

Infrarenal aortic aneurysm repair using a modular bifurcated stent graft with an OEC Elite CFD

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Clinical challenge

Throughout the last decade, endovascular aortic repair has become a preferred surgical technique¹ to prevent the risk of aneurysmal rupture for eligible patients. Patient selection relies on strict anatomical criteria. The preoperative planning of the procedure includes careful analysis of the morphology of the aortic lesion and the access to the iliac artery. Only then is the feasibility and the stent graft sizing determined. The procedure is then performed under fluoroscopy guidance. Depending on the complexity of the navigation (artery calcification, tortuosity, diameter) and patient thickness, the amount of X-ray radiation can be significant, and needs to be managed.

Solution

The procedure was performed with the assistance of X-ray imaging from an OEC Elite CFD C-arm, and an ImagiQ2™ (Stille AB, Solna Sweden) surgical table. In order to limit radiation exposure, the fluoroscopy technique was set to 'low dose' with 8 pulses per second. Each fluoroscopy sequence was recorded and replayed at the speed of 8 images per second. The recording and the replay of all the image sequences allows the physician to inject small amounts of contrast media to support the navigation of the tools, without using the Digital Subtraction Angiography (DSA) technique that is higher in X-ray dose. The contrast agent used was Xenetix® 300mg/dl (Guerbet, France), diluted by half over the whole procedure.

Clinical Example

An 88-year-old male presented an 80 mm diameter aortic infrarenal aneurysm. Patient was eligible for endovascular treatment and underwent an infrarenal aortic repair with a bifurcated modular aortic stent graft (Zenith Alpha™ Abdominal and Zenith® Spiral® -Z AAA Iliac Leg, Cook Medical Inc, USA). Patient's BMI was about 30.9 kg/m2 (100 kg and 1.80 m).

Procedure

The procedure was performed under general anesthesia. Arterial access was gained percutaneously (ProGlide, Abbott Vascular, US) under ultrasound guidance. The preoperative planning assessed the best projection to optimize the visualization

of the origin of the lowest renal artery. After introduction of the bifurcated body and before deployment, a short angiography with subtraction was completed with 7cc of contrast media. Then, the catheterization of the contralateral stump of the bifurcated body and the deployment of both iliac leg extensions were achieved while preserving the hypogastric origins. Final subtracted angiography with 12.5cc of contrast media,

confirmed aneurysmal exclusion, renals, hypogastrics and stentgraft patency.

- The entire procedure lasted 40 minutes.
- The total fluoroscopy time used for the procedure was 1 min 56s.
- The total Dose Area Product (DAP) was 2.09 Gy.cm².
- The amount of contrast volume injected was 40ml.

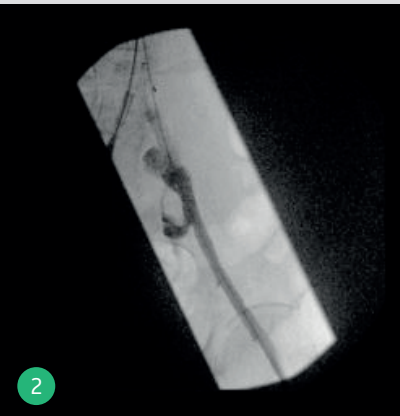
Conclusion

The chosen fluoroscopy mode allowed the realization of an infrarenal aortic aneurysm repair procedure managing a low dose level of about 2 Gy.cm² for 2 min of fluoroscopy. □

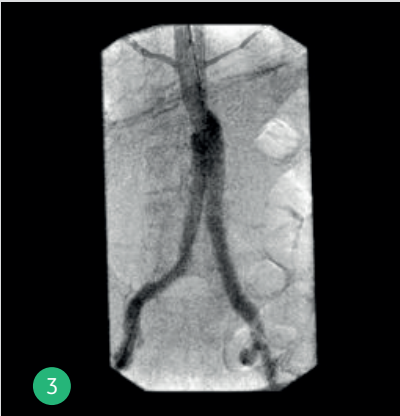
DSA & CINE FLUORO CONTROL IMAGES



DSA: intraoperative angiogram showing aneurysm sac at the aortic level.



Cine fluoro acquisition showing the origin of the left hypogastric artery.



Final DSA acquisition showing the good patency of the stent graft and good exclusion of the aneurysm.

X-RAY EXPOSURE TIME AND DOSE BY FLUOROSCOPY MODE

This summary shows that the Cine fluoro mode use allows significant savings in Dose Area Product (DAP).²

FLUOROSCOPY MODE	X-RAY EXPOSURE TIME IN THE MODE (seconds)	X-RAY EXPOSURE TIME IN THE MODE (%)	TOTAL DAP (Gy.cm²)
DIGITAL SUBTRACTION 8pps, low dose	1 & 3 : 5,6	4,8%	0,44
CINE FLUORO 8 pps, low dose	2 : 110,8	95,2%	1,65
TOTAL	116,4	100%	2,09

¹ Millemium Research 2011

² B. Maurel et al. 'Evaluation of Radiation during EVAR Performed on a Mobile C-arm 'European Journal of Vascular and Endovascular Surgery 43 (2012) 16e21.

Dr. Sobocinski is a paid consultant for GE Healthcare. The statements by Dr. Sobocinski described here are based on his own opinions and on results that were achieved in his unique setting. Since there is no "typical" hospital and many variables exist, i.e. hospital size, case mix, etc.. there can be no guarantee that other customers will achieve the same results.