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Fibrolipoma of the Ring Finger: MR Imaging and Histological Correlation

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Abstract. *Fibrolipoma is characterized by the presence of prominent bundles of mature fibrous tissue traversing the fatty lobules. We present a case of a pathologically-proven fibrolipoma arising in the right ring finger of a 66-year-old female. Physical examination showed a 2-cm, soft, mobile, nontender mass. Neurovascular examinations including Tinel sign were normal. Plain radiographs revealed a well-defined radiolucent area with no calcification. Magnetic resonance imaging showed a lipomatous tumor with an unusual biphasic pattern. The patient underwent an excisional biopsy. Histologically, the tumor consisted of mature adipocytes with sclerotic fibrous elements as well as myxoid changes. The patient has had no evidence of local recurrence within seven months of follow-up. To the best of our knowledge, this is the first report of fibrolipoma without nerve involvement in the finger. Although nonspecific, clinicians should know the various imaging features of fibrolipoma to avoid an unnecessarily extensive surgery.*

Lipoma is probably the most common soft tissue tumor and can occur in any part of the body. However, it is extremely rare in the finger, with reported incidence of 1% (1). Occasionally, histological subtypes are recognized by an admixture of other mesenchymal elements that comprise an intrinsic part of the tumor. One example is a fibrolipoma that has a significant fibrous tissue component. The etiology of this tumor is unclear. Here, we present a unique case of fibrolipoma arising in the ring finger of an elderly female and discuss the differential diagnosis of this extremely rare condition.

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Case Report

A 66-year-old right-hand dominant female was referred to our hospital with a 10-month history of a slow-growing, painless mass on the volar aspect of the proximal phalanx of the right ring finger. Physical examination showed a soft, mobile, nontender mass, measuring approximately 2.0×2.0 cm. Neurovascular examinations including Tinel sign were normal. Laboratory data were within normal limits. The patient's medical history was unremarkable.

Plain radiographs revealed a well-defined radiolucent area with no calcification. Magnetic resonance imaging (MRI) showed a subcutaneous soft tissue mass with an unusual biphasic pattern. The radial component exhibited intermediate-to-high signal intensity on both T1- and T2-weighted sequences. The ulnar component exhibited high signal intensity on both T1- and T2-weighted sequences (Figures 1A and B). Contrast-enhanced fat-suppressed T1-weighted sequences demonstrated mild enhancement of the radial component (Figure 1C). Based on these findings, a lipomatous tumor was suggested, including sclerotic lipoma, fibrolipoma, or well-differentiated liposarcoma.

The operative procedure was carried out under general anesthesia with tourniquet control. A zigzag incision was performed on the volar aspect of the ring finger. The mass was encapsulated and did not involve the flexor tendon sheath, local vasculature, or digital nerve. It was easily dissected from surrounding tissues. Grossly, the tumor consisted of yellow-white fibroadipose tissue (Figure 2A). Microscopically, the tumor exhibited proliferation of mature adipocytes arranged in lobules and separated by fibrous septa (Figure 2B). In addition, the non-lipogenic component consisted of spindle-shaped cells in a sclerotic collagenous stroma (Figure 2C). Myxoid stromal change was focally found. Neither cellular atypia nor mitotic figures were observed. Immunohistochemically, the spindle-shaped cells were focally and weakly-positive for CD34, but negative for murine double minute-2 (MDM2), cyclin-dependent kinase-4 (CDK4), CD99, and smooth muscle actin. The MIB-1 (Ki-67) labeling index was less than 1%. Based on these features, the tumor was diagnosed as a fibrolipoma.

The postoperative course was uneventful. At the seven-month follow-up, the patient was doing well without evidence of local recurrence.

Discussion

Benign lipomatous tumors are classified into various subtypes based on their clinical, histological, or cytogenetic features (2). Fibrolipoma is one of the less common histological subtypes of lipoma. It has a prominent fibrous component in addition to mature adipose tissue element. Marginal excision is curative and local recurrence is rare. Although fibrolipoma may develop in virtually any region of the body, there is, to the best of our knowledge, no English literature describing the occurrence of this tumor in the finger.

MRI is the most commonly used modality in the evaluation of lipomatous tumors. Ordinary lipomas have generally been described as showing homogeneous signal intensity identical to subcutaneous fat in all MR pulse sequences, with complete loss of signal after fat suppression (3). No enhancement is usually observed following intravenous contrast administration (4). In the current case, however, mild inhomogeneous enhancement was found in nonadipose (fibrous) areas. Therefore, we could not entirely rule out the possibility of a well-differentiated liposarcoma. Kajihara *et al*. (5) also noted the existence of non-adipose areas and heterogeneous enhancement in fibrolipoma. It may be difficult to distinguish fibrolipoma from well-differentiated liposarcoma by enhancement with gadolinium alone.

The differential diagnosis for fibrolipoma includes sclerotic lipoma, spindle cell lipoma, neural fibrolipoma, and well-differentiated liposarcoma.

Sclerotic lipoma, first described by Zelger *et al*. (6) in 1997, is a rare but distinctive fibroma-like variant of lipoma. It occurs in all age groups but more often in young to middle-aged adults, with a slight male predominance. Sclerotic lipoma usually presents as a slow-growing, painless mass in the finger (7). Histological analysis shows a dominant fibrous or fibrosclerotic matrix that contains scattered mature adipocytes. The fatty component comprises between 5% and 50% of the mass. Immunohistochemically, the non-lipogenic tumor cells stains for CD99 and variably for CD34, S-100 protein, and smooth muscle actin (7). In the current case, we eliminated the possibility of a sclerotic lipoma because the fatty component of the lesion prevailed (approximately 80%) and immunostaining for CD99 and smooth muscle actin was negative.

Spindle cell lipoma typically presents as a slow-growing, painless, firm nodule in the subcutaneous tissue of the posterior neck, shoulder, and back. It rarely arises in the finger. There is a marked male predilection between 40 and 70 years of age (8). The MRI appearance is not pathognomonic and displays a spectrum of features (9).

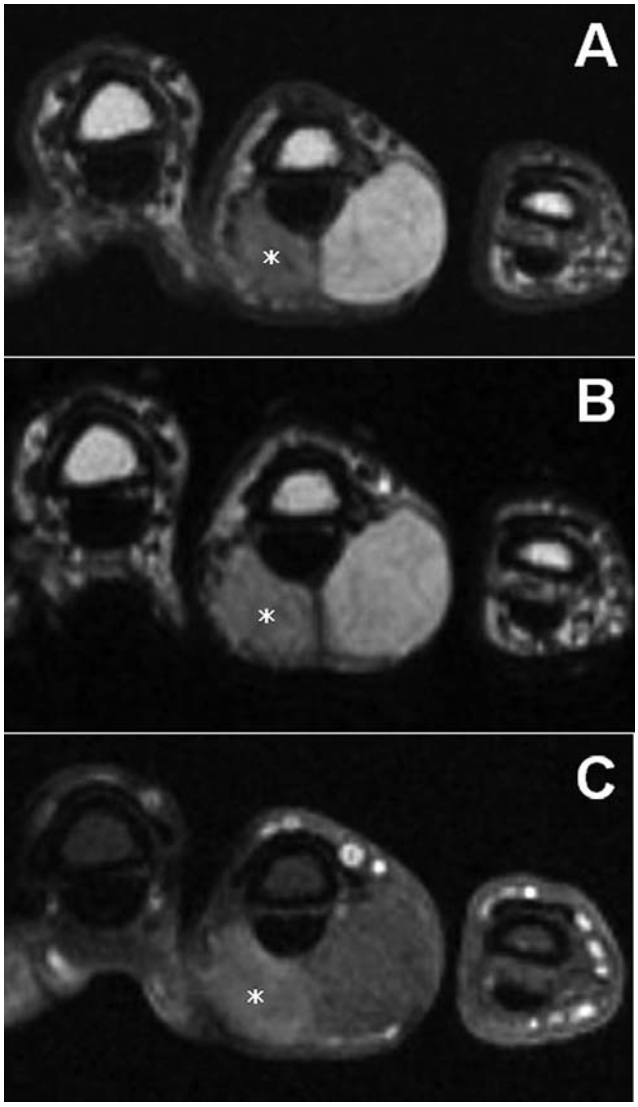

Figure 1. *Axial magnetic resonance images of fibrolipoma at the proximal phalanx level of the right ring finger. T1- (A) and T2- (B) weighted sequences show that the radial component (*) has intermediate-to-high signal intensity and the ulnar component has high signal intensity. Contrast-enhanced fat-suppressed T1-weighted sequence (C) demonstrates a mild enhancement of the radial component (*).*

Histologically, spindle cell lipoma consists of a relative equal mixture of spindle-shaped cells and mature adipocytes. Immunohistochemically, the spindle-shaped cells are strongly positive for CD34 but negative for smooth muscle actin or S-100 protein (10, 11). The current case seems to be different from spindle cell lipoma because a strong and diffuse pattern of CD34 staining was not demonstrated.

Neural fibrolipoma, also known as fibrolipomatous hamartoma of nerve, is a rare tumor-like lipomatous process that almost exclusively involves the median nerve (and its

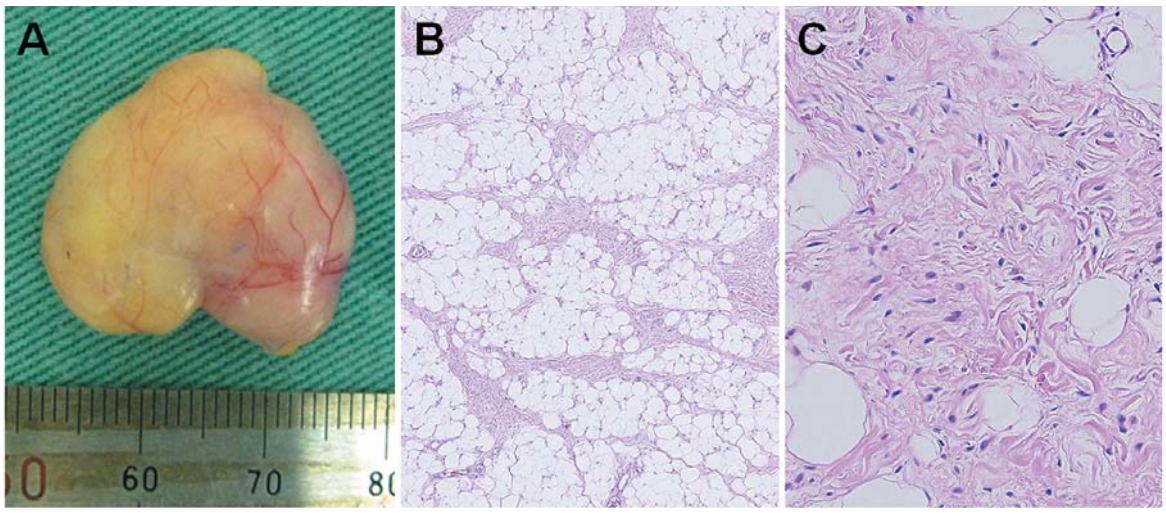

Figure 2. *A: Gross appearance of the tumor. B: The tumor is composed of mature adipocytes and collagenous fibrous tissue. C: A recognizable non-adipose component consists of spindle-shaped cells without atypia in a sclerotic collagenous stroma.*

digital branches) in the hand. It is associated with macrodactylia in about one-third of cases (12). Most cases occur within the first three decades of life. Neural fibrolipoma presents as a slow-growing, sometimes painful, soft lump. The MRI feature is virtually pathognomonic and reveals a coaxial cable-like appearance on axial planes and a spaghetti-like appearance on coronal planes on both T1- and T2-weighted sequences (13). Histologically, neural fibrolipoma consists of fibrofatty tissue that grows along epineurium and perineurium and surrounds and infiltrates the nerve trunk. In the current case, we were able to eliminate the possibility of a neural fibrolipoma on the basis of gross and microscopic features.

Well-differentiated liposarcoma is the most common form of liposarcoma encountered in late adult life. It usually presents as a slow-growing, painless mass in the lower extremity, especially the thigh. On MRI, well-differentiated liposarcoma typically demonstrates a largely lipomatous mass representing over 75% of the lesion and non-adipose components in thick septa (> 2 mm) of irregular aspect or nodular foci (3, 4, 14). The thick septa show moderate or marked enhancement after intravenous gadolinium administration (4). Histologically, well-differentiated liposarcoma consists of mature adipocytes with significant variation in cell size and hyperchromatic nuclei. Immunostaining for MDM2, CDK4, and p16 has recently been shown to be a highly sensitive and specific means of identifying and separating well-differentiated liposarcoma from benign lipomatous tumors (15). In the current case, MDM2 and CDK4 were not expressed, strongly suggesting that the tumor was a benign lipomatous tumor.

In summary, as far as we are aware of, we have reported the first case of fibrolipoma without nerve involvement in the finger. Clinicians should consider fibrolipoma as a possible diagnosis for a lipomatous lesion in the finger, thereby avoiding unnecessarily aggressive treatment.

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