Journal of Neurology, Neurosurgery and Spine

Short Communication
Published: 23 Dec, 2016

Evolution of Ischemic Stroke Therapy

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Short Communication

Neurosurgical intervention with mechanical thrombectomy has very recently become the standard of care for the treatment of acute ischemic stroke. The history for the treatment of ischemic stroke is a fairly young one that began with the first carotid endarterectomy (CEA) for stroke prevention by Dr. Debakey in 1953 [1]. By the 1970's CEA became widespread for the prevention of thromboembolic strokes due to carotid artery stenosis. However it wasn't until 1991 when the North American Symptomatic Carotid Endarterectomy Trial reported the superior effectiveness of CEA over best medical therapy for improving stroke outcome [2]. This was the first comprehensive and well thought out study that evaluated surgical intervention options for ischemic strokes.

The NASCET trial was the gateway for future studies that evaluated new treatment modalities for stroke intervention. In 1995 the National Institute of Neurological Disorders and Stroke (NINDS) trial reported improvement in patient outcome when intravenous (IV) tPA was given within 3 hours of stroke symptoms [3]. This 4.5 hours following symptom onset following the European Cooperative Acute Stroke Study (ECASS III) trial [4].

Following the positive result of IV tPA for acute stroke management, a plethora of studies investigated more invasive treatment options for acute stroke preventions. In 1998 the PROACT trial reported on improvement in stroke outcome with the use of intra-arterial urokinase if used within 6 hours of stroke symptom onset [5]. This was the first FDA approved intervention options for the treatment of acute ischemic strokes.

Following the PROACT trial neurovascular stroke intervention took center stage for management of ischemic strokes. The first generation devices were introduced in the early 2000's including the MERCI devices [6]. Although studies showed successful vessel revascularization with the use of these devices, the MERCI device did not gain FDA approval for stroke intervention. Nonetheless this device became widely used as an adjuvant to IV tPA for treatment of acute intracranial vessel occlusions.

At this point the stroke market became flooded with a variety of devices and catheters intended to revascularize occluded intracranial vessels and therefore improve ischemic stroke outcome. These included the 2nd generation devices such as the Penumbra aspiration device as well as 3rd generation stent retrievers that include the Solitaire and Trevo mechanical thrombectomty devices.

The many years of studies and trials that set out to show how different techniques, devices, and medications could potentially improve stroke outcome culminated in the HERMES collaborative study that was a meta-analysis of 5 recent mechanical thrombecomty trials [7]. These trials included MR CLEAN, ESCAPE, REVASCAT, SWIFT PRIME, and EXTEND IA. The analysis showed a positive correlation between mechanical thrombectomy and patient outcome following ischemic stroke intervention if the procedure was performed within 6 hours of symptom onset. These positive results led to an explosion in the number of mechanical thrombectomy procedures performed worldwide mirroring the rise of CEA that was seen in the 1970's.

The future of endovascular stroke intervention is very promising. New technology in combination with increasing surgeon experience will lead to continuous improvement in patient outcome following ischemic strokes. Ischemic stroke which has traditionally been a devastating disease process now has a promising future.

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Received Date: *05 Dec 2016*
Accepted Date: *21 Dec 2016*
Published Date: *23 Dec 2016*

Citation:
Rahimi SY, Todnem ND. Evolution of Ischemic Stroke Therapy. J Neurol Neurosurg Spine. 2016; 1(2): 1006.

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