

In.nrw Hyther: Electromagnetically navigated in situ fenestration of aortic stent grafts

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Introduction

The endovascular repair of aortic aneurysms overlapping regions with side branches (e.g. renal arteries) is a remaining challenge, as sufficient fixation of the stent graft with preservation of the blood flow to abdominal organs is hindered considerably, frequently necessitating open surgery or complex debranching operations followed by graft implantation. In this abstract we present a concept and phantom study for in-situ fenestration of aortic stent grafts using an electro-magnetically guided catheter/guidewire system to allow for endovascular repair of large AAA.

Methods

The proposed system consists of a high porosity aortic stent graft (Vaskutek, Scotland, UK), an electromagnetic navigation system (Aurora, Northern Digital, Waterloo, Canada) operated by a custom made navigation software and a steerable guided catheter (Polydiagnost, Germany) in combination with a custom made navigated guidewire. The system was tested in a vascular phantom with an aortic stent graft in place using a preinterventional CT dataset (Sawbones, USA). Then the guidewire together with the catheter was advanced to the ostium of the renal arteries, the tip of the catheter was deflected and the guidewire was used to penetrate the stent graft in order to gain access to the renal artery. The catheterization times, number of attempts and quality of the fenestration were assessed and analysed.

Results

The average catheterization time was 88.6 ± 79.8 s (18-474s, start to catheterization time), with 1.48 ± 0.9 attempts. The mean quality of the fenestration (on a scale from 1 to 3, judged by the distance from the ostial center) was 2.0 ± 0.7 . Main reason for increased catheterization times and higher number of attempts was wearing of the guidewire.

Conclusion

With the caveat of material durability, the developed system allowed for a reliable fenestration of the aortic stent graft followed by catheterization of the renal arteries.

