For an interventionalist, there is no such thing as a “little mistake”

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Carotid restenosis

Restenosis may occur either after CEA and CAS.
In-stent restenosis – treatment option

PTA: 5.5/20 mm balloon
In-stent restenosis by OCT

OPTICAL COHERENCE TOMOGRAPHY AFTER CAROTID STENTING: RATE OF STENT MALAPPOSITION, PLAQUE PROLAPSE AND FIBROUS CAP RUPTURE ACCORDING TO STENT DESIGN. Eur J Vasc Endovasc Surg 2013;45:579-87
OCT after PTA for in-stent restenosis

Good angiographic result after simple PTA, but ……
OCT after PTA for in-stent restenosis

LESSON LEARNED:
PTA alone is no more a good option!!
Better re-stenting!

**Disadvantages**
- Increase arterial stiffness
- Kink or bend in the distal ICA → major hyperplastic reaction at the distal end of the second stent (?)

**Advantage**
- Plaque containment
CASE REPORT

- 66 year-old man
- left CEA and patch (2001)
- asymptomatic left carotid restenosis (December 2007)

He underwent left CAS

Two nitinol stents were deployed to correct the long restenosis (Exponent; Medtronic® 9x30 and 9x40 mm).
CASE REPORT

Seven months later (July 2008)
- pulsating, latero-cervical huge mass, which had developed rapidly two weeks prior.

Duplex ultrasonography, angio MRI
Internal Carotid false aneurysm + multiple fractures of proximal stent
We first planned to exclude the pseudoaneurysm using a cover stent

This endovascular attempt failed
CASE REPORT

Impossibility to cannulate the ICA

proximal stent dislodged inside the pseudoaneurysm sac
Open repair
OPEN REPAIR

ICA

ECA

CCA

STENT

SAC

Patch
At that moment the complete disruption of the suture line of the previous Dacron patch was evident.
arterial reconstruction by CCA-ICA bypass.
Carotid stent fracture has been reported as a late complication after CAS by few Authors.


*fractures in the SFA = poor patency rate*

Scheinert et al, *FESTO study. JACC 2005*
Stenting for carotid artery stenosis: Fractures, proposed etiology and the need for surveillance

Ling et al, JVS 2008

Type I fracture

Type II fracture.
The presence of two or more fractures, with obvious discontinuity of the stent margin

Type III fracture
Transverse linear fracture without stent displacement (arrow)

Type IV fracture.
Transverse linear fracture with stent displacement (arrow).
CASE REPORT
BACKGROUND

To our best knowledge stent fracture has been reported as a cause of restenosis but never as a cause of false aneurysm.

We report a case of huge pseudoaneurysm (5 cm) in a patient with two carotid stents (one fractured) implanted for post-CEA restenosis.
DISCUSSION

Carotid pseudoaneurysm may be an expected complication after CAS for post-CEA restenosis.

Rupture of the dacron patch may be due to the radial force of stent over the previous suture line, aggravated by:

- the irregular conformation (fish scale) of open cell design in the central segment
- the sharp edges of fractured stents
CONCLUSION

A word of caution should be said for CAS in case of restenosis post-CEA and patch, in particular if a stent with this kind of variable geometry (open cell design in the middle) is implanted.
This case underlines a regular check-up after CAS for post-CEA restenosis, with **plain radiography** in addition to duplex US for early detection of stent fractures which could potentially cause a similar complication.
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Stenting for carotid artery stenosis: Fractures, proposed etiology and the need for surveillance

- Carotid Fracture rate of 29% (14/48), on follow-up plain radiography

- only three of these had restenosis 50%

- No pt had cerebral symptoms

It is interesting to note that the type IV fracture, which by definition are displaced, did not have restenosis detected at average follow-up in this series

Ling et al, JVS 2008
How to deal with it:

- Diagnosis

- Indication to treatment

- Treatment options
Treatment options for restenosis following CEA or CAS

**Endovascular treatment**
- PTA
- Cutting balloon angioplasty
- Re-stenting (primary/after PTA, CBA)
- DEB
- DES

**Surgical treatment** *(stent removal)*
- CEA
- bypass