

area represents the goal of the early treatment, because its evolution in necrosis or recovery (even partial) depends on the time and the rate of reperfusion.

This feature of the acute cerebrovascular accident can be considered very similar, in organizational aspects, with that observed in the ischemic heart attack in which a very early treatment, beginning “at the home of the patients”, is able to increase the recovery. A correct diagnosis and initial treatment of stroke in pre-hospital phase, should therefore be considered a priority.

After a territorial first-line treatment, the correct intra-hospital diagnosis and assessment of ischemic or hemorrhagic injury with neuroimaging (CT-scan, NMR, angiography, trans-cranial ultrasonography) can lead the decision to treat with intraarterial thrombolysis (and other procedures) or with medical care and intravascular embolization. Beside these conventional treatment, the evaluation of patient from an “intensivist point of view” (based on a cerebral perfusion pressure optimization), might also open “less-conventional” therapeutic options such as decompressive craniotomy and mild-therapeutic hypothermia. This approach needs a strict collaboration between various specialists, and it must be considered an emergency intensive care regimen of treatment.

Growing evidences support that the creation of dedicated “in-hospital pathway” for an early diagnosis/treatment of stroke produces a decrease in mortality and an improvement of recovery after acute cerebrovascular event. According with these consideration, a correct territorial management of stroke and the hospitalization in specialized center should be considered the corner stone of stroke treatment. An intensive-care approach might be guarantee to optimize the possibility of an early reperfusion of peri-ischemic area.

References

- van der Worp BH and van Gijn J. *N Engl J Med* 2007;357:572–579.
White H and Venkatesh B. *Neurosurg Anesth* 2008;107:979–988.

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Triage of Patients with Suspected Stroke

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Suspected stroke patients require rapid clinical evaluation to identify those who may benefit from timely thrombolytic administration. The diagnosis of stroke requires focused history and physical examination as well as clinical judgment. At the moment, only standardized stroke scales have sufficient evidence to be used in the pre-hospital and very early (triage) hospital setting in patients with suspected stroke. In our emergency departments the CPSS is used at triage due to its extreme simplicity (requiring only 1–2 minutes to be administered), and its high reliability. Interestingly, in previous studies conducted in emergency scenarios CPSS showed a lower sensitivity than expected, missing the diagnosis in about one third of patients with stroke. Our data supports these findings as we observed high percentage of false negatives (29%) for the CPSS in our study population. In our experience a multi-marker had an accuracy similar to pre-hospital standardized stroke scale (CPSS), misdiagnosing about one third of patients, thus discouraging their use as stand alone tests

in triage of patients with suspected stroke. The combination of the two tests seems to increment diagnostic yield, encouraging further studies to investigate the potential clinical utility of biomarkers in triage of patients with suspected stroke.

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Integration Between Triage Physician and Neurologist

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Intravenous thrombolysis with tPA within 3 hours from onset is the principal approved drug treatment for acute ischemic stroke. Acute stroke must be managed as an emergency for the narrow treatment time windows. Indeed the efficacy of tPA in term of recovery from disability is time dependent.

The recent ECASS 3 trial confirmed the hypothesis, derived from a previous meta-analysis of randomised control trials, that tPA could be efficacious up to 4.5 hours from symptoms onset, but, now the administration of tPA beyond 3 hours is “off label”.

An organized acute stroke care pathway with the integration of several personnel is essential. The implementation of a red code for stroke from the emergency service to the triage physician and first clinical evaluation of patients is necessary for a rapid assessment of acute stroke patients. A trained emergency department staff in caring for acute cerebrovascular disease patients is necessary to improve screening and selection for acute phase treatment.

This model of integration between several professionals in the emergency department should be used even for patients with TIA in order to identify those patients with higher risk of stroke recurrence within 72 hours according to the ABCD2 score.

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A Rapid Access to Secondary Prevention: “Day T.I.A. Project”

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The transient ischemic attack (TIA) is a brief episode of neurological dysfunction caused by focal brain or retinal ischemia, with clinical symptoms typically lasting less than one hour, and without evidence of acute infarction. In the literature preceding the advanced neuroimaging with CTscan-angiography and diffusion weighted MRI, the duration of the neurological deficits lasted at least 24 hours but in 2002 a new definition was proposed because only a deficit less than one hour is probably to occur without permanent brain injury (Albers GW et al. *N. Engl J. Med.* 2002;347:1713–1716). According to the new definition, the diagnosis of TIA needs to be confirmed by CT or MRI in order to exclude acute stroke. The TIA can recur showing in this way the possible severity of transient episode. Often the

TIAs are due to embolism from large vessels pathology extra and/or intra cranial; also cardioembolic sources are identified as causes that, if they aren't removed, can recur as TIAs or stroke. The risk of stroke in people affected by TIA or minor stroke is ten-fold more frequent than in general population in the first year from the initial episode; moreover during the 5 years following the transient ischaemic attack in non-treated patients, the risk of cerebral infarction is estimated to be 25%. Therefore time window for prevention is very short : the better setting for effective procedures to prevent the stroke after TIA is hospitalization if :

1. the onset of TIAs is within the previous 48 hours
2. TIAs last for more than 10 minutes
3. frequent recurrence of TIAs.

However many transient neurological symptoms are not properly transient ischemic attacks: the mimic TIAs are frequently due to seizures, subdural haematoma, migraine. For these reasons the investigations about the major categories of symptom presentations associated to cerebrovascular risk factors have to be taken into consideration to formulate the ABCD and ABCD2 (Rothwell P.M. et al., Lancet 2005, Jonsthorpe C. et al, Lancet 2007). The ABCD2 is meaningful for a stroke risk during the next two and seven days following TIA ,because the delayed arrivals into hospital of patients with elevated score (6–7 ABCD2) is barely effective to prevent the onset of a major risk. The great value of SOS TIA study (Lavalley, Lancet Neurol 2007) was the demonstration that early admission to locally structured ad hoc organization (TIA clinic) permit the reduction of 79% of relative risk of stroke to 90 days.

On the basis of these studies we propose an organization model modulated according to the score and the time of TIA by creating the hospital pathways. This project can rely on neurologists and dedicated nurses, computerized reports, CT/ MRI imaging, carotid neurosonology and TCCD. The “Day TIA” is a 48 hours admission in Stroke Unit for patients with a score ABCD2>6; with a score of 4–5, patients are admitted into OBI at the ED; with a score <4 they can be evaluated at cerebrovascular service within seven days. At the same time we informed the Reggio Emilia province population about “why, when, where,” they could take benefit from going to “Day TIA” hospital, prevention offices, ALICE group (Italian association for stroke) and GPs. The aim is the primary prevention by simultaneous scheduling neurosonologic and cardiologic examinations for people aged more than 60 years , with elevated blood pressure and/ or diabetes in order to realize the novel paradigm of prevention.

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Diagnostic and Therapeutic Pathways in Acute Stroke: The Point of View of Neuroradiologist

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Diagnostic imaging modalities in evaluation of acute ictus play a fundamental role for a correct clinical approach. The early detection

and knowledge by widely available and unintrusive techniques, such as CT and MR, of brain ischemic damage still in reversible phase have important therapeutic and prognostic implications, also particularly in planning revascularization of intracranial arterial segments, by intravenous or intra-arterial thrombolytic therapy, and thromboendarterectomy or stenting of epiaortic vessels.

Diagnostic-therapeutics pathway in patients with suspected stroke provides, first of all, to discriminate between ischemic brain injuries and other pathologies leading acute neurological deficit (intracerebral hemorrhage, tumors, abscess, post-traumatic lesions, seizures ..), successively to determinate the etiologic mechanism of ischemic event on the basis of clinical data and further aimed investigations. With regards to specific investigations it is possible to outline guidelines that, starting from clinical findings, articulate in terms of priority and correlation with other methodics (ultrasonography), also considering the accessibility to more advanced technologies.

The study of extracranial arterials and cerebral circulation, including the research of the kind and site of endovascular lesion, represents a preliminary procedure to therapeutic decisions in the majority of ischemic events.

Noncontrast-CT is still now the imaging modality of choice for identifying the underlying pathology in the initial hours of acute stroke, because immediately exclude intracranial hemorrhage or tumor, and can also be used to detect early signs of an infarct (hyperdensity of middle cerebral artery, early parenchymal low-density, mass effect due to cytotoxic edema).

At present noncontrast-MR is a complementary technique to confirm the diagnosis of acute ischemic event because of high sensitivity especially in infratentorial or lacunar lesions.

CT and MR remain the standard acute stroke imaging modality in the first 12–24 hours after clinical onset; in the light of recent treatments by intravenous or intra-arterial thrombolysis and neuroprotective agents to improve the clinical outcome, other diagnostic tools are needed that quickly (within 3–6 hours) shows not only lesion size but also vessel occlusion and that provides information about the collateral circulation, tissue at risk and salvageable brain (ischemic penumbra).

In the evaluation of epiaortic and intracranial vessels ultrasonography is actually employed, in association with Angio-CT and Angio-RM, also if this methodic present some limits to assess the degree of stenosis and characterize the pathologic arterial walls.

Dynamic contrast-enhanced CT and MR imaging techniques such as the Perfusion-Weighted CT and Perfusion-Weighted MR imaging, associated with Diffusion-Weighted MR, arouse great interest helping predict clinical outcome at very early time points and allowing the identification of optimal candidates for therapeutic interventions, including thrombolysis (ie, those patients with a sizeable volume of potentially salvageable tissue at risk).

Cerebral angiography, non risks exempt and performing only in qualified centers, is not recommended in the hyperacute phase of stroke with the exception of selected cases for revascularizing treatments (i.a. thrombolysis, stenting).

Digital angiography, besides confirming site and nature of the vascular occlusion, gives information about existence and goodness of collateral circulation, involvement of deep territories, wideness of avascular area by parenchymography, and about the endovascular accessibility for thromboembolic therapy. With regard to this interventional procedure is of primary importance the site of embolic occlusion and it is essential to observe “therapeutic window” of 4–6 hours for carotid districts, but wider for vertebro-basilar occlusions.