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Case Report

Intravascular fasciitis of the hip joint in a postpartum female: misdiagnosed as low grade fibromyxoid sarcoma

Yan He[1], Guan Huang[1], Yang Wang[2], Haiyan Zhao[1], Zhaohui Zheng[1], Wensong Lin[1], Luting Zhou[3], Zheng Zhu[1], Chaofu Wang[3]

[1]Department of Pathology, Longgang Centry Hospital of Shenzhen, Shenzhen 518116, Guangdong Province, P. R. China; [2]Department of Pathology, Shenzhen People's Hospital, Shenzhen 518001, Guangdong Province, P. R. China; [3]Department of Pathology, Ruijin Hospital, Shanghai Jiaotong University School of Medicine, Shanghai 200025, P. R. China

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Abstract: Intravascular fasciitis is a special type of nodular fasciitis. It is an uncommon lesion. We report here the first case of intravascular fasciitis involving the deep muscle of the hip joint. The female, postpartum patient presented with a large, firm, painless tumoral mass in the anterolateral muscles of the right hip. The diagnosis of intravascular fasciitis was difficult because of the large size and location of the lesion. The false positive immunohistochemistry for MUC4 initially caused our team to misdiagnose the intravascular fasciitis as a low grade malignant fibromyxoid sarcoma. Our case adds to the literature on intravascular fasciitis. Since the operation about 20 months prior, the tumor in this case has not recurred.

Keywords: Intravascular fasciitis, hip joint, low grade malignant fibromyxoid sarcoma, MUC-4, misdiagnosis

Introduction

Soft tissue tumors are difficult to diagnose histologically, and the different soft tissue tumors are not easy to tell apart. Nodular fasciitis is one of the most easily misdiagnosed soft tissue diseases. It is also called pseudosarcoma fasciitis because of its rapid growth and the frequent involvement of adjacent tissues. Intravascular fasciitis is an extremely rare variant of nodular fasciitis. Most cases of intravascular fasciitis reported in the literature occur in the mucous membrane or subcutaneously in the head, neck, and limbs. However, intravascular fasciitis occurring in the deep muscles of the hip joint has not been reported in the literature so far. Here, we report the first case involving the deep muscle of the hip joint, which was misdiagnosed as low-grade malignant fibromyxoid sarcoma.

Case presentation

A 32-year-old female patient occasionally felt a painless mass in the right hip joint at one-month postpartum. Clinical examination revealed the mass was not mobile, non-tender, and firm on palpation. The patient was breastfeeding her baby, and she was healthy before. All blood laboratory findings were normal. Magnetic resonance imaging (MRI) showed an oval signal measuring 5 × 5 × 4 cm short T1 signal and long T2 signal foci in the anterolateral space of the right hip joint with a well-circumscribed and uneven signal (**Figure 1A**). Grossly, the mass was approximately 5.5 × 5 × 4 cm, ovoid, and grey-white in appearance with no hemorrhage or necrosis. An envelope appeared to be visible on the mass' surface. The cut surface was smooth, glistening, and mucous (**Figure 1B**).

Microscopically, the mass was composed of slightly atypical fascicular or haphazardly arranged, long, spindle cells. The myxoid and collagenous backgrounds of the lesion were obvious (**Figure 2A**). Additionally, there were abundant extravascular red blood cells and occasional lymphocyte infiltration (**Figure 2B**). Tumor necrosis was not detected. The tumor surface

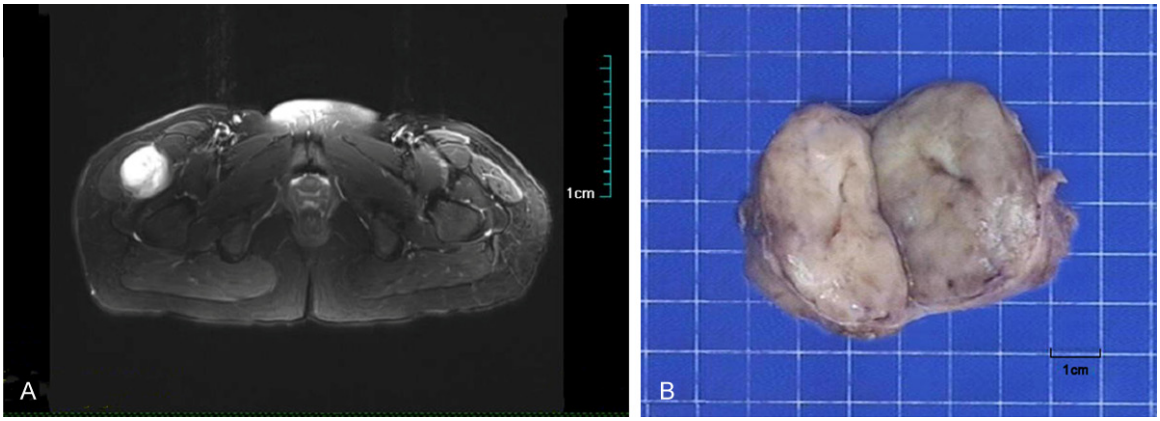

Figure 1. Magnetic resonance imaging (MRI) image of the hip joint and the gross of the tumor. A. The MRI showed a single mass with a clear boundary. B. The mass was ovoid and grey-white. The cut surface was revealed as smooth, glistening, and mucinous; an envelope appears to be visible on the surface of the mass.

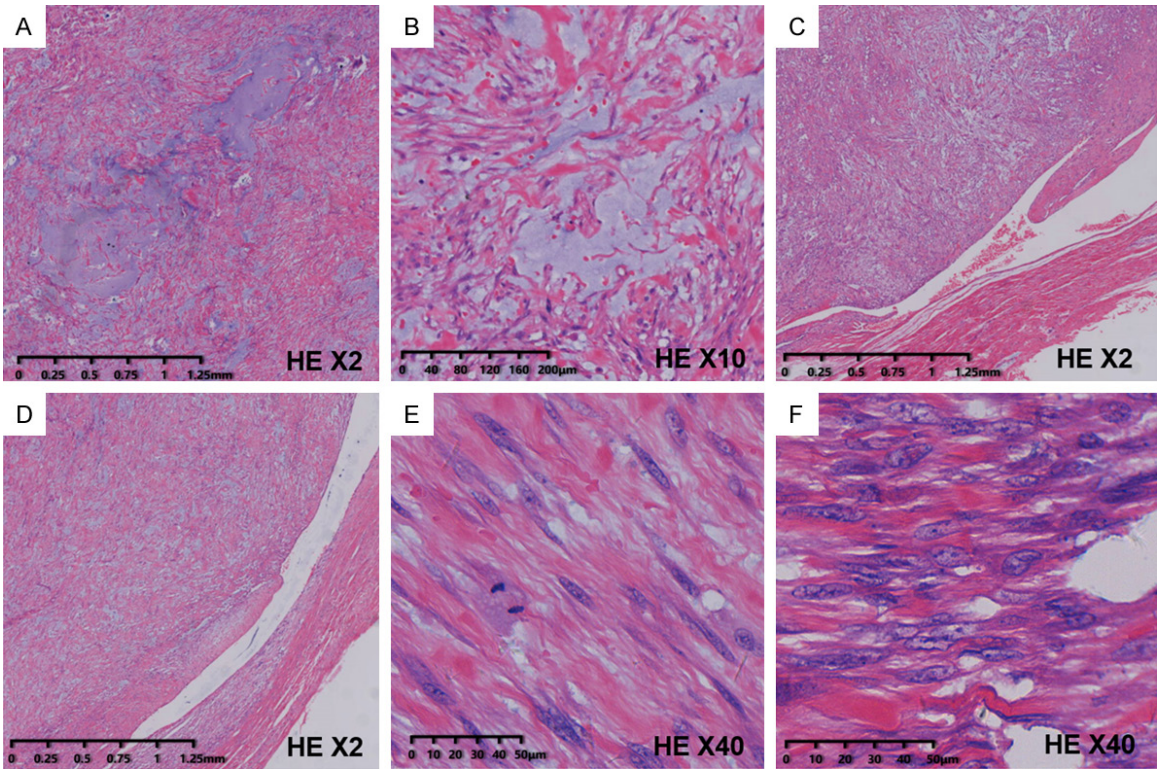

Figure 2. Hematoxylin-eosin staining. (A) Myxoid backgrounds of the lesion were obvious (× 2). (B) Abundant extravascular red blood cells and occasional lymphocyte infiltration (× 10). (C and D) The tumor surface has a slit-like space separated with the blood vessels, and the overlying vascular epidermis was intact (× 2), (E) Mitotic activity was observed (× 40), and (F) small nucleoli of these spindle cells were obvious (× 40).

had a slit-like space separated by the blood vessels, and the overlying vascular epidermis was intact (**Figure 2C**, **2D**). Mitotic activity was observed, approximately 1 mitosis per 10 high-power fields (**Figure 2E**). Long spindle cells showed a slightly atypical fascicular or haphazard arrangement (**Figure 2F**).

Immunohistochemical (IHC) staining showed the long spindle cells were positive for smooth muscle actin (SMA) (**Figure 3A**), calponin, and vimentin, and negative for pan-cytokeratin (CK pan), CD163, CD31, CD34, Bcl-2, desmin, S-100, ALK, ER, PR, and EMA. Ki-67 showed approximately 10% of spindle cells positive

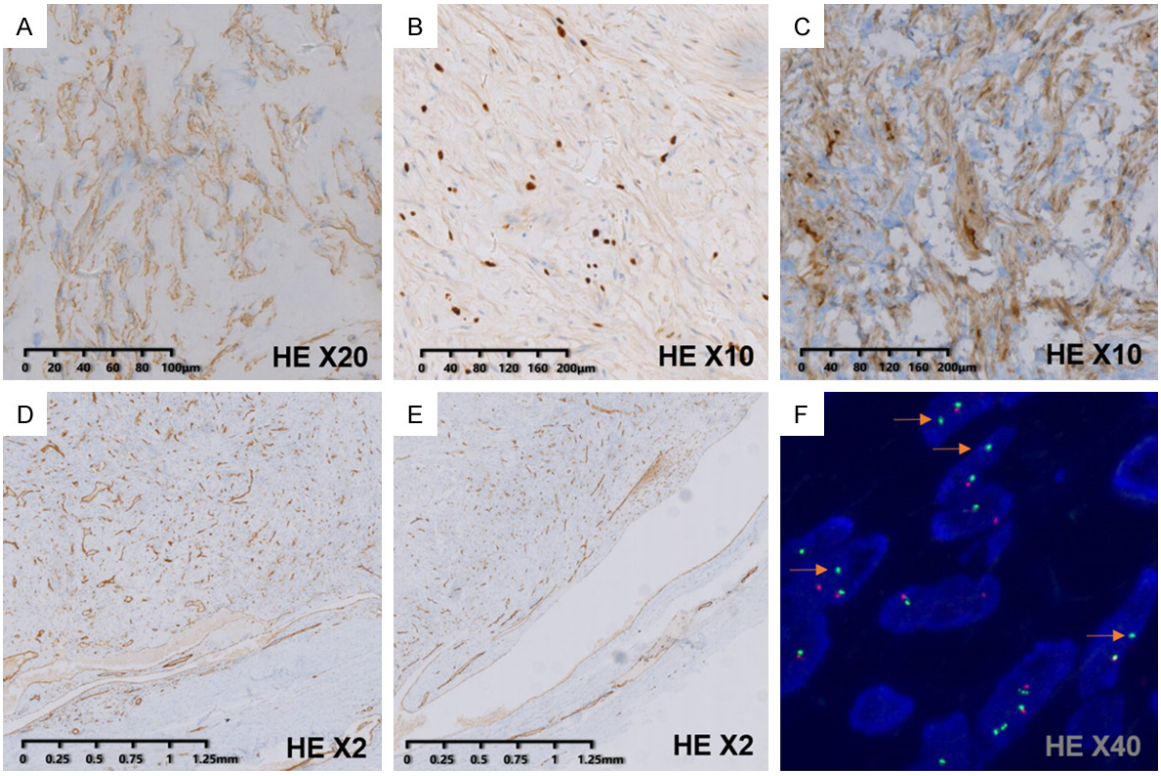

Figure 3. Immunohistochemical and fluorescence in situ hybridization (FISH) staining: (A) long spindle cells were positive for SMA (× 20). (B) Ki-67 showed approximately 10% spindle cells positive (× 10). (C) Spindle cells and vascular endothelial cells showed MUC-4 cytoplasmic staining (× 10). (D and E) CD31 follows the outline of the continuous endothelial cells (× 2). (F) FISH showed most lesional cells had the USP6 gene separation (× 40).

(**Figure 3B**). The myxoid stroma showed positive staining with alcian blue, which was noted to have MUC4's false-positive expression (**Figure 3C**). Vascular endothelial cells showed CD31 positive and drew the outline of the continuous endothelial cells (**Figure 3D**, **3E**). Because the tumor was in the deep muscle of the hip joint, MUC4's expression was false-positive, and the tumor's large volume, combined with the fissured vascular space around the mass, led us to diagnose the case as low grade fibromyxoid sarcoma. Later, we rechecked the IHC staining and found that not only the spindle cells but also vascular endothelial cells showed MUC4 positive; hence, the initial positive expression of MUC4 was not positive. We conducted the IHC staining of MUC4 again and found the result to be negative. Additional fluorescence in situ hybridization (FISH) showed that the USP6 gene was separated (**Figure 3F**).

Consequently, the case was diagnosed as intravascular fasciitis. Since the operation about 20 months ago, the patient has not had a recurrence.

Discussion

Intravascular fasciitis (IVF) is a rare variant of nodular fasciitis with blood vessel involvement. Since the 17 cases of intravascular fasciitis reported by Patchefsky and Enzinger in 1981, 43 cases of intravascular fasciitis have been reported in the English literature to the best of our knowledge; our case was the 44th. The most common locations were the upper extremities or the lower extremities (21 cases). The second most common locations were the head and neck (15 cases). The third most common locations were the trunk (3 cases), groin (2 cases), aorta (2 cases), and hip joint (1 case). The 43 previously reported cases of intravascular fasciitis and the current case are summarized in **Table 1** [1-24]. The patients' mean age was 26 years old (range, 6 months-66 years old) with 52.2% (23/44) being male and 47.7% (21/44) being female.

The pathogenic mechanism of intravascular fasciitis is still uncertain. Some possible predisposing factors are trauma, thrombosis, or preg-

Table 1. Clinical and pathologic features of eported cases of intravascular fasciitis (Data as 1/6/2020)

Reference	Case	Sex	Age (years)	Location	Duration	Clinical symptoms	Gross (cm)	IHC staining/genetic changes
Patchefsky AS 1981 [1]	17	8 F, 9 M	20.5 (range from 0.5 to 57)	5 cases in Head and neck, 7 cases in Upper extremity, 2 cases in Trunk, 3 cases in Lower extremity	From 2-3 weeks to 10-60 months	Slowly growing mass, painless, firm	Oval, red-pink, gray-tan-white, mean 1.5 (range from 0.6 to 5)	N/A
Freedman PD 1986 [2]	1	M	19	Mandibular right first molar	3 months	Firm mass with ulcer	Yellowish-white nodule, 2.5	
	1	M	53	Left buccal mucosa	2 months	Firm, immobile	2	N/A
Kahn MA 1987 [3]	1	F	20	Lower left labial mucosa	3 months	Slowly enlarging, painless, firm, mobile	Yellowish-white nodule, well circumscribed, 1.5	N/A
Price SK 1993 [4]	2	M	17	Outer canthus of right eye	6 weeks	Following an injury, swelling	2	N/A
		M	20	Near the eye	N/A	Nontender, firm, mobile	Pale, grey, 1	
Beer K 1996 [5]	1	F	18	Lateral thigh	Several years	Growing slowly mass, pain, mobile	2	Colloidal iron staining (+), MSA (+), S100 (-),
Samaratunga H 1996 [6]	1	M	49	Left groin	3 months	Slowly increased mass,	Firm, tender, tan to greyish, lobulated, 3	Vimentin (+), SMA (+)
Sticha RS 1997 [7]	1	M	4	Right foot	6 weeks	A little white bump, painless, firm	Poorly demarcated, firm, mobile, tan, 2.8	N/A
Ito M 1999 [8]	1	M	26	Right forearm	N/A	N/A	Single, tender	SMA (+)
Gwan-Nulla DN 2000 [9]	1	M	26	Aorta	8 days	Aortic dissection	N/A	N/A
Anand A 2007 [10]	1	F (pregnant)	20	Right hypothenar	2 months	Slowly growing, painless, mobile mass	Multi-nodular, well circumscribed, tan, firm, 3	SMA (+)
Sugaya M 2007 [11]	1	M	66	Medial border of the right foot	1 year	Slowly growing mass, painless, mobile	1	Vimentin (+)
Pantanowitz L 2008 [12]	1	M	17	Wrist	8 days	N/A	1.2	N/A
Wang L 2011 [13]	1	F	28	Left leg	8 years	No discomfort, slight phlebeurysma and hyperpigmentation	Tan, soft, 0.7	Vimentin (+), SMA (+)
Reiser V 2012 [14]	1	F	58	Right cheek	Several weeks	Rapidly growing, painless, mobile mass	Poorly demarcated, firm, 2.8	SMA (+), Bcl2 focally (+), Ki-67 (<10%+)
Chi AC 2012 [15]	1	F	20	Upper lip	3 weeks	Enlarging rapidly, chronic sialadenitis	Tan, soft, 0.7	SMA (+)
Seo BF 2013 [16]	1	M	26	Lower lip	1 month	Firm, well-circumscribed, rubbery, nontender	Fusiform mass, smooth surface, 1	Vimentin (+)
Zheng Y 2014 [17]	1	M	21	Flank	N/A	N/A	Red-tan, oval, well demarcated, 0.5	SMA (+), MSA (+)
Lee HG 2015 [18]	1	F	41	Left lower limb	3 weeks	Mild discomfort and heaviness, firm, swelling	Grey-yellow and glistening, no necrosis or haemorrhage, 3.8	SMA (+)
Min SI 2015 [19]	1	F	29	Left leg	3 months	Acutely pain, diffuse swelling, taking ethinyl estradiol, thrombosis	Fusiform, smooth surface, 4.5	SMA (+), Ki-67 (7%+)
Kuklani R, 2016 [20]	2	F	25	Oral	N/A	Rapidly enlarging swelling, multinodular, nontender	Firm, mobile, 1	Vimentin (+), Actin (+), SMA (+), Ki-67<5% (+)
		M	26	Tongue	1 week	Rapidly growing mass, denied pain or numbness	1	SMA (+), Vimentin (+), Ki-67<10 (+)

Takahashi K 2017 [21]	1	F	30	Right inguinal	1 month	Hard, well-defined, mobile, painful	2	Calponin, SMA (+)
Bartu M 2018 [22]	1	F	61	Ascending aorta	Accidental finding	Acute aortic dissection	N/A	SMA, calponin (+), Ki-67 25% (+)
Pan H 2019 [23]	1	M	27	Left lower limb	5 days	Swelling and pain	A grayish white solid mass, 4	SMA, Vimentin (+)
Lu Y 2020 [24]	1	M	19	Right lower limb	2 months	Swelling, pain	Grayish myxoid appearance, 2.3	SMA (+), MSA (+), Vimentin (+), Ki-67 (5%+), CTNNB1-USP6 gene fusion
Current case 2020	1	F (pregnant)	32	Right hip joint	Accidental finding	Occasionally touched, postpartum, painless	Ovoid, grey-white, smooth, mucous, firm, 5.5	SMA (+), Calponin (+), Ki-67 (10%+), USP6 gene separation

F, female; M, male; N/A, not available; SMA, smooth muscle actin.

nancy-related changes [10]. This present case, which occurred in a young postpartum female, may reveal a pathogenetic relationship with estrogen and progestin. The majority of patients were generally healthy before the lesion, which was presented as a single, palpable, firm, painless, slowly growing mass. Most of the cases were mobile and well-circumscribed. The lesions were usually oval or ovoid, and the average diameter was less than 2 cm (range from 6 mm to 5.5 cm). The lesions' duration ranged from 2 weeks to several years. Most of the lesions were of short duration.

In the reported cases, the intravascular fasciitis' microscopic feature was the proliferation of spindle cells. The lesion usually had a slit-like space or cleft-like network separated by blood vessels. Spindle cells made of fibroblasts and myofibroblasts were arranged in a swirling, short interlacing, matted, or haphazard pattern. The proliferating spindle cells often were myxoid stroma, collagenous stroma, or highly vascular stroma. Multinucleated giant cells, extravasated red blood cells, and chronic inflammatory cells were also present in the stroma. In some cases, the components of the spindle cells were intermingled with the surrounding connective tissue and neighboring blood vessels, but the overlying epidermis was usually intact [17]. Mitosis of the nucleus was commonly seen. Up to 10 mitoses were commonly found per 10 high power fields in some cases, but atypical nuclear mitosis was absent [18].

IHC usually showed that the spindle cells were positive for vimentin and SMA, occasionally positive for calponin [21, 22] and actin [20], focally positive for BCL2 [14], and negative for CK (pan), S100, desmin, CD31, CD34, CD117, MUC4, CD31, and CD34. The expression of SMA helped to confirm the fibroblastic and myofibroblastic differentiation of the spindle cells. The multinuclear giant cells expressed CD68 positive, suggesting that these cells were of histiocytic origin. In a recent report about genetic markers of soft tissue, Erickson-Johnson and his colleagues reported that more than 92% of nodular fasciitis had MYH9-USP6 gene fusions [25]. Intravascular fasciitis is a rare type of nodular fasciitis. Therefore, it has the same genetic characteristics as nodular fasciitis. Fluorescence in situ hybridization (FISH) detection is helpful for the diagnosis of large lesions, multinodular lesions, and morphologically atypical lesions.

Intravascular fasciitis is a hyperplastic lesion of myofibroblasts and fibroblasts. The rapid growth and frequent mitosis create a risk of misdiagnosis as a soft tissue sarcoma, such as this case, which was misdiagnosed because of the large size, mitotic activity, lesion location, and the false-positive MUC4. The MUC4 gene product is the major constituent of mucus. MUC4 immunostain is a specific and highly sensitive marker for low grade fibromyxoid sarcoma, expressing cytoplasmic staining of tumor cells [26]. The main differential diagnoses of intravascular fasciitis are low grade malignant myofibroblast tumor, myxofibrosarcoma, and low grade fibromyxoid sarcoma. These diseases are malignant and usually require extended resection, radiation therapy, and chemotherapy after operations. However, intravascular fasciitis is a benign disease; simple excision of the lesions is usually curative. The misdiagnosis of intravascular fasciitis will cause great harm to patients. The diagnosis of fibroblast and myofibroblast tumors is difficult because of their similar morphology. Therefore, the diagnosis of a soft tissue tumor should be combined with histological morphology, immunohistochemical expression, and genetic study to avoid misdiagnosis. Since the operation about 20 months ago, the tumor in this case has not recurred.

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The study was approved by the ethics committee of Longgang Centry Hospital of Shenzhen and the patient provided written informed consent.

Disclosure of conflict of interest

None.

Address correspondence to: Chaofu Wang, Department of Pathology, Ruijin Hospital, Shanghai Jiaotong University School of Medicine, Shanghai, China. E-mail: wangchaofu@126.com

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