

Intramuscular hemangioma in the foot of a child: a rare case report

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ABSTRACT

Intramuscular hemangiomas are rare benign vascular tumors. Plantar foot involvement is exceptionally uncommon and poses unique diagnostic and therapeutic challenges due to the weight-bearing nature of the region. We report the case of a 10-year-old girl who presented with a slowly progressive, painful mass in the medial plantar region of the left foot. Physical examination revealed a deep-seated, mildly tender nodular lesion without overlying skin changes or functional limitation. Magnetic resonance imaging demonstrated a well-circumscribed lesion located within the flexor digitorum brevis muscle, showing signal characteristics consistent with an intramuscular hemangioma. Based on the benign radiological features, limited lesion size, absence of functional impairment, and potential risks associated with surgical or interventional treatment, a conservative management strategy with close clinical follow-up was adopted. Intramuscular hemangiomas may remain clinically silent for years and become symptomatic with growth, mechanical loading, or increased physical activity. Treatment options include surgery, sclerotherapy, and observation; however, in selected pediatric cases, conservative follow-up may be preferable to avoid unnecessary morbidity. When clinical and imaging findings indicate benign behavior and lesion stability, structured conservative follow-up represents a safe and effective management approach.

Keywords: Intramuscular hemangioma, pediatric soft tissue tumor, plantar foot, case report

INTRODUCTION

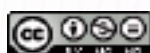
Intramuscular hemangiomas (IMHs) are rare vascular tumors of benign nature that arise within skeletal muscle tissue and may pose significant diagnostic challenges both clinically and radiologically. They are reported to account for less than 1% of all hemangiomas. Although most cases occur during childhood and young adulthood, diagnosis is frequently delayed, and lesions may be followed for prolonged periods with incorrect preliminary diagnoses such as soft tissue masses, muscle strain, or sequelae of trauma. In particular, some infantile lesions—especially superficial infantile capillary hemangiomas—may regress spontaneously and require only observation.¹

The etiopathogenesis of IMHs has not been fully elucidated. They are largely considered to be of congenital origin, arising from vascular developmental anomalies during the embryonic period. The hemodynamic and molecular genetic phenotypes closely resemble those observed in angiovenous malformations. Newly identified mutations, including cases with coexisting mutation types, and insertion mutations offer valuable insights into the genetic basis of vascular anomalies.³ However, cases that are not clinically apparent at birth and become symptomatic during childhood or adolescence have

also been reported. This phenomenon is thought to be related to the ability of these lesions to remain quiescent for long periods and to become clinically evident with growth or increased physical activity.

From an anatomical perspective, IMHs are most commonly located in the lower extremities, particularly within the thigh and calf muscles. In contrast, involvement of the foot and plantar region is exceedingly rare. The plantar surface of the foot is subjected to substantial mechanical load and has a complex anatomical structure, and because surgical interventions in this region carry a high risk of functional impairment, IMHs in this location require special consideration during clinical decision-making.

Magnetic resonance imaging (MRI) is regarded as the gold standard for the diagnostic evaluation and characterization of IMHs.² On T1-weighted sequences, these lesions typically appear iso- to mildly hypointense and may demonstrate a heterogeneous structure containing foci of high signal intensity corresponding to intralesional fat; on T2-weighted images, marked hyperintensity is characteristic.⁴ These radiological features support the benign vascular nature of the



lesion and facilitate differentiation from lipoma, fibromatosis, rhabdomyosarcoma, and other soft tissue tumors.

Treatment options include surgical excision, sclerotherapy, embolization, and conservative observation. Particularly in pediatric patients, an individualized treatment strategy should be adopted, taking into account lesion location, symptom severity, growth rate, and functional impact. In this case report, we discuss the clinical course and conservative management of a 10-year-old girl diagnosed with a symptomatic intramuscular hemangioma of the plantar foot that did not result in functional impairment, in the context of the relevant literature.

CASE

A 10-year-old girl presented to our outpatient clinic with complaints of a palpable mass in the plantar surface of the left foot that had been noticed for several years, accompanied by pain during walking. There was no history of significant trauma, infection, or previous surgical intervention. The patient's family reported that the mass was initially very small but had become more apparent in recent years, with pain increasing particularly after prolonged walking or physical activity. There was no history of nocturnal pain, rest pain, or systemic symptoms.

Physical examination revealed a deep-seated, nodular lesion approximately the size of a hazelnut in the medial aspect of the plantar surface of the left foot, causing mild tenderness on palpation. The overlying skin appeared normal, with no discoloration, increased temperature, or superficial vascular prominence. Range of motion of the foot and ankle joints was full and painless. Neurological examination revealed no sensory deficits or reflex abnormalities. Peripheral pulses were palpable and normal.

Plain radiographs of the foot obtained for initial evaluation were unremarkable, showing no evidence of bone destruction, periosteal reaction, or calcification. Subsequently, MRI was performed. Imaging demonstrated a well-circumscribed mass measuring approximately 20×15×20 mm within the flexor digitorum brevis muscle, with smooth margins and no infiltrative characteristics. On T1-weighted images, the lesion exhibited intermediate signal intensity, with small high-signal foci around the lesion suggestive of fatty deposits (**Figure**). On T2-weighted sequences, the lesion showed marked hyperintensity compared with the surrounding skeletal muscle. Contrast-enhanced imaging revealed heterogeneous enhancement. These radiological findings were consistent with the diagnosis of an intramuscular hemangioma.

The patient's clinical and radiological findings were evaluated in a multidisciplinary setting. Considering the limited size of the lesion, the absence of infiltrative features, the lack of significant functional impairment, and the young age of the patient, invasive treatment options such as surgical excision or sclerotherapy were not pursued. The benign nature of the lesion, its potential natural course, and the circumstances that might necessitate intervention were explained in detail to the patient and her family. Regular clinical and radiological follow-up was recommended.

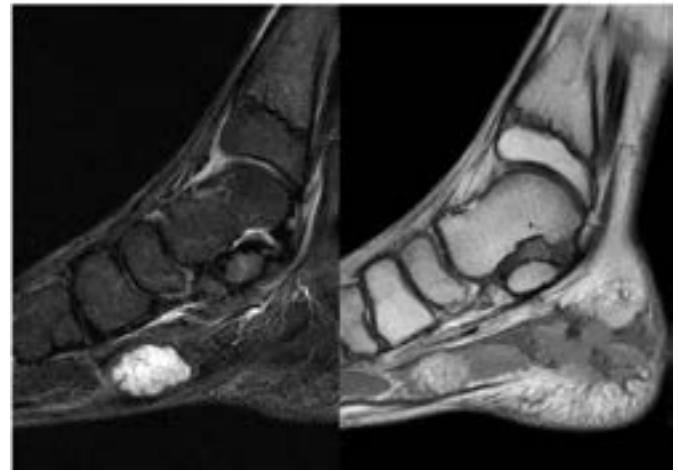


Figure. Intramuscular hemangioma

During follow-up, the patient continued to experience intermittent pain; however, this did not reach a level that restricted daily activities or school life. No clinically significant increase in lesion size was observed. Given that musculoskeletal development would continue through adolescence and young adulthood, conservative management was maintained until completion of growth.

DISCUSSION

Hemangiomas are among the most common benign soft tissue tumors of infancy and early childhood and show a marked female predominance in the general population.⁵ The male-to-female ratio has been reported to range between 1:3 and 1:5 in the literature.⁶ Regarding anatomical distribution, approximately 60% of cases occur in the head and neck region, 25% in the trunk, and 15% in the extremities. Within this distribution, intramuscular localization is particularly rare, accounting for less than 1% of all hemangiomas.

Classically, congenital hemangiomas are present within the first month of life and progress through three phases: proliferative, stable, and involutorial. With an incidence of 4–10%, infantile hemangiomas (IH) are the most encountered benign tumors in infancy.^{1,2} They are characterized by a phase of rapid growth, followed by a progressive involution.⁵ The proliferative phase is usually most prominent during the first 6–12 months, followed by a gradual regression over subsequent years. Most superficial lesions, commonly referred to as “strawberry hemangiomas,” undergo spontaneous involution between 18 months and 10 years of age.⁷ However, hemangiomas located intramuscularly or beneath the deep fascial layers may not follow this typical course; they can remain clinically silent for prolonged periods and become symptomatic during late childhood or adolescence.

One of the rare features of the present case is the localization of the lesion in the plantar region of the foot, which is an uncommon anatomical site. IMHs of the lower extremity are most frequently reported in the thigh and calf muscles, whereas plantar involvement—particularly within the flexor digitorum brevis muscle—has been described only in a limited number of cases. As a weight-bearing area, the plantar surface of the foot may become painful even with small-volume lesions, although functional impairment does not

necessarily accompany the pain. Such lesions may be difficult to detect while the patient is at rest, as the hemangioma may not be engorged with blood. However, asking the patient to stand for 3–4 minutes may help reproduce typical symptoms.⁸ Similarly, in the present case, the patient reported pain during walking and physical activity, but no functional limitation affecting daily activities was observed.

Another distinctive aspect of this case is that the lesion was not recognized during the congenital period and became clinically apparent only over the past few years. This observation suggests that IMHs are not always diagnosed in early childhood and may become symptomatic in association with mechanical loading, growth, and increased physical activity. This variability highlights the heterogeneous biological behavior of hemangiomas and indicates that a uniform clinical course cannot be assumed.

From a differential diagnostic perspective, a wide range of infectious, inflammatory, and neoplastic conditions should be considered in pediatric patients presenting with a painful plantar mass. Deep-seated abscesses, in particular, may present with pain and tenderness; however, they are typically associated with acute onset, erythema, increased local temperature, systemic signs of infection, and elevated inflammatory markers. On MRI, abscesses are characterized by central fluid signal intensity and prominent peripheral contrast enhancement. The absence of these clinical and radiological features in the present case strongly excluded an infectious process. Other conditions such as plantar fibromatosis, lipoma, nerve sheath tumors, and malignant soft tissue tumors were also considered, but MRI findings were most consistent with an intramuscular hemangioma.

Although hemodynamic complications are rare in IMHs, deep and large-volume lesions have been associated with thrombosis, local hematoma formation, and, rarely, circulatory overload related to high-flow vascular anomalies. Several vascular tumors and malformations are associated with complex coagulation derangements.⁹ In small, low-flow lesions confined to limited anatomical regions such as the plantar foot, the likelihood of such complications is extremely low. This consideration further supported the decision for conservative management in the present case.

Among treatment options, sclerotherapy is often preferred for diffuse lesions or those unsuitable for surgical excision due to the risk of functional impairment. Commonly used sclerosant agents include ethanol, polidocanol, sodium tetradecyl sulfate, and bleomycin, which induce endothelial damage leading to fibrosis and lesion shrinkage. However, in pediatric patients—particularly in sensitive regions such as the plantar foot—sclerotherapy carries risks including skin necrosis, nerve injury, muscle fibrosis, and long-term functional impairment. Therefore, indications for sclerotherapy should be carefully evaluated.

Surgical excision is generally reserved for cases with severe pain, rapid growth, functional impairment, neurovascular compression, or significant cosmetic concerns. Nevertheless, complete resection of IMHs is not always feasible, and high postoperative recurrence rates have been reported. Parents

are often advised to avoid early surgical intervention, as approximately 50% of these hemangiomas regress by the age of 5 years and up to 70% by the age of 7 years.¹⁰ In addition, plantar foot surgery carries inherent risks such as scar formation, altered load distribution, and chronic pain. Surgical management of hemangiomas is further complicated by their vascular nature, infiltrative growth within muscle tissue, and high recurrence rates.¹¹

Long-term follow-up is therefore recommended for these lesions. Tang et al.,¹² in a study predominantly involving adult patients, reported that most recurrences occurred within 2 years, although some were observed as late as 6 years after primary surgery. They also noted that 50% of patients with recurrent disease required additional surgical intervention.

In the present case, choosing not to intervene carried certain theoretical risks, including potential lesion growth, increased pain severity, or rare local complications. However, given the current clinical presentation, these risks were considered low, whereas the potential complications associated with early surgical or interventional treatment were deemed more significant. Accordingly, the patient was managed with close clinical follow-up and a symptom-oriented conservative approach.

CONCLUSION

IMHs of the plantar foot are exceedingly rare and should be considered in the differential diagnosis of painful, late-presenting soft tissue masses in pediatric patients. In selected cases where clinical and MRI findings indicate benign behavior, lesion stability, and absence of functional impairment, close and structured conservative follow-up may represent a safe and effective management strategy, avoiding unnecessary morbidity associated with early surgical or interventional treatments.

ETHICAL DECLARATIONS

Informed Consent

Informed consent was obtained from the legal guardians of the pediatric patient(s) described in this report. Where developmentally appropriate, assent was also sought from the child. The inclusion of vulnerable populations in this study adhered to national and international ethical guidelines. Extra care was taken to ensure voluntary participation, understanding, and protection of participant dignity and autonomy.

Peer Review Process

This report underwent external peer review.

Conflict of Interest

The authors declare no conflicts of interest.

Financial Disclosure

This case report did not receive any financial support.

Author Contributions

The design, data collection, analysis, and writing processes of the article were carried out by a single author.

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I was born in Kahramanmaraş. In 2002, I graduated from Istanbul University Faculty of Medicine and embarked on my career as a doctor, a profession I had dreamed of since childhood and dearly loved. In 2011, I completed my training at İstanbul Bilim University Florence Nightingale Hospital and became a specialist in cardiovascular surgery. I started working at Kırıkkale University Faculty of Medicine as an Assistant Professor in 2013 and continue to work there as an Associate Professor. I have conducted research in the biomedical field and developed patents. We established Implanox at Kırıkkale University Technopark, where we develop surgical and orthopaedic products, taking this work to a more professional level. My hobbies include nature walks, motocross, and travelling to unexplored places.

