Outcomes of fenestrated endovascular repair of juxtarenal aortic aneurysm

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Fenestrated endovascular repair for juxtarenal aortic pathology

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Objective: To evaluate the outcomes after fenestrated endovascular aortic repair (f-EVAR) in a tertiary European referral center.

Methods: All patients treated with commercially available custom-made f-EVAR between September 2002 and June 2007 were prospectively enrolled in a computerized database including co-morbidities and aneurysm morphology. Patients were retrospectively analyzed. Follow-up consisted of clinical examinations and computed tomography (CT) scanning.

Results: A total of 54 patients were included in this study. Median age was 72 (interquartile range [IQR] 68-76) years and 85% were men. Median preoperative aneurysm diameter was 60 (53-66) mm. One hundred thirty-four vessels were targeted (43 scallops, 91 fenestrations) and 96 stents were placed (69 bare, 27 covered). Target vessel catheterization was achieved in 98% of cases. Two patients (3.7%) died within 30 days, 1 from trash embolization and multiorgan failure and 1 from retroperitoneal bleeding caused by a renal artery perforation. Three type I endoleaks occurred intraoperatively, two sealed pre-discharge and one was treated with a Palmaz stent (Cordis, Miami Lakes, Fla) on postoperative day 4. Thirteen patients had type II endoleaks, and 2 required treatment. The median clinical follow-up was 25 (12-32) months with median CT follow-up of 22 (4-26) months. Aneurysm diameter decreased ≥5 mm in 47%, was unchanged in 50%, and increased ≥5 mm in 3% of patients at 1 year. There were three type II endoleaks at 1-year follow-up, one of which was successfully treated after 19 months due to aneurysm growth. Ninety-six percent of target vessels remained patent during the study period and all occlusions occurred within the first year of follow-up. Five target vessels occluded (2 renal arteries [RAs] and 3 superior mesenteric arteries [SMAs]) without symptoms during follow-up and successful reinterventions were done on 2 stenosed RAs. Three patients suffered creatinine increase but none needed dialysis. One late aneurysm-related death occurred due to massive bleeding during redo surgery for infection.

Conclusion: Despite complex anatomy or severe comorbidities in these patients f-EVAR has acceptable short- and midterm results in this series which includes a learning curve and offers a valid treatment alternative to patients unsuitable for standard EVAR or open repair. (J Vasc Surg 2009;49:568-75.)
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Objective: To evaluate late outcomes after fenestrated endovascular aortic repair (f-EVAR) in a tertiary European referral center.

Methods: In 2009, we published short- and midterm results after f-EVAR in the first 54 patients treated with this technique at our center between September 2002 and June 2007. In this paper, we provide long-term follow-up of the same patient cohort with the main focus on target vessel (TV) patency, renal function, reinterventions, and survival.

Results: A total of 54 patients were included in this study. Median age was 72 years (interquartile range [IQR], 68-76 years) at primary operation, and 85% were men. Median preoperative aneurysm diameter was 60 mm (IQR, 53-66 mm). One hundred thirty-four vessels were targeted (mean, 2.5 per patient), and 96 TV stents were placed. The median clinical follow-up was 67 months (IQR, 37-90 months), and computed tomography follow-up was 60 months (IQR, 35-72 months). Aneurysm diameter decreased ≥5 mm in 39% ± 7% at 12 months, 64% ± 8% at 36 months, and 71% ± 8% at 60 months. Primary TV patency was 94% ± 2% at 12 months, 91% ± 3% at 36 months, and 90% ± 3% at 60 months. Glomerular filtration rate decreased by 17% at 59 months (IQR, 26-73 months) follow-up (60 [IQR, 46-79] vs 50 [IQR, 38-72] mL/min/1.73 m²; P < .001), and one patient became dialysis-dependent secondary to a renal stent occlusion. Reintervention-free survival was 88% ± 5% at 12 months, 69% ± 7% at 36 months, and 56% ± 5% at 60 months. At least one reintervention was done in 37% of patients, of which 29% were endoleak-related, 26% TV-related, 13% graft-limb-related, and 32% due to other causes. The majority of reinterventions (68%) were based on complications detected on routine follow-up. Estimated overall survival was 93% ± 4% at 12 months, 76% ± 6% at 36 months, and 60% ± 7% at 60 months. In total, 54% of the patients died during the 10-year study period, where 9% died of aneurysm-related causes.

Conclusions: Long-term mortality after f-EVAR is high, but most patients die from nonaneurysmal causes. Aneurysm-related mortality is associated with technical complications that can be reduced with increased experience. Reinterventions are common, and most complications are detected on routine follow-up. (J Vasc Surg 2014;59:115-20.)
Long-term follow-up

- Same patient cohort
- Clinical follow-up 67 months
- CT and GFR follow-up 60 months
Results
AAA diameter

Decrease ≥5 mm

39% at 12 months
64% at 36 months
71% at 60 months
Renal function

17% decline in GFR
Renal function

50% GRF ≤ 60

26% Decrease > 30%

Occlusion (n=1)
No stenosis (n=6)

50% GFR > 60

26% Decrease > 30%

Stenosis (n=1)
No stenosis (n=6)
Target vessel patency

Primary vs assisted patency
- Primary patency
- Primary assisted patency
- Primary patency-censored
- Primary assisted patency-censored

Cum Survival

96%  93%  93%

94%  91%  90%

Follow-up (months)

Months of follow-up

Patients at risk

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<th>24</th>
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</table>
TV patency

134 TV

8 Stenosis (6%)
- 6 Stented
- 2 Untreated

8 Occlusions (6%)
- 5 Renals
- 3 SMA
Re-interventions

20 patients (37%)

- Endoleak 29%
  - 5 Type I
  - 2 Type II

- Target vessel 26%
  - 5 Renal
  - 1 SMA

- Graft limb 13%
  - 1 Stenosis

- Other 32%
  - 3 Occlusions

68% of re-interventions based on complications detected on routine follow-up
Survival

All cause mortality

93%   76%   60%

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Follow-up (months)
Mortality

- 54% (n=29)
  - 7% Operative (n=2)
    - SMA embolization
    - Renal bleeding
  - 10% AAA related during FU (n=3)
  - 83% Unrelated causes (n=24)
    - Bleeding
    - Rupture
    - Infection
Conclusion

• Long-term mortality is high but mostly non-aneurysm related
• Aneurysm related mortality is associated with technical complications that can be reduced with increased experience and better understanding of the stent graft behavior
• Re-interventions are common 37%
• most complications are detected on routine CT follow-up 68%
• Knowledge of failure mechanisms is vital to adequately evaluate postoperative imaging
Thank you!