Strategy and technical tips in treating AV fistulas

Jos C. van den Berg, MD PhD
Ospedale Regionale di Lugano, sede Civico
Lugano
University of Bern
Switzerland
Complications related to AV fistulas

- Stenosis
- Trombosis
- Infection
- Arterial steal
- Aneurysm
- Pseudo-aneurysm
- IMN: Ischemic Monomelic Neuropathy
Indications for intervention

Early failure of hypoplastic autogenous arteriovenous fistulas
  Inflow stenosis at the arteriovenous anastomosis
  Early development of venous outflow stenosis

Late failure of chronic fistulas and grafts
  Access thrombosis (urgent)
  Isolated venous or outflow anastomotic stenosis

Arm edema
  Central vein or double outlet stenosis
Treatment options

• PTA
  – POBA
  – Cutting balloon angioplasty
  – High pressure balloon angioplasty
  – Scoring balloon angioplasty
  – DCB

• Stenting
  – BMS: only in central stenosis, no benefit in periphery
  – Covered stent: only in AV graft (US experience)
PTA

• Outpatient (no immobilization required)
• Inflow and outflow should be visualized
• How to obtain flow ‘counter-current’
  – External compression
    • Tourniquet
    • Manual (radiation exposure)
  – Balloon occlusion
  – Advancing catheter into arterial side
Diagnostic angiography

- Direct puncture
- Cuff around upper arm
- Visualisation
  - Inflow (cuff > systolic blood pressure)
  - Anastomosis
  - Outflow (cuff deflated)
Diagnostic angiography

Cuff deflated

Cuff inflated
Diagnostic angiography

Outflow
Diagnostic angiography
Diagnostic angiography

Balloon occlusion
Angioplasty

- Tight focal stenoses
- Elastic recoil
- High pressures/long inflation times
- Vessel preparation (CBA/SBA)
Angioplasty (PTA)

• High pressure balloon
  – 55% of lesions require pressure >15 atm to efface waist
  – Very high pressures (>20 atm) more frequently needed in native fistulas
  – Mean pressure required for venous anastomotic stenoses 17.9 atm, for venous outflow 15.6 atm
  – Majority of balloons can be inflated 5-6 atm higher than IFU indicate (NB variation and balloon fatigue)

Trerotola SO et al, JVIR 2005;16:1613-1618
Vesely TM et al, JVIR 2006;17:623-628
PTA
Prolonged inflation
Prolonged inflation
Cutting balloon- ’pre-cutting’
Cutting balloon-’pre-cutting’
Scoring balloon
Scoring balloon
Stent
Stent
Covered stent

B-C AVF

3 overlapping 10x80 Fluency Covered Stents

8 months

B. Dolmatch SIR 2009
Covered stent

- Better outcomes in treatment of graft-venous anastomosis

Haskal ZJ et al, NEJM 2010;362:494-503
Haskal ZJ et al, JVIR 2016;27:1105-1114
Thrombotic occlusion - treatment

- Thrombectomy
  - Surgical
  - Percutaneous

- Thrombolysis
Thrombosis-percutaneous thrombectomy

• Aspiration (Penumbra/guiding catheter)
• Thrombectomy devices
  – Baskets
  – Fragmentation devices
  – Aspirex
  – Etc.
• May be combined with thrombolysis
• Results similar to surgery
Thrombosis - percutaneous thrombectomy
Thrombosis-percutaneous thrombectomy

Bittl JA, JACC Card Int 2010;3:1-11
Thrombo-aspiration
Thrombo-aspiration

Penumbra-CAT 6
Thrombo-aspiration
Conclusion

- Proper angiography of inflow and outflow is mandatory
- Vessel preparation is essential
- No place for stenting (except for central lesions)
Strategy and technical tips in treating AV fistulas

Jos C. van den Berg, MD PhD
Ospedale Regionale di Lugano, sede Civico
Lugano
University of Bern
Switzerland