



## Původní sdělení | Original research article

# Stent or balloon: How to treat proximal internal carotid artery occlusion in the acute phase of ischemic stroke? Results of a short survey

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## SOUHRN

Tento krátký průzkum („survey“) představuje názory autorů na tři otázky související s endovaskulární léčbou pacientů po akutní cévní mozkové příhodě s kritickou stenózou proximálního segmentu arteria carotis interna buď samotného, nebo v kombinaci s distálnějším uzávěrem intrakraniální tepny. S touto kombinací se lze setkat přibližně u 15 % pacientů s akutní cévní mozkovou příhodou řešenou intervenčně. Mezi intervenční strategie patří balonková dilatace s následnou mechanickou trombektomií nebo implantace stentu do karotidy po mechanické trombektomii (či před ní). Antitrombotická léčba se rovněž různí, od okamžitého nasazení duální protidestičkové léčby až po odložení léčby do doby, kdy kontrolní CT vyloučí krvácení do zóny ischemie.

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## ABSTRACT

This short survey presents authors views on three questions related to endovascular treatment of acute ischemic stroke patients with critical stenosis of proximal internal carotid artery either alone or combined with a more distal intracranial artery occlusion. Approximately 15% of patients with acute stroke undergoing interventional treatment present with this condition. The interventional strategy varies from balloon dilatation followed by mechanical thrombectomy to carotid stenting preceded or followed by mechanical thrombectomy. Antithrombotic treatment also varies from immediate dual antiplatelet therapy to therapy postponed after control CT excludes hemorrhage into the ischemic zone.

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Carotid artery stenting (CAS) is an established alternative to carotid endarterectomy (CEA) for the treatment of stenotic internal carotid artery (ICA) after transient ischemic attack or in stable chronic disease. However, the indication for CAS is less clear in patients presenting during the initial hours of evolving acute ischemic stroke. During the recent few years emergent endovascular intervention (mostly by means of mechanical thrombectomy) was confirmed to be the most effective treatment of moderate-to-severe acute ischemic stroke [1–5]. Some patients with acute ischemic stroke who are indicated for mechanical thrombectomy present with a concomitant (or an isolated) occlusion of the proximal segment of ICA.

CAS ( $\pm$  thrombectomy if a tandem lesion is present) is usually considered to be a standard treatment for this situation [6]. However, it has significant limitations in this setting. The use of dual antiplatelet therapy (DAPT, combination of aspirin + clopidogrel) in the acute phase of a large stroke may increase the risk of hemorrhagic transformation of the ischemic brain tissue. The incidence of symptomatic intracranial hemorrhage after CAS for acute stroke is extremely high: 16–22% [7,8]. On the contrary, stent placement without DAPT puts the patient into a serious risk of early stent thrombosis with a large irreversible cerebral ischemia as a potential consequence. Thus, some endovascular operators advocate a stepwise approach for the treatment of these acute proximal ICA lesions: (*step 1*) balloon dilatation at the time of presentation (recanalizing the artery, providing access to eventual intracranial clot in tandem lesions) and (*step 2*) stent placement later in the course of stroke. Such strategy may avoid the risks mentioned above. As there is no randomized comparison of these two strategies (CAS versus balloon dilatation), we completed a short survey among a small group of endovascular specialists experienced in acute stroke interventions. The results of this survey are presented here and all survey participants are co-authors of this short manuscript.

### ***What percentage of patients with moderate-to-severe acute ischemic stroke, undergoing emergent endovascular intervention, presents with proximal ICA occlusion (or critical stenosis)?***

Based on the expert estimates, the frequency of proximal ICA occlusion varies between 5% (Mazighi), 10% (Prochazka, Sievert, de Vries), 15% (Abelson, Hopkins), 17% (Meuwissen), 20% (Lanzer, Koznar) up to 27% (Blasko). Thus, approximately one of six patients with acute ischemic stroke undergoing intervention have a significant ICA lesion. This is just slightly more than 13% in the well conducted MR CLEAN trial [1].

### ***What is your preferred approach to these patients with critical proximal ICA stenosis?***

- (a) Acute stenting in all patients with a critical proximal ICA lesion: Lanzer, Prochazka, Blasko, Mazighi, Koznar, de Vries.
- (b) Deferred stenting (balloon only in the acute phase, CAS later during the same hospital stay): None.
- (c) Balloon dilatation only (with CAS or CEA only when clinically indicated during the follow-up): Meuwissen, Abelson, Hopkins.

- (d) Balloon angioplasty (5 min inflation) followed by thrombectomy and control angiogram and ICA stent only if angiographically needed: Sievert.

### ***What is your approach to antithrombotic medication in patients with carotid stent implantation during the acute phase of ischemic stroke?***

DAPT started immediately after stent implantation: Hopkins, Prochazka, Sievert, de Vries

Aspirin only after stent implantation, clopidogrel added next day after CT excluded hemorrhagic transformation: Meuwissen, Abelson, Lanzer, Blasko, Mazighi, Koznar

DAPT (incl. ASA) started next day after CT excluded hemorrhagic transformation: None.

There is a difference between patients who received iv thrombolysis and those who did not. These are quite different groups regarding risk of intraparenchymal hemorrhage. Dual antiplatelet should be delayed if thrombolysis was given to a patient with acute ischemic stroke.

Furthermore, the role of postprocedure C-arm CT for revealing of possible hyperdensities due to hemato-encephalic barrier disruption (micro- or macrobleeds) should be carefully investigated. The greater the extension of hypodensities due to necrosis, the higher risk of hemorrhage.

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### **Additional comments from survey participants**

*Meuwissen:* "With bridging thrombolysis we prefer balloon dilatation whenever feasible and to start clopidogrel next day (after control CT). If CAS is necessary we give aspirin immediately and we start clopidogrel next day (after control CT). Stenting is preferred with distal protection. If patient is on chronic oral anticoagulants and we performed balloon dilatation alone, we just continue oral anticoagulants, without antiplatelet agents. If we performed acute CAS in a patient on chronic oral anticoagulation we start clopidogrel next day (after control CT). We prefer not to stenting/angioplasty (in particular when there is good flow) and to perform endarterectomy as deferred procedure within a few weeks after stroke (when clinically indicated)."

*Abelson:* "I am concerned about DAPT in the presence of a large stroke and thus try to avoid stent placement. I have found this strategy feasible in about half of the cases. Stents in the carotid may also complicate thrombus extraction with stent retrievers (which can become entangled in the carotid stent on withdrawal). If a carotid stent is deployed I usually give low dose aspirin either orally or via nasogastric tube as no iv aspirin is available in South Africa. We start clopidogrel next day only if the patient has had a good response to embolectomy and there is no bleed on repeat CT. If the patient has a large area of infarction despite recanalization I still try to avoid DAPT for a few days because of concern for intracranial hemorrhage."

*Lanzer:* "(a) The patients with proximal ICA occlusion might have longer therapeutic window compared with those with M1 occlusions due to preformed collateralization via the meningohypophyseal, inferolateral and ophthalmic arteries. (b) Angioplasty alone produces additional injury and increases the risk of re-occlusion of an unstable lesion to begin with. (c) Hypothetically, the risk of diffuse hemorrhage is the greatest within 24 hours

post-intervention. Possibly ongoing risk of local bleeding into the infarct core has limited clinical sequelae, if any."

*Procházka:* "We cross the occlusion of the ICA origin by neurovascular technique using embolic protection wire, with subsequent direct stenting of the lesion, or thrombus aspiration with the 6F sheath. It depends on the calcifications of the lesion. No problems observed with DAPT immediately after stenting for the long time in our center, after stenting the ICA, we are crossing the stented area with the guiding sheath and making intracranial mechanical embolectomy with stent retriever or catheter aspiration."

## Summary

Acute stroke interventional treatment is a quickly evolving field of medicine with many remaining questions to be answered. The strategy of proximal ICA treatment during acute phase of large stroke is unclear and the strategies differ even among internationally recognized experts. Generalizations are difficult to make in complex disease processes such as this. The decisions can be impacted by patient variation and should be individualized. Nevertheless, well conducted controlled registries and/or randomized studies are needed in this field.

## Conflict of interest

No conflict of interest.

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## Ethical statement

I declare on behalf of all authors that the research was conducted according to Declaration of Helsinki.

## Informed consent

I declare that informed consent requirements do not apply to this manuscript.

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