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## Review Article

## If I Had a Stroke in 2018 - @

**Laura Baptiste, Celine Breniere, Julien Gueniat, Mathilde Graber, Lucie Garnier, Benoit Delpont, Christelle Blanc-Labarre, Claire Zabawa, Yannick Bejot and Maurice Giroud\***

*Stroke Unit, Stroke and Tele-Stroke Network, University Hospital of Dijon-Bourgogne, Departement of Teaching, Faculty of Medicine of Dijon, France*

**\*Address for Correspondence:** Maurice Giroud, Stroke Unit, University Hospital of Dijon, 14 Rue Gaffarel-21079 Dijon Cedex, France, Tel : 0380293753; E-mail : maurice.giroud@chu-dijon.fr

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## SUMMARY

The management of stroke is now recognized as a real medical emergency as well as myocardial infarct, because stroke units, fibrinolysis with rt-pa and mechanical thrombectomy in cerebral infarct, have dramatically changed prognosis of ischemic stroke with a decrease of mortality of 20 % and an increase of total recovery of 20 %.

This medical emergency enforces the care systems because it needs a speedy network for the patient, his family and the care professionals because it is necessary to start treatment as soon as possible to be efficacious.

The consequences to avoid the lost of chance, need several actions:

- inform the public about the interest of FAST score
- to identify the first signs (facial palsy, palsy of arm, aphasia and time of stroke onset);
- call emergency phone,
- translate the patient towards an appropriate medical center;
- use tele-stroke when the hospital has no neurologist;
- And manage the patient in a stroke unit, to introduce in a second time the secondary prevention thanks to therapeutical education.

**Keywords:** Ischemic Stroke; Emergency; Network; Telestroke

## INTRODUCTION

Stroke is a major problem of public health because it is frequent, severe, with elevated mortality and handicap rates, and it uses a great quantity of human and logistic resources [1,2].

Its incidence is stable over 55 years but the number of stroke rises below 55 years [3]. It is the first cause of motor handicap, the 2<sup>nd</sup> cause of cognitive decline, the 2<sup>nd</sup> cause of death in women and the 3<sup>rd</sup> in men [1,2]. For those specific features, stroke is now a recognized disease of brain [4].

By contrast, prevention and care have been improved since the 20<sup>th</sup> century with the implementation of stroke units that have demonstrated their efficacy to reduce death and handicap [5].

Fibrinolysis with rt-pa [6] and mechanical thrombectomy are the two approved and efficacious treatments of ischemic stroke, reducing death and handicap in more than 20 % [7]. Prevention is now possible because we can treat the 10 vascular risk factors responsible of 90 % of stroke [8]. Tele-Stroke allows to generalize fibrinolysis even in hospitals without any neurologists [7,9-11].

To synthesis all the steps allowing the decrease of the burden of stroke, it is possible to give the floor to a person providing us his opinion about his hopes for optimal prevention and care for a hypothetical stroke.

### **Pre-hospital stage: Information of the public on primary prevention, on the first symptoms of stroke and the interest to call the emergency phone**

To prevent my stroke, I should like to be informed on the significant neuro-vascular risks factors, on the place of blood hypertension, diabetes, hypercholesterolemia, tobacco consumption, cardiac arrhythmia, sleep apnea, teeth inflammation, physical activity and nutrition that are the scientifically validated easily detectable main neuro-vascular risks for stroke [8, 12].

Furthermore, their treatment are both efficacious in clinical trials but also in the real life, decreasing the risk of stroke [12,13].

The evidence-based prevention is now demonstrated and applied by an individual prevention, leading to the people to be actors of

their health, by a smartphone application so called "Riskometer" [14]. Riskometer is out of the ordinary application in health, because it evaluates 20 neuro-vascular risks, and it provides advices. Its evaluation shows that this application is efficacious decreasing the proportion of non-treated neuro-vascular risk factors and decreasing the risk of stroke onset [15]. Therefore, I want to access to this application and diffuse it through all my family and friends.

Despite all these measures, If I may have a stroke, I should like that the professionals learn me the first major symptoms predictive of a stroke at home.

For the experts in stroke, FAST appears being a good scale to identify the onset of a stroke with 3 major, frequent and accessible symptoms by everybody: unilateral face palsy, arm palsy and aphasia, recording also the hour of onset. I have learnt by the way of a public meeting that FAST was improved by 2 symptoms increasing its sensitivity and its specificity, adding balance and eyes troubles, giving the scale BE-FAST [16].

The latest important information the public must know is to call the national emergency phone to speed up the tertiary comprehensive stroke center for an accurate stroke identification, making the right decision [10,16]. It will choose the best course, the right hospital able to deliver the treatments, fibrinolysis and mechanical thrombectomy [10], or if not possible, towards an hospital connected with the tertiary comprehensive stroke center by Tele-stroke whose efficacy and safety are demonstrated [7-11] allowing to quickly receive fibrinolysis.

### **Intra-hospital stage: Early carryover towards the right hospital at the right time**

After calling the emergency phone, I am moved either towards the emergency ward or Stroke Unit, of the nearest right hospital, to be managed by a stroke neurologist, whose objective is to determine the indications and contra-indications of fibrinolysis by rt-pa and mechanical thrombectomy [7,10], according to my medical history (my age, the time period, my clinical history as blood hypertension, cardiac arrhythmia, cancer, treatment by antiplatelets or anticoagulants as anti-K-vitamin or direct oral anticoagulants).

Cerebral imaging par MRI will be the first procedure, to evaluate the ischemic or hemorrhagic stroke sub- types, the size of the infarct,

the penumbra, the mismatch, and the identification of a thrombus in large cerebral arteries eligible to mechanical thrombectomy by an Interventional Neuro-Radiologist [7,10].

Outside MRI, a CT-scan with perfusion and angio-scan will respond to the same questions [7,10].

If there is a large mismatch, and a thrombus I hope that I shall receive the association intra-venous fibrinolysis and mechanical thrombectomy whose superiority compared to a single fibrinolysis has been demonstrated [7,10], even if I arrive to the needle 4 h after the stroke onset (I am below 80 years). If I have an isolated aphasia (NIH < 4), fibrinolysis is recommended compared to the severe sequelae [17].

If I do not fulfill the criteria of the current guideline, because a wake-up stroke with a last-seen normal time longer than 4.5 h for fibrinolysis of 6 h for mechanical thrombectomy, a MR-based perfusion-diffusion-mismatch finding may suggest the use of fibrinolysis even despite the lack of evidence.

Aggravating factors will be sought and treated: blood tension over 180/90 mmHg that is dangerous with the risk of hemorrhage during fibrinolysis, glycemia over 1,5 g/l, justifying not drip serum with glucose, removed by serum with salt, a decrease of oxygen level in blood, a rise of temperature, a swallowing trouble. An urinary-catheter will be put in only if there is an urinary globe. Because of my varicose veins, a prevention of sural phlebitis and lung embolus will be performed [10]. If my consciousness or NIH Scale decrease, measured respectively by the nurses using Glasgow score and NIH scale, the neurologist will be alerted and will seek for worsening of the ischemic stroke, or a complication as cerebral hemorrhage, a decrease of blood tension or an increase of glycemia over 1.5 g/l. If there is a cerebral hemorrhage, the best procedure remains the acute decrease of blood tension below 140/90 mmHg [18]. If there is a malignant infarction I shall accept an early decompressive craniectomy [19].

**Etiological check-up: major stage to implement an optimal secondary prevention**

The identification of an atherothrombosis disease from both the neuro-vascular risk factors, angiographic and ultra-sound screening or a cardio-embolic disease with electrocardiogram, long duration Holter to detect cardio-arrhythmia, and a Transoesophageal Echocardiography to detect a Patent Foramen Ovale associated or not to an atrial septal aneurysm, will allow to propose efficacious treatments.

At the end of this check-up, I shall wait for all the results to know the cause of my ischemic stroke according to the TOAST Classification [20], leading to a right preventive strategy.

**Secondary prevention: one of the most important therapeutical advance justifying the Therapeutical Education**

To avoid recurrent strokes, motor and cognitive decline [21], I shall hope to benefit of 3 therapeutical classes if atheroma is identified as the cause of my stroke: control of blood hypertension with Conversion Enzyme Inhibition [21], control of cholesterol level with statine [22] and antiplatelets as demonstrated by the Express Study in 2007 [23]. Ticagrelor, a new antiplatelets, is superior to aspirin at preventing stroke, myocardial infarction, or death at 90 days in patients with acute ischaemic stroke or TIA associated with ipsilateral atherosclerosis stenosis [24].

If my Stroke is induced by cardiac arrhythmia the new class of Direct Oral Anticoagulants has demonstrated its efficacy and risk of bleeding lower than that of anti-K-vitamin [25]. I know that only one molecule has its reversal.

If I present a contra-indication to anticoagulant, there is the possibility to close left atrial appendage to prevent recurrent stroke from arrhythmia.

As I am young enough, if that a Patent Foramen Ovale with atrial septal aneurysm is associated to a cryptogenic stroke, I read in media, that the closure of the Patent Foramen Ovale associated to aspirin was better than aspirin alone [26].

Finally, my neurologist concluded that I had a cryptogenic benign ischemic stroke and in this condition my early preventive treatment was aspirin, able to significantly decrease the risk of recurrent TIA or stroke [27,28] for the following year.

I accept to be moved towards a service of rehabilitation for the light motor palsy of my left arm, and dysarthria, because rehabilitation is efficacious to treated the phasic [29], motor sequelae induced by stroke.

I am also invited to join a stroke network to share with other patients and care givers about the physical, professional, familial and financial problems induced by my cryptogenic stroke, and I shall be invited to be managed by a neurologist between 3 and 9 months after stroke or TIA onset to check my compliance to treatments, to identify some vascular risk factors unknown during my first event, and to detect any complications (spasticity, cognitive decline) [30].

After this first event, despite my young age, I am volunteer to follow Riskometer and to participate to Riburst study [14].

**PERSPECTIVES**

Trials on new fibrinolytic molecules, new neuroprotective agents, stem cell transplants, the interest of CT-scan or MRI within ambulance vehicle to reduce delay, the interest of mechanical thrombectomy until 24 hours [31], must be developed.

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