Aortic Curvature as a Predictor of Intraoperative Type IA Endoleak

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INTRODUCTION

Aortic angulation is commonly used to describe the abdominal aortic trajectory. The association with complications, such as type IA endoleak after endovascular aortic repair (EVAR) has not been uniform between studies, possibly due to triangular oversimplification of the trajectory. By contrast, aortic curvature describes the true aortic trajectory and may provide better predictive value for complications related to EVAR.

METHODS

Sixty-four patients with intraoperative type IA endoleak and 79 without type IA endoleak were included. The aortic trajectory was divided into six segments with potentially different influence on the stent graft performance: suprarenal, juxtarenal and infrarenal aortic neck, the entire aortic neck, aneurysm sac and terminal aorta. Curvature was automatically calculated over the six segments by numerical computation. Aortic curvature was compared to other standard neck characteristics including neck length, neck diameter, maximum aneurysm sac diameter, neck thrombus and calcium thickness and circumference, suprarenal angulation, infrarenal angulation and neck tortuosity index. Independent risk factors for intraoperative type IA endoleak were identified using backwards stepwise logistic regression.

RESULTS

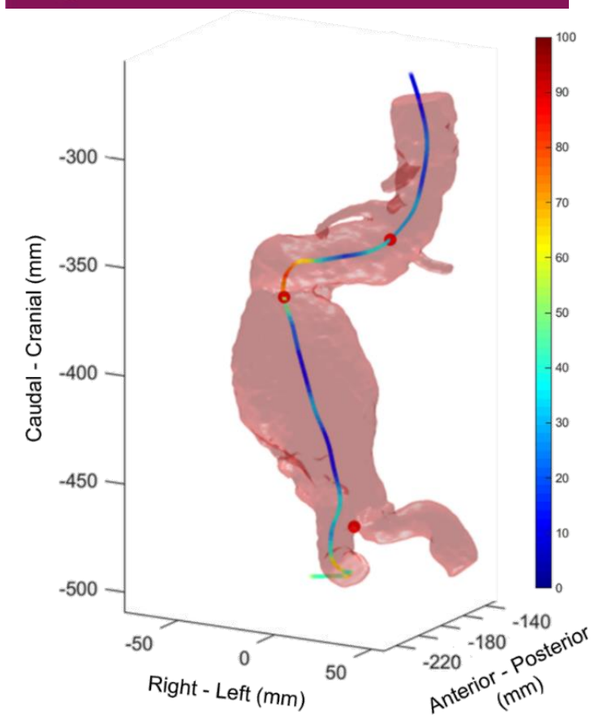

Figure 1, Curvature over the abdominal aortic trajectory. Lowest renal artery, aortic neck and bifurcation are marked.

Logistic regression identified only aortic neck calcification and aortic curvature, expressed over the juxtarenal aortic neck, the aneurysm sac and the terminal aorta, as independent predictors of intraoperative type IA endoleak.

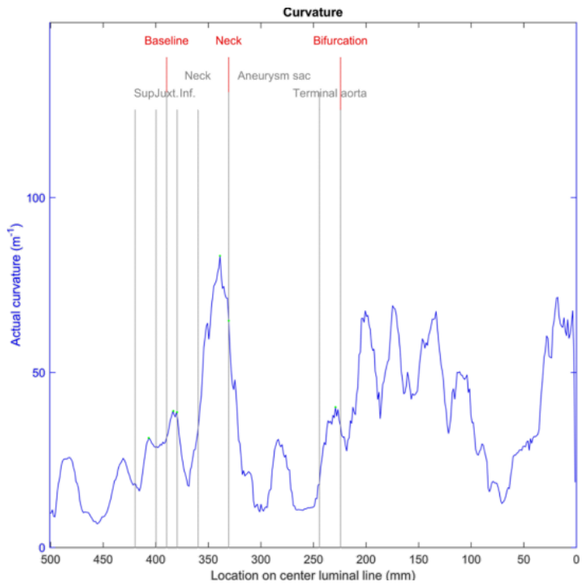

Figure 2, Graph of the curvature over the aorto-iliac trajectory. The six segments of the aortic trajectory are marked.

CONCLUSION

Together with aortic neck calcification, aortic curvature is the best predictor of intraoperative type IA endoleak, as expressed within the juxtarenal aortic neck, the aneurysm sac and the terminal aorta. Aortic neck angulation was not a predictor for acute failure. Aortic curvature may provide a better anatomic characteristic to define patients at risk for early complications after EVAR.

Table 1, Final regression model

Variable	Coefficient	S.E.	OR *	P value
Calcification circumference (°)	.013	.006	1.013	.020
Curvature (m^{-1}):				
Juxtarenal aorta	.034	.016	1.034	.039
Aneurysm sac	.053	.027	1.054	.048
Terminal aorta	.037	.012	1.038	.002
Constant	*-3.965*	*.818*	*.019*	*.000*

* Odds ratio; indicates the increase in risk for intra-operative type IA endoleak per unit increase in the covariate.

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