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Periprocedural antithrombotic medication in acute ischemic stroke treated by catheter-based thrombectomy. A review

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ABSTRACT

This review summarized limited information known about periprocedural antithrombotic therapy before, during and immediately after percutaneous catheter-based thrombectomy for acute ischemic stroke. Very few data on this topic were published so far. In general, rtPA should be used upfront whenever clinically clearly indicated (0–3 h from stroke onset, absence of contraindications) irrespective of subsequent mechanical thrombectomy. If mechanical treatment follows after thrombolysis, neither anticoagulation, nor antiplatelet agents should be used in the acute phase. No data exist about the periprocedural use of anticoagulation or antiplatelet therapy in patients who cannot receive fibrinolysis and undergo direct mechanical thrombectomy alone. Most centers use no or very low dose heparin and a single dose of aspirin.

Contents

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Introduction

Interventional therapy of acute ischemic stroke is slowly emerging as an alternative treatment option besides thrombolytic therapy. Frequently both treatments are combined (''bridging'' thrombolysis or intraarterial ''local'' thrombolysis). Among various technical approaches to interventional therapy thrombectomy with stent-retrievers dominates after 2012, when the first devices (Solitaire® and Trevo®) were approved by the FDA. There is very limited information available on periprocedural antiplatelet or anticoagulant therapy before/during/after catheter-based thrombectomy (CBT). The aim of this article is to summarize the available published information on this topic.

What is (not) mentioned in the US guidelines?

Possibly the most comprehensive document on this subject – the American guidelines for the management of acute stroke [1] – describes the reperfusion strategies and the use of anticoagulant and antiplatelet agents as the primary therapy for stroke, but not as periprocedural therapy during CBT. There are 22 contraindications for the use of thrombolysis in acute stroke within 0–3 h from stroke onset, 27 contraindications for its use between 3 and 4.5 h and intravenous (systemic) thrombolysis is not recommended after 4.5 h (Table 1). Among important contraindications is very high blood pressure (due to increased risk of intracranial bleeding). Arterial blood pressure should be below 180/105 mmHg before iv. rtPA is initiated. Intravenous rtPA in the dose of 0.9 mg/kg (max. 90 mg total) is indicated for selected patients (without contraindications) who can be treated within 3 h of stroke onset (IA recommendation) or within 3–4.5 h (IB recommendation). Interestingly, rtPA has FDA approval only for the use within 0–3 h from stroke onset and not for more delayed use. In other words, iv. thrombolysis between 3 and 4.5 h from stroke onset is recommended by the guidelines, but not approved by the FDA. Similarly, intraarterial rtPA is not approved by FDA, but was frequently used as part of acute intervention prior to the era of stent-retrievers. Nowadays, when stent-retrievers are much faster and much more effective, i.a. use of rtPA is reserved only for patients with more distal occlusions, not accessible with stent-retrievers. The guidelines also recommend, that patients eligible for rtPA should receive iv. rtPA even if endovascular treatment is considered (IA recommendation). The total ischemic time (stroke onset – reperfusion) is even more critical in acute stroke than in acute myocardial infarction. Thus, the guidelines recommend door-to-needle time <60 min (from hospital arrival to initiation of rtPA infusion) as an important parameter for quality control.

Thrombectomy devices can be useful in achieving recanalization alone or in combination with pharmacological fibrinolysis (IIaB recommendation). Mechanical thrombectomy is reasonable in patients who have contraindications to the use of intravenous fibrinolysis (IIaC recommendation). As mentioned above, no information is given in these guidelines about the use of anticoagulants during CBT in patients with contraindications for thrombolysis. In general, urgent anticoagulation with the goal of preventing early recurrent stroke or improving stroke outcomes or for the management of non-cerebrovascular conditions is not recommended due to the risk of serious intracranial hemorrhage (IIIA recommendation). Anticoagulant therapy within 24 h after rtPA is not recommended (IIIB).

Table 1 – Contraindications for thrombolytic therapy of acute stroke [1].

Absolute contraindications	Relative contraindications
Significant head trauma or prior stroke in previous 3 months	Only minor or rapidly improving stroke symptoms (clearing spontaneously)
Symptoms suggest subarachnoid hemorrhage	Pregnancy
Arterial puncture at noncompressible site in previous 7 days	Seizure at onset with postictal residual neurological impairments
History of previous intracranial hemorrhage	Major surgery or serious trauma within previous 14 days
Intracranial neoplasm, arteriovenous malformation, or aneurysm	Recent gastrointestinal or urinary tract hemorrhage (within previous 21 days)
Recent intracranial or intraspinal surgery	Recent acute myocardial infarction (within previous 3 months)
Elevated blood pressure (systolic >185 mm Hg or diastolic >110 mm Hg)	Aged >80 years
Active internal bleeding	Severe stroke (NIHSS > 25)
Acute bleeding diathesis	Taking an oral anticoagulant regardless of INR
Platelet count <100,000/mm^3	History of both diabetes and prior ischemic stroke
Heparin received within 48 h, resulting in abnormally elevated aPTT greater than the upper limit of normal	Imaging evidence of ischemic injury involving more than one third of the MCA territory
Current use of anticoagulant with INR >1.7 or PT >15 s	
Current use of direct thrombin inhibitors or direct factor Xa inhibitors with elevated sensitive laboratory tests (such as aPTT, INR, platelet count, and ECT; TT; or appropriate factor Xa activity assays)	
Blood glucose concentration <2.7 mmol/L	
CT demonstrates multilobar infarction (hypodensity >1/3 cerebral hemisphere)	