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Evaluation intraoperativer 3D Bildgebungsverfahren im Hybrid-OP im Rahmen der endovaskulären Aortenchirurgie

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Feasibility and accuracy of fusion imaging during thoracic endovascular aortic repair

Objective: To evaluate accuracy and feasibility of fusion imaging during thoracic endovascular aortic repair (TEVAR). **Methods:** From January 2013 to January 2015 fusion imaging was used in 18 TEVAR procedures. Patients were prospectively enrolled for the survey and informed consent was obtained. Planning of the procedure and computed tomography (CT) angiography (CTA) segmentation with determination of all relevant surgical landmarks that should be displayed on fusion imaging was done using the preoperative CTA data. The registration was done with an intraoperative noncontrast-enhanced conebeam CT and CTA (three-dimensional [3D-3D registration; n=15] or with two fluoroscopic images in anteroposterior and lateral projection and the CTA (two-dimensional-3D registration; n [3). An intraoperative digital subtraction angiography was performed to adjust fusion imaging and to allow accuracy measurement.

Results: Fusion imaging was possible in all included patients. The median dose for non contrast-enhanced cone beam CT imaging was 28.6 Gy/cm² (range, 17.9-43.3) and 0.46 Gy/cm² for two fluoroscopic images in the two-dimensional-3D group. Full accuracy was achieved in two cases (11%), with a median deviation of 11.7 mm (range, 0.0-37.2). Manual realignment was possible in all cases.

Conclusions: This early experience shows that fusion imaging is feasible in TEVAR procedures using different registration methods. However, it shows a significant deviation in thoracic procedures because of different sources of error, making confirmation of fusion overlay with a digital subtraction angiography necessary in any case. (J Vasc Surg 2016; 63:314-22.)

Intraoperative contrast-enhanced cone beam computed tomography to assess technical success during endovascular aneurysm repair

Background: The aim of the study was to analyze the use of contrast-enhanced cone beam computed tomography (ceCBCT) during endovascular aneurysm repair (EVAR) and to compare this imaging modality with standard completion digital subtraction angiography (cDSA) and postoperative computed tomography angiography (CTA) regarding the detection of endograft-associated complications.

Methods: Between September 2012 and April 2015, ceCBCT was used in 98 EVAR patients in addition to cDSA and CTA. Endoleaks, intraluminal thrombus and limb stenoses, contrast agent use, and radiation exposure were recorded for all modalities.

Results: cDSA detected 16 (16.3%) endoleaks; ceCBCT, 35 (35.7%) endoleaks; and CTA, 22 (22.4%) endoleaks. All endoleaks identified by cDSA or CTA were also seen on ceCBCT. ceCBCT detected intraluminal thrombus in three patients (none in cDSA or CTA) and

previously undetected limb stenoses in three patients. It prompted intraoperative interventions in 7 of 98 patients (7.1%). Replacing cDSA and CTA by ceCBCT would have caused a 39% reduction of inhospital contrast agent volume in this cohort.

Conclusions: ceCBCT can reliably detect all endograft-associated complications during EVAR. It offers the chance for immediate revision of remediable problems in a relevant proportion of patients and could thus reduce early reintervention rates. ceCBCT can safely replace early follow-up CTA and thereby reduce in-hospital use of contrast media. (J Vasc Surg 2016;64:577-84.)