Fenestrated Aortic Endografts: What Are the Limitations and Complications?

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Background

Fenestrated stent grafts are designed to treat patients who have unsuitable proximal necks for standard endovascular repair. These grafts are customized to the individual patient's anatomy. The graft used is a three-part composite system based on the Cook Zenith device. The first part is a tube fitted with the customized fenestrations. The second part is a bifurcated graft and the third part a contralateral limb. The technique involves four additional steps compared to a standard Zenith graft deployment. The first step is a partial deployment (in terms of diameter) of the proximal tubegraft, allowing catheterization of the targeted sidebranches but also repositioning of the graft during that process. The second step is the simultaneous catheterization of the targeted side branches. The third step is the full deployment of the tube graft. The final step is stenting of the fenestrations, to maintain full appositioning, perhaps a better fixation of the graft and a better seal at the level of the fenestrations.

Limitations

Limitations are inherent to each endovascular technique and the fenestrated technique makes no exception. One has to take into consideration both anatomical limitations and selection issues. With regard to anatomical limitations, the relative/absolute contraindications are in majority related to the technical steps mentioned above. One has to be able to reposition the graft during the catheterization process. Therefore a narrow access due to diseased or curling iliac arteries, an angulated or funnel-shaped neck, thrombus in the proximal neck, heavy calcification, and previous aortic surgery with prosthetic grafts in situ, can render this repositioning tedious or impossible. The catheterization process with wires, catheters, introducer guides, and stents can become increasingly difficult in the presence of narrow, arteriosclerotic target vessels, target vessels with a sharp take-off, or target vessels with a short main trunk. In addition, higher occlusion rates can be expected. Finally, the planning and measurement of the graft is more difficult in case of severely angulated necks, double renal arteries, and difficult anatomy (eg, target vessels too close to each other). With regard to selection issues, one must remember that this technique, although quickly becoming readily available, is still experimental and lacks mid- and long-term results. It is mandatory to give the patient full information and to individualize the choice between conservative treatment, open surgery, and fenestrated stent-grafting, and to remain open-minded about this choice. In our hospital, up to now, we really have only considered the technique in patients who had contraindications for open repair, either cardiopulmonary, or in presence of a hostile abdomen. In addition, the patients had to have an aneurysm of at least 55 mm in diameter.

Complications

In Groningen, up to June 2005, we performed 54 procedures with fenestrated and branched stent grafts. If we exclude all branched cases (ie, fully branched grafts or fenestrated grafts fitted with covered stents, used for juxtarenal or suprarenal aneurysms), we performed 32 procedures with fenestrated grafts for short-necked aneurysms. In this cohort, there was no 30-day mortality. There were seven postoperative complications, including two cardiac complications, one urinary tract infection, two retroperitoneal hematomas and two superficial wound infections. From the technical point of view, there were four intraoperative complications. In one case, we mispositioned a contralateral limb; this had to be treated with an aorto-uni-iliac conversion graft and a femorofemoral crossover bypass. In a second case, the overlap between the tube graft and the bifurcated graft was judged too short: this was treated with a bridging stent graft. In two cases, a stent became dislodged during insertion and deployment of the bifurcated graft. These two stents were retrieved and replaced. Out of the 74 targeted side branches (29 right renal arteries; 28 left renal arteries, 1 accessory renal artery; 16 superior mesenteric arteries), 73 were patent at the end of the procedure. In one patient, we lost an accessory renal artery, but no endoleak occurred. Within 30 days an occlusion occurred in another renal artery. During follow-up, two more occlusions were diagnosed. All three renal artery occlusions occurred in non-stented fenestrations in the early experience of this study. Five type II endoleaks were diagnosed, but fortunately no type I endoleaks. Three patients died of unrelated causes at 4, 8, and 9 months, respectively. One patient was lost to follow-up after completing his 1-year follow-up.

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