Improving Door-to-Needle Times: A Single-Center Validation of the Target Stroke Hypothesis

The treatment effect of intravenous tissue-type plasminogen activator (tPA) for acute ischemic stroke is very time dependent. National guideline recommendations exist for the emergency department (ED) care of these patients. Door to computed tomography (CT) is recommended to occur ≤25 minutes and door to needle ≤60 minutes from arrival in the ED. Dr. Ruff et al. from Massachusetts General Hospital describe 10 best practices implemented in their acute stroke protocol to improve door to needle times. Emergency Medical Services notify the ED of patients with potential acute stroke on the way to the hospital. The ED team activates a pager that notifies 16 medical professionals, including physicians from neurology and neuroradiology, technologists, pharmacists, and nurses. In the ED, the patient is placed on the monitor, and super stat laboratories are drawn. The neurology team performs the National Institutes of Health Stroke Scale score and determines eligibility for intravenous tPA. Intravenous tPA is mixed if stroke team suspects a stroke, even before the CT scan. Intravenous tPA is given, when indicated, immediately after the noncontrast head CT scan.

A retrospective analysis of a prospectively collected cohort of patients was performed comparing patients before the intervention (2003–2006) and after the intervention (2008–2011). During this time period, 2595 patients presented directly to the Massachusetts General Hospital ED with the diagnosis of acute ischemic stroke. A total of 284 (11%) patients received intravenous tPA. For patients who arrived in an intravenous tPA window, the door to CT <25 improved from 26.7% preintervention to 52.3% postintervention (P<0.001). Door to needle <60 doubled from 32.4% to 70.3% (P<0.001) after intervention as well. In summary, both door to CT and door to needle times greatly improved with these 10 best practices and thus patients with acute ischemic stroke are treated a much timelier fashion. See p 504.

Predictors of Acute and Persisting Ischemic Brain Lesions in Patients Randomized to Carotid Stenting or Endarterectomy

In the previously published MRI substudy of the International Carotid Stenting Study (ICSS), acute ischemic lesions on diffusion-weighted imaging (DWI) were found more commonly after carotid artery stenting than carotid endarterectomy. In the article by Rostamzadeh et al., predictors for acute and persisting periprocedural DWI lesions were determined among patients with symptomatic carotid stenosis. MRI brain was performed 1 to 7 days before treatment, 1 to 3 days after treatment, and 27 to 33 days after treatment. Acute lesions were defined as DWI hyperintense lesions on the early post-treatment scans, and persisting lesions were defined as fluid attenuated inversion recovery hyperintense lesions on the later follow-up scan at the site of the previous DWI lesion. Patients in the carotid stenting group had more acute lesions than those in the endarterectomy group (relative risk, 8.8; P<0.001). Acute lesion count in the carotid artery stenting group was higher in older patients (trend), men, and patients with stroke as the qualifying event. Higher systolic blood pressure (≥158.5 mmHg) was associated with higher DWI lesion count in the carotid endarterectomy group. More severe white matter disease was associated with higher DWI lesion count in both groups. Patients in the carotid artery stenting group had more persisting lesions than those in the carotid endarterectomy group, but the rate of conversion from acute to persisting lesion was lower in the stenting group. In summary, carotid stenting in ICSS was associated with more acute and persisting ischemic infarcts than endarterectomy. The main risk factors for peri-procedural infarcts in this cohort are elderly men with stroke as precipitating event in patients treated with stenting and high blood pressure in those treated with endarterectomy. Although per ICSS, there was no difference in the proportion of patients with disabling deficits after 1 month between carotid artery stenting and carotid endarterectomy; further studies are warranted to look at the long-term effects of the increased stroke burden, such as cognitive testing. See p 591.

Reperfusion Injury on Magnetic Resonance Imaging After Carotid Revascularization

Reperfusion injury after carotid revascularization procedures can be visualized by delayed gadolinium enhancement in the subarachnoid space on fluid attenuated inversion recovery images and is called HARM or hyperintense acute reperfusion marker. HARM has been previously shown to be associated with reperfusion injury, hemorrhagic transformation, and poor outcome. This prospective study by Cho et al. included 45 patients with severe (≥70%) carotid stenosis. All patients received MRI with DWI and fluid attenuated inversion recovery sequences before and 24 hours after the procedures. HARM was detected by injecting gadolinium immediately after the procedures, but the authors sought to determine the occurrence of and predictors for HARM. HARM was seen in 8 (17.8%) patients. Four (50%) of these patients demonstrated neurological deterioration or symptomatic HARM. All 4 of these patients showed clinical improvement over days with tight blood pressure control, and symptomatic HARM disappeared on follow-up MRI. Patients with symptomatic HARM were older and had more frequent leukoaraisis and higher postprocedural systolic blood pressure than patients without it. New cerebral infarcts as seen on the postprocedural DWI images were identified in 13 (28.9%) patients. HARM was not associated with these new infarcts. In summary, HARM seems to be common after carotid revascularization, especially in the elderly, with white matter disease and high postintervention blood pressure. Although it seems to lead to neurological deterioration, it also seems reversible on follow-up imaging. Further large studies will be needed to understand this phenomenon and its implications better. See p 602.