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Musculoskeletal Point-of-Care Ultrasound for the Detection of Active Haemorrhage in Intramuscular Haematoma: A Case Report

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***Abstract*— A 73-year-old man on chronic warfarin therapy presented to the emergency department with acute right thigh pain and swelling, without a history of trauma. Musculoskeletal point-of-care ultrasound (MSK-POCUS) rapidly identified an intramuscular hematoma with evidence of active haemorrhage. Subsequent computed tomography angiography (CTA) confirmed a sizable hematoma in the right vastus intermedius muscle and detected a small pseudoaneurysm. The patient was managed conservatively, with close monitoring yielding no further complications. This case demonstrates the diagnostic utility and efficiency of MSK-POCUS in the acute evaluation of musculoskeletal complaints, particularly in patients at risk for anticoagulant-induced bleeding. The report highlights the value of bedside ultrasound for prompt diagnosis, its advantages over other imaging modalities in emergency settings, and the importance of enhancing training for widespread POCUS implementation in clinical practice.**

***Index Terms*— Anticoagulants; Hematoma; Thigh; Ultrasonography; Point-of-Care; and Warfarin.**

I. BACKGROUND

Acute haemorrhage is a major complication of oral anticoagulant (OAC) therapy, and could be so severe as to threaten the patient's life. Management, including reversal of the OAC, depends on the urgency, site, and severity of the haemorrhage. This case report emphasises the significance of integrating musculoskeletal point-of-care ultrasound (MSK-POCUS) into the initial assessment of musculoskeletal complaints in the acute setting, to detect the presence of intramuscular haemorrhage.

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II. CASE PRESENTATION

History of Presenting Illness

A 73-year-old male presented to the emergency department (ED) complaining of a sudden onset of sharp pain in the right thigh that started two days prior while he was sleeping. The course of the pain was progressive. The patient denied any history of trivial trauma, loss of consciousness, recent travel, immobilisation, fever, skin changes, chest pain, shortness of breath, palpitations, or previous similar history.

Past Medical Illness

The patient was known to have valvular heart disease, post-mitral valve replacement, and atrial flutter. He was on warfarin and bisoprolol, and his INR fluctuated between 2.2 to 3. The last INR before the current ED visit was 4.2, and his warfarin dose was decreased from 5 mg to 4.5 mg.

Physical Examination

The patient was conscious, alert, oriented, looked well, and was calm in the bed. His blood pressure was 132/88 mmHg, heart rate 72 bpm, respiratory rate 20 bpm, and temperature was 37 °C. Physical examination of the right lower limb showed that the right thigh was slightly swollen by visual estimation compared with the left thigh, with no skin colour changes or hotness, and the compartments were firm and tender. Neurovascular examination was unremarkable.

Using a linear probe (6-13 mHz) and on musculoskeletal setting, the ultrasound (Supplementary Video 1a and 1b) illustrated a well-defined hypoechoic area within the lateral aspect of the upper part of the thigh, which suggests a collection. Within the collection, an internal flow is noted when colour Doppler was applied, suggesting an active haemorrhage (Supplementary Video 2 and figure 1).

Laboratory Examinations

The complete blood count (CBC) results were as follows: haemoglobin 9.3 g/dL (no significant drop compared with a previous result of 9.6 g/dL);

haematocrit 29%; mean corpuscular volume (MCV) 97.3 pg; mean corpuscular haemoglobin (MCH) 31.2 g/dL. The coagulation profile revealed a partial thromboplastin time (PTT) of 41 seconds, prothrombin time (PT) of 35.1 seconds, and international normalised ratio (INR) of 2.73. The renal profile showed a creatinine level of 329 μmol/L, urea 24.9 mg/dL, and potassium 6.3 mEq/L.

Imaging Examination

CTA of the lower extremity showed a 3 x 6.3 x 9.3 cm heterogeneous collection in the right vastus intermedius muscle, with a small, 0.4 cm pseudoaneurysm in the anterior aspect of the lesion, likely arising from the terminal branches of the profunda femoris artery.

Treatment Course

This case involved a warfarin-associated intramuscular hematoma with active bleeding from a branch of the profunda femoris artery. It was managed conservatively using a watch-and-wait approach; after 11 days, there were no further complications or progression of the hematoma. The patient's haemoglobin remained stable, and his INR was within the therapeutic range. Because he was at high risk for thrombosis, the primary team resumed warfarin. The patient was discharged in stable condition with regular follow-up scheduled in the outpatient department.

III. DISCUSSION

We report a case of spontaneous muscle hematoma diagnosed at the bedside using MSK-POCUS. Such hematomas are most commonly associated with anticoagulant use and have a higher prevalence among elderly patients [1]. While imaging modalities such as CT and MRI are often utilised for diagnosis [2], ultrasound offers a rapid, efficient, safe, and accessible alternative that can complement the clinical examination. In cases of acute bleeding, ultrasound allows for the objective identification of intramuscular blood collections, accurate measurement of their size and location, monitoring of their progression, and confirmation of resolution [3]. Typical ultrasound findings include disruption of the muscle's normal fibrillar pattern, with anechoic and hypoechoic areas indicating the presence of blood [3].

MSK-POCUS is specifically designed for the targeted assessment of musculoskeletal structures, utilising limited scanning planes or simplified protocols to streamline the evaluation process [4]. It is frequently integrated into the ED workflow as an extension of the physical examination, providing dynamic, high-resolution imaging of muscles, soft tissues, and joints through high-frequency transducers [3.5–15 MHz] [5].

Although MRI is considered the gold standard for diagnosing soft tissue conditions [6], its routine use is limited by factors such as restricted availability, lengthy examination times, the need for sedation in paediatric patients, and significant cost [2]. These limitations make ultrasound—particularly MSK-POCUS—a more practical and prevalent option in many acute care settings.

The clinical value of MSK-POCUS is further supported by the case reported by Sharma et al. [7], in which an iliopsoas haemorrhage was identified in an elderly patient on warfarin, using POCUS in the ED. This exemplifies the utility of MSK-POCUS in promptly identifying deep intramuscular haemorrhages.

Recent advancements in bedside imaging include the use of contrast-enhanced ultrasound (CEUS) [8]. For instance, Ma et al. [9] demonstrated the effectiveness of bedside CEUS in a patient with left upper limb pain and swelling, where it revealed a hematoma with active haemorrhage from the brachial artery. CEUS has proved to be a rapid and accurate tool for detecting microvascular and low-velocity haemorrhages, and holds promise as an alternative imaging modality when CT is contraindicated or unavailable.

In our case, MSK-POCUS enabled the rapid assessment of the patient's symptoms and the detection of active haemorrhage, which was subsequently confirmed with additional imaging. Nevertheless, limitations are expected due to the nature of the case report study. Initial MSK-POCUS compression and follow-up scan could have provided valuable information regarding the hematoma's progression or resolution. Additionally, a key area for improvement was the integration of MSK-POCUS into emergency training programs to enhance the effective use of this diagnostic tool.

IV. CONCLUSION

In conclusion, incorporating POCUS into routine physical examinations including MSK-POCUS can significantly enhance the detection of soft tissue pathologies, potentially shortening ED stays and enabling more rapid clinical decision-making and timely interventions. However, POCUS remains

highly operator-dependent. Integrating POCUS into training programs can help standardise practice among operators, promoting more consistent and reliable use of the modality.

V. REFERENCES

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Supplementary Material

Supplementary Video 1a and b: B-mode ultrasound view shows a well-defined hypoechoic area within the muscle, consistent with an intramuscular collection with an internal flow.

Supplementary Video 2: Colour Doppler imaging reveals a colour signal within the hematoma suggestive of active internal bleeding.

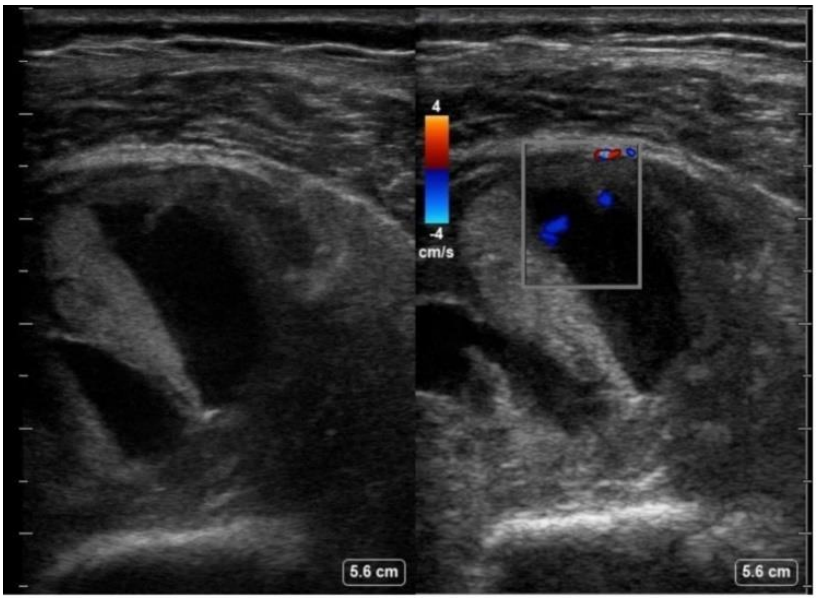

Figure 1. Dual image: (Left)- B-mode (grayscale) ultrasound shows a well-defined hypoechoic fluid collection within the muscle, consistent with intramuscular haematoma. (Right)- Colour Doppler image evaluates blood flow within the haematoma.