

YAŞLI HASTA GRUBUNDA DERİN VEN TROMBOZU

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Derin ven trombozu(DVT) , venöz dolaşım sisteminde oluşan trombozların genel adıdır. En sık alt ekstremitelerde derin venlerinde nadir olarak üst ekstremitelerde, pelvis ve diğer venlerde görülür. Derin ven trombozu basit bacak şişliğinden, hayati tehdit eden pulmoner emboliye (PE) kadar değişen klinik bulgulara sebep olur. ⁽¹⁾ İleri yaş, DVT için ciddi bir risk faktörüdür. Yapılan araştırmalarda 40 yaştan sonra risk artmaya başlar , her dekatta risk ikiye katlanır. Toplumda 85 yaş üzeri yaşlı nüfusda , 40 yaş altı hasta grubuna göre DVT riski 15 kat artmış olarak saptanır. ⁽²⁾

Venöz tromboembolizmi ile ilgili yapılan prospektif ve retrospektif bir çok çalışmada yaşlı hastalarda 3 yıllık mortalitede DVT, tüm nedenlere bağlı ölümlerde prediktif belirleyici olarak saptanmıştır. Kanser, kardiyovasküler, nörodejeneratif hastalıklar, kronik akciğer hastalığı, arteriyel hipertansiyon, hipoksemi, trombositopeni ve yüksek kardiyak troponin gibi bir çok hastalıkla DVT ilişkilendirilmiştir. ^(3,4,5) İsveç' de yapılan 5 üniversite ve 4 volümü yüksek merkezli prospektif cohort çalışmasında 65 yaş üstü hastalarda DVT mortaliteyi %21 oranında arttırdığı görülmüş. Mortalite artışı, ilaç kullanımını yetersizliği ve inaktif yaşamla ilişkili bulunmuştur. DVT'ye bağlı ölümler pulmoner emboli , enfeksiyon , kanama olarak saptanmıştır . ⁽⁶⁾

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Klinik semptomları başladıktan 14 günden az süre geçmiş olup , yaşam beklentisi 1 yıldan fazla, kanama riski düşük olan , böbrek fonksiyonları ve fonksiyonel kapasitesi iyi olan hastalarda tercih edilir. Bunlar, katater aracılıklı trombolitik tedavi, ultrasonla hızlandırılmış katater aracılıklı trombolitik tedavidir (EKOS), farmako- mekanik trombektomidir (FMT-anjiojet). Kullanımı yaşlı hastalarda yaygın değildir.^(83,84)

Inferior Vena Kava (İVK) Filtre Kullanımı:

Rutinde önerilmemekle birlikte mükerrer PE, oral antikoagülasyonun kontrendike olduğu hastalarda ve yeterli antikoagülasyona rağmen yineleyen venöz tromboemboli geçiren hastalarda geçici İVK filtresi önerilir.⁽⁷⁹⁾ Yaşlı hastalarda kontrast nefropatisi, yaşam beklentisi ve hasta fonksiyonel kapasitesi göz önüne alınarak karar verilmelidir.

Kompresyon Çorabı:

Kompresyon çorabı ağrıyı ödemi azaltmada posttrombotik sendromu önleme etkileri mevcuttur. 2021 ESVS kılavuzunda proksimal DVT olgularında için ilk 24 saat içinde çoklu bandaj veya orta -yüksek basınç varis çorabı (30-40 mmHg) önerilmektedir.⁽⁸⁵⁾ Ek olarak proksimal DVT olgularında semptom ve bulgular sınırlı ise 6-12 ay süre ile dizaltı kompresyon çorabı önerilmektedir.^(79,86)

Yaşlı hastalarda kompresyon çorabı ve bacak elevasyonu gibi konservatif yöntemler tedavinin etkinliğini arttırmaktadır. Her türlü tedavide hastanın yaşı ve yaşla birlikte oluşan organ disfonksiyonları, ek hastalıklarını düşünerek minimal invazif davranılması uygundur.

Kaynaklar

1. Özcan S, Biçer E, Taşkıran E. Derin ven trombozu ve pulmoner emboli. TOTBİD Dergisi 2019; 18:114-127
2. Raskob GE, Angchaisuksiri P, Blanco AN, Buller H, Gallus A, Hunt BJ, et al. Thrombosis: a major contributor to global disease burden. Seminars in thrombosis and hemostasis. 2014;40(7):724-735.
3. Spencer FA, Gore JM, Lessard D, et al. Venous thromboembolism in the elderly. A community-based perspective. Thromb Haemost. 2008; 100:780-788

4. Spirk D, Husmann M, Hayoz D, et al. Predictors of in-hospital mortality in elderly patients with acute venous thrombo-embolism: The Swiss Venous ThromboEmbolic Registry (SWIVTER). *Eur Heart J*. 2012; 33:921-926
5. Castelli R, Bucciarelli P, Porro F, Depetri F, Cugno M. Pulmonary embolism in elderly patients: prognostic impact of the Cumulative Illness Rating Scale (CIRS) on short-term mortality. *Thromb Res*. 2014; 134:326-330
6. Faller N, Limacher A, Méan M, Righini M, et al. Predictors and Causes of Long-Term Mortality in Elderly Patients with Acute Venous Thromboembolism: A Prospective Cohort Study *The American Journal of Medicine* 2017;130,2:198-206
7. Silverstein MD, Heit JA, Mohr DN, Petterson TM, O'Fallon WM, Melton LJ. Trends in the incidence of deep vein thrombosis and pulmonary embolism: a 25-year population-based study. *Arch Intern Med*. 1998;158(6):585-593.
8. Gillum RF. Pulmonary embolism and thrombophlebitis in the United States, 1970–1985. *Am Heart J*. 1987;114(5):1262-1264.
9. Balleisen L, Bailey J, Epping PH, Schulte H, van de Loo J. Epidemiological study on factor VII, factor VIII and fibrinogen in an industrial population: I. Baseline data on the relation to age, gender, body-weight, smoking, alcohol, pill-using, and menopause. *Thromb Haemost*. 1985;54(2):475-479.
10. Cooper JW, Groce J 3rd. DVT/PE prophylaxis in medically ill patients: a new avenue of clinical management in the long term care setting. *Consult Pharm* 2001; 16:7–17
11. Uzun Ş, Sarıcaoğlu F, Çeliker V, Derin ven trombozu Türkiye Klinikleri *J Med Sci*. 2007;27(6):853-61
12. Lip GY, Blann AD. Thrombogenesis and fibrinolysis in acute coronary syndromes. Important facets of a prothrombotic or hypercoagulable state? *J Am Coll Cardiol*. 2000; 36: 2044-2046.
13. Borissoff JL, Spronk HM, ten Cate H. The hemostatic system as a modulator of atherosclerosis. *N Engl J Med*. 2011; 364: 1746-176
14. Xianglai Xu, Wang B, Ren W et al. Age-related Impairment of Vascular Structure and Functions. *Aging Dis*. 2017; 8(5): 590–610.
15. Ferrucci L, Corsi A, Lauretani F, Bandinelli S, Bartali B, Taub DD, et al. The origins of age-related proinflammatory state. *Blood* 2005; 105: 2294-2299
16. Koster T, Rosendaal FR, Reitsma PH, Van Der Velden PA, Briet E, Vandenbroucke JP. Factor VII and fibrinogen levels as risk factors for venous thrombosis. a case-control study of plasma levels and DNA polymorphisms--the Leiden Thrombophilia Study (LETS). *Thromb Haemost* 1994; 71: 719– 22.
17. Meijers JC, Tekelenburg WL, Bouma BN, Bertina RM, Rosendaal FR. High levels of coagulation factor XI as a risk factor for venous thrombosis. *N Engl J Med* 2000; 342: 696– 701.
18. Tsai AW, Cushman M, Rosamond WD, Heckbert SR, Tracy RP, Aleksic N, Folsom AR. Coagulation factors, inflammation markers, and venous thromboembolism: the longitudinal investigation of thromboembolism etiology (LITE). *Am J Med* 2002; 113: 636– 42.
19. Oger E, Lacut K, Van Dreden P, et al. High plasma concentration of factor VIII coagulant is also a risk factor for venous thromboembolism in the elderly. *Haematologica*. 2003;88(4):465-469.
20. Wang H, R. Rosendaal F, Cushman M, et al. Procoagulant factor levels and risk of venous thrombosis in the elderly. *J Thromb Haemost*. 2021 ; 19(1): 186–193
21. Mari D, Coppola R, Provenzano R. Hemostasis factors and aging. *Exp Gerontol* 2008; 43: 66– 73.
22. Van Hylckama Vlieg A, Rosendaal FR. High levels of fibrinogen are associated with the risk of deep venous thrombosis mainly in the elderly. *J Thromb Haemost* 2003; 1: 2677– 8.

23. McMurdo ME, Witham MD, Gillespie ND. Including older people in clinical research. *BMJ*. 2005;331(7524):1036-1037.
24. Bauer KA, Weiss LM, Sparrow D, et al. Aging-associated changes in indices of thrombin generation and protein C activation in humans: normative aging studies. *J Clin Invest* 1987; 80: 1527-34
25. Kario K, Matsuo T, Kobayashi H. Which factors affect high D-dimer levels in the elderly. *Thromb Res* 1991; 62: 501-8
26. Cadroy Y, Pierrejean D, Fontan B, et al. Influence of aging on the activity of the hemostatic system: prothrombin fragment 1+2, thrombin-antithrombin III complexes and D-dimers in 80 healthy subjects with age ranging from 20 to 94 years. *Nouv Rev Fr Hematol* 1992; 34: 43-6
27. Robertson BR, Pandolfi M, Nilsson IM. 'Fibrinolytic capacity' in healthy volunteers at different ages as studied by standardized venous occlusions of arms and legs. *Acta Med Scand* 1972; 191: 199-202
28. Pottier P, Hardouin JB, Lejeune S, Jolliet P, Gillet B, Planchon B. Immobilization and the risk of venous thromboembolism. a meta-analysis on epidemiological studies. *Thromb Res* 2009; 124: 468- 76.
29. Weill-Engerer S, Meaume S, Lahlou A, Piette F, Saint-Jean O, Sachet A, Beinis JY, Gallinari C, Grancher AS, Vincent JP, Naga H, Belmin J, Salvatore R, Kazes M, Pautas E, Boiffin A, Pira JB, Duviquet M, Knafo D, Piau A, et al. Risk factors for deep vein thrombosis in inpatients aged 65 and older: a case-control multicenter study. *J Am Geriatr Soc* 2004; 52: 1299- 304.
30. Cannegieter SC, Doggen CJ, Van Houwelingen HC, Rosendaal FR. Travel-related venous thrombosis: results from a large population-based case control study (MEGA study). *PLoS Med* 2006; 3: 307
31. Kuipers S, Cannegieter SC, Middeldorp S, Robyn L, Buller HR, Rosendaal FR. The absolute risk of venous thrombosis after air travel: a cohort study of 8,755 employees of international organisations. *PLoS Med* 2007; 4: e290.
32. Weill-Engerer S, Meaume S, Lahlou A, Piette F, Saint-Jean O, Sachet A, Beinis JY, Gallinari C, Grancher AS, Vincent JP, Naga H, Belmin J, Salvatore R, Kazes M, Pautas E, Boiffin A, Pira JB, Duviquet M, Knafo D, Piau A, et al. Risk factors for deep vein thrombosis in inpatients aged 65 and older: a case-control multicenter study. *J Am Geriatr Soc* 2004; 52: 1299- 304.
33. Blom JW, Doggen CJ, Osanto S, Rosendaal FR. Malignancies, prothrombotic mutations, and the risk of venous thrombosis. *JAMA* 2005; 293: 715- 22.
34. -Rocha AT, Paiva EF, Lichtenstein A, Milani R Jr, Cavalheiro CF, Maffei FH. Risk-assessment algorithm and recommendations for venous thromboembolism prophylaxis in medical patients. *Vasc Health Risk Manag*. 2007;3(4):533-553
35. Paneesha S, McManus A, Arya R, Scriven N, Farren T, Nokes T, Bacon S, Nieland A, Cooper D, Smith H, O'Shaughnessy D, Rose P. Frequency, demographics and risk (according to tumour type or site) of cancer-associated thrombosis among patients seen at outpatient DVT clinics. *Thromb Haemost*. 2010; 103: 338- 43.
36. White RH, Zhou H, Gage BF. Effect of age on the incidence of venous thromboembolism after major surgery. *J Thromb Haemost*. 2004; 2: 1327- 33
37. Borch KH, Braekkan SK, Mathiesen EB, Njolstad I, Wilsgaard T, Stormer J, Hansen JB. Abdominal obesity is essential for the risk of venous thromboembolism in the metabolic syndrome: the Tromso study. *J Thromb Haemost*. 2009; 7: 739- 45.
38. Sare GM, Gray LJ, Bath PM. Association between hormone replacement therapy and subsequent arterial and venous vascular events: a meta-analysis. *Eur Heart J* 2008; 29: 2031-41.

39. Gomes MP, Deitcher SR. Risk of venous thromboembolic disease associated with hormonal contraceptives and hormone replacement therapy: a clinical review. *Arch Intern Med* 2004; 164: 1965– 76.
40. Verkooijen HM, Bouchardy C, Vinh-Hung V, Rapiti E, Hartman M. The incidence of breast cancer and changes in the use of hormone replacement therapy: a review of the evidence. *Maturitas* 2009; 64: 80– 5.
41. Curb JD, Prentice RL, Bray PF, Langer RD, Van HL, Barnabei VM, Bloch MJ, Cyr MG, Gass M, Lepine L, Rodabough RJ, Sidney S, Uwaifo GL, Rosendaal FR. Venous thrombosis and conjugated equine estrogen in women without a uterus. *Arch Intern Med* 2006; 166: 772– 80.
42. Mari D, Coppola R, Provenzano R. Hemostasis factors and aging. *Exp Gerontol* 2008; 43: 66– 73
43. Folsom AR, Cushman M, Tsai MY, Heckbert SR, Aleksic N. Prospective study of the G20210A polymorphism in the prothrombin gene, plasma prothrombin concentration, and incidence of venous thromboembolism. *Am J Hematol* 2002; 71: 285– 90.
44. Rosendaal FR, Koster T, Vandenbroucke JP, Reitsma PH. High risk of thrombosis in patients homozygous for factor V Leiden (activated protein C resistance). *Blood* 1995; 85: 1504– 8.
45. Howell MD, Geraci JM, Knowlton AA. Congestive heart failure and outpatient risk of venous thromboembolism: a retrospective, case-control study. *J Clin Epidemiol* 2001; 54: 810– 6.
46. Yang CC, Kao CC. Cardiovascular diseases and the risk of venous thromboembolism: a hospital-based case-control study. *J Chin Med Assoc* 2007; 70: 103– 9
47. Kamphuisen PW, Agnelli G, Sebastianelli M. Prevention of venous thromboembolism after acute ischemic stroke. *J Thromb Haemost* 2005; 3: 1187– 94.
48. Larsson L, Grimby G, Karlsson J. Muscle strength and speed of movement in relation to age and muscle morphology. *J Appl Physiol* 1979; 46: 451– 6.
49. Chopard RP, Miranda Neto MH, Biazotto W, Molinari SL. Age-related changes in the human renal veins and their valves. *Ital J Anat Embryol* 1994; 99: 91– 101.
50. Brooks EG, Trotman W, Wadsworth MP, Taatjes DJ, Evans MF, Ittleman FP, Callas PW, Esmon CT, Bovill EG. Valves of the deep venous system: an overlooked risk factor. *Blood* 2009; 114: 1276– 9.
51. Carpentier PH, Maricq HR, Biro C, Poncot-Makinen CO, Franco A. Prevalence, risk factors, and clinical patterns of chronic venous disorders of lower limbs: a population-based study in France. *J Vasc Surg* 2004; 40: 650– 9.
52. Folsom AR, Boland LL, Cushman M, Heckbert SR, Rosamond WD, Walston JD. Frailty and risk of venous thromboembolism in older adults. *J Gerontol A Biol Sci Med Sci.* 2007; 62: 79– 82.
53. Diomond PT, Macciocchi SN. Predictive power of clinical symptoms in patients with presumptive deep venous thrombosis. *Am J Phy med Rhebil* 1997; 76:49-51
54. van Belle A, Buller HR, Huisman MV, Huisman PM, Kaasjager K, Kamphuisen PW, Kramer MHH, Kruij MJHA, KwakkkelvanErp JM, Leebeek FWG, Nijkeuter M, Prins MH, Sohne M, Tick LW. Effectiveness of managing suspected pulmonary embolism using an algorithm combining clinical probability, D-dimer testing, and computed tomography. *JAMA* 2006; 295:172–9
55. Perrier A, Desmarais S, Miron MJ, de Moerloose P, Lepage R, Slosman D, Didier D, Unger PF, Patenaude JV, Bounameaux H. Non-invasive diagnosis of venous thromboembolism in outpatients. *Lancet* 1999; 353:190–5.
56. Schutgens RE, Ackermark P, Haas FJ, Nieuwenhuis HK, Peltenburg HG, Pijlman AH, Pruijm M, Oltmans R, Kelder JC, Biesma DH. Combination of a normal D-dimer concent-

- ration and a non-high pretest clinical probability score is a safe strategy to exclude deep venous thrombosis. *Circulation* 2003; 107:593–7.
57. Bates SM, Kearon C, Crowther M, Linkins L, O'Donnell M, Douketis J, Lee AY, Weitz JI, Johnston M, Ginsberg JS. A diagnostic strategy involving a quantitative latex Ddimer assay reliably excludes deep venous thrombosis. *Ann Intern Med* 2003; 138:787–94.
 58. Cini M, Legnani C, Frascaro M, Sartori M, Cosmi, B Palareti GD-dimer use for deep venous thrombosis exclusion in elderly patients: a comparative analysis of three different approaches to establish cut-off values for an assay with results expressed in D-dimer units. *Int J Lab Hematol.* 2014; 36 (5): 541-547
 59. . Haas FJ, Schutgens RE, Biesma DH. An age-adapted approach for the use of Ddimers in the exclusion of deep venous thrombosis. *Am J Hematol* 2009; 84:488–9
 60. Gaitini D, Khoury R, Israelit S, Beck-Razi N., Sparing ultrasound in emergency department patients with suspected deep vein thrombosis by using clinical scores and D-dimer testing. *J Clin ultrasound* 2016; 44:231-239
 61. Fraser DG, Moody AR, Morgan PS, Martel AL, Davidson I, Diagnosis of lower-limb deep venous thrombosis : a prospective blinded study of magnetic resonance direct thrombus imaging. *Ann Intern Med* 2002; 136:89-98
 62. Albers, G., Amarenco, P., Easton, J. D., Sacco, R., & Teal, P. Antithrombotic and thrombolytic therapy for ischemic stroke: The 7th ACCP conference on antithrombotic and thrombolytic therapy. *Chest*, 126(Suppl.),2004; 489S–512S
 63. Kearon C, Akl EA, Comerota AJ, Prandoni P, Bounameaux H, Goldhaber SZ, et al. Antithrombotic therapy for VTE disease: Antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest* 2012;141(2 Suppl): 419-496
 64. Hull, R.D.G.; David, A.; Burnett, A.E. Heparin and LMW heparin: Dosing and adverse effects. Tirnauer, S., Ed.; UpToDate. Available online: <https://www.uptodate.com/contents/heparin-and-lmw-heparin-dosing-and-adverse-effects> (accessed on 4 November 2019)
 65. Blann, A.D.; Landray, M.J.; Lip, G.Y.H. ABC of antithrombotic therapy: An overview of antithrombotic therapy. *Br. Med.Assoc.* 2002; 325, 762–765.
 66. Bernardi, E.; Piccioli, A.; Oliboni, G.; Zuin, R.; Girolami, A.; Prandoni, P. Nomograms for the administration of unfractionated heparin in the initial treatment of acute thrombo-embolism—An overview. *Thromb. Haemost.* 2000; 84, 22–26.
 67. Lim, W.D.; Francesco, D.; Eikelboom, J.W.; Crowther, M.A. Meta-Analysis: Low-molecular-weight heparin and bleeding in patients with severe renal insufficiency. *Ann. Intern. Med.* 2006; 144, 673–684.
 68. Ageno, W., Gallus, A.S., Wittkowsky, A., Crowther, M., Hylek, E.M., Palareti, G. Oral anticoagulant therapy: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed; American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest* 2012;141,144-188
 69. Van den Besselaar, A.M.H.P.; Chantarangkul, V.; Angeloni, F.; Binder, N.B.; Byrne, M.; Daurer, R.; Gudmundsdottir, B.R.; Jespersen, J.; Kitchen, S.; Legnani, C.; et al. International collaborative study for the calibration of proposed International Standards for thromboplastin, rabbit, plain, and for thromboplastin, recombinant, human, plain. *J. Thromb. Haemost.* 2017; 16, 142–149.
 70. Riley, R.S.; Rowe, D.; Fisher, L.M. Clinical utilization of the international normalized ratio (INR). *J. Clin. Lab. Anal.* 2000; 14, 101–114
 71. Andreotti F, Rocca B, Husted S, Ajjan RA, ten Berg J, Cattaneo M, et al. Antithrombotic therapy in the elderly: expert position paper of the European Society of Cardiology Working Group on Thrombosis. *Eur Heart J* 2015; 36:3238–49.

72. Ortel TL, Neumann I, Ageno W, Beyth R, Clark NP, Cuker A, et al. American Society of Hematology 2020 guidelines for management of venous thromboembolism: treatment of deep vein thrombosis and pulmonary embolism. *Blood Adv* 2020; 4:4693-738.
73. CHMP. INN/Active Substance: Direct Oral Anticoagulants (DOACs). Assessment Report. Procedure under Article 5(3) of Regulation (EC) No 726/2004, Procedure number: EMEA/H/A-5(3) /1487; European Medicines Agency: 2020. Available online
74. Chen, A.; Stecker, E.; Warden, B.A. Direct oral anticoagulant use: A practical guide to common clinical challenges. *J. Am. Heart Assoc.* 2020;9
75. Bozkurt K. Periferik Arter ve Ven Hastalıkları - Ulusal Tedavi Kılavuzu 2021. Türk Kalp Damar Cerrahisi Derneği Ulusal Vasküler ve Endovasküler Cerrahi Derneği Fleboloji Derneği 2021:293-324
76. Connolly SJ, Ezekowitz MD, Yusuf S, Eikelboom J, Oldgren J, Parekh A, Pogue J, Reilly PA, Themeles E, Varrone J, Wang S, Alings M, Xavier D, Zhu J, Diaz R, Lewis BS, Darius H , Diener HC, Joyner CD, Wallentin L, RE-LY .*N Engl J Med.*: 2009; 361 (12): 1139-51.
77. Giugliano RP, Ruff CT, Braunwald E, et al. Edoxaban versus warfarin in patients with atrial fibrillation. *N Engl J Med.* 2013; 369:2093–2104
78. Ruff CT, Giugliano RP, Braunwald E, et al. Comparison of the efficacy and safety of new oral anticoagulants with warfarin in patients with atrial fibrillation: a meta-analysis of randomised trials. *Lancet.* 2014; 383:955–962.
79. Sharma M, Cornelius VR, Patel JP, et al. Efficacy and harms of direct oral anticoagulants in the elderly for stroke prevention in atrial fibrillation and secondary prevention of venous thromboembolism: systematic review and meta-analysis. *Circulation.* 2015; 132:194–204.
80. Sardar P, Chatterjee S, Chaudhari S, Lip GY. New oral anticoagulants in elderly adults: evidence from a meta-analysis of randomized trials. *J Am Geriatr Soc.* 2014; 62:857–864.
81. Andreotti F, Rocca B, Husted S, et al. Antithrombotic therapy in the elderly: expert position paper of the European Society of Cardiology Working Group on Thrombosis. *Eur Heart J.* 2015; 36:3238–3249.
82. Hohnloser SH, Hijazi Z, Thomas L, et al. Efficacy of apixaban when compared with warfarin in relation to renal function in patients with atrial fibrillation: insights from the ARISTOTLE trial. *Eur Heart J.* 2012; 33:2821–2830
83. Kahn SR, Julian JA, Kearon C, Gu CS, Cohen DJ, Magnuson EA, et al. Quality of life after pharmacomechanical catheter-directed thrombolysis for proximal deep venous thrombosis. *J Vasc Surg Venous Lymphat Disord* 2020; 8:8-23.e18.
84. Notten P, Ten Cate-Hoek AJ, Arnoldussen CWKP, Strijkers RHW, de Smet AAEA, Tick LW, et al. Ultrasound-accelerated catheter-directed thrombolysis versus anticoagulation for the prevention of post-thrombotic syndrome (CAVA): a single-blind, multicentre, randomised trial. *Lancet Haematol* 2020;7: 40-49
85. Kakkos SK, Gohel M, Baekgaard N, Bauersachs R, Bellmunt-Montoya S, Black SA, et al. Editor's Choice - European Society for Vascular Surgery (ESVS) 2021 Clinical Practice Guidelines on the Management of Venous Thrombosis. *Eur J Vasc Endovasc Surg* 2021; 61:9-82.
86. Ten Cate-Hoek AJ, Amin EE, Bouman AC, Meijer K, Tick LW, Middeldorp S, et al. Individualised versus standard duration of elastic compression therapy for prevention of post-thrombotic syndrome (IDEAL DVT): a multicentre, randomised, single-blind, allocation-concealed, non-inferiority trial. *Lancet Haematol* 2018;5: 25-33