

KQ2. 간헐적 파행이 있어 하지 동맥폐쇄성질환으로 진단된 환자로 재개통술을 고려하는 있는 환자에서 적절한 영상검사는 무엇인가?

출처 문헌번호	문헌정보	연구유형	대상자수	연구결과	Study quality (KCIQ)	Study quality (original)
27	2. Hirsch AT, Haskal ZJ, Hertzler NR, et al. ACC/AHA 2005 guidelines for the management of patients with peripheral arterial disease (lower extremity, renal, mesenteric, and abdominal aortic): executive summary a collaborative report from the American Association for Vascular Surgery/Society for Vascular Surgery, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology, and the ACC/AHA Task Force on Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Peripheral Arterial Disease) endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation; National Heart, Lung, and Blood Institute; Society for Vascular Nursing; TransAtlantic Inter-Society Consensus; and Vascular Disease Foundation. <i>J Am Coll Cardiol</i> 2006; 47(6):1239-1312.	Review/Other-Dx	N/A	N/A		4
27	9. Rutherford RB, Lowenstein DH, Klein MF. Combining segmental systolic pressures and plethysmography to diagnose arterial occlusive disease of the legs. <i>Am J Surg</i> 1979; 138(2):211-218.	Observational-Dx	11 volunteers and 103 patients	Both tests 86% accurate when multilevel disease was present, 97% when used in combination with no errors observed in diagnosing either normal limbs or those with isolated occlusive disease.	5	4
27	10. 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.	Observational-Dx	18 patients	Authors found agreement for the degree of stenosis in 77.7% of the arteries and discrepancy for 22.3% of the arteries when all categories were considered. Grouping the six categories according to the threshold for treatment (categories 1 and 2 as one group and categories 3, 4, and 5 as the second group) resulted in an agreement of 91.95%. Compared with DSA, CTA yielded a sensitivity of 90.9% and a specificity of 92.4%. MDCTA is an accurate, noninvasive technique for the imaging of PVD.	2	2
27	13. 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.	Review/Other-Dx	N/A	Recent advances in technology have moved CT to the front line for many vascular diseases, dramatically changing clinical evaluation pathways. Understanding CT technology is critical for optimizing protocols.	5	4
27	15. Fotiadis N, Kyriakides C, Bent C, Vorvolakos T, Matson M. 64-section CT angiography in patients with critical limb ischaemia and severe claudication: comparison with digital subtractive angiography. <i>Clin Radiol</i> . 66(10):945-52, 2011 Oct.	Observational-Dx	41 consecutive patients	For arterial segments with haemodynamically significant disease (stenosis >=50%), the overall sensitivity, specificity, and accuracy of MDCT in patients with severe claudication and CLI was 99% (95% CI: 98-100%), 98% (95% CI: 97-100%) and 98% (95% CI: 97-99%), respectively. The PPV was 97% and the NPV was 99%. MDCT angiography is a useful tool in the assessment of patients with severe claudication and CLI and can be reliably used to grade disease severity and plan treatment.	2	2
27	16. Schemthaler R, Stadler A, Lomoschitz F, et al. Multidetector 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.	Observational-Dx	50 consecutive patients	Mean sensitivity and specificity in the detection of significant stenoses (over 70%) were 100% and 99.5% in the iliac arteries, 97.4% and 99.0% in the femoro-popliteal arteries, and 98.3% and 99.8% in the infrapopliteal arteries, respectively. High kappa values for exact stenoses gradation (0.74-1), lesion length (0.74-1), and number of lesions (0.71-1) were reached by MDCTA, indicating high agreement with DSA. Non-invasive MDCTA is an accurate tool for the assessment of all treatment-relevant morphologic information of PAOD (gradation, length, and number of stenoses) compared to DSA.	2	2
27	17. 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.	Observational-Dx	50 patients	Substantial to almost perfect interobserver agreement was achieved in all cases. At DSA, 349 diseased segments were found among the 1,137 segments evaluated. Sensitivity, specificity, and accuracy, based on a consensus reading of MDCTA, were 96%, 93%, and 94%, respectively. A statistically significant difference (P<.05) between DSA and MDCTA was present only in arteries graded 1 or 2. Interobserver agreement was almost perfect among the three readers for treatment recommendations based on findings at CTA and DSA.	2	2
27	18. 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.	Observational-Dx	212 patients	Data from renal, carotid and PAD of 212 patients. 107 had PAD. Vessel to vessel analysis went from sensitivity 86%, specificity 95%, PPV 89%, and NPV 80% in iliac arteries to the popliteal arteries where sensitivity 90%, specificity 96%, PPV 82%, and NPV 98%.	2	2
27	19. Heijnenbroek-Kal MH, Kock MC, Hunink MG. Lower extremity arterial disease: multidetector CT angiography meta-analysis. <i>Radiology</i> . 2007;245(2):433-439.	Meta-analysis	436 patients from 12 studies of 9,541 arterial segments	Of the 70 studies initially identified, 12 were included in which multidetector CT angiography was used to evaluate 9541 arterial segments in 436 patients. The pooled sensitivity and specificity for detecting a stenosis of at least 50% per segment were 92% (95% confidence interval: 89%, 95%) and 93% (95% confidence interval: 91%, 95%), respectively. Three studies provided data about the diagnostic performance of multidetector CT angiography in subdivisions of the arterial tract. The diagnostic performance of multidetector CT angiography in the infrapopliteal tract was lower than but not significantly different from that in the aortiliac (P > .11) and femoropopliteal (P > .40) tracts. Regression analysis showed that diagnostic performance was not significantly influenced by differences in study characteristics.	1 M	
27	20. Willmann JK, Wildermuth S, Pfammatter T, et al. Aortiliac and renal arteries: prospective intraindividual comparison of contrast-enhanced three-dimensional MR angiography and multi-detector row CT angiography. <i>Radiology</i> . 226(3):798-811, 2003 Mar.	Observational-Dx	46 patients; 2 readers	Sensitivity of MR angiography for detection of hemodynamically significant arterial stenosis was 92% for reader 1 and 93% for reader 2, and specificity was 100% and 99%, respectively. Sensitivity of CT angiography was 91% for reader 1 and 92% for reader 2, and specificity was 99% and 99%, respectively. Differences between the two modalities were not significant. Interobserver and intermodality agreement was excellent (kappa = 0.88-0.90). The time for performance of 3D reconstruction and image analysis of CT data sets was significantly longer than that for MR data sets (P <.001). Patient acceptance was best for CT angiography (P = .016).	1	1
27	21. Kayhan A, Palabiyik F, Serinsoz S, et al. Multidetector CT angiography versus arterial duplex USG in diagnosis of mild lower extremity peripheral arterial disease: is multidetector CT a valuable screening tool? <i>European journal of radiology</i> 2012;81:542-6.	Observational-Dx	43 patients; 774 vessel segments	A total of 774 vessel segments were imaged by both modalities. When all arteries were considered, MDCTA detected obstructed or stenotic lesions in 16.8% of arteries, versus 11.1% compared to DUS. When suprapopliteal arteries alone were considered, MDCTA detected lesions in 15.0% of arteries, versus 11.0% with DUS. When infrapopliteal arteries only were considered, MDCTA detected lesions in 19.6% of arteries, versus 11.3% with DUS. MDCTA showed 5.7% (95% CI: [3.5%, 7.9%]) more lesions than DUS when all arteries were considered together, 8.3% (95% CI: [4.6%, 12.0%]) more lesions when only the infrapopliteal arteries were compared, and 4.0% (95% CI: [1.3%, 6.8%]) more lesions when only suprapopliteal arteries were compared (p<0.01 for all comparisons).	2	2
27	25. 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.	Observational-Dx	79 patients	Precise agreement (%) and the percent of major discrepancies (segment classified as normal/mild stenosis on one study and severe stenosis/occlusion on the other) between MRA and ANGIO for respective arterial segments was as follows: common and external iliacs (n = 256) 77/3.5; superficial femoral and above-knee popliteal (n = 255) 73/6.7; below-knee popliteal (n = 131) 84/3.8; infrapopliteal runoff vessels (n = 864) 74/12.4; pedal vessels (n = 111) 69/19.8 Kappa values indicated moderate agreement (between MRA and angiography) beyond chance for all arterial segments. Treatment plans formulated by the attending surgeon, the MRA surgeon, and the angiography surgeon agreed in more than 85% of cases.	5	4
27	26. Jens S, Koelemay MJ, Reekers JA, Bipat S. Diagnostic performance of computed tomography angiography and contrast-enhanced magnetic resonance angiography in patients with critical limb ischaemia and intermittent claudication: systematic review and meta-analysis. <i>Eur Radiol</i> 2013;23:3104-14.	Meta-analysis	12 CTA, 30 CE-MRA studies; 673 and 1,404 participants, respectively	Out of 5,693 articles, 12 CTA and 30 CE-MRA studies were included, respectively evaluating 673 and 1,404 participants. Summary estimates of sensitivity and specificity were respectively 96% (95% CI, 93-98%) and 95% (95% CI, 92-97%) for CTA, and 93% (95% CI, 91-95%) and 94% (95% CI, 93-96%) for CE-MRA. Regression analysis showed that the prevalence of CLI in individual studies was not an independent predictor of sensitivity and specificity for either technique. Methodological quality of studies was moderate to good.	1 M	
27	27. 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.	Observational-Dx	106 patients	2,378 vessel segments were evaluated. In 2,156 segments, MRA and DSA were concordant for stenosis classification; in 188 segments the two modalities differed in one category, and in 24 segments they differed in two categories. MRA sensitivity 96.7%; and specificity 95.8%, for differentiating nonsignificant from hemodynamically significant stenosis (kappa = 0.91).	3	3
27	28. Iglesias J, Pena C. Computed tomography angiography and magnetic resonance angiography imaging in critical limb ischemia: an overview. [Review]. <i>Tech Vasc Interv Radiol</i> . 17(3):147-54, 2014 Sep.	Review/Other-Dx	N/A	No results in abstract	5	4

27	30. Hodnett PA, Ward EV, Davarpanah AH, et al. Peripheral arterial disease in a symptomatic diabetic population: prospective comparison of rapid unenhanced MR angiography (MRA) with contrast-enhanced MRA. <i>AJR Am J Roentgenol</i> 2011;197:1466-73.	Observational-Dx	25 diabetic patients	For this study, 775 segments were analyzed. On a per-segment basis, the mean values of the diagnostic accuracy of unenhanced MRA compared with reference CEMRA for two reviewers, reviewers 1 and 2, were as follows: sensitivity, 87.4% and 92.1%; specificity, 96.8% and 96.0%; positive predictive value, 90.8% and 94.0%; and negative predictive value, 95.5% and 94.6%. Substantial agreement was found when overall DSA results were compared with QISS unenhanced MRA ($\kappa = 0.68$) and CEMRA ($\kappa = 0.63$) in the subgroup of patients who also underwent DSA. There was almost perfect agreement between the two readers for stenosis scores, with Cohen's kappa values being greater than 0.80 for both MRA techniques.	2	2
27	31. 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.	Meta-analysis	N/A	With a random effects model, pooled sensitivity for MRA 97.5% was higher than that for duplex US 87.6%. Pooled specificities were similar: 96.2% for MRA and 94.7% for duplex US.	1	M
27	32. 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.	Experimental-Dx	352 total patients; 178 in contrast-enhanced MRA group and 174 in duplex US group	At 6 months, 352 patients (239 [68%] men, 113 [32%] women; mean age, 65 years) were analyzed. The use of contrast-enhanced MR angiography versus duplex US reduced the number of additional vascular imaging procedures by 42%; contrast-enhanced MR angiography was also associated with higher therapeutic confidence. Diagnostic costs for contrast-enhanced MR angiography were 167 euros (186 dollars) higher than those for duplex US ($P < .001$). No statistically significant differences were found for total cost, changes in disease severity, or changes in QOL between patients examined with duplex US and those examined with contrast-enhanced MR angiography ($P > .05$). Replacing duplex US with contrast-enhanced MRA for the initial imaging workup of patients with PAD reduces the need for additional imaging, although diagnostic costs are higher.	1	1
27	37. 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.	Observational-Dx	30 patients	For lesion $<$ or $>$ than 50%, sensitivity 77%, specificity 98%, PPV 94%, NPV 92%. These results are not significantly different from interobserver variability for angiography.	3	3
27	38. 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.	Observational-Dx	28 total patients 56 extremities	Overall sensitivity for duplex scanning compared to arteriography in detecting stenotic or occlusive disease was 91%, specificity was 94%, PPV 85% and NPV 97%. Results for Duplex scanning were better in the proximal and middle segment compared to the distal third of the superficial femoral artery. The sensitivity of segmental lower extremity pressures and pulse volume recordings for predicting proximal superficial femoral artery disease compared to arteriography was 82%; specificity was 79% and accuracy 80%, all inferior to that of Duplex scanning. Duplex US is suitable for noninvasive assessment of superficial femoral artery disease.	2	2
27	39. 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.	Observational-Dx	30 patients	An increase in peak systolic velocity of more than 200% accurately predicted a 50% or greater reduction in luminal diameter on angiography (70% sensitivity, 96% specificity). The presence of spectral broadening and an abnormal waveform shape were found to correlate poorly with the degree of stenosis. Analysis of variance showed no significant difference between observers in velocity measurements ($p = 0.79$). Although stenoses of greater than 50% can be distinguished from minor stenoses, more precise definition of the degree of narrowing is unlikely. The good repeatability of the velocity ratio makes it an excellent tool for monitoring major changes in the progression of disease.	5	4
27	41. 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.	Observational-Dx	55 patients	To recognize severe stenoses (50%-100% diameter reduction) in any arterial segment, duplex scanning had sensitivity and specificity rates of 74% and 96%. However, sensitivity and specificity rates increased to 80% and 98%, when there was no 50%-100% diameter-reducing lesion in adjacent segments, whereas they decreased to 66% and 94%, when there was at least one 50%-100% diameter-reducing lesion in adjacent segments. The results demonstrated that the presence of multiple stenoses was an important limitation of duplex scanning for the detection and quantification of lower limb arterial disease.	2	2
27	43. Chan KA, Junia A. Lower extremity peripheral artery disease: a basic approach. [Review]. <i>Br J Hosp Med (Lond)</i> . 81(3):1-9. 2020 Mar 02.	Review/Other-Dx	N/A	No results available.	5	4
168	255. Menke J, Larsen J. Meta-analysis: accuracy of contrast-enhanced magnetic resonance angiography for assessing steno-occlusions in peripheral arterial disease. <i>Ann Intern Med</i> 2010;153:325e34.	metaanalysis	1022	Data synthesis: The 32 included studies generally had high methodological quality. About 26% of the 1022 included patients had critical limb ischemia with pain at rest or tissue loss. Overall, the pooled sensitivity of MRA was 94.7% (95% CI, 92.1% to 96.4%) and the specificity was 95.6% (CI, 94.0% to 96.8%) for diagnosing segmental steno-occlusions. The pooled positive and negative likelihood ratios were 21.56 (CI, 15.70 to 29.69) and 0.056 (CI, 0.037 to 0.083), respectively. Magnetic resonance angiography correctly classified 95.3%, overstaged 3.1%, and understaged 1.6% of arterial segments. Limitation: Similar to most studies of computed tomographic angiography in PAD, the primary studies reported the diagnostic accuracy of MRA on a per-segment basis, not a per-patient basis.	1	
168	256. 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;285:1338e45.	metaanalysis	1090	Of 3583 studies initially identified, 34 were included that evaluated MRA in 1090 patients (72% men; median age, 65 years). Magnetic resonance angiography was highly accurate for assessment of all lower extremity arteries. Three-dimensional gadolinium-enhanced (3-D Gd) MRA improved diagnostic performance compared with 2-D MRA (relative diagnostic odds ratio, 2.8 [95% confidence interval, 1.2-6.4], adjusted for number of subdivisions within arterial tracts. The estimated points of equal sensitivity and specificity were 94% and 90% for 3-D Gd MRA and 2-D MRA, respectively.	1	
168	257. Ouwendijk R, de Vries M, Stijnen T, Pattynama PM, van Sambeek MR, Buth J, 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 Am J Roentgenol</i> 2008;190:1349e57.	experimental	514	With adjustment for potentially predictive baseline variables, the learning curve, and hospital setting, a significantly higher confidence and less additional imaging were found for MRA and CTA compared with duplex sonography. No statistically significant differences were found in improvement in functional patient outcomes and quality of life among the groups. The total costs were significantly higher for MRA and duplex sonography than for CTA.	1	
198	118. Burbelko M, Augsten M, Kalinowski MO, et al. Comparison of contrast-enhanced multi-station MR angiography and digital subtraction angiography of the lower extremity arterial disease. <i>J Magn Reson Imaging</i> . 2013;37:1427-35.	observational	485	Sensitivity and specificity ranged from 73% to 93% and 64% to 89% and were highest in the thigh area. Both readers showed comparable results. Evaluation of good and better quality MRAs resulted in a considerable improvement in diagnostic accuracy.	1	
198	120. Shareghi S, Gopal A, Gul K, et al. Diagnostic accuracy of 64 multidetector computed tomographic angiography in peripheral vascular disease. <i>Catheter Cardiovasc Interv</i> . 2010;75:23-31.	observational	28	For all segments evaluated, the overall diagnostic accuracy for detecting grade III and IV lesions was 98% with a sensitivity of 99% and a specificity of 98%. For the aorto-iliac segments, the diagnostic accuracy was 98% with a sensitivity of 100% and a specificity of 99%. For the femoro-popliteal segments, the overall accuracy was 98% with a sensitivity of 100% and a specificity of 99%. For the infra-popliteal segments, the overall accuracy was 98% with a sensitivity of 97% and a specificity of 99%. One segment could not be visualized by MDCT compared to 49 segments that could not be visualized by DSA.	1	
198	121. 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 Am J Roentgenol</i> . 2004;182:201-9.	observational	24	Of the 480 segments studied, 470 were assessable on both digital subtraction angiography and MDCT angiography. On digital subtraction angiography, 142 stenocclusive segments (20 mildly stenotic, 14 moderately stenotic, 25 severely stenotic, and 83 occluded) were detected. With regard to the detection of segments that had more than mild stenosis, the sensitivity, specificity, and accuracy of MDCT angiography were 99.2%, 99.1%, and 99.1%, respectively. In the 421 noncalcified and mildly calcified segments, the sensitivity, specificity, and accuracy of MDCT angiography for the detection of more-than-mild stenosis were 100%, 100%, and 100%, respectively.	1	

198	122. 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;3:361-9.	meta-analysis	-	The summary ROC curves demonstrated a high level of diagnostic performance for both types of duplex imaging, with color-guided duplex scanning being superior ($p = .022$). For example, at a false-positive rate of .05 (specificity = .95), the analysis predicted a true-positive rate (sensitivity) of .83 for duplex alone and .93 for color guided duplex. Differences in the case mix of the study population and study design did not affect the results. Furthermore, sensitivity analysis did not reveal a strong effect of any single study on the results.	1
245	38 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	observational	50	Mean sensitivity and specificity in the detection of significant stenoses (over 70%) were 100% and 99.5% in the iliac arteries, 97.4% and 99.0% in the femoropopliteal arteries, and 98.3% and 99.8% in the infrapopliteal arteries, respectively. High kappa values for exact stenoses gradation (0.74-1), lesion length (0.74-1), and number of lesions (0.71-1) were reached by MD-CTA, indicating high agreement with DSA.	3
245	39 Kreitner KF, Kunz RP, Herber S, Martenstein S, Dorweiler 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	observational	22	Consensus readings of MRA and DSA revealed higher image quality and fewer motion artifacts for MRA ($P = 0.021$ and $P = 0.008$, respectively, sign test); interobserver agreement was good ($\kappa = 0.78$) for image quality, and moderate ($\kappa = 0.46$) for motion artifacts. There were no differences between CE-MRA and DSA in detecting patent vessel segments with a high degree of agreement ($\kappa = 0.89$), and interobserver agreement for MRA was substantial ($\kappa = 0.89$). Significantly more vessels were assessed as partially occluded on DSA than on CE-MRA ($P = 0.004$). There was a good agreement between DSA and CE-MRA for assessment of relevant vessel stenosis ($\kappa = 0.61$); interobserver agreement for MRA was good ($\kappa = 0.65$). CE-MRA detected significantly more patent metatarsal arteries than did DSA ($P < 0.001$).	1
245	40 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	observational	40	There were 1720 segments for analysis. Duplex ultrasound depicting stenosis >50% demonstrated a sensitivity (S) 81.4%, specificity (E) 99%, positive predictive value (PPV) 96.2%, and negative predictive value (NPV) 94.8%. Occlusions showed S 90%, E 97%, PPV 98.1%, and NPV 88.4%. Magnetic resonance angiography depicting stenosis >50% demonstrated a S 91%, E 99%, PPV 96.7%, and NPV 97.6%. Occlusions showed S 95.4%, E 98%, PPV 98.4%, and NPV 94.7%.	1
245	41 Eiberg JP, Gronvall Rasmussen JB, Hansen MA, Schroeder TV. Duplex ultrasound scanning of peripheral arterial disease of the lower limb. <i>European Journal of Vascular and Endovascular Surgery.</i> 2010; 40(4):507-512	observational	169	The agreement between DUS and DSA was very good ($\kappa > 0.8$) or good ($0.8 \geq \kappa > 0.6$) in most segments, but moderate ($0.6 \geq \kappa > 0.4$) in the tibio-peroneal trunk and the peroneal artery. Agreement between the two techniques was significantly better in the supragenicular ($\kappa = 0.75$ (95% confidence interval (CI): 0.70-0.80)) than in the infragenicular segments ($\kappa = 0.63$ (0.59-0.67)) ($p < 0.001$). Similarly, the technical success rate was significantly higher in the supragenicular segments (DUS: 100%; DSA: 99%) than in the infragenicular segments (both 93%) ($p < 0.001$). DUS was the best technique for imaging of the distal crural arteries (92% vs. 97%; $p < 0.001$) and DSA was the best technique for imaging of the proximal crural arteries (95% vs. 91%; $p < 0.01$). Neither the agreement nor the technical success rate was influenced by the severity of PAD, that is, IC versus CLI.	3
245	42 Gjonnaess E, Morken B, Sandbaek G, Stranden E, Slagsvold 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	observational	58	The sensitivity (specificity in parentheses) for significant obstructions in the suprainguinal region were 96% (94%) for CE-MRA and 91% (96%) for CDU, in the thigh region 92% (95%) for CE-MRA and 76% (99%) for CDU, and in the knee region 93% (96%) for CE-MRA and 33% (98%) for CDU. CDU failed to visualize 10% of suprainguinal, 2% of thigh and 13% of knee-region arterial segments.	1
245	43 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	observational	20	First-pass MR angiography with gadofosveset had good diagnostic utility in 83.9% of all segments and no venous contamination in 96.8% of all segments. There was no difference between the performance of intraarterial digital subtraction angiography and that of i.v. contrast-enhanced MR angiography in arterial visibility overall ($p = 0.245$) or in subgroup analysis of surgical arterial bypass targets ($p = 0.202$). The overall sensitivity, specificity, and accuracy of i.v. gadofosveset-enhanced MR angiography for characterization of clinically significant stenosis and occlusion were 91.4%, 96.1%, and 93.9%. In the subgroup analysis, the sensitivity, specificity, and accuracy were 85.5%, 96.5%, and 92.1%.	2
245	44 Napoli A, Anzidei M, Zaccagna F, Cavallo Marincola B, Zini C, Brachetti 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	observational	212	A total of 7420 arterial segments were evaluated, with excellent agreement between readers ($\kappa \geq 0.928$). On a segmental basis, both sensitivity and specificity for stenosis of 70% or more were at least 96% (3072 of 3113 segments and 4141 of 4279 segments, respectively), with an accuracy of 98% (7213 of 7392 segments), a PPV of 96% (3072 of 3187 segments), an NPV of 99% (3141 of 3187 segments), a PLR of 36.7, and an NLR of 0.013. There was no significant difference between CT angiographic and DSA findings ($P = .62-.87$). In accordance with TASC II guidelines, 49 patients were referred for conservative treatment, 87 underwent endovascular procedures, 38 underwent surgery, and 17 received hybrid treatment. Therapy recommendations based on CT angiographic findings alone were identical to those based on DSA findings in all but one patient.	2
168 245 36	10. Collins R, Cranny G, Burch J, Aguiar-Ibáñez 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 Technol Assess</i> 2007;11:iii-iv, xi-xiii, 1-184	review	-	A total of 113 studies met the inclusion criteria (including six economic evaluations). For the detection of stenosis greater than 50% in the whole leg, contrast-enhanced (CE) MRA (14 studies) had the highest diagnostic accuracy, with sensitivity ranging from 92 to 99.5% and specificity from 64 to 99%. Two-dimensional (2D) time-of-flight (TOF) MRA (11 studies) was less accurate, with sensitivity ranging from 79 to 94% and specificity from 74 to 92%. 2D phase-contrast (PC) MRA (one study) had a sensitivity of 98% and specificity of 74%. CTA (seven studies) also appeared slightly inferior to CE MRA, with a sensitivity ranging from 89 to 99% and specificity from 83 to 97%, but better than DUS (28 studies), which had a sensitivity ranging from 80 to 98% and specificity from 89 to 99%. There was some indication that CE MRA and DUS were more accurate for detecting stenoses/occlusions above the knee than below the knee or in the pedal artery. The four studies of patient attitudes strongly suggested that patients preferred CE MRA to CA. CA was considered the most uncomfortable test, followed by CE MRA, with CTA being the least uncomfortable. Half of the patients (from a sample who did not suffer from claustrophobia and had no metallic implants) expressed no preference between undergoing TOF MRA or DUS; most of those who did express a preference favoured TOF MRA. In the 55 studies identified for adverse events, MRA was associated with the highest reported proportion. However, the most severe adverse events were more common in patients undergoing CA; although these were rare for both tests. The economic evaluation showed DUS dominated the other alternatives when the whole leg was assessed, by presenting higher effectiveness at a lower cost per quality-adjusted life-year (QALY; i.e. 13,646 pounds per QALY). When the assessment was limited to a section of the leg, either above the knee or below	1

36	11. 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	observational	334	Overall, color Doppler sonography revealed diagnostic agreement with angiography in 668 of 714 lesions (93.5%), including 343 of 369 (92.9%) nonsignificant stenoses, 279 of 297 (93.9%) significant stenoses, and 46 of 48 (95.8%) occlusions. Overestimation occurred in 26 of 369 (7%) nonsignificant stenoses and 3 of 297 (1%) significant stenoses. Underestimation was observed in 15 of 297 (5%) significant stenoses and in 2 of 48 (4.2%) occlusions. Peak systolic velocity ratio correlated better ($P < 0.01$) than peak systolic velocity with diameter reduction percentage as assessed at angiography.	2
36	12. 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	observational	79	Rates of sensitivity and specificity of arterial duplex mapping for identifying a high-grade stenosis at the three arterial levels were 88% and 97%, 95% and 100%, and 78% and 99%, respectively. Those for segmental Doppler pressures were 59% and 86%, 73% and 80%, and 48% and 53%, respectively. There was complete agreement between arterial duplex mapping and angiography in 82% of the limbs studied and between segmental pressures and angiography in 34% of the limbs ($p < 0.0001$). The presence of diabetes, kidney failure, or previous vascular surgery in the limb studied did not affect the accuracy of either test.	3
36	13. Rieker O, Düber C, Schmiedt W, von Zitzewitz H, Schweden F, Thelen M. Prospective comparison of CT angiography of the legs with intraarterial digital subtraction angiography. <i>AJR Am J Roentgenol</i> 1996;166:269-276	observational	50	The sensitivities of CTA were 100% for the diagnosis of femoral artery occlusion, 100% for the detection of popliteal artery (including tibial-peroneal arterial trunk) occlusion, and 94% for the detection of tibial artery occlusion. The specificities were 100%, 99%, and 98%, respectively. When maximum-intensity-projection images were interpreted without axial scans, sensitivities were 98%, 85%, and 92% and specificities were 100%, 99%, and 97%, respectively. For the accurate grading of high-grade (75-99%) stenoses of the superficial femoral artery and the popliteal artery (including tibial-peroneal arterial trunk), the sensitivities of CTA were 88% and 73% and the specificities were 94% and 100%, respectively. When maximum-intensity-projection images alone were used, the sensitivities for the correct grading of high-grade stenoses were 58% and 36% and the specificities were 99% and 100%, respectively.	3
36	14. 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	observational	24	A mean scanning time of 66 seconds was required to cover a mean of 1,233 mm, resulting in a mean of 908 transverse reconstructions. All 504 arterial segments were depicted and analyzable. Mean arterial attenuation ranged from 253 HU in the midabdominal aorta to 357 HU in the popliteal artery and 253 HU in the dorsalis pedis or posterior tibial artery measured inferior to the tibiotalar joint. Maximum mean venous enhancement (99 HU) was observed in the saphenous vein at the ankle, with all other venous stations measuring less than 74 HU.	3
36 168	15. 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	metaanalysis	957	Of 909 studies identified, 20 (2.2%) met the inclusion criteria. These 20 studies had a median sample size of 33 (range, 16-279) and included 957 patients, predominantly with intermittent claudication (68%). Methodological quality was moderate. Overall, the sensitivity of CTA for detecting more than 50% stenosis or occlusion was 95% (95% confidence interval [CI], 92%-97%) and specificity was 96% (95% CI, 93%-97%). Computed tomography angiography correctly identified occlusions in 94% of segments, the presence of more than 50% stenosis in 87% of segments, and absence of significant stenosis in 96% of segments. Overstaging occurred in 8% of segments and understaging in 15%.	1
36	16. Khilnani NM, Winchester PA, Prince MR, Vidan E, Trost DW, Bush HL Jr, 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	observational	30	The three readers selected identical segments for inflow at MR angiography and x-ray angiography in 32, 32, and 35 of the 35 limbs evaluated (mean percentages of agreement [95% CI]: 91% [77%, 98%], 91% [77%, 98%], and 95% [90%, 100%], respectively). The readers selected identical segments for outflow in 32, 32, and 34 of the 35 limbs evaluated (mean percentages of agreement [95% CI]: 91% [77%, 98%], 91% [77%, 98%], and 97% [85%, 100%], respectively).	2
36	17. Kreitner KF, Kalden P, Neufang A, Düber C, Krummenauer 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	observational	24	MR angiography was significantly better than DSA in revealing peripheral runoff vessels ($p < 0.001$). In nine (38%) of the 24 patients, MR angiography showed patent pedal vessels suitable for distal bypass grafting that were not revealed by DSA. Because of the results of MR angiography, treatment plans changed in seven of the nine patients in whom patent vessels were subsequently used as target vessels for distal pedal bypass grafts.	2
36	18. 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	observational	39	Sensitivity and specificity values for MR angiography regarding the assessment of grafts were 100% for 87 evaluable segments for which digital subtraction angiography correlation was available: stenosis ($n = 10$), occlusions ($n = 9$), ectasia or aneurysms ($n = 8$). Six segments could not be assessed because of the presence of intravascular stents or metallic clips.	3
36	19. 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	observational	15	Using both techniques, 70 of 75 evaluated locations (93.3%) were classified identically. This included six stenoses $< 50\%$ and six stenoses $> 50\%$, respectively. Four of five overestimations of stenoses were scaled in DSA as stenoses type 1. One stenosis was categorized as type 3 in DSA. Sensitivity for CE MRA for detecting stenoses $> \text{or} = 25\%$ was 100% and the specificity 90%. Interobserver agreement for all evaluations was 0.77 (Spearman rank correlation test).	3