Endovascular treatment for pseudo-occlusion of the internal carotid artery

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Disclosure

Speaker name: Daqiao Guo

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

I do not have any potential conflict of interest
ICA atheromatous pseudo-occlusion (APO) is a very tight atherosclerotic stenosis in which the artery beyond the stenosis is collapsed.

Prevalence of APO is uncertain and estimated in the range of 0.5-10% of all revascularization.

Various terms have been used to describe APO:
- near total occlusion
- string/slim sign
- preocclusive stenosis
- subtotal occlusion
- functional occlusion
- hairline residual lumen

Classification
Nature History

• APO might cause a high risk of recurrent stroke

Total ICA occlusion will occur in 40% of the APO patients within 12 months or in 100% of the APO within 34 months.

Severe flow reduction of APO with full collapse stimulates blood stagnation with increased risk of thrombus formation and intracranial embolization.

• Early revascularization might be beneficial within a few days after the onset of symptoms

The 90-day risk of recurrent stroke was 18% for 50-99% carotid stenosis, and 43% for symptomatic APO with full collapse.
Prognosis

- An updated meta-analysis reveals a statistically significant difference in pooled stroke IRs per 100 p-ys of BMT (IR=6.19) compared with CEA (IR=2.24, P=0.002) and CAS (IR=1.64, P < 0.001) studies.

- No statistically significant differences were recorded in pooled IRs per 100 p-ys between CEA and CAS, concerning TIA, stroke, stroke-related death, and MAE.
Our experiences

- From Jan. 2013 to Dec. 2015, 678 patients were treated with CAS for ICA high-grade stenosis and 10 of these (1.47%) presented with a carotid pseudo-occlusion.
- All of 10 patients were at high risk for CEA.
- All males, mean age of 70 ± 8 years.
- EPD and closed-cell Wallstents (Boston Scientific) were used.
Microcatheter

- When EPD couldn’t be advanced due to a tight stenosis, an exchange length 0.014-inch microguidewire and microcatheter was used for navigation.

- Angiography through microcatheter to verify ICA lumen integrity and diameter in APO with full collapse.

- Pre-dilation without distal protection using a 2mm balloon to allow the EPD to cross the APO.

- Keep the 0.014-inch guidewire as “buddy wire” to facilitate the filter across the tight stenosis.
Dilatation

• Predilation of the stenosis was required in all patients to allow deployment of the stent

• If the dilatation was unsatisfactory (< 4.0 mm at the stenotic portion), pre-dilatation was added with a larger balloon (4-5mm balloon) again

• Postdilated with slightly undersized balloons (5-5.5mm)

• No attempt to completely dilate the stent was made to prevent the severe hemodynamic effects, brain embolization and hyperperfusion syndrome
Case

Before CAS

After CAS
Case

3-month

6-month
Our experiences

• All patients were successfully treated and showed satisfactory dilatation with residual stenosis <30%

• New ischemic lesions were found on T1- or T2-weighted MRI scans in 5 patients

• No hemorrhagic lesions were found on CT

• No new neurological deficits related to the treated lesion appeared during the perioperative and 6-month follow-up period
Hyperperfusion syndrome

- The risk of hyperperfusion after CAS is reported to be high in APO cases with severe hemodynamic compromise (8-10%)
  - Strictly blood pressure control
  - Avoidance of full stent dilation, particularly when collaterals were deemed rather insufficient
  - Using mannitol (125ml/Q12h) to increase plasma osmolality and prevent cerebral edema

Conclusions

- Pseudo-occlusion of the ICA represents a critical level of carotid occlusive disease, which is associated with insufficient blood flow and high risk of recurrent stroke.
- Based on the current evidence, the ICA pseudo-occlusion is a stent-treatable lesion with minimum risk and high success rate.
- Careful patient selection and adequate experience in complex CAS procedures as well as in the usage of appropriate EPD would be the key to achieve low rates of periprocedural complications.
Thanks for your attention
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