Leiomyoma of the Hand

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Received: 5 August 2008 / Accepted: 26 September 2008 / Published online: 25 October 2008
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Abstract Leiomyoma is most commonly found in the uterus and lower extremities of middle-aged women. Leiomyoma is uncommonly reported in the hand and is extremely uncommon in children. We present three cases of leiomyoma of the hand, including one case in the hand of a 10-year-old boy.

Keywords Hand · Leiomyoma · Tumors · Treatment

Introduction

Leiomyoma is a solitary, benign, slowly growing tumor that originates from smooth muscle [5]. This tumor can develop anywhere that smooth muscle is present, and is most commonly found in the uterus [1]. Women in the third to fifth decade of life are most likely to be affected [1]. Less commonly, leiomyoma has been reported in the extremities, with greater prevalence in the lower extremities than the upper extremities [1, 2]. The first case of leiomyoma of the

hand was published in 1960 by Butler et al. [3]. Since that time, 150 cases of leiomyoma of the hand have been reported in the English literature [1, 4, 6, 8, 12, 14, 15, 20]; however, only three of these have been in children [14, 18, 20]. We present three cases of leiomyoma of the hand, including one case in a 10-year-old boy. This boy is the youngest reported case of leiomyoma of the hand in an immunocompetent child.

Case Report #1

A 10-year-old, right-hand dominant boy presented with a 1-year history of a slowly growing, painless mass on the volar base of his right middle finger (Fig. 1). Physical examination revealed a 3-cm, soft, mobile mass that was nontender to palpation. The vascular, sensory, and motor exams were otherwise unremarkable.

Plain radiographs revealed a soft tissue mass with mild associated bony compression of the middle finger proximal phalanx (Fig. 2). Further evaluation with MRI demonstrated a 2.6-cm T2 hyperintense mass suggestive of a peripheral nerve sheath tumor versus a cartilaginous neoplasm (Fig. 3a,b).

Under general anesthesia, a zigzag incision was made directly over the mass. A skin flap was elevated, and the neurovascular bundles on either side of the mass were identified and preserved. The mass was well-encapsulated and did not involve the flexor tendon sheath, local vasculature, or digital nerves. It was easily dissected from the surrounding tissue along with its capsule and removed in its entirety.

Supported in part by a Midcareer Investigator Award in Patient-Oriented Research (K24 AR053120) from the National Institute of Arthritis and Musculoskeletal and Skin Diseases (to Dr. Kevin C. Chung).

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Figure 1 Note the mass at the volar base of patient's right middle finger.

Pathology examination demonstrated a tan, rubbery mass with few focal punctuate calcifications (Fig. 4). Immunohistochemistry using antibodies directed against smooth muscle actin and S100 protein showed diffuse immunoreactivity for smooth muscle actin and negative for S100 (Fig. 5a,b). The diagnosis was leiomyoma. He had no recurrence at 6-month follow-up.

Case Report #2

A 54-year-old, right-hand dominant woman presented with a 1-cm, firm, mobile mass on the volar surface of her left first web space present that was present for approximately 1 year (Fig. 6). She complained of progressively increasing achy pain. A thorough neurovascular examination of the left hand was normal. X-ray imaging was unremarkable; however, MRI revealed an enhancing, high T2 signal intensity 7-mm mass within the deep subcutaneous fat adjacent to the thenar eminence. Small vessels were also identified radiating from the lesion, which suggested a possible vascular etiology such as vascular malformation (Fig. 7). Under intravenous sedation with local anesthesia, a zigzag incision was made over the mass, which was noted to be associated with the bifurcation of the common digital artery (Fig. 8). Pathology examination showed a 0.6-cm firm, grey-brown nodule that appeared hemorrhagic on its cut surface. Microscopic evaluation confirmed the diagnosis of leiomyoma.

Case Report #3

A 48-year-old, right-hand dominant female presented with a mass on her right palm at the base of her index and

middle fingers that had been present for 6 months (Fig. 9). On examination, a 1-cm soft, nontender, mobile mass was present on the volar surface of the right hand between the heads of the second and third metacarpals. MRI revealed a $7.8 \times 6.2 \times 5$ -mm well-circumscribed lesion in this location. The mass had increased intensity on T2-weighted images. Appearance on MRI suggested a diagnosis of neuroma, synovial sarcoma, or less likely hemangioma. Exploration revealed that the lesion was attached to the common digital artery to the second web space (Fig. 10). Microscopic examination confirmed the diagnosis of vascular leiomyoma.

Discussion

Leiomyoma is a benign, slowly growing, solitary neoplasm of smooth muscle origin. It has been described throughout the body wherever smooth muscle is present, including uterus, esophagus, gastrointestinal stroma, lung pleura, and lower extremities. [5, 7, 9, 13, 19]. The occurrence of leiomyoma in the hand is uncommon, likely due to the minimal amount of smooth muscle in this location. In a pathology review of 562 cases of leiomyoma, less than 10% were located in the hand [7]. Enzinger and Weiss described three distinct types of leiomyomata: vascular, cutaneous, and deep soft tissue [5]. When present in the hand, leiomyomata are almost always vascular, arising from

Figure 2 X-ray showing soft tissue swelling at site of the mass.

Figure 3 **a, b** MRI showing an enhancing mass seen on T2-weighted image at the base of the middle finger.

Figure 4 The mass appeared to be a 2-cm well-circumscribed nodule.

Figure 5 **a** Photomicrograph showing thinly encapsulated leiomyoma composed of cytologically bland spindle cells arranged in a pattern typical of smooth muscle tumors (hematoxylin and eosin stain, original magnification $\times 100$). **b** Photomicrograph of immunohistochemical stain

using an antibody directed against smooth muscle actin. Neoplastic cells show strong, diffusely positive cytoplasmic staining confirming the diagnosis of leiomyoma (original magnification $\times 400$).

Figure 6 The mass is palpable on the palm (*circled*).

the tunica media layer of the vein [16]. Cutaneous tumors are intradermal and originate from the nonstriated muscle of erector pili. Deep soft tissue leiomyomata have not been described in the hand, but are instead found predominantly as large tumors in the lower extremities.

When present in the hand, leiomyoma is often described as a well-circumscribed, firm mass measuring less than 2 cm [1, 7]. Initially, the mass may be painless; however, patients often develop progressive pain, perhaps from compression of surrounding nerves [12, 15]. Imaging with MRI demonstrates a well-circumscribed round or oval mass that is hyperintense to muscle on T1 images and mixed isointense/hyperintense on T2-weighted images [10]. MRI imaging can be helpful to distinguish between benign and malignant soft tissue tumors of the hand; however,

Figure 7 MRI showed a hyperintense mass on T2-weighted image adjacent to the thenar eminence.

Figure 8 Intra-operative view of the leiomyoma.

radiography alone cannot reliably distinguish between the various benign soft tissue masses that may be present [11]. Benign tumors typically appear homogeneous with defined borders and without involvement of neurovascular structures, whereas malignant lesions tend to have ill-defined borders and neurovascular involvement [11]. MRI is particularly useful to identify anatomic borders and vascular involvement of the tumor preoperatively.

Histologically, three types of leiomyoma have been described: solid, cavernous, and venous. The solid type is composed of smooth muscle bundles surrounded by thin-walled vessels that intersect one another. Cavernous tumors contain dilated vascular channels with smaller amounts of smooth muscle, and venous type have venous channels with thick muscular walls easily distinguishable from

Figure 9 The mass is visible between the second and third metacarpal heads (*arrow*).

Figure 10 The leiomyoma seen during exploration.

adjacent smooth muscle bundles [7]. Treatment is complete surgical excision, which is uniformly curative, as this tumor has never been reported to metastasize.

Our cases were unusual because leiomyomata are not commonly found in the hand, and are particularly uncommon in children. Prior to our report, only three previous cases of leiomyoma of the hand have been reported in children, ages 10, 12, and 14 [14, 18, 20]. The youngest report was in a 10-year-old boy with the human immunodeficiency virus [14]. This patient presented with multiple cutaneous and systemic manifestations of disease, including leiomyoma. Our patient was an otherwise healthy child who presented with an isolated leiomyoma of the hand. Upon presentation, our patient reported presence of the tumor for approximately 1 year, suggesting that he initially developed the tumor at age 9.

The differential diagnosis for soft tissue mass in the hand is quite broad. A recent review article by Sobanko et al. described 15 common benign soft tissue tumors of the hand, including most commonly ganglion cyst (60–70%), followed by giant cell tumor (3–9%) [17]. Other diagnoses included fibroma, lipoma, schwannoma, glomus tumor, neurofibroma, neurilemmoma, spindle cell sarcoma, nodular melanoma, and nodular fasciitis. Children with hand tumors present an even greater diagnostic challenge, as the differential diagnosis may also include vascular malformation, lymphatic malformation, hemangioma, and benign fibrous tumor, amongst others [11]. Treatment of these lesions varies based on diagnosis, ranging from observation to nonoperative medical management, to surgical excision. Because of these varied treatments, it is important for a hand surgeon to be aware of the diagnostic possibilities based on examination and imaging of a hand tumor, particularly in a child. Our report suggests that an isolated, nodular soft tissue mass in the hand should be imaged with MRI to identify anatomic borders and intensity. If the

aforementioned physical exam and MRI findings are present, differential diagnosis should include leiomyoma, and surgical excision with post-operative histopathologic analysis should be considered.

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