

표 1. 인터벤션 핵심질문 2 근거표

핵심질문 2

| 문헌정보                                                                                                                                                                                                                                         | 연구유형             | 대상자 수                 | 문헌 질<br>KCIG |
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| Stavropoulos SW, Clark TW, Carpenter JP, et al. Use of CT angiography to classify endoleaks after endovascular repair of abdominal aortic aneurysms. J Vasc Interv Radiol. 2005; 16(5):663-667.                                              | Observational-Dx | 36 patients           | 1            |
| Tse DM, Tapping CR, Patel R, et al. Surveillance after endovascular abdominal aortic aneurysm repair. [Review]. Cardiovasc Intervent Radiol. 37(4):875-88, 2014 Aug.                                                                         | Review/Other-Dx  |                       | 2            |
| Bredahl K, Taudorf M, Long A, et al. Three-dimensional ultrasound improves the accuracy of diameter measurement of the residual sac in EVAR patients. Eur J Vasc Endovasc Surg. 46(5):525-32, 2013 Nov.                                      | Observational-Dx | 124 patients          | 2            |
| AbuRahma AF, Welch CA, Mullins BB, Dyer B. Computed tomography versus color duplex ultrasound for surveillance of abdominal aortic stent-grafts. J Endovasc Ther. 2005; 12(5):568-573.                                                       | Observational-Dx | 178 patients          | 2            |
| Bargellini I, Cioni R, Napoli V, et al. Ultrasonographic surveillance with selective CTA after endovascular repair of abdominal aortic aneurysm. J Endovasc Ther. 2009; 16(1):93-104.                                                        | Observational-Dx | 196 patients          | 2            |
| Hoffmann B, Bessman ES, Um P, Ding R, McCarthy ML. Successful sonographic visualisation of the abdominal aorta differs significantly among a diverse group of credentialed emergency department providers. Emerg Med J. 2011; 28(6):472-476. | Observational-Dx | 278 consecutive       | 3            |
| Millen A, Canavati R, Harrison G, et al. Defining a role for contrast-enhanced ultrasound in endovascular aneurysm repair surveillance. J Vasc Surg. 58(1):18-23, 2013 Jul.                                                                  | Observational-Dx | 539 patients          | 3            |
| Picel AC, Kansal N. Essentials of endovascular abdominal aortic aneurysm repair imaging: postprocedure surveillance and complications. [Review]. AJR Am J Roentgenol. 203(4):W358-72, 2014 Oct.                                              | Review/Other-Dx  |                       | 5            |
| Garg T, Baker LC, Mell MW. Adherence to postoperative surveillance guidelines after endovascular aortic aneurysm repair among Medicare beneficiaries. J Vasc Surg. 61(1):23-7, 2015 Jan.                                                     | Review/Other-Dx  | 9,695 patients        | 5            |
| Gill HL, Ladowski S, Sudarshan M, et al. Predictive value of negative initial postoperative imaging after endovascular aortic aneurysm repair. J Vasc Surg. 60(2):325-9, 2014 Aug.                                                           | Observational-Dx | 134 patients          | 2            |
| Patel MS, Carpenter JP. The value of the initial post-EVAR computed tomography angiography scan in predicting future secondary procedures using the Powerlink stent graft. J Vasc Surg. 2010;                                                | Observational-Dx | 345 patients<br>1,519 | 2            |

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| 52(5):1135–1139.                                                                                                                                                                                                                                                                                                                                                              |                  | post-EVAR<br>CT scans |   |
| Sternbergh WC, 3rd, Greenberg RK, Chuter TA, Tonnessen BH. Redefining postoperative surveillance after endovascular aneurysm repair: recommendations based on 5-year follow-up in the US Zenith multicenter trial. <i>J Vasc Surg.</i> 2008; 48(2):278–284; discussion 284–275.                                                                                               | Observational-Tx | 739 patients          | 2 |
| Farner MC, Carpenter JP, Baum RA, Fairman RM. Early changes in abdominal aortic aneurysm diameter after endovascular repair. <i>J Vasc Interv Radiol.</i> 2003; 14(2 Pt 1):205–210.                                                                                                                                                                                           | Observational-Dx | 63 patients           | 2 |
| Cayne NS, Veith FJ, Lipsitz EC, et al. Variability of maximal aortic aneurysm diameter measurements on CT scan: significance and methods to minimize. <i>J Vasc Surg.</i> 2004; 39(4):811–815.                                                                                                                                                                                | Observational-Dx | 23 patients           | 2 |
| Bargellini I, Cioni R, Petrucci P, et al. Endovascular repair of abdominal aortic aneurysms: analysis of aneurysm volumetric changes at mid-term follow-up. <i>Cardiovasc Intervent Radiol.</i> 2005; 28(4):426–433.                                                                                                                                                          | Observational-Dx | 63<br>consecutive     | 2 |
| Demehri S, Signorelli J, Kumamaru KK, et al. Volumetric quantification of type II endoleaks: an indicator for aneurysm sac growth following endovascular abdominal aortic aneurysm repair.[Erratum appears in <i>Radiology.</i> 2015 Oct;277(1):308 Note: Steinger, Michael L [corrected to Steigner, Michael L]; PMID: 26402504]. <i>Radiology.</i> 271(1):282–90, 2014 Apr. | Observational-Dx | 72 patients           | 2 |
| Prinssen M, Verhoeven EL, Verhagen HJ, Blankensteijn JD. Decision-making in follow-up after endovascular aneurysm repair based on diameter and volume measurements: a blinded comparison. <i>Eur J Vasc Endovasc Surg.</i> 2003; 26(2):184–187.                                                                                                                               | Observational-Dx | 82 patients           | 1 |
| Bley TA, Chase PJ, Reeder SB, et al. Endovascular abdominal aortic aneurysm repair: nonenhanced volumetric CT for follow-up. <i>Radiology.</i> 2009;253(1):253–262.                                                                                                                                                                                                           | Observational-Dx | 70 patients           | 2 |
| Bobadilla JL, Suwanabol PA, Reeder SB, Pozniak MA, Bley TA, Tefera G. Clinical implications of non-contrast-enhanced computed tomography for follow-up after endovascular abdominal aortic aneurysm repair. <i>Ann Vasc Surg.</i> 27(8):1042–8, 2013 Nov.                                                                                                                     | Observational-Dx | 126 patients          | 3 |
| Cani A, Cotta E, Recalchini C, et al. Volumetric analysis of the aneurysmal sac with computed tomography in the follow-up of abdominal aortic aneurysms after endovascular treatment. <i>Radiol Med (Torino).</i> 117(1):72–84, 2012 Feb.                                                                                                                                     | Observational-Dx | 33 patients           | 2 |
| Nambi P, Sengupta R, Krajcer Z, Muthupillai R, Strickman                                                                                                                                                                                                                                                                                                                      | Observational-Dx | 316                   | 2 |

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| N, Cheong BY. Non-contrast computed tomography is comparable to contrast-enhanced computed tomography for aortic volume analysis after endovascular abdominal aortic aneurysm repair. <i>Eur J Vasc Endovasc Surg.</i> 2011; 41(4):460-466.                                                                   |                  | consecutive                  |   |
| Caldwell DP, Pulfer KA, Jaggi GR, Knuteson HL, Fine JP, Pozniak MA. Aortic aneurysm volume calculation: effect of operator experience. <i>Abdom Imaging.</i> 2005; 30(3):259-262.                                                                                                                             | Observational-Dx | 10 patients                  | 5 |
| Czermak BV, Fraedrich G, Schocke MF, et al. Serial CT volume measurements after endovascular aortic aneurysm repair. <i>J Endovasc Ther.</i> 2001; 8(4):380-389.                                                                                                                                              | Observational-Dx | 53 patients                  | 3 |
| Merkle EM, Klein S, Kramer SC, Wisianowsky C. MR angiographic findings in patients with aortic endoprostheses. <i>AJR.</i> 2002; 178(3):641-648.                                                                                                                                                              | Review/Other-Dx  |                              | 5 |
| Klemm T, Duda S, Machann J, et al. MR imaging in the presence of vascular stents: A systematic assessment of artifacts for various stent orientations, sequence types, and field strengths. <i>J Magn Reson Imaging.</i> 2000; 12(4):606-615.                                                                 | Review/Other-Dx  | 8 different stent types      | 5 |
| Ayuso JR, de Caralt TM, Pages M, et al. MRA is useful as a follow-up technique after endovascular repair of aortic aneurysms with nitinol endoprostheses. <i>J Magn Reson Imaging.</i> 2004; 20(5):803-810.                                                                                                   | Observational-Dx | 28 patients                  | 2 |
| Habets J, Zandvoort HJ, Reitsma JB, et al. Magnetic resonance imaging is more sensitive than computed tomography angiography for the detection of endoleaks after endovascular abdominal aortic aneurysm repair: a systematic review. [Review]. <i>Eur J Vasc Endovasc Surg.</i> 45(4):340-50, 2013 Apr.      | Review/Other-Dx  | 11 Articles;<br>369 Patients | 2 |
| Pitton MB, Schweitzer H, Herber S, et al. MRI versus helical CT for endoleak detection after endovascular aneurysm repair. <i>AJR.</i> 2005; 185(5):1275-1281.                                                                                                                                                | Observational-Dx | 52 patients                  | 2 |
| Lookstein RA, Goldman J, Pukin L, Marin ML. Time-resolved magnetic resonance angiography as a noninvasive method to characterize endoleaks: initial results compared with conventional angiography. <i>J Vasc Surg.</i> 2004; 39(1):27-33.                                                                    | Observational-Dx | 12 patients                  | 2 |
| Ersoy H, Jacobs P, Kent CK, Prince MR. Blood pool MR angiography of aortic stent-graft endoleak. <i>AJR Am J Roentgenol.</i> 2004;182(5):1181-1186.                                                                                                                                                           | Observational-Dx | 7 patients                   | 2 |
| Ichihashi S, Marugami N, Tanaka T, et al. Preliminary experience with superparamagnetic iron oxide-enhanced dynamic magnetic resonance imaging and comparison with contrast-enhanced computed tomography in endoleak detection after endovascular aneurysm repair. <i>J Vasc Surg.</i> 58(1):66-72, 2013 Jul. | Observational-Dx | 23 patients                  | 1 |

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| Resta EC, Secchi F, Giardino A, et al. Non-contrast MR imaging for detecting endoleak after abdominal endovascular aortic repair. <i>Int J Cardiovasc Imaging</i> . 29(1):229–35, 2013 Jan.                                                                                      | Observational-Dx | 23 patients  | 2 |
| Ashoke R, Brown LC, Rodway A, et al. Color duplex ultrasonography is insensitive for the detection of endoleak after aortic endografting: a systematic review. <i>J Endovasc Ther</i> . 2005; 12(3):297–305.                                                                     | Meta-analysis    |              | 1 |
| Sun Z. Diagnostic value of color duplex ultrasonography in the follow-up of endovascular repair of abdominal aortic aneurysm. <i>J Vasc Interv Radiol</i> . 2006; 17(5):759–764.                                                                                                 | Meta-analysis    |              | 1 |
| Gargiulo M, Gallitto E, Serra C, et al. Could four-dimensional contrast-enhanced ultrasound replace computed tomography angiography during follow up of fenestrated endografts? Results of a preliminary experience. <i>Eur J Vasc Endovasc Surg</i> . 48(5):536–42, 2014 Nov.   | Observational-Dx | 22 patients  | 2 |
| Gurtler VM, Sommer WH, Meimarakis G, et al. A comparison between contrast-enhanced ultrasound imaging and multislice computed tomography in detecting and classifying endoleaks in the follow-up after endovascular aneurysm repair. <i>J Vasc Surg</i> . 58(2):340–5, 2013 Aug. | Observational-Dx | 171 patients | 2 |
| .Perini P, Sediri I, Midulla M, Delsart P, Gautier C, Haulon S. Contrast-enhanced ultrasound vs. CT angiography in fenestrated EVAR surveillance: a single-center comparison. <i>J Endovasc Ther</i> . 19(5):648–55, 2012 Oct.                                                   | Observational-Dx | 62 patients  | 2 |
| Gray C, Goodman P, Herron CC, et al. Use of colour duplex ultrasound as a first line surveillance tool following EVAR is associated with a reduction in cost without compromising accuracy. <i>Eur J Vasc Endovasc Surg</i> . 44(2):145–50, 2012 Aug.                            | Observational-Dx | 145 patients | 2 |
| Abbas A, Hansrani V, Sedgwick N, Ghosh J, McCollum CN. 3D contrast enhanced ultrasound for detecting endoleak following endovascular aneurysm repair (EVAR). <i>Eur J Vasc Endovasc Surg</i> . 47(5):487–92, 2014 May.                                                           | Observational-Dx | 23 patients  | 2 |
| Karthikesalingam A, Al-Jundi W, Jackson D, et al. Systematic review and meta-analysis of duplex ultrasonography, contrast-enhanced ultrasonography or computed tomography for surveillance after endovascular aneurysm repair. <i>Br J Surg</i> 2012;99:1514–23.                 | Meta-analysis    |              | 1 |
| Causey MW, Jayaraj A, Leotta DF, et al. Three-dimensional ultrasonography measurements after endovascular aneurysm repair. <i>Ann Vasc Surg</i> . 27(2):146–53, 2013 Feb.                                                                                                        | Observational-Dx | 7 patients   | 2 |
| Collins JT, Boros MJ, Combs K. Ultrasound surveillance                                                                                                                                                                                                                           | Observational-Dx | 160          | 3 |

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| of endovascular aneurysm repair: a safe modality versus computed tomography. <i>Ann Vasc Surg.</i> 2007; 21(6):671–675.                                                                                                                                                                                               |               | patients     |   |
| Chaikof EL, Dalman RL, Eskandari MK, et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. <i>J Vasc Surg.</i> 2018 Jan;67(1):2–77.                                                                                                                  | Guideline     |              | 1 |
| Go MR, Barbato JE, Rhee RY, Makaroun MS. What is the clinical utility of a 6-month computed tomography in the follow-up of endovascular aneurysm repair patients? <i>J Vasc Surg</i> 2008;47:1181–6.                                                                                                                  | Observational | 376 patients | 2 |
| Chung J, Kordzadeh A, Prionidis I, Panayiotopoulos Y, Browne T. Contrast-enhanced ultrasound (CEUS) versus computed tomography angiography (CTA) in detection of endoleaks in post-EVAR patients. Are delayed type II endoleaks being missed? A systematic review and metaanalysis. <i>J Ultrasound</i> 2015;18:91–9. | Meta-analysis |              | 1 |
| Zimmermann H, D'Anastasi M, Rjosk-Dendorfer D, Helck A, Meimarakis G, Reiser M, et al. Value of high-resolution contrast-enhanced ultrasound in detection and characterisation of endoleaks after EVAR. <i>Clin Hemorheol Microcirc</i> 2014;58:247–60.                                                               | Observational | 80 patients  | 2 |
| Nyheim T, Staxrud LE, Rosen L, Slagsvold CE, Sandbaek G, Jorgensen JJ. Review of postoperative CT and ultrasound for endovascular aneurysm repair using Talent stent graft: can we simplify the surveillance protocol and reduce the number of CT scans? <i>Acta Radiol</i> 2013;54:54–8.                             | Observational | 56 patients  | 2 |
| Mirza TA, Karthikesalingam A, Jackson D, Walsh SR, Holt PJ, Hayes PD, et al. Duplex ultrasound and contrast-enhanced ultrasound versus computed tomography for the detection of endoleak after EVAR: systematic review and bivariate metaanalysis. <i>Eur J Vasc Endovasc Surg</i> 2010;39:418–28.                    | Meta-analysis |              | 1 |
| Fearn S, Lawrence-Brown MM, Semmens JB, Hartley D. Followup after endovascular aortic aneurysm repair: the plain radiograph has an essential role in surveillance. <i>J Endovasc Ther</i> 2003;10:894–901.                                                                                                            | Review        |              | 5 |
| Wanhainen A, Bergqvist D, Björck M. Measuring the abdominal aorta with ultrasonography and computed tomography – difference and variability. <i>Eur J Vasc Endovasc Surg</i> 2002;24:428–34.                                                                                                                          | Observational | 61 patients  | 1 |
| Beeman BR, Murtha K, Doerr K, McAfee-Bennett S, Dougherty MJ, Calligaro KD. Duplex ultrasound factors predicting persistent type II endoleak and increasing AAA sac diameter after EVAR. <i>J Vasc Surg</i> 2010;52:1147–52.                                                                                          | Observational | 278 patients | 2 |
| Bastos Goncalves F, Baderkhan H, Verhagen HJ,                                                                                                                                                                                                                                                                         | Observational | 597          | 1 |

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| Wanhainen A, Björck M, Stolker RJ, et al. Early sac shrinkage predicts a low risk of late complications after endovascular aortic aneurysm repair. Br J Surg 2014;101:802–10.                                                                                                                                |               | patients        |   |
| Bastos Goncalves F, van de Luitgaarden KM, Hoeks SE, Hendriks JM, Ten Raa S, Rouwet EV, et al. Adequate seal and no endoleak on the first postoperative computed tomography angiography as criteria for no additional imaging up to 5 years after endovascular aneurysm repair. J Vasc Surg 2013;57:1503–11. | Observational | 131 patients    | 2 |
| Brown LC, Greenhalgh RM, Powell JT, Thompson SG. Use of baseline factors to predict complications and reinterventions after endovascular repair of abdominal aortic aneurysm. Br J Surg 2010;97:1207–17.                                                                                                     | Observational | 756 patients    | 2 |
| Karthikesalingam A, Holt PJ, Hinchliffe RJ, Nordon IM, Loftus IM, Thompson MM. Risk of reintervention after endovascular aortic aneurysm repair. Br J Surg 2010;97:657–63.                                                                                                                                   | Observational | 533 patients    | 3 |
| Baderkhan H, Haller O, Wanhainen A, Björck M, Mani K. Followup after endovascular aortic aneurysm repair can be stratified based on first postoperative imaging. Br J Surg 2018;105:709–18.                                                                                                                  | Observational | 326 patients    | 1 |
| Schanzer A, Greenberg RK, Hevelone N, Robinson WP, Eslami MH, Goldberg RJ, et al. Predictors of abdominal aortic aneurysm sac enlargement after endovascular repair. Circulation 2011;123:2848–55.                                                                                                           | Observational | 10,228 patients | 1 |