

표 1 . 인터벤션 핵심질문2 근거표

핵심질문 2

문헌정보	연구유형	대상자 수	
Jager KA, Phillips DJ, Martin RL, et al. Noninvasive mapping of lower limb arterial lesions. <i>Ultrasound Med Biol</i> 1985; 11(3):515-521.			3
Fletcher JP, Kershaw LZ, Chan A, Lim J. Noninvasive imaging of the superficial femoral artery using ultrasound Duplex scanning. <i>J Cardiovasc Surg (Torino)</i> 1990; 31(3):364-367.			2
Leng GC, Whyman MR, Donnan PT, et al. Accuracy and reproducibility of duplex ultrasonography in grading femoropopliteal stenoses. <i>J Vasc Surg</i> 1993; 17(3):510-517.			4
de Vries SO, Hunink MG, Polak JF. Summary receiver operating characteristic curves as a technique for meta-analysis of the diagnostic performance of duplex ultrasonography in peripheral arterial disease. <i>Acad Radiol</i> 1996; 3(4):361-369.			4
Allard L, Cloutier G, Durand LG, Roederer GO, Langlois YE. Limitations of ultrasonic duplex scanning for diagnosing lower limb arterial stenoses in the presence of adjacent segment disease. <i>J Vasc Surg</i> 1994; 19(4):650-657.			2
Mewissen MW, Kinney EV, Bandyk DF, et al. The role of duplex scanning versus angiography in predicting outcome after balloon angioplasty in the femoropopliteal artery. <i>J Vasc Surg</i> 1992; 15(5):860-865; discussion 865-866.			3
Sacks D, Robinson ML, Summers TA, Marinelli DL. The value of duplex sonography after peripheral artery angioplasty in predicting subacute restenosis. <i>AJR</i> 1994; 162(1):179-183.			3
Spijkerboer AM, Nass PC, de Valois JC, et al. Iliac artery stenoses after percutaneous transluminal angioplasty: follow-up with duplex ultrasonography. <i>J Vasc Surg</i> 1996; 23(4):691-697.			4
Lowery AJ, Hynes N, Manning BJ, Mahendran M, Tafrik S, Sultan S. A prospective feasibility study of duplex ultrasound arterial mapping, digital subtraction angiography, and magnetic resonance angiography in management of critical lower limb ischemia by endovascular revascularization. <i>Ann Vasc Surg</i> 2007; 21(4):443-451.			4
Mandolino T, Canciglia A, D'Alfonso M, Carmignani A. Infrainguinal revascularization based on duplex ultrasonography. <i>J Vasc Med Biol</i> 2007; 19(4):253-258.			4

asound arterial mapping. <i>Int Angiol</i> 2006; 25(3):256–260.			
de Vries M, Ouwendijk R, Flobbe K, et al. Peripheral arterial disease: clinical and cost comparisons between duplex US and contrast-enhanced MR angiography—a multicenter randomized trial. <i>Radiology</i> 2006; 240(2):401–410.			3
Ouwendijk R, de Vries M, Stijnen T, et al. Multicenter randomized controlled trial of the costs and effects of noninvasive diagnostic imaging in patients with peripheral arterial disease: the DIPAD trial. <i>AJR</i> 2008; 190(5):1349–1357.			3
Ersoy H, Rybicki FJ. Biochemical safety profiles of gadolinium-based extracellular contrast agents and nephrogenic systemic fibrosis. <i>J Magn Reson Imaging</i> 2007; 26(5):1190–1197.			4
Cambria RP, Kaufman JA, L'Italien GJ, et al. Magnetic resonance angiography in the management of lower extremity arterial occlusive disease: a prospective study. <i>J Vasc Surg</i> 1997; 25(2):380–389.			4
Herborn CU, Goyen M, Quick HH, et al. Whole-body 3D MR angiography of patients with peripheral arterial occlusive disease. <i>AJR</i> 2004; 182(6):1427–1434.			2
Loewe C, Schoder M, Rand T, et al. Peripheral vascular occlusive disease: evaluation with contrast-enhanced moving-bed MR angiography versus digital subtraction angiography in 106 patients. <i>AJR</i> 2002; 179(4):1013–1021.			2
Khilnani NM, Winchester PA, Prince MR, et al. Peripheral vascular disease: combined 3D bolus chase and dynamic 2D MR angiography compared with x-ray angiography for treatment planning. <i>Radiology</i> 2002; 224(1):63–74.			4
Ersoy H, Rybicki FJ. MR angiography of the lower extremities. <i>AJR</i> 2008; 190(6):1675–1684.			4
Mell M, Tefera G, Thornton F, Siepman D, Turnipseed W. Clinical utility of timeresolved imaging of contrast kinetics (TRICKS) magnetic resonance angiography for infrageniculate arterial occlusive disease. <i>J Vasc Surg</i> 2007; 45(3):543–548; discussion 548.			3
Ruhl KM, Katoh M, Langer S, et al. Time-resolved 3D MR angiography of the foot at 3 T in patients with peripheral arterial disease. <i>AJR</i> 2008; 190(6):W360–364.			4
Leiner T, Kessels AG, Nelemans PJ, et al. Peripheral arterial disease: comparison of color duplex US and contrast-enhanced MR angiography for diagnosis. <i>Radiology</i> 2005; 235(2):699–708.			3
Leiner T, Tordoir JH, Kessels AG, et al. Comparison of treatment plans for peripheral arterial disease made			3

e with multi-station contrast medium-enhanced magnetic resonance angiography and duplex ultrasound scanning. <i>J Vasc Surg</i> 2003; 37(6):1255-1262.			
Visser K, Hunink MG. Peripheral arterial disease: gadolinium-enhanced MR angiography versus color-guided duplex US—a meta-analysis. <i>Radiology</i> 2000; 216(1):67-77.			4
Hay JW, Lawler E, Yucel K, et al. Cost impact of diagnostic imaging for lower extremity peripheral vascular occlusive disease. <i>Value Health</i> 2009; 12(2):262-266.			4
Vahl AC, Geselschap J, Montauban van Swijndregt AD, et al. Contrast enhanced magnetic resonance angiography versus intra-arterial digital subtraction angiography for treatment planning in patients with peripheral arterial disease: a randomised controlled diagnostic trial. <i>Eur J Vasc Endovasc Surg</i> 2008; 35(5):514-521; discussion 522-513.			3
Huber TS, Back MR, Ballinger RJ, et al. Utility of magnetic resonance arteriography for distal lower extremity revascularization. <i>J Vasc Surg</i> 1997; 26(3):415-423; discussion 423-414.			2
Davis CP, Schopke WD, Seifert B, Schneider E, Pfammatter T, Debatin JF. MR angiography of patients with peripheral arterial disease before and after transluminal angioplasty. <i>AJR</i> 1997; 168(4):1027-1034.			3
Habibi R, Krishnam MS, Lohan DG, et al. High-spatial-resolution lower extremity MR angiography at 3.0 T: contrast agent dose comparison study. <i>Radiology</i> 2008; 248(2):680-692.			4
Rofsky NM, Johnson G, Adelman MA, Rosen RJ, Krinsky GA, Weinreb JC. Peripheral vascular disease evaluated with reduced-dose gadolinium-enhanced MR angiography. <i>Radiology</i> 1997; 205(1):163-169.			2
Lim RP, Hecht EM, Xu J, et al. 3D nongadolinium-enhanced ECG-gated MRA of the distal lower extremities: preliminary clinical experience. <i>J Magn Reson Imaging</i> 2008; 28(1):181-189.			3
Miyazaki M, Akahane M. Non-contrast enhanced MR angiography: Established techniques. <i>J Magn Reson Imaging</i> 2012; 35(1):1-19.			4
Offerman EJ, Hodnett PA, Edelman RR, Koktzoglou I. Nonenhanced methods for lower-extremity MRA: a phantom study examining the effects of stenosis and pathologic flow waveforms at 1.5T. <i>J Magn Reson Imaging</i> 2011; 33(2):401-408.			4
Hoey ET, Ganeshan A, Puni R, Henderson J, Crowe PM. Fresh blood imaging of the peripheral vasculature: an emerging unenhanced MR technique. <i>AJR</i> 2010; 195(6):1444-1448.			4

Kumamaru KK, Hoppel BE, Mather RT, Rybicki FJ. CT angiography: current technology and clinical use. <i>Radiol Clin North Am</i> 2010; 48(2):213–235, vii.			4
Kock MC, Dijkshoorn ML, Pattynama PM, Myriam Hunink MG. Multi-detector row computed tomography angiography of peripheral arterial disease. <i>Eur Radiol</i> 2007; 17(12):3208–3222.			4
Fotiadis N, Kyriakides C, Bent C, Vorvolakos T, Matsou M. 64-section CT angiography in patients with critical limb ischaemia and severe claudication: comparison with digital subtractive angiography. <i>Clin Radiol</i> 2011; 66(10):945–952.			2
Schernthaner R, Stadler A, Lomoschitz F, et al. Multi-detector CT angiography in the assessment of peripheral arterial occlusive disease: accuracy in detecting the severity, number, and length of stenoses. <i>Eur Radiol</i> 2008; 18(4):665–671.			2
Catalano C, Fraioli F, Laghi A, et al. Infrarenal aortic and lower-extremity arterial disease: diagnostic performance of multi-detector row CT angiography. <i>Radiology</i> 2004; 231(2):555–563.			2
Fine JJ, Hall PA, Richardson JH, Butterfield LO. 64-slice peripheral computed tomography angiography: a clinical accuracy evaluation. <i>J Am Coll Cardiol</i> 2006; 47(7):1495–1496.			2
Heijenbroek-Kal MH, Kock MC, Hunink MG. Lower extremity arterial disease: multidetector CT angiography metaanalysis. <i>Radiology</i> 2007; 245(2):433–439.			4
Martin ML, Tay KH, Flak B, et al. Multidetector CT angiography of the aortoiliac system and lower extremities: a prospective comparison with digital subtraction angiography. <i>AJR</i> 2003; 180(4):1085–1091.			2
Ofer A, Nitecki SS, Linn S, et al. Multidetector CT angiography of peripheral vascular disease: a prospective comparison with intraarterial digital subtraction angiography. <i>AJR</i> 2003; 180(3):719–724.			3
Ota H, Takase K, Igarashi K, et al. MDCT compared with digital subtraction angiography for assessment of lower extremity arterial occlusive disease: importance of reviewing cross-sectional images. <i>AJR</i> 2004; 182(1):201–209.			2
Willmann JK, Baumert B, Schertler T, et al. Aortoiliac and lower extremity arteries assessed with 16-detector row CT angiography: prospective comparison with digital subtraction angiography. <i>Radiology</i> 2005; 236(3):1083–1093.			1
Willmann JK, Wildermuth S, Pfammatter T, et al. Aortoiliac and renal arteries: prospective intraindividual comparison of contrast-enhanced three-dimensional MR angiography and multi-detector row CT angiography.			1

hy. Radiology 2003; 226(3):798–811.			
Willmann JK, Mayer D, Banyai M, et al. Evaluation of peripheral arterial bypass grafts with multi-detector row CT angiography: comparison with duplex US and digital subtraction angiography. Radiology 2003; 229(2):465–474.			2
Ouwendijk R, Kock MC, van Dijk LC, van Sambeek M R, Stijnen T, Hunink MG. Vessel wall calcifications at multi-detector row CT angiography in patients with peripheral arterial disease: effect on clinical utility and clinical predictors. Radiology 2006; 241(2):603–608.			4
Mostardi PM, Haider CR, Glockner JF, Young PM, Riederer SJ. High spatial and temporal resolution imaging of the arterial vasculature of the lower extremity with contrast enhanced MR angiography. Clin Anat 2011; 24(4):478–488.			4
van der Heijden FH, Legemate DA, van Leeuwen MS, et al. Value of duplex scanning in the selection of patients for percutaneous transluminal angioplasty. Eur J Vasc Surg 1993;7:71–6.			NA
Edwards JM, Coldwell DM, Goldman ML, et al. The role of duplex scanning in the selection of patients for transluminal angioplasty. J Vasc Surg 1991;13:69–74.			
Martin ML, Tay KH, Flak B, et al. Multidetector CT angiography of the aortoiliac system and lower extremities: a prospective comparison with digital subtraction angiography. AJR Am J Roentgenol 2003;180:1085–91.			NA
Willmann JK, Wildermuth S, Pfammatter T, et al. Aortoiliac and renal arteries: prospective intraindividual comparison of contrast-enhanced three-dimensional MR angiography and multi-detector row CT angiography. Radiology 2003;226:798–811.			NA
Willmann JK, Mayer D, Banyai M, et al. Evaluation of peripheral arterial bypass grafts with multi-detector row CT angiography: comparison with duplex US and digital subtraction angiography. Radiology 2003;229:465–74.			NA
Ofer A, Nitecki SS, Linn S, et al. Multidetector CT angiography of peripheral vascular disease: a prospective comparison with intraarterial digital subtraction angiography. AJR Am J Roentgenol 2003;180:719–24.			NA
Ota H, Takase K, Igarashi K, et al. MDCT compared with digital subtraction angiography for assessment of lower extremity arterial occlusive disease: importance of reviewing cross-sectional images. AJR Am J Roentgenol 2004;182:201–9.			
Rubin GD, Schmidt AJ, Logan LJ, et al. Multi-detector row CT angiography of lower extremity arterial inf			

low and runoff: initial experience. <i>Radiology</i> 2001;221:146-58.			
Catalano C, Fraioli F, Laghi A, et al. Infrarenal aortic and lowerextremity arterial disease: diagnostic performance of multi-detector row CT angiography. <i>Radiology</i> 2004;231:555-63.			
Baum RA, Rutter CM, Sunshine JH, et al. Multicenter trial to evaluate vascular magnetic resonance angiography of the lower extremity. American College of Radiology Rapid Technology Assessment Group. <i>JAMA</i> 1995;274:875-80.			
Nelemans PJ, Leiner T, de Vet HC, et al. Peripheral arterial disease: meta-analysis of the diagnostic performance of MR angiography. <i>Radiology</i> 2000;217:105-14.			
Khilnani NM, Winchester PA, Prince MR, et al. Peripheral vascular disease: combined 3D bolus chase and dynamic 2D MR angiography compared with x-ray angiography for treatment planning. <i>Radiology</i> 2002;224:63-74.			
Visser K, Hunink MG. Peripheral arterial disease: gadolinium-enhanced MR angiography versus color-guided duplex US—a meta-analysis. <i>Radiology</i> 2000;216:67-77.			
Visser K, Hunink MG. Peripheral arterial disease: gadolinium-enhanced MR angiography versus color-guided duplex US—a meta-analysis. <i>Radiology</i> 2000; 216:67-77.			NA
Collins R, Cranny G, Burch J, Aguiar-Ibanez R, Craig D, Wright K, Berry E, Gough M, Kleijnen J, Westwood M. A systematic review of duplex ultrasound, magnetic resonance angiography and computed tomography angiography for the diagnosis and assessment of symptomatic, lower limb peripheral arterial disease. <i>Health Technol Assess</i> 2007;11:iii-iv, xi-xiii, 1-184.			NA
Bandyk DF, Chauvapun JP. Duplex ultrasound surveillance can be worthwhile after arterial intervention. <i>Percept Vasc Surg Endovasc Ther</i> 2007;19:354-359; discussion 360-351.			NA
Ferris BL, Mills JL Sr, Hughes JD, Durrani T, Knox R. Is early postoperative duplex scan surveillance of leg bypass grafts clinically important? <i>J Vasc Surg</i> 2003;37:495-500.			NA
Ouwendijk R, de Vries M, Stijnen T, Pattynama PM, van Sambeek MR, Buth J, Tielbeek AV, van der Vliet DA, SchutzeKool LJ, Kitslaar PJ, de Haan MW, van Engelsehoven JM, Hunink MG. Multicenter randomized controlled trial of the costs and effects of noninvasive diagnostic imaging in patients with peripheral arteri			NA

al disease: the DIPAD trial. <i>AJR Am J Roentgenol</i> 2008;190:1349-1357.			
Hingorani A, Ascher E, Marks N. Preprocedural imaging: new options to reduce need for contrast angiography. <i>Semin Vasc Surg</i> 2007;20:15-28.			NA
Met R, Bipat S, Legemate DA, Reekers JA, Koelemay MJ. Diagnostic performance of computed tomography angiography in peripheral arterial disease: a systematic review and meta-analysis. <i>JAMA</i> 2009;301:415-424.			NA
Poon E, Yucel EK, Pagan-Marin H, Kayne H. Iliac artery stenosis measurements: comparison of two-dimensional time-of-flight and three-dimensional dynamic gadolinium-enhanced MR angiography. <i>AJR Am J Roentgenol</i> 1997;169: 1139-1144.			NA
Ho KY, de Haan MW, Kessels AG, Kitslaar PJ, van Engelsehoven JM. Peripheral vascular tree stenoses: detection with subtracted and nonsubtracted MR angiography. <i>Radiology</i> 1998;206:673-681.			NA
Quinn SF, Sheley RC, Semonsen KG, Leonardo VJ, Kojima K, Szumowski J. Aortic and lower-extremity arterial disease: evaluation with MR angiography versus conventional angiography. <i>Radiology</i> 1998;206:693-701.			NA
Nelemans PJ, Leiner T, de Vet HC, van Engelsehoven JM. Peripheral arterial disease: meta-analysis of the diagnostic performance of MR angiography. <i>Radiology</i> 2000;217:105-114.			NA
Koelemay MJ, Lijmer JG, Stoker J, Legemate DA, Bossuyt PM. Magnetic resonance angiography for the evaluation of lower extremity arterial disease: a meta-analysis. <i>JAMA</i> 2001;285:1338-1345.			NA
Barnes RW. Noninvasive diagnostic assessment of peripheral vascular disease. <i>Circulation</i> 1991;83:I20-I27.			
Clement DL, Van Maele GO, De Pue NY. Critical evaluation of venous occlusion plethysmography in the diagnosis of occlusive arterial diseases in the lower limbs. <i>Int Angiol</i> 1985;4:69-74.			
Pinto F, Lencioni R, Napoli V, Petrucci R, Vignali C, Armillotta N, et al. Peripheral ischemic occlusive arterial disease: comparison of color Doppler sonography and angiography. <i>J Ultrasound Med</i> 1996;15:697-704; quiz 705-706			NA
Moneta GL, Yeager RA, Lee RW, Porter JM. Noninvasive localization of arterial occlusive disease: a comparison of segmental Doppler pressures and arterial duplex mapping. <i>J Vasc Surg</i> 1993;17:578-582			
Rieker O, Düber C, Schmiedt W, von Zitzewitz H, Schweden F, Thelen M. Prospective comparison of CT angiography of the legs with intraarterial digital subtr			NA

action angiography. <i>AJR Am J Roentgenol</i> 1996;166:269–276			
Rubin GD, Schmidt AJ, Logan LJ, Sofilos MC. Multi-detector row CT angiography of lower extremity arterial inflow and runoff: initial experience. <i>Radiology</i> 2001;221:146–158			NA
Kreitner KF, Kalden P, Neufang A, Düber C, Krummnauer F, Küstner E, et al. Diabetes and peripheral arterial occlusive disease: prospective comparison of contrast-enhanced three-dimensional MR angiography with conventional digital subtraction angiography. <i>AJR Am J Roentgenol</i> 2000;174:171–179			NA
Bertschinger K, Cassina PC, Debatin JF, Ruehm SG. Surveillance of peripheral arterial bypass grafts with three-dimensional MR angiography: comparison with digital subtraction angiography. <i>AJR Am J Roentgenol</i> 2001;176:215–220			NA
Dorenbeck U, Seitz J, Völk M, Strotzer M, Lenhart M, Feuerbach S, et al. Evaluation of arterial bypass grafts of the pelvic and lower extremities with gadolinium-enhanced magnetic resonance angiography: comparison with digital subtraction angiography. <i>Invest Radiol</i> 2002;37:60–64			
Collins R, Cranny G, Burch J, Guiar-Ibanez R, Craig D, Wright K et al. A systematic review of duplex ultrasound, magnetic resonance angiography and computed tomography angiography for the diagnosis and assessment of symptomatic, lower limb peripheral arterial disease. <i>Health Technology Assessment</i> . 2007; 11(20):iii–iiv			
Scherthaner R, Stadler A, Lomoschitz F, Weber M, Fleischmann D, Lammer J et al. Multidetector CT angiography in the assessment of peripheral arterial occlusive disease: accuracy in detecting the severity, number, and length of stenoses. <i>European Radiology</i> . 2008; 18(4):665–671			
Kreitner KF, Kunz RP, Herber S, Martenstein S, Doreweiler B, Dueber C. MR angiography of the pedal arteries with gadobenate dimeglumine, a contrast agent with increased relaxivity, and comparison with selective intraarterial DSA. <i>Journal of Magnetic Resonance Imaging</i> . 2008; 27(1):78–85			
Bueno A, Acin F, Canibano C, Fernandez-Casado JL, Castillo E. Diagnostic accuracy of contrast-enhanced magnetic resonance angiography and duplex ultrasound in patients with peripheral vascular disease. <i>Vascular and Endovascular Surgery</i> . 2010; 44(7):576–585			
Eiberg JP, Gronvall Rasmussen JB, Hansen MA, Schroeder TV. Duplex ultrasound scanning of peripheral ar			

terial disease of the lower limb. <i>European Journal of Vascular and Endovascular Surgery</i> . 2010; 40(4):507-512			
Gjonnaess E, Morken B, Sandbaek G, Strandén E, Sla gsvold CE, Jorgensen JJ et al. Gadolinium-enhanced magnetic resonance angiography, colour duplex and digital subtraction angiography of the lower limb arteries from the aorta to the tibio-peroneal trunk in patients with intermittent claudication. <i>European Journal of Vascular and Endovascular Surgery</i> . 2006; 31(1):53-58			
Kos S, Reisinger C, Aschwanden M, Bongartz GM, Jacob AL, Bilecen D. Pedal angiography in peripheral arterial occlusive disease: first-pass i.v. contrast-enhanced MR angiography with blood pool contrast medium versus intraarterial digital subtraction angiography. <i>American Journal of Roentgenology</i> . 2009; 192(3):775-784			
Napoli A, Anzidei M, Zaccagna F, Cavallo Marincola B, Zini C, Brchetti G et al. Peripheral arterial occlusive disease: diagnostic performance and effect on therapeutic management of 64-Section CT angiography. <i>Radiology</i> . 2011; 261(3):976-986			