
A RARE OCCURRENCE OF LEFT RADIAL VEIN THROMBOSIS IN A 23-YEAR-OLD GHANAIAN MALE – A CASE REPORT

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ABSTRACT

The occurrence of upper extremity deep vein thrombosis (UEDVT) is rare. It is usually either diagnosed late or missed entirely, leading to dire complications. It is therefore imperative to highlight the need for clinicians to have a high index of suspicion for UEDVT in patients presenting with upper limb swelling and to emphasize the immense benefit of prompt and effective therapy. We present a case of a 23-year-old Ghanaian male who presented to the University Hospital, Kwame Nkrumah University of Science and Technology with a four-day history of painful swelling of the left forearm a day after the administration of an intravenous bolus of dextrose solution of unknown concentration at a peripheral facility to correct hypoglycaemia. Physical examination revealed a tender swollen left upper limb. The superficial veins were not visible. However, neurovascular examination of the left upper limb was unremarkable. A doppler ultrasound scan showed a nearly 74% occlusion of the left radial vein. A diagnosis of deep vein thrombosis (DVT) of the left upper limb was made. The patient was started on oral rivaroxaban, an anticoagulant, at 15mg twice daily for 21 days, then 20mg daily for 3 months at which a repeat doppler ultrasound scan showed no evidence of a DVT. Early detection of DVT and prompt treatment in patients with upper extremity swelling following an intravenous procedure is crucial as thrombophlebitis may not be the only cause of all such upper limb swellings.

Keywords: Deep Vein Thrombosis, Upper extremity, Thrombophlebitis, Rivaroxaban, Ghana

INTRODUCTION

Deep vein thrombosis (DVT) is a ubiquitous clinical problem with significant global mortality (Ossei et al., 2020; Stone et al., 2017). Although lower extremity DVT (LEDVT) is common, upper extremity DVT (UEDVT) rarely occurs (Sajid et al., 2007). There are two types of UEDVT; primary (Paget-von Schrotter syndrome (PSS) and secondary. PSS involves repetitive or rigorous upper arm physical activity, the secondary form is linked to malignancy and usage of central line catheters or pacemakers (Grigorian & Nahmias, 2023). It is typical for secondary UEDVT to affect the larger, proximal blood vessels, while the involvement of more distal veins such as the radial vein, is a rarity (Bosch et al., 2020). Patients frequently present with clinical features suggestive of primary UEDVT or its complications but some may be asymptomatic (Bosch et al., 2020).

Approximately 10% of DVTs manifest in the upper extremities, thus an incidence of 4 to 10 cases per 100,000 persons every year (Joffe et al., 2004). The incidence of UEDVT is on the surge in this era, owing to an increase in secondary UEDVTs with most patients having a central line (Grant et al., 2012). Between 14-23% of all patients with central catheterization develop UEDVTs (Al-Thani et al., 2016; Joffe & Goldhaber, 2002). The two prominent determinants of risk are malignancy, which occurs in 22-64% of cases, and the presence of indwelling lines, which is observed in 10-93% of patients with secondary UEDVT. Only 10% to 20% of cases of UEDVT are attributable to PSS (van den Houten et al., 2016).

Missed or delayed diagnosis of UEDVT can lead to complications that could be fatal. Pulmonary embolism, a common complication in 15% to 32% of LEDVT, occurs in to 6% of UEDVTs (Turetz et al., 2018). Other complications like chronic venous insufficiency, superior vena cava (SVC) syndrome, and loss of venous access

can be incapacitating when they arise (Ari & Levy, 2017). In Ghana, there is a paucity of data on UEDVT hence the need for this report to create awareness about the condition. Our focus is to emphasize the necessity for clinicians to possess a heightened sense of alertness in regards to upper extremity deep vein thrombosis in patients who exhibit signs of swelling in this area. The expeditious and efficient administration of medical intervention is of paramount importance and can yield substantial advantages.

Case Presentation

A 23-year-old male presented to the University Hospital, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana with a 4-day history of pain and swelling in the left forearm. The pain and swelling began a day after he had received a bolus of intravenous dextrose at a peripheral health facility on account of hypoglycaemia (random blood sugar of < 2mmol/L). He had previously been on oral medications; amoxicillin/clavulanate 625mg twice a day, ibuprofen 400mg three times daily, cetirizine 10mg at night, prednisolone 10mg three times daily and vitamin C 100mg three times daily on account of acute upper respiratory tract infection. He had taken these medications for 24 hours prior to reporting at the University Hospital. He had no known chronic illness and had not been on any anticancer or antipsychotic medications. There was no prior history of paralysis, paraesthesia, or immobilization of the left upper limb. He had no previous surgeries and no personal or family history of bleeding coagulopathies or malignancy. There was no history of chronic alcohol use. Despite being on antibiotics, the swelling was not resolving.

Examination revealed a young male who looked well, was afebrile, anicteric and not pale. He was not in respiratory distress. His respiratory rate was 24cpm, breath sound

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intensity was adequate bilaterally with vesicular breath sounds and no added sounds. The first and second heart sounds were present and normal. There was no murmur. His blood pressure was 120/88mmHg and his pulse rate was 66 beats per minute which was regular and of good volume. Other systems were unremarkable.

His left upper limb was swollen with loss of the prominent appearance of superficial veins relative to the right forearm. There was localized tenderness in the left forearm but no pitting or differential warmth. The sensation was preserved, radial and brachial pulses were present and normal, and both upper limbs had a normal range of motion. Well's score was 0 [swollen limb (+1), tenderness along the deep

veins (+1) and alternate diagnosis (-2)]. The Constans Clinical Decision score was 1.

Doppler ultrasound showed loss of compressibility of the left radial vein with associated left radial vein thrombosis of 73.9% occlusion. Other tests ordered were a clotting profile, full blood count, and liver and renal function tests. The patient was started on oral rivaroxaban 15mg twice daily for 21 days, then 20mg once daily for 3 months. Within two weeks of starting the treatment, the pain and swelling began to resolve and the superficial veins became prominent. The doppler ultrasound scan was repeated at 3 months and there was no evidence of DVT. Patient was followed up and, at 12 months, another ultrasound scan taken was normal. The patient has been well since then.



Figure 1: Figure showing swelling of the left forearm compared to the right



Figure 2: Figure showing the left forearm 12 months after initiating treatment

DISCUSSION

Virchow's triad encompasses damage to the vascular wall, stagnant blood flow and an increased tendency of a blood clot: leading to a thromboembolic event. Thrombophlebitis accounts for the most of cases of upper limb swelling following peripheral intravenous

cannulation, with an incidence of fifty per cent (Saji et al., 2015). Superficial thrombophlebitis - involving the superficial veins - in the upper extremities resolves by elevating the limb, applying compresses, and non-steroidal anti-inflammatory agents (Guanche-Sicilia et al., 2021). Also, several conditions may mimic swelling in the upper extremities which include

localized infection with cellulitis, lymphedema, axillary node dissection and DVT.

A thorough evaluation comprising of detailed history taking and physical examination can frequently reveal clinical indications that may indicate the presence of UEDVT, which can be verified through subsequent imaging studies. Typically, patients manifest with limb swelling and arm discomfort, as is evident in this case report. The history taking ought to encompass the onset and duration of limb swelling, along with any antecedent history of DVT, and patients may also convey a sensation of heaviness in the arm. The physical examination may exhibit limb erythema along with visible veins across the chest and upper extremities, commonly referred to as Urschel's sign. It is significant to consider past medical or family history of clotting disorders and any prior endeavours at central venous catheterization as relevant factors, notwithstanding their inapplicability to the current case.

The manifestation of even slight swelling in the left forearm, coupled with a difference of 1cm between the two forearms and a lack of observable symptoms such as pitting oedema or collateral superficial veins, does not strongly indicate the presence of DVT. Based on a Well's score of 0, the likelihood of a DVT diagnosis was low. However, the Constans Clinical Decision score, which relies on four variables to classify suspected cases of UEDVT, suggested an intermediate probability of DVT with a score of 1. The four key variables utilized in the decision-making process include the presence of venous material, localized pain, unilateral oedema, and other feasible diagnoses.

The singular risk factor identified for UEDVT in our patient was the use of a peripheral intravenous cannula to rectify hypoglycemia. Though the precise concentration of administered dextrose remains unknown, hypertonic dextrose administered via peripheral intravenous

access is a recognized treatment modality for correcting hypoglycemia. A report by Lancaster et al. (2010) has indicated that certain drugs administered via peripheral veins, although administered through a large vein, may damage intima. The study revealed that five cases of DVT were linked to the use of harsh medications administered through peripheral intravenous lines inserted below the antecubital fossa (Lancaster et al., 2010). Furthermore, securing peripheral intravenous access using prominent veins at the antecubital fossa has demonstrated an increase in the risk of UEDVT, with the risk escalating proportionally with the duration of use as the catheter migrates along the vein caused by the movement of the elbow joint, causing injury to the endothelium and the development of clots.

In contrast, several studies have reported central venous catheters as a primary risk factor for UEDVT (Brewer, 2012; Heil et al., 2017; Spencer et al., 2007a). These catheters are used for administering chemotherapy, fluids, blood products, and hemodialysis. Notably, catheter-related UEDVT poses the greatest risk for subsequent pulmonary thromboembolism when compared to all other causes of UEDVT (Davies et al., 2018). However, in the present case study, a rare occurrence of UEDVT was observed after intravenous cannulation on account of hypoglycemia. There is no gender preponderance in UEDVT, and it occurs in both males and females (Delluc et al., 2019). According to Spencer et al (2007b), patients reporting UEDVT were relatively younger and non-Caucasian than those presenting with lower limb DVT. This was similar in our case, where the patient was a young adult in his early twenties.

Compression duplex ultrasonography is a valuable tool utilized for diagnosing DVT in the upper extremity; showing a sensitivity rate of 97%, paired with a specificity rate of 96%. (Grigorian & Nahmias, 2023).

Although there are imaging techniques like magnetic resonance imaging and computed tomographic venography that perform better; they are often impractical due to their high costs, radiation risks and limited accessibility. While magnetic resonance venography has a sensitivity of 100%, surpassing that of compression duplex ultrasonography, the latter is still the preferred method of diagnosis due to its non-invasiveness, affordability, and widespread accessibility. This assertion is supported by literature from (Bosch et al., 2020; Scarvelis & Wells, 2006).

Furthermore, laboratory investigations are not required for diagnosing DVT. However, coagulation studies may be ordered if a clotting disorder is suspected. A D-dimer test can aid in the exclusion of UEDVT in patients presenting with low suspicion for the condition. (Anderson et al., 2003). D-dimer is sensitive but not specific for DVT; a negative result (D-dimer level) makes DVT an unlikely diagnosis, and a high value only suggests the need for further evaluation (Cho et al., 2021).

The primary objective in the management of UEDVT is to eradicate the thrombus, alleviate acute symptoms, mitigate the likelihood of recurrence, and prevent the onset of potential complications including pulmonary embolism and post-thrombotic syndrome. (Elman & Kahn, 2006; Levy et al., 2012). Currently, anticoagulation therapy, encompassing vitamin K antagonists (VKAs) and direct oral anticoagulants (DOACs), serves as the cornerstone of acute VTE event management. (Van Es et al., 2014). The preferred method of treatment in the past was VKAs such as warfarin. In our index patient, the medication of choice was rivaroxaban, which is a direct factor Xa inhibitor. Factor Xa inhibitors have a safety profile that does not necessitate regular monitoring of clotting profiles. Consequently, the patient did not need to undergo regular venipunctures or frequent hospital visits as required with the use of VKAs. Although

research has shown that rivaroxaban prolongs PT and aPTT (Yuan et al., 2023), generally DOAC treatment is linked to a significant reduction in the probability of major bleeding, intracranial bleeding, and fatal and clinically relevant non-major bleeding in comparison to other types of anticoagulants (Houghton et al., 2017).

According to Kearon & Akl (2014) and Khorana et al (2017), rivaroxaban was the most commonly prescribed medication for the treatment of UEDVT and the duration of treatment was at least three–six months. Rivaroxaban and apixaban are the most frequently prescribed DOACs, in contrast to dabigatran and edoxaban which have been utilized to a lesser extent among patients (Alkhameys & Barrett, 2022; Corrales-Medina et al., 2022).

CONCLUSION

Not every swollen limb following an intravenous procedure should be attributed to thrombophlebitis. DVT is a differential diagnosis and should be considered in any patient presenting with a swelling of the upper extremity. Early detection of UEDVT, prompt and effective therapy will prevent complications such as pulmonary embolism and death.

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AUTHORS CONTRIBUTION

KABA, EK and NKAB were involved in the diagnosis and management of the patient. All authors contributed to the draft, review and approval of the final manuscript for publication

CONFLICT OF INTEREST

Authors have no conflict of interest to declare

Ethical consideration

Patient provided informed consent for this case report to be submitted for publication

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