

**Endovascular treatments of ischemic stroke**

*Serge Bracard, René Anxionnat, Xavier Ducrocq, Ariel Lebedinsky, Stephanos Finitzis, Luc Picard  
Department of Diagnostic and Interventional Neuroradiology  
Hôpital Neurologique, CHU de Nancy, Nancy, France*

**Stroke Therapy**

The majority of ischemic strokes are due to thromboembolic arterial occlusion. Over the past few years, there have been intensive investigations regarding intravenous therapy for the treatment of acute ischemic stroke. At the present time, tissue plasminogen activator (rt-PA), when administered within the three hours of symptom onset has been shown to be an effective therapy. The benefits were demonstrated in the NINDS trial in 1995.

Intra arterial thrombolysis is thought to be more effective than intravenous rt-PA. In PROACT II, patients within 6 hours of symptom onset with ACM occlusion were randomised to receive intra arterial thrombolysis with systemic heparinization versus heparinization alone. A good or excellent score on modified Rankin scale was achieved in 40% in the intra arterial group versus 25% in the control group. Intracerebral hemorrhage rates were increased in the intra arterial group, however no difference in overall mortality was observed.

A combined approach that uses the speed of initiation of therapy with IV rtPA and the improved recanalizations efficacy of rapidly administered local IA rt-PA may improve patient outcome from major stroke. In the first studies, combined intravenous – intra arterial thrombolysis seems to be more efficient but need larger studies to be accepted.

Further research is being conducted in the use of mechanical devices (like MERCI trial) with good results. The advantages of these approaches include lack of systemic and hemorrhagic complications.

**Carotid stenting**

Carotid stenosis may cause ischemic events by reducing cerebral blood flow or by acting as a source of thromboemboly. Randomized studies have established carotid endarterectomy to be an effective therapy for patients with significant carotid stenosis. Additionally, CEA may reduce the risk of ischemic events and overall mortality for patients with asymptomatic stenosis.

Carotid stenting (CAS) is the less invasive percutaneous procedure that is being investigated as an alternative to CEA. At the present time carotid stenting may be particularly useful for patients who are poor surgical candidates, have received prior radiation or have restenosis or bilateral lesions.

In the past few years, evidence is growing that CAS might be an alternative to CEA and some series showed comparable major stroke and deaths rate of CEA and CAS. In order to reduce embolization of plaque fragments to the brain during CAS, cerebral protection devices have been developed. In the French EVA 3S study, the risk of any stroke within 30 days was about 3 times that of patients treated with cerebral protection and the safety committee of EVA3 S recommended to stop unprotected CAS .

**Intracranial stenosis**

Atherosclerotic disease of the intracranial vessels accounts for approximately 10% of ischemic stroke.

Despite antithrombotic therapy many patients have recurrent ischemic events. In the French GESICA multicentric study 44% of 102 patients who were treated with maximal antithrombotic therapy had ischemic events during the 24 months follow-up period.

Studies of intracranial angioplasty and/or stenting have shown high technical success rates of more than 90%.

However, compared with extra cranial vessels, angioplasty of intracranial vessels has a higher complication rate.

In the GESICA study, 28 angioplasties were performed with 4 complications (14.2%), 2 deaths: 1 arterial rupture, 1 reperfusion haematoma and 2 strokes. During the follow up period (mean follow-up: 19.5 months) only 1 TIA was observed but no stroke.