

# Intramuscular Hemangioma of the Triceps Brachii Muscle: A Case Report

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**Introduction:** Intramuscular hemangioma (IMH) is a rare type of benign tumor that represents less than 1% of all hemangiomas. Chronic pain and a palpable mass are the most common symptoms. Due to the atypical clinical characteristics of the disease, accurate diagnosis is difficult. Misdiagnosis of IMH as malignancy can occur due to similarities in imaging features between IMH and malignancy. To diagnose IMH accurately, multiple imaging modalities, including X-ray, MRI, CT, and <sup>18</sup>F-FDG PET/CT, can be used. However, the final diagnosis of IMH is confirmed through histopathological examination.

**Case:** This case reports a 16-year-old girl diagnosed with IMH in the triceps brachii muscle. Seek medical attention due to pain and discomfort in the left shoulder. Initial imaging with contrast-enhanced MRI and CT suggested synovial sarcoma. The moderate uptake of FDG on positron emission tomography/computed tomography (PET/CT) also raised suspicions of malignancy. The pathological findings revealed an intramuscular hemangioma with thrombosis and thrombus organization.

**Conclusion:** The accurate diagnosis of IMH can be challenging due to the absence of distinct clinical symptoms and imaging findings. When evaluating periarticular intramuscular lesions, IMH should be considered if the MRI shows mixed signals with heterogeneous enhancement. Despite the moderate uptake of FDG seen in some IMH cases, it should not automatically rule out the possibility of IMH. Hence, a combination of imaging modalities and histopathological examination is crucial in ensuring a correct diagnosis of IMH.

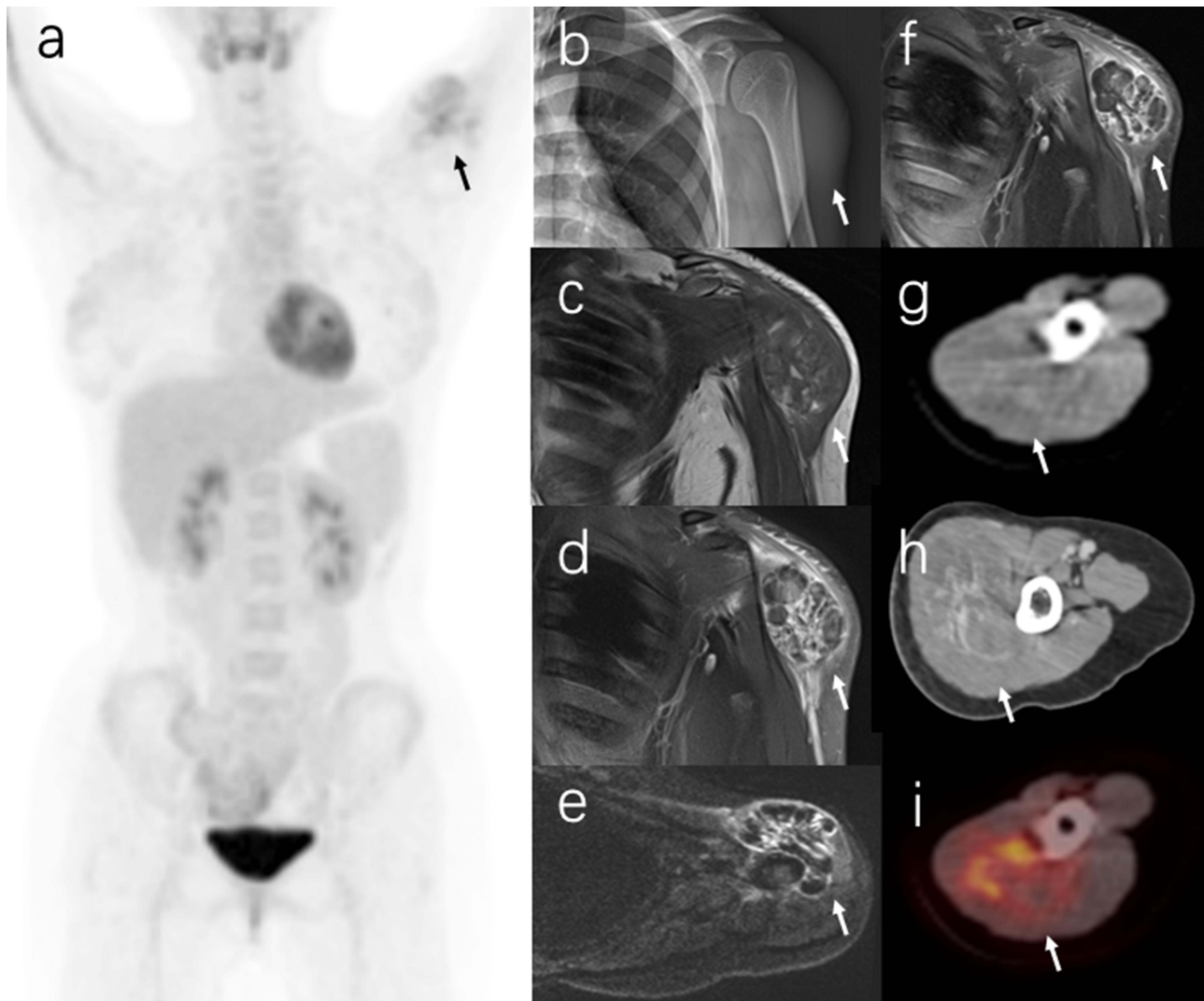
**Keywords:** intramuscular hemangioma, fluorine-18-fluorodeoxyglucose positron emission tomography/computed tomography, magnetic resonance imaging

## Introduction

Intramuscular Hemangioma (IMH), which is a rare benign vascular tumor that often occurs in skeletal muscle.<sup>1–3</sup> IMH is often mistaken for a malignant tumor due to the lack of clinical symptoms and specific imaging findings.<sup>4,5</sup> It often presents as a vascular malformation and occurs in the skeletal muscles of the extremities or trunk.<sup>6</sup> The accurate diagnosis is mainly based on postoperative pathological examination or biopsy.<sup>7</sup> The case being reported is of an IMH in the triceps brachii muscle that was misdiagnosed preoperatively as a malignant tumor by different imaging examinations.

## Clinical Presentation

The case is about a 16-year-old girl with a one-year history of a left shoulder mass with intermittent mild pain (Figure 1), the pain can be tolerated. There was no other discomfort or abnormality in the remaining whole body. The laboratory examination were negative. X-ray, CT, and MRI examinations have shown a mass within the triceps brachii muscle. X-ray displays a high-density shadow with blurred margins (Figure 1b). MRI shows a 56-mm soft tissue mass with mixed-intensity abnormal signal on T1 (Figure 1c) and T2-weighted images (Figure 1d), a predominantly iso-hypointensive signal mixed with high signal on DWI (Figure 1e), and a hyperintense, well-defined enhancing mass on contrast-enhanced coronal MRI (Figure 1f). CT shows a lobulated mixed-density mass with ill-defined margins (Figure 1g) in the triceps muscle with significant inhomogeneous enhancement (Figure 1h). Based on these findings, synovial sarcoma was considered as a potential diagnosis.



**Figure 1** The figure shows the PET/CT images of a patient with IMH in the triceps brachii muscle. The maximum intensity projection (MIP) images show a solitary lesion of abnormal  $^{18}\text{F}$ -FDG activity in the left shoulder (a, black arrow). The X-ray examination reveals a dense shadow in the left shoulder with blurred margins (b, arrow). On MRI, the mass has mixed intensity abnormal signals on T1-weighted images (c, arrow) and T2-weighted images (d, arrow). The diffusion-weighted imaging (DWI) shows a mainly iso-hypointense signal mixed with grid-like high signal (e, arrow). The contrast-enhanced coronal MRI displays a hyperintense, well-defined enhancing mass (f, arrow). CT scans show a lobulated mixed-density mass in the triceps muscle with ill-defined margins (g, arrow) and marked inhomogeneous enhancement (h, arrow). The axial fusion PET/CT (i, arrow) shows a 56mmx45mm mass in the triceps brachii muscle with a SUVmax of 5.2.

The MIP image shows an  $^{18}\text{F}$ -FDG uptake in the left shoulder that is consistent with an abnormality (Figure 1a). Further analysis using axial fusion PET/CT (Figure 1i) confirms the presence of a 56 mm  $\times$  45 mm mass in the triceps brachii muscle with a maximum SUV of 5.2, indicating focal malignancy without metastasis. This information can aid in the differential diagnosis between benign and malignant conditions and provide information for systemic assessment.

The patient was transferred to a superior hospital for surgical treatment because the mass on the left shoulder was considered malignant on imaging. After surgery, pathology revealed the mass was an intramuscular hemangioma with thrombosis and thrombus formation. Immunohistochemistry was positive for CD34, ERG, Vim, SMA markers and negative for CK. Upon the successful excision, the girl's symptoms and signs resolved completely.

## Discussion

Intramural hemangioma (IMH) is a rare, benign tumor of the skeletal muscles, accounting for less than 1% of all hemangiomas.<sup>3,8,9</sup> Its uncommon incidence, location, and lack of symptoms make diagnosis difficult.<sup>5</sup> The preferred treatment for IMH is surgical resection, but complete excision can be challenging due to the local invasiveness of the

lesion to surrounding tissues.<sup>10,11</sup> MRI is the preferred method for diagnosing IMH, as it can clearly show the extent of the lesion and its proximity to surrounding tissues and can also reveal the intratumoral components.<sup>12</sup> On MRI, IMH typically shows moderate or high-intensity signal in T1-weighted images, sometimes accompanied by heterogeneously intense signal in T2-weighted images.<sup>13,14</sup> In the present case, the lesion showed mixed intensity abnormal signals on T1-weighted and T2-weighted images and was misdiagnosed as synovial sarcoma due to its location near the shoulder joint and mixed signal and heterogeneous enhancement on MRI.

The case reported in the previous statement shows that elevated <sup>18</sup>F-FDG avidity (SUVmax 5.2) was observed in the lesion, which is inconsistent with previous reports that found low FDG uptake (SUVs ranged from 0.73 to 1.67) by musculoskeletal hemangiomas.<sup>15–17</sup> This unexpected finding led to the initial misdiagnosis of the lesion as a malignant tumor. However, postoperative pathology confirmed the presence of intramuscular hemangioma with thrombosis and thrombus tissue, leading to speculation that the elevated FDG uptake might be related to the thrombus formation in the lesion. There is emerging evidence that suggests a connection between inflammation and thrombosis,<sup>18</sup> with metabolically active inflammatory cells exhibiting high <sup>18</sup>F-FDG uptake. Although few reports have described the application of <sup>18</sup>F-FDG PET/CT in musculoskeletal hemangiomas, there appears to be no PET/CT reports specifically for intramuscular hemangioma, more data is needed to verify these findings.

## Conclusion

This report suggested that MRI and <sup>18</sup>F-FDG PET/CT may have limitations in identifying intramuscular hemangiomas (IMH) and some malignancies. It is important to consider IMH when periarticular intramuscular lesions show mixed signals and heterogeneous enhancement on MRI. IMH needs to be differentiated from synovial sarcoma and should not be excluded when there is elevated FDG avidity.

## Abbreviations

IMH, Intramuscular hemangioma; CT, Computed tomography; MRI, Magnetic resonance imaging; <sup>18</sup>F-FDG, fluorine-18-fluorodeoxyglucose; PET/CT, Positron emission tomography/computed tomography; DWI, Diffusion-weighted imaging; MIP, Minimum intensity projection; SUV, Standardized Uptake Value.

## Standard of Reporting

CARE guidelines were followed for this study.

## Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of Chongqing University Three Gorges Hospital, China. Written informed consent has been obtained from the parental to have case details and images published.

## Consent for Publication

Informed consent has been obtained from the patient for publication of the case report and accompanying images.

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## Disclosure

The authors declare no conflict of interest, financial or otherwise.

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