

EVIDENCE BASED STATEMENT

DOMAIN **2**, Statement **5**

TOPIC: “Venous ultrasound for deep venous thrombosis”

SEARCH TERMS & SOURCES

((deep venous) AND (thrombosis)) AND (ultrasound)) AND (protocol)

INCLUSION CRITERIA

- Lower limb only
- Reviews
- Publication < 10 years, only ENG

SEARCH RESULT BEFORE - AFTER SELECTION

39 (before) - 9 (after selection)

PERTINENT LITERATURE NOT IDENTIFIED BY THE LITERATURE SEARCH

1. Kearon C, de Wit K, Parpia S, et al. Diagnosis of deep vein thrombosis with D-dimer adjusted to clinical probability: prospective diagnostic management study. BMJ. 2022;376:e067378. Published 2022 Feb 15. doi:10.1136/bmj-2021-067378
2. Heller, T., M. Becher, J.-C. Kröger, et. al. "Isolated calf deep venous thrombosis: frequency on venous ultrasound and clinical characteristics." BMC Emergency Medicine 2020;21(1).
3. Beller E, Becher M, Meinel F, et al. Prevalence and predictors of alternative diagnoses on whole-leg ultrasound negative for acute deep venous thrombosis. BMC Med Imaging. 2020 Dec 2;20(1):127.
4. Zhang S, Chu W, Wang H, et al. Evaluation of stability of deep venous thrombosis of the lower extremities using Doppler ultrasound. J Int Med Res. 2020 Aug;48(8)
5. Naringrekar H, Sun J, Ko C, et al. It's Not All Deep Vein Thrombosis: Sonography of the Painful Lower Extremity With Multimodality Correlation. J Ultrasound Med. 2019 Apr;38(4):1075-1089.
6. Zuker-Herman R, Ayalon Dangur I, et al. Comparison between two-point and three-point compression ultrasound for the diagnosis of deep vein thrombosis. J Thromb Thrombolysis. 2018 Jan;45(1):99-105.
7. Needleman L, Cronan JJ, Lilly MP, et al. Ultrasound for Lower Extremity Deep Venous Thrombosis: Multidisciplinary Recommendations From the Society of Radiologists in Ultrasound Consensus Conference. Circulation. 2018 Apr 3;137(14):1505-1515.
8. Gornik H, Gerhard-Herman S, Misra E, et. al. "ACCF/ACR/AIUM/ASE/IAC/SCAI/SCVS/SIR/SVM/SVS/SVU 2013 Appropriate Use Criteria for Peripheral Vascular Ultrasound and Physiological Testing Part II: Testing for Venous Disease and Evaluation of Hemodialysis Access." Journal of the American College of Cardiology 2013;62(7): 649-665
9. Goodacre S, Sampson F, Thomas S, van Beek E, Sutton A. Systematic review and meta-analysis of the diagnostic accuracy of ultrasonography for deep vein thrombosis. BMC Med Imaging. 2005; 5:6.

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IDENTIFIED REFERENCES

1. Di Vilio A, Vergara A, Desiderio A, et al. Incremental value of compression ultrasound sonography in the emergency department. *World J Crit Care Med.* 2021 Sep 9;10(5):194-203.
2. Varrias D, Palaiodimos L, Balasubramanian P, et al. The Use of Point-of-Care Ultrasound (POCUS) in the Diagnosis of Deep Vein Thrombosis. *J Clin Med.* 2021 Aug 30;10(17):3903.
3. Kay AB, Morris DS, Woller SC, et al. Trauma patients at risk for venous thromboembolism who undergo routine duplex ultrasound screening experience fewer pulmonary emboli: A prospective randomized trial. *J Trauma Acute Care Surg.* 2021 May 1;90(5):787-796.
4. Al-Khafaji RA, Schierbeck L. Deep Venous Thrombosis in a Patient with a Moderate Pretest Probability and a Negative D-Dimer Test: A Review of the Diagnostic Algorithms. *J Blood Med.* 2020 May 27;11:173-184.
5. Patel H, Sun H, Hussain AN, Vakde T. Advances in the Diagnosis of Venous Thromboembolism: A Literature Review. *Diagnostics (Basel).* 2020 Jun 2;10(6):365.
6. Elmi G, Rinaldi ER, Domanico A, Aluigi L. Calf deep vein thrombosis - clinical relevance, diagnostic approaches and therapeutic options. *Vasa.* 2020 Aug;49(5):359-366.
7. Arabi YM, Burns KEA, Al-Hameed F, et al. Surveillance or no surveillance for deep venous thrombosis and outcomes of critically ill patients: A study protocol and statistical analysis plan. *Medicine (Baltimore).* 2018 Sep;97(36):e12258.
8. Dronkers CEA, Mol GC, Maraziti G, et al. Predicting Post-Thrombotic Syndrome with Ultrasonographic Follow-Up after Deep Vein Thrombosis: A Systematic Review and Meta-Analysis. *Thromb Haemost.* 2018 Aug;118(8):1428-1438.
9. Cascio V, Hon M, Haramati LB, Gour A, Spiegler P, Bhalla S, Katz DS. Imaging of suspected pulmonary embolism and deep venous thrombosis in obese patients. *Br J Radiol.* 2018 Sep;91(1089):20170956.

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TEXT FOR INCLUSION IN THE DOCUMENT

DOMAIN 02, Statement 05, TOPIC: “Venous ultrasound for deep venous thrombosis”

Ultrasound scanning for deep venous thrombosis (DVT) detection must always be integrated by a proper clinical risk score (for example Wells score) and lab evaluation. In case of unlikely clinical risk, a negative D-dimer can safely exclude DVT.

Ultrasound scanning should be performed in case of likely clinical probability or in case of unlikely clinical probability but with a positive D-dimer and in all patients in which probability was not assessed. Up to the authors knowledge there is no globally validated ultrasound protocol for ultrasound DVT detection. Limiting the scanning above the knee might leave a significant risk of distal thrombosis and embolization, therefore a full leg scanning, including peroneal and posterior tibial veins) is suggested by the authors.

Right and left common femoral vein spectral analysis should be included to assess symmetry.

Compression ultrasound maneuver should be performed every 2 cm in order to avoid false negative.

***[Needleman L, Cronan JJ, Lilly MP, et al. Ultrasound for Lower Extremity Deep Venous Thrombosis: Multidisciplinary Recommendations From the Society of Radiologists in Ultrasound Consensus Conference. Circulation. 2018 Apr 3;137(14):1505-1515].**

Special focus should be dedicated to symptomatic areas to exclude superficial venous thrombosis and/or other etiologies.

[Beller E, Becher M, Meinel F, et al. Prevalence and predictors of alternative diagnoses on whole-leg ultrasound negative for acute deep venous thrombosis. BMC Med Imaging. 2020 Dec 2;20(1):127].

In case of distal DVT, serial imaging can be performed in carefully evaluated patients. A venous ultrasound scanning should be performed at 1 week of before if symptomatic to assess possible extension.

[Heller, T., M. Becher, J.-C. Kröger, et. al. "Isolated calf deep venous thrombosis: frequency on venous ultrasound and clinical characteristics." BMC Emergency Medicine 2020;21(1)].

Calf DVT scanning specificity has been reported to be over 97%, yet the sensitivity was found to be around 56%. Therefore, proper care in the follow up of the serial scanning is fundamental.

[Goodacre S, Sampson F, Thomas S, van Beek E, Sutton A. Systematic review and meta-analysis of the diagnostic accuracy of ultrasonography for deep vein thrombosis. BMC Med Imaging. 2005;5:6].

In case of ilio-caval extension suspect, an ilio-caval ultrasound, computed tomography or magnetic resonance should be taken into consideration.

Whatever diagnostic assessment should be scheduled if leading to a possible change in the patient management.

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STATEMENT FOR PUBLIC EVIDENCE-BASED AWARENESS

Statement:

"ultrasound scanning for deep venous thrombosis detection must include pre-test clinical risk assessment and it should cover all the leg with assessments every 2 cm"

4 SELECTED REFERENCES

1. *Needleman L, Cronan JJ, Lilly MP, et al. Ultrasound for Lower Extremity Deep Venous Thrombosis: Multidisciplinary Recommendations From the Society of Radiologists in Ultrasound Consensus Conference. Circulation. 2018 Apr 3;137(14):1505-1515
2. Beller E, Becher M, Meinel F, et al. Prevalence and predictors of alternative diagnoses on whole-leg ultrasound negative for acute deep venous thrombosis. BMC Med Imaging. 2020 Dec 2;20(1):127
3. Heller, T., M. Becher, J.-C. Kröger, et. al. "Isolated calf deep venous thrombosis: frequency on venous ultrasound and clinical characteristics." BMC Emergency Medicine 2020;21(1)
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identified LITERATURE BIAS

Surveillance differences in the different reports

SUGGESTED NEXT LINES OF RESEARCH

Validation of a global protocol for deep venous thrombosis ultrasound scanning