



Case Report

Knowledge of point-of-care ultrasound and management of deep vein thrombosis patient in resource limited setup: A case report

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ABSTRACT

Introduction: and importance: Deep vein thrombosis (DVT), frequently encountered in an emergency setting, if not identified and managed early, leads to pulmonary embolism that may be life threatening to the patient. The use of point-of-care ultrasound (POCUS) can be used as an effective and time saving tool for diagnosis of such life threatening conditions.

Case presentation: We present a case of a 53 years old male who presented to the emergency department (ED) with complaints of swelling and pain in the left lower limb for one week and redness of overlying skin for the same duration. Following a point-of-care ultrasound scan, a diagnosis of DVT was made. The condition was quickly identified and promptly treated preventing possible complications.

Discussion: Use of point-of-care ultrasound to diagnose DVT has been shown to decrease the need for comprehensive scans, decrease time to diagnosis and length of stay at the emergency department. To improve medical care by increasing early detection, lowering costs, and improving overall patient care, more training of emergency physicians in ultrasound technique and standardized use of ultrasound to screen for DVT in the ED is required.

Conclusion: This case report highlights how, despite the unavailability of sophisticated diagnostic procedures, a skill of using POCUS can prove to be lifesaving in a resource-limited setting.

1. Introduction

Ultrasound imaging is a non-invasive technology that allows for a more accurate clinical assessment and localization of the area of concern. Vascular access, vascular ultrasound, neural access for nerve blocks and regional anesthesia, lung ultrasound (LUS), focused assessment with sonography for trauma (FAST), cardiac ultrasound (transthoracic echocardiography) in differentiating types of shock are all applications of ultrasound in anesthesia practice [1,2]. Point-of-care ultrasonography (POCUS) is a significant innovation in the area of anesthesiology and critical care medicine, providing a crucial adjunct and tool to guarantee better patient care [3].

The use of vascular ultrasonography by physician is a safe and accurate way to rule out deep vein thrombosis (DVT). Two-point or three-point compression test has been used by the emergency physician or the

critical care physician to diagnose DVT [4]. The importance of early diagnosis of DVT can not only aid for early treatment but also help in preventing dreadful complications such as pulmonary embolism.

In this case report, we try to highlight how the skill of using POCUS can be of great importance to diagnose a life-threatening condition like DVT in an emergency department (ED) of a resource-limited facility. This case report has been reported in line with the SCARE 2020 criteria [5].

2. Case presentation

53 years old male presented in the ED with chief complaints of swelling of the left lower limb for one week and pain for the same duration. The swelling was gradual in onset, started initially from the left thigh and later generalized to the whole lower limb extending up to

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the ankle joint. He also complained of redness of the skin overlying the left limb for the same duration. Regarding his past medical history, he is a known case of type 2 diabetes mellitus under oral hypoglycemic agent (tablet Metformin 500 mg twice daily) for the past 5 years. He had no significant surgical history but had a history of road traffic accident with sustained injury in the left knee and the left thigh region 15 days prior to the onset of the symptoms.

On examination, swelling, local rise of temperature, and tenderness in the left calf region were noticed as in Fig. 1. Contralateral limb had normal physical examination findings (Fig. 1). All the baseline investigations were sent. Differential diagnosis were made as DVT or cellulitis of the left lower limb. To rule out DVT, patient's left lower limb compression ultrasonography was done in the groin region and the popliteal fossa.

Noncompressibility of the both femoral vein and the popliteal vein was found (Fig. 2). Provisional diagnosis of left lower limb DVT was made and the patient was admitted after counseling about the risk of PE. The patient was sent for a left lower limb venous Color Doppler the next morning, which confirmed extensive DVT extending superiorly upto the left common iliac vein and inferiorly upto the popliteal vein. The patient was kept on subcutaneous low molecular weight heparin 60 mg twice daily along with warfarin 5 mg once daily. Heparin was stopped on the 4th day of administration and warfarin was continued. Targeting the international normalized ratio (INR) value of 2–3, the warfarin dose was readjusted to 7 mg. On day 9 the patient was discharged and asked to follow up after 1 month with prothrombin time (PT) and INR value.

After a month, the swelling on the left limb was significantly reduced and all other symptoms were also resolved. The INR value was 2 which was within our target range.

3. Discussion

DVT is a common condition encountered in an ED that, if isn't diagnosed and treated promptly, may lead to potentially life-threatening pulmonary embolism (PE). But the diagnosis is tricky due to varying frequency of symptoms such as edema, pain, erythema, and tenderness which may be present in only 23%–50% of the patients [6].

POCUS is the bedside utilization of ultrasound to guide appropriate diagnosis and medical procedures [7]. Using POCUS to diagnose DVT has been shown to decrease the need for comprehensive scans, decrease time to diagnosis, length of stay at the ED [8,9]. Despite the fact that venogram is a gold standard for detecting DVT, ultrasonography is the most reliable non-invasive diagnostic procedure for detecting DVT. Therefore, its importance in an emergency setting for diagnostic accuracy and better overall patient care cannot be stressed more. However, the use of ultrasound to diagnose DVT in the ED has not exceeded 30% between 1999 and 2010 [10].



Fig. 1. Gross image of a man presenting with swelling of left lower limb.

A few studies have demonstrated that well-trained emergency physicians are capable of performing bedside ultrasonography for lower extremity DVT with sensitivities and specificities of 95% and 96%, respectively [11–13]. Emergency physician bedside ultrasound scanning provides the most cost-efficient method to map out the diagnosis of suspected DVT. To improve medical care by increasing early detection, lowering costs, and improving overall patient care, more training of emergency physicians in ultrasound technique and standardized use of ultrasound to screen for DVT in the ED is required. By making this statement, we are attempting to emphasize the importance of POCUS as a skill, that all emergency physicians should acquire for the better management of their patients.

We report the above case to highlight the skill of using point of care ultrasound by an anesthesiologist or an emergency care physician to diagnose life-threatening conditions like DVT in a resource-limited emergency setup.

4. Conclusion

The case has been managed with the combined effort of an anesthesiologist (use of POCUS) and a physician (medical management) in a resource-limited setting. Early diagnosis and management of the patient was crucial and was possible in this case because of knowledge and the skill of the point of care ultrasound (POCUS). Having knowledge of POCUS may improve the management of patient in limited resource set up.

Ethical approval

Not applicable.

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Author contribution

Sachhyatkar Bista: Literature review, study concept, data collection, writing the initial draft.

Sabin Rajbhandari: Literature review, monitoring, supervision, revising the manuscript.

Saurab Karki, Subashchandra Pokharel: Literature review, data collection, writing initial draft, revising and editing the manuscript.

Sudasha Karki: Literature review, revising and editing the manuscript.

Registration of research studies

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Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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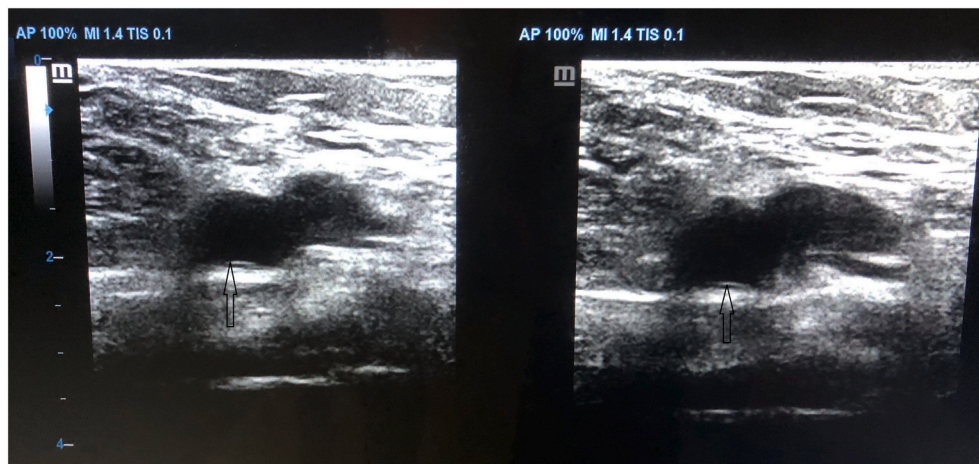


Fig. 2. Two point compression ultrasonography showing non-compressible left popliteal vein.

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Declaration of competing interest

No conflicts of interest.

References

- [1] P.K. Gupta, K. Gupta, A.N.D. Dwivedi, M. Jain, Potential role of ultrasound in anesthesia and intensive care, *Anesth. Essays Res.* 5 (2011) 11–19, <https://doi.org/10.4103/0259-1162.84172>.
- [2] K.L. Mok, Make it SIMPLE: enhanced shock management by focused cardiac ultrasound, *J. Intens. Care* 4 (2016) 51, <https://doi.org/10.1186/s40560-016-0176-x>.
- [3] L. Li, R.J. Yong, A.D. Kaye, R.D. Urman, Perioperative point of care ultrasound (POCUS) for anesthesiologists: an overview, *Curr. Pain Headache Rep.* 24 (2020) 20, <https://doi.org/10.1007/s11916-020-0847-0>.
- [4] J.H. Lee, S.H. Lee, S.J. Yun, Comparison of 2-point and 3-point point-of-care ultrasound techniques for deep vein thrombosis at the emergency department, *Medicine (Baltim.)* 98 (2019), e15791, <https://doi.org/10.1097/MD.00000000000015791>.
- [5] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, For the SCARE group. The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230, <https://doi.org/10.1016/J.IJSU.2020.10.034>.
- [6] C. Kearon, Diagnosis of suspected venous thromboembolism, *Hematol. Am. Soc. Hematol. Educ. Progr.* 2016 (2016) 397–403.
- [7] J.L. Kendall, S.R. Hoffenberg, R.S. Smith, History of emergency and critical care ultrasound: the evolution of a new imaging paradigm, *Crit. Care Med.* 35 (2007) S126–S130.
- [8] R. Zuker-Herman, I. Ayalon Dangur, R. Berant, E.C. Sitt, L. Baskin, Y. Shaya, S. Shiber, Comparison between two-point and three-point compression ultrasound for the diagnosis of deep vein thrombosis, *J. Thromb. Thrombolysis* 45 (2018) 99–105.
- [9] R.A. Poley, J.L. Newbigging, M.L. Sivilotti, Estimated effect of an integrated approach to suspected deep venous thrombosis using limited-compression ultrasound, *Acad. Emerg. Med.* 21 (2014) 971–980.
- [10] G.D. Barnes, S. Gafoor, T. Wakefield, G.R. Upchurch, P. Henke, J.B. Froehlich, National trends in venous disease, *J. Vasc. Surg.* 51 (2010) 1467–1473, <https://doi.org/10.1016/j.jvs.2009.12.070>.
- [11] F. Pomeroy, F. Dentali, V. Borretta, M. Bonzini, R. Melchio, J.D. Douketis, L. M. Fenoglio, Accuracy of emergency physician-performed ultrasonography in the diagnosis of deep-vein thrombosis, *Thromb. Haemostasis* 109 (2013) 137–145.
- [12] P.R. Burnside, M.D. Brown, J.A. Kline, Systematic review of emergency physician-performed ultrasonography for lower-extremity deep vein thrombosis, *Acad. Emerg. Med.* 15 (2008) 493–498, <https://doi.org/10.1111/j.1553-2712.2008.00101.x>.
- [13] S.A. Shiver, M. Lyon, M. Blaivas, S. Adhikari, Prospective comparison of emergency physician-performed venous ultrasound and CT venography for deep venous thrombosis, *Am. J. Emerg. Med.* 28 (2010) 354–358, <https://doi.org/10.1016/j.ajem.2009.01.009>.