Dealing with Tandem Lesions

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Disclosures

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Prognosis in ICA Occlusions

- NIHSS > 17 with a large vessel occlusion carries a poor prognosis i.e. Relative Risk D&D 84%
- NIHSS > 21 relative risk of D&D of 92 % (NINDS tPA investigators NE J Med 1998)
- Acute stroke secondary to extracranial ICA occlusion with MCA occlusion (Tandem) is a strong predictor of mortality
- ICA “T” occlusion 73 % mortality only 3 % have good outcomes (i.e. mRS <2) (Smith W et al, Stroke 2007; Nogueira et al AJNR 2009)
Predictors of Mortality

- Strongest predictors of mortality:
  - Failure to revascularize (OR, 0.28; 95% CI, 0.16 to 0.50; P<0.0001),
  - Baseline National Institutes of Health Stroke Scale score (odds ratio, 1.09; 95% CI, 1.04 to 1.14; P=0.0001)
  - Age (OR, 1.05; 95% CI, 1.03 to 1.07; P<0.0001)
  - Internal carotid artery occlusion (OR, 2.17; 95% CI, 1.22 to 3.86; P=0.0084)

Tandem Occlusions: Low Recanalization with IV tPA

- Clinical and Vascular Outcome of ICA vs MCA After IV tPA. Linfante et al Stroke, 2002;33:2066-7

- Tandem internal carotid artery/middle cerebral artery occlusion are independent predictor of poor outcome after IV tPA. (Rubiera M, Ribo M et al Stroke 2006;37:2301–5)

Endovascular Treatment of Tandem Extracranial/Intracranial Anterior Circulation Occlusions

Preliminary Single-Center Experience

Malik et al Stroke. 2011; 42: 1653-1657
Retrospectively review case records University of Pittsburgh Medical Center from July 1999 to April 2010

The study included patients with a concomitant complete ICA origin occlusion and occlusion of the intracranial ICA, M1 MCA, or M2 MCA
- 77 patients
- TIMI ≥2 58 (75.3%)
- parenchymal hematoma : 8 (10.4%).
- Distal embolization: 3 (3.9%).
- In 18 of 77 patients (23.4%), distal (ie, intracranial) recanalization was observed after proximal recanalization, obviating the need for distal intervention.
□ Good clinical outcomes were achieved in 32 patients (41.6%)

□ In multivariate analysis TIMI ≥2; baseline NIHSS, baseline APECT; age were significantly associated with good outcomes
Endovascular treatment of tandem vascular occlusions in acute ischemic stroke


Tandem Lesions

- 28 consecutive patients
- Mean NIHSS 18
- Extracranial carotid occlusions with a concomitant middle cerebral artery occlusion were seen in 89.3% of patients (n=25)
- Vertebral artery combined with basilar artery lesions in 10.7% (n=3)
- An antegrade approach (ie, treatment of the extracranial lesion first) was used in 24 patients (85.7%)
Tandem Lesions

- Proximal occlusion recanalization was achieved usually with a stent (n=27; 96.4%)
- ≥TICI 2A 96.4%
- mRS score of ≤2 at 90 days was achieved in 56.5% of patients
Tandem ICA plus MCA Occlusions

- High recanalization rates with angioplasty and stenting
- At times, proximal recanalization of the ICA results in recanalization of the MCA
- Tandem Occlusions: higher recanalization rates in MCA occlusions with new generation thrombectomy devices (i.e. Stent-trievers and/or Aspiration devices)
Acute ICA Angioplasty and Stenting with a Tandem MCA occlusion

How I do it
Patient

- 74 year-old man
- Sudden onset of left arm and leg weakness with head and eyes deviation to the right and neglect
- Arrives to the ED 3 hours after symptom onset
- NIHSS 21
- In the angio room at 4 hours after symptom onset
CTA:
extracranial
Right ICA occlusion
Acute ICA Stenting:

- 8F sheath, 8 F Balloon Guide catheter

- Angioplasty (4 x 20mm balloon) proximal protection with balloon guide catheter and aspiration

- Stenting (Precise 8x40;7x30 mm )
Acute ICA Stenting

- Microcatheter in the MCA
- Thrombectomy with Stent-Triever
Patient

- The day after:
  - Extubated
  - NIHSS of 3
  - mRS of 0 at 30 days
65 y/o man presenting with left hemiplegia, profound neglect (NIHSS 18) 2:30 min after symptoms onset

Decreased level of consciousness

Intubated for airway protection

0.9 mg/kg of IV tPA

Cerebral Angiogram started 4-hours after symptom onset
Acute ICA Stenting:

- 8F sheath, 8 F Balloon Guide catheter
- Angioplasty (4 x 20mm balloon) proximal protection with balloon guide catheter and aspiration
- Stenting (Precise 8x40;7x30 mm)
Acute ICA Stenting

- Microcatheter in the MCA
- Thrombectomy with Stent-Triever
Patient

- Day after:
  - NIHSS of 4
  - mRS of 1 at 30 days
What to do when Stent-Triever or Aspiration Fails to Recanalize the ICA?
Patient

- 55 year-old man
- Sudden onset of slurred speech, disorientation, left arm > leg > face weakness
- Arrives to the ED 4.5 hours after symptom onset.
- On exam, head and eyes deviation to the right, profound neglect, left arm and leg plegia (NIHSS 19)
- In the angio room at 5.5 hours after symptom onset
- Decreased level of consciousness during the procedure requiring intubation
Failure to Recanalize the MCA

- Despite several passages we failed to recanalize the M1

- We then proceeded with angioplasty with Gateway balloon followed by stenting with Wingspan
Patient

- Day after:
  - NIHSS of 5
  - mRS of 1 at 30 days, NIHSS 2
Stenting in Acute Stroke Patients Who Failed Thrombectomy Devices

Linfante I, Samaniego E, Geisbüsch P, Dabus G

Results

- 19 patients 65 years (28 to 91 range)
- Mean NIHSS 18
- Complete occlusion (TIMI 0) of the affected vessel.
- 10 MCA (M1); 4 ICA terminus; 3 BA; 2 ICA + MCA
- All FAILED IV or IA tPA and/or mechanical thrombectomy
- Six enterprise and 13 wingspans stents were deployed.
- In 14 patients (74%), intervention was performed < 8 hours after symptom onset.
Long-term Results

- 42% mRS < 2
- 5 patients (26%) died; 3 patients from hemorrhagic transformation of the stroke
- Two died from large ischemic infarctions
Tandem Occlusions

- ICA angioplasty and stenting
- High recanalization rates in MCA occlusions with new generation thrombectomy devices (i.e. Stent-trievers and Aspiration devices)
- If new generation thrombectomy device fail to recanalize the MCA, angioplasty and stenting of the MCA is an effective option
ICA Dissections
Endovascular stent therapy for extracranial and intracranial carotid artery dissection: single-center experience

ICA Dissections

- 32 patients, 24 extracranial ICA dissections with common CA involvement (4), and extracranial ICA-intracranial ICA (16).
- Carotid artery occlusion was 100% in 15 cases (34.1%), 99% in 6 cases (13.6%), 70%-98% in 13 cases (29.5%), and < 70% in 10 cases (22.7%).
- Stent deployment was successful in 97.7%.
- Recanalization (TIMI 2 or 3) 95.5%.
- Procedure-related complications occurred in 7 patients.
- At discharge, 36 patients (83.7%) had modified Rankin Scale scores of 0-2.
Patient

- 40 year old woman found by her husband with aphasia and right hemiparesis
- Normal CT, IV tPA given within 1:15 min after symptom onset
- Initial improvement and then worsened, repeat CT unchanged
- Referred for angiography
- Angiogram started, approximately 2 hours after stroke onset
CT 3 days later
Conclusions

- Acute extracranial ICA occlusion is a strong predictor of mortality
- Angioplasty and Stenting of acute ICA occlusion is technically possible and safe
- Most often tandem (ICA+MCA): high recanalizations with stentrieviers or aspiration or stenting