Open and Endovascular Treatment of Superior Vena Cava Syndrome of Benign Etiology

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Disclosure

• I do not have any potential conflict of interest
The increased use of central venous catheters, ports, pacemakers and defibrillators raised the incidence of benign superior vena cava syndrome (SVCS)

19,000 cases of SVCS occur every year in the United States

Benign aetiologies may now comprise up to 40% of cases

Rice TW, Rodriguez RM, Light RW. The superior vena cava syndrome: clinical characteristics and evolving etiology. Medicine (Baltimore) 2006;85:37-42
Types of SVCS

Types of SVCS

Open and Endovascular Treatment of SVCS of Benign Etiology

"endovascular"[All Fields] OR "open"[All Fields]

AND "vena cava"[All Fields]

AND ("thrombosis"[All Fields] OR "occlusion"[All Fields])
Endovascular Treatment of SVCS

• 9 studies (all retrospective): 136 patients
  – Central venous catheters and pacemakers 80.6%
  – Mediastinal fibrosis 13.7%
  – Other causes 5.6%
    • Post radiation fibrosis
    • Benign tumor
    • Goiter
    • Transposition of the great vessels
Endovascular Treatment of SVCS

• **Risk Factors**
  - History of DVT
  - Neck irradiation
  - Behcet disease
  - Existing dialysis fistula on the side of pacemaker leads

• **Diagnosis**
  - Earlier venography
  - Later CT venography or MR venography
Endovascular Treatment of SVCS

Types of SVCS

- Type I: 6.6%
- Type II: 37.7%
- Type III: 42.2%
- Type IV: 13.3%
Technical success 95.6% (132/138)

- PTA + stenting 73.6%
- PTA 17.3%
- Thrombolysis, PTA and stenting 9%

### Stents

#### Self expanding
- Wallstent (Boston Scientific) 53.7%
- S.M.A.R.T (Cordis) 8.7%
- Protégé (eV3 Inc) 5%
- Zilver (Cook), Luminexx (Bard) 1.2%

#### Balloon expandable
- Palmaz (Cordis) 20%
- Express LD (Boston Scientific) 2.5%
  Gianturco Z stent 1.2%

#### Covered stents
- Viabahn (W.L. Gore) 3.7%
- iCast (Atrium Maquet) 1.2%
Endovascular Treatment of SVCS

Pacemaker-Induced SVCS

Two Techniques

1. Lead removal, stent implantation, and reimplantation of new leads

2. Plain balloon dilatation of the vein with stent placement in selected cases
Endovascular Treatment of SVCS

Results

• 30-day mortality 0%

• Complications 3.6%
  – Stent migration (2 patients)
  – SVC penetration
  – Arm hematoma
  – 3rd degree heart block
Endovascular Treatment of SVCS

Results

- FU 11-48 months
- Regression of the symptoms: 97.3%
- Recurrence 32 pts (26.6%)
- 58 secondary procedures
  - 48 PTAs
  - 5 PTAs with stenting
  - 3 thrombolyses and
  - 2 bypass grafts
Haemodialysis catheter

12mm Balloon
Open Surgical Reconstruction of SVCS

- 4 studies (all retrospective): 87 patients
  - Central venous catheters and pacemakers 28.5%
  - Mediastinal fibrosis 58.4%
  - Other causes 13%
    - 5 idiopathic thromboses
    - 2 hypercoagulable state
    - 2 after ventriculoatrial shunts
    - 1 surgical excision
Open Surgical Reconstruction of SVCS

Types of SVCS:

Type I: 9.8%
Type II: 11.5%
Type III: 34.4%
Type IV: 44.2%
Type of graft

- **Spiral saphenous vein graft** 59.7% (52/87)
  - Straight (48/52): Innominate or Jugular vein to right atrial appendage
  - Bifurcated (4/52): Internal jugular vein and innominate vein to right atrial appendage
- **Externally reinforced ePTFE** 26.4% (23/87)
- **Femoral vein** 6.8% (6/87)
- **Human allograft** 2.3% (2/87)
- **Reversed saphenous vein** 1.1% (1/87)
- **Venous transposition** 3.4% (3/87)
Open Surgical Reconstruction of SVCS

Results

- 30-day mortality 0%
- 13 reoperations (15%) before discharge
  - 8 graft thrombosis
  - 3 stenoses of the graft
  - 2 patients with a mediastinal hematoma needing evacuation
Open Surgical Reconstruction of SVCS

Results

• FU 30 m - 10.9 years

• Complete or partial regression of the symptoms: 93.5%

• Recurrence 24 pts (31.1%)
  – 33 secondary procedures
    • 10 PTAs
    • 11 PTAs with stenting
    • 9 thrombectomies
    • 2 graft replacements
    • 1 thrombolysis
Pooled primary patency after endovascular and open surgical repair for benign SVC syndrome
Conclusions

• Benign SVCS syndrome is now more common as the use of indwelling catheters for dialysis and cardiac therapy expands

• Both open and endovascular treatments show good results regarding regression of the symptoms

• Mid-term primary patency is similar with a significant incidence of secondary interventions
Conclusions

- Endovascular is the first line of treatment for SVCS caused by intravenous devices, while surgery is most often performed for mediastinal fibrosis.
- Patients who underwent surgical treatment usually presented with more severe disease.
- There is a high incidence of reoperations before discharge after surgery.
- Secondary interventions after initial endovascular treatment or open surgery are mainly endovascular.