling inside, and MRI shows an enlarged vein and intravascular T2 signal intensity with mild perivascular soft tissue infiltration, which is similar to what is seen in DVT [2-8]. However, MRI and CT scans may not be sufficient because they demonstrate no specific imaging features for IVF. Recently, Takahashi et al. [9] reported IVF on ultrasound appears as a low echoic mass with posterior echo enhancement and several hypervascular areas. In contrast, NF and solitary fibrous tumors appear as a low echoic hypovascular mass without perilesional hyperechogenicity. They concluded that DUS is helpful in the clinical diagnosis of defined fibrous tumors.

Accurate preoperative diagnosis to rule out sarcoma is important to avoid unnecessary extensive radical surgery, which may result in mortality or severe morbidity. Mendoza-Moreno et al. [10] reported the early postoperative mortality of a patient with an IVF in the vena cava after extensive resection of the tumor with the duodenum. On CT images, leiomyosarcomas are characteristically heterogeneous soft tissue masses with degeneration, hemorrhage, or necrosis. Intravenous contrast enhancement may be more marked peripherally at the tumor site. Fatty elements and dystrophic calcifications are rare [11]. Because of the poor prognosis of leiomyosarcoma in the vessels, a differential diagnosis of an intravascular tumor is important. Relapses are common with leiomyosarcoma, and unlike IVF, they spread rapidly to other locations. In 10% of cases, metastatic disease is already present at the time of diagnosis [12], and the 5-year survival rate for leiomyosarcoma is only 32% [13]. The treatment of sarcoma includes radical excision, adjuvant radiation therapy, and chemotherapy.

To our knowledge, this is the first case to report the PET-CT findings of an IVF, even though Zhou et al. [14] reported that NF is a hypermetabolic lesion on PET-CT. In this case, PET-CT revealed a solitary hypermetabolic lesion in the femoral vein with no other findings elsewhere, which helped rule out chronic DVT from sarcoma, but IVF was not suspected due to its rarity. When a hypermetabolic lesion appears on PET-CT, it is often considered a malignant lesion, although it can be seen in many benign lesions. Metser and Even-Sapir [15] reported that many benign vascular lesions can show increased uptake, including DVT, varicose veins, atheromatous plaque, chronic aortic dissection, vasculitis, and vascular grafts (including infection). The differentiation of benign from malignant uptake of ^{18}F-fluorodeoxyglucose on PET alone may be quite challenging due to the low anatomical resolution of PET and the paucity of anatomical landmarks.

Preoperative biopsy can help establish a surgical plan; however, we did not perform a preoperative biopsy because of the risks of bleeding, adjacent organ injury, and possible spread of malignancy. We decided to perform surgery with

https://doi.org/10.5758/vsi.200079

intraoperative frozen section biopsy. In contrast, Kang et al. [16] performed ultrasound-guided biopsy, revealing that the mass contained fibrous tissues with chronic inflammation; however, this was not helpful in differentiating IVF from sarcoma. Endovascular biopsy may be attempted for an intravascular tumor in a large vessel [17]. For a large tumor in the inferior vena cava, aggressive surgery may be deferred using this approach.

Intraoperative findings are critical for accurate diagnosis. The vascular involvement of IVF is typically longitudinal along the vessel axis, leading to characteristic serpentine or multinodular growth patterns [18]. The tumor can involve the intima, media, adventitia, or perivascular soft tissues without invading the adjacent organs.

Pathologic examination revealed the following findings. Spindle cells were arranged in a storiform or haphazard manner, with plump vesicular nuclei and, in some cases, with prominent nucleoli. Mitotic activity ranged from absent to prominent. Unlike soft tissue sarcomas, significant cytological pleomorphism and abnormal mitotic figures were absent [19,20]. Frozen section biopsy is typically used to rule out malignancy, which requires radical wide excision. However, without immunohistochemical staining (IHCS), frozen sections might not be sufficient to confirm the diagnosis of IVF. The tumor comprised spindle cells without definite malignant features of cytological pleomorphism and a high index of mitotic activity. In IHCS of IVF, spindle cells are typically positive for smooth muscle actin and vimentin, but negative for cytokeratins, S-100 protein, desmin, CD31, and CD34 [4]. In this case, spindle cells were seen within the vessel wall and no abnormal mitotic figure were found, which was sufficient for the diagnosis of IVF; additional IHCS was not performed.

In conclusion, it is important to distinguish IVF from sarcoma and DVT to avoid aggressive treatment. Because no single modality of DUS, CT, MRI, and PET-CT has pathognomonic findings, clinical suspicion is most important in the diagnosis of IVF. For a homogeneous mass confined to a vessel without metastasis, IVF should be suspected, and endoluminal biopsy or intraoperative frozen section biopsy is important to rule out sarcoma.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

ORCID

Hyo Kee Kim
http://orcid.org/0000-0002-0332-2326
Ahram Han
http://orcid.org/0000-0002-3866-5214
Sanghyun Ahn
http://orcid.org/0000-0003-4308-4788
Sangil Min
http://orcid.org/0000-0002-0688-0278
Jongwon Ha
http://orcid.org/0000-0003-2285-3517
Seung-Kee Min
http://orcid.org/0000-0002-1433-2562

AUTHOR CONTRIBUTIONS

Concept and design: SKM. Analysis and interpretation: HKK, SKM. Data collection: HKK. Writing the article: HKK, SKM. Critical revision of the article: AH, SA, SM, JH. Final approval of the article: all authors. Obtained funding: none. Overall responsibility: SKM.

REFERENCES

1) Patchefsky AS, Enzinger FM. Intravascular fasciitis: a report of 17 cases. Am J Surg Pathol 1981;5:29-36.
2) Seo BF, Kim DJ, Kim SW, Lee JH, Rhie JW, Ahn ST. Intravascular fasciitis of the lower lip. J Craniofac Surg 2013;24:892-895.
3) Luna A, Molinari L, Bollea Garlatti LA, Ferrario D, Volonteri V, Roitman P, et al. Nodular fasciitis, a forgotten entity. Int J Dermatol 2019;58:190-193.
4) Chi AC, Dunlap WS, Richardson MS, Neville BW. Intravascular fasciitis: report of an intraoral case and review of the literature. Head Neck Pathol 2012;6:140-145.
5) Min SI, Han A, Choi C, Min SK, Ha J, Jung IM. Iliofemoral vein thrombosis due to an intravascular fasciitis. J Vasc Surg Cases 2015;1:73-76.
6) Lu Y, He X, Qiu Y, Chen H, Zhuang H, Yao J, et al. Novel CTNNB1-USP6 fusion in intravascular fasciitis of the large vein identified by next-generation sequencing. Virchows Arch 2020;477:455-459.
7) Gwan-Nulla DN, Davidson WR Jr, Grenko RT, Damiano RJ Jr. Aortic dissection in a weight lifter with nodular fasciitis of the aorta. Ann Thorac Surg 2000;69:1931-1932.
8) Bártů M, Dundr P, Němejcová K, Prokopová P, Zambo I, Černý Š. Intravascular fasciitis leading to an aortic dissection. A case report. Cesk Patol 2018;63:196-199.

9) Takahashi K, Yanagi T, Imafuku K, Kitamura S, Inamura-Takashima Y, Yamaguchi Y, et al. Ultrasonographic features of intravascular fasciitis: case report and review of the literature. J Eur Acad Dermatol Venereol 2017;31:e457-e459.
10) Mendoza-Moreno F, Minguez-Garcia J, del Rocio Diez-Gago M, Olmedilla-Arregui G, Tallon-Iglesias B, Zarzosa-Hernandez G, et al. What do we know about intravascular fasciitis affecting inferior vena cava? Management and report of a case. Int Surg J 2018;5:325-329.
11) Levy AD, Manning MA, Al-Refaie WB, Miettinen MM. Soft-tissue sarcomas of the abdomen and pelvis: radiologic-pathologic features, part 1-common sarcomas: from the radiologic pathology archives. Radiographics 2017;37:462-483.
12) Reix T, Sevestre H, Sevestri-Pietri MA, Szychta P, Pietri J. Primary malignant tumors of the venous system in the lower extremities. Ann Vasc Surg 1998;12:589-596.
13) Bradley WD, Fields KB, Delaney MJ. Leiomyosarcoma of the femoral vein in a marathon runner. J Am Board Fam Pract 1992;5:219-221.
14) Zhou Q, Young D, Vingan H. Nodular fasciitis mimicking recurrent lymphoma on positron emission tomography-computed tomography. Radiol Case Rep 2016;11:110-112.
15) Metser U, Even-Sapir E. Increased (18) F-fluorodeoxyglucose uptake in benign, nonphysiologic lesions found on whole-body positron emission tomography/computed tomography (PET/CT): accumulated data from four years of experience with PET/CT. Semin Nucl Med 2007;37:206-222.
16) Kang JH, Kim DI, Chung BH, Heo SH, Park YJ. A case report of the intravascular fasciitis of a neck vein mimicking intravascular tumorous conditions. Ann Vasc Dis 2018;11:553-556.
17) Pomoni A, Sotiriadis C, Gay F, Jouannic AM, Qanadli SD. Percutaneous endovascular biopsy of intravascular masses: efficacy and safety in establishing pre-therapy diagnosis. Eur Radiol 2018;28:301-307.
18) Lee HG, Pyo JY, Park YW, Ro JY. Intravascular fasciitis of the common femoral vein. Vasa 2015;44:395-398.
19) Zheng Y, George M, Chen F. Intravascular fasciitis involving the flank of a 21-year-old female: a case report and review of the literature. BMC Res Notes 2014;7:118.
20) Le P, Servais AB, Salehi P. Intravascular fasciitis presenting as recurrent deep venous thrombosis. J Vasc Surg Cases Innov Tech 2020;6:609-611.

https://doi.org/10.5758/vsi.200079