ENDOVASCULAR TREATMENT OF MALFUNCTIONING HAEMODIALYSIS GRAFTS/FISTULAS

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Stenosis

- Stenosis
- Native fistula/grafts.
- Radio-cephalic
  - 55-75% of stenosis in proximity to the anastamosis
  - 25% in the outflow tract.
- Brachio-cephalic and brachio-basilic stenosis most commonly at the cephalic - subclavian junction
- Basilic -junction with the axillary vein
- Grafts in the body.
- Central stenosis-common 30-50%
- Percutaneous transluminal angioplasty standard of care treatment for correction of stenosis in AVF and AV graft.

PTA

- **Technical success**
  - 88-94% native veins
  - 98% grafts.

- **Primary patency rates**
  - 55-77% at 6 months
  - 26-68% at 12 months
  - 60% at 18 months
  - 40% at 24 months.

- **Secondary patency rates**
  - 72-90% at 6 months
  - 72-85% at 12 months
  - 68% at 18 months

- **Central stenosis-10% patency at 12 months**

- **Complications**
  - 4-5% (haematoma and rupture)

- **Catastrophic vessel rupture in**
  - <1%

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Cutting balloons

- Create a dissection plane then a standard balloon to desired size.
- Used most commonly for failed venoplasty particularly anastomotic sites.
- Some advocate primary use to reduce the barotrauma during venoplasty.
- Primary patency rates at 88%, 73% and 34% at 6, 12, and 24 months.
- A comparative study showed primary patency 100% v 97.1%, 88.6% v 62.9%, 71.4% v 42.9% at 3, 6 and 12 months.
- Meta-analysis 1034 patients
- Six-month target lesion patency significantly higher in PCB angioplasty (67.2% vs. 55.6% RD 0.12; 95% CI 0.05-0.19; P < 0.05)
- Increase risk of rupture. Cutting balloons should not be used immediately after standard balloon venoplasty.

- Peregrin JH, Rocek M. Results of a peripheral cutting balloon prospective multicentre European vascular access. Cardiovasc Interv Radiol 2007;30:212-215
Stents—Early studies no benefit

- Stents function as an endoskeleton and provide supportive expansion to diseased vessels.
- In 65 patients with self-expanding stainless steel stents for failing or occluded dialysis accesses thrombosis in 10% of patients within 1 week.
- In a series of 52 patients, the primary patency at 6 months was only 46% after placement of stents.
- Prospective randomized trial of 58 patients > 50%, Gianturco Rosch Z metallic stent conferred no advantage in duration of patency at 30, 60, 90, 180 or 360 d.
- Quinn et al. showed, in their randomized study, that primary and secondary patency for PTA versus stents was comparable.
- 87 prospective patients over a 3-yr period, the primary patency rates for PTA at 60, 180, and 360 d were 55%, 31%, and 10%, respectively, and for stents were 36%, 27%, and 11%, respectively.

Stents

- Vogel and Parise demonstrated increase in mean primary patency (64 pts AVG) from 2.5 months with angioplasty to 10.6 months after nitinol SMART stent.

- Prospective, nonrandomized trial in 60 patients upper extremity AVGs:
  - Significant decrease in restenosis in the stent group compared with angioplasty (7% vs 16%; \( P = 0.001 \))
  - Improvement in mean primary graft patency (5.6 vs 8.2 mo; \( P = 0.05 \))

- Vogel PM, Parise C: SMART stent for salvage of hemodialysis access grafts. J Vasc Interv Radiol15:1051–1060, 2004
- Vogel PM, Parise C: Comparison of SMART stent placement for arteriovenous graft salvage versus successful graft PTA. J Vasc Interv Radiol16:1619–1626, 2005
Stents

- Graft patency after thrombectomy and placement of a nitinol stent (14 pts) compared with PTA (34) alone.

- The primary graft patency significantly longer for the stent group
  - Median survival, 85 versus 27 d (P = 0.02)
  - Secondary patency (median survival, 1215 versus 46 d; P = 0.049).

- 61 pts with AVG - Primary patency for PTA 32% at 3 months, 24% at 6 months, and 14% at 12 months

- Stenting 85%, 63% and 49% (P < .001).

- Cumulative median patency was 60 days for PTA and 260 days for stenting.

- 211 patients primary assisted AVG (99) patency significantly longer for the stent group compared with angioplasty,

- Median survival of 138 versus 61 d, respectively (aHR = 0.17; 95% confidence interval, 0.07 to 0.39; P < 0.001).

- The primary AVG patency for stent versus angioplasty was 91% versus 80% at 30 d, 69% versus 24% at 90 d, and 25% versus 3% at 180 d, respectively.

- The primary assisted AVF (112) patency did not differ significantly between the stent and angioplasty groups.

References:

Stentgrafting

- 17 pts with Fluency plus Improvement in graft survival (88.2% at 6 months and 86.2% at 12 months) over conventional surgical or angioplasty techniques.
- Fifty Viabahn stents deployed in 37 consecutive patients - Overall Kaplan-Meyer PPs were 60% at 12 months and 42% at 24 months.
- Estimated PP rates at 12 and 24 months for long segment recanalization procedure were 53% and 31%, respectively.
- Female sex, access age and thrombosis were associated with reduced primary patency.

- Stentgraft- Fluency plus in 104 patients, Technical success 98% - Primary 47% (62% AVF and 35% grafts), secondary 79% at 6 months.
- Smaller grafts less well 63%v38% 9-10mm v 6-8mm
- Not cross the elbow 47% v 25%

- 58 patients
- 32 BM v 29 Stentgrafts
- Primary 50%v59%, 41%v52% and 22%v29% at 3, 6 and 12 months.

- Cephalic arch - Six month primary patency for bare stents and stent grafts were 39%, and 82%, respectively; one year primary patency was 0%, and 32%, respectively, with a significant statistical difference of p = 0.0023 at one year

- Bent CL et al JVIR 2010:21:496-502
Stentgraft V PTA

- 190 patient randomised stent graft group significantly better primary patency at 6 months (51% for stent graft group and 23% for PTA group, \( p < 0.001 \)) and better access circuit patency (38% for stent graft group and 20% for PTA group, \( p = 0.008 \)).
- No significant difference between the two groups in access circuit assisted patency and access circuit cumulative patency rates.

- REVISE - 295 patients randomized, and 293 patients comprising the Intent-To-Treat (ITT) analysis group.
- 145 patients to the stent group and 148 subjects to the PTA group, although 24 patients later excluded from the effectiveness analysis.
- 24-month 65 patients in each arm. Primary patency at 6 months, 12 months, and 24 months was 52.9%, 30.2% and 15.7%, respectively, for the stent group and 35.5%, 18.2%, and 9.9%, respectively, for the PTA group (\( p = 0.008 \)).
- Access circuit primary patency was 21.4% and 9.6% for stent group and 15.2% and 6.8% for the PTA group, at 12 and 24 months respectively (\( p = 0.035 \)).
- No statistically significant difference between the groups in assisted primary patency, access secondary patency, or treatment site secondary patency.

Endovascular Intervention

- Stentgraft primary patency in 17 patients with AV fistulae of 94.1, 88.2, and 88.2% after 3, 6, and 12 months of follow-up, respectively.
- Viabil device (GoreMedical, Flagstaff, AZ) much lower porosity than Viabahn or Flair; primary patency rate of 85% at both 2 and 6 months 20-patient pilot trial.
- **RESCUE- 275 pts** Access site patency 6 months was significantly higher in the stent-graft group (18.6%) versus the PTA group (4.5%; P < .001), 12 months (stent graft, 6.2%; PTA, 1.5%)

- Increasing evidence to use BM stents but best for covered stents in grafts.
- **Avoid:** At venous junctions, dialysis puncture sites or small veins <5mm and in the presence of sepsis.
- Stent migration/fracture/infection
- Drug eluting balloons –showing great promise for the future.


Kim CY et al. CVIR 2012;35:832-838

