New gold standard treatment for acute stroke: endovascular thrombectomy using stent-retrievers

Patrick Pullicino, Steve M. Cordina

The last year has seen the most dramatic advance in the treatment of acute stroke since the United States National Institutes of Health tissue plasminogen activator (tPA) study[1] showed in 1995 that intravenous (IV) thrombolysis delivered within three hours of stroke onset could improve outcome. IV tPA became standard treatment for acute stroke after that study, but there was still difficulty in recanalising large vessel occlusions and up to one half of patients were left with severe deficits despite IV tPA. In 2008, the European Cooperative Acute Stroke Study (ECASS) III[2] extended the IV tPA time window from three to four and a half hours from stroke onset but favourable outcome at 90 days was still only seen in 52% of patients, as in other studies. In cardiology, it was demonstrated that endovascular treatments were superior to IV, but it appeared that this was going to be one area where stroke differed. Repeated endovascular studies, the largest of which was Interventional Management of Stroke (IMS) III trial[3] showed no advantage over IV tPA. The only exception was the borderline results of the Prolyse in Acute Thromboembolism (PROACT) II[4] trial in 1999. One common recurring theme was the need for early recanalization for maximal benefit[5] and the decreased recanalization noted with larger clot burden.[6]

Patrick Pullicino
Professor of Clinical Neuroscience,
Rutherford Building,
University of Kent

Steve M. Cordina, MD
Assistant Professor of Neurology,
Neurosurgery and Radiology Director,
Stroke,
Neurocritical Care and Endovascular
Neurosurgery University of South Alabama
College of Medicine

All this has dramatically changed. Since October 2014, no less than seven randomized clinical trials have been reported and shown that endovascular therapy is highly beneficial for intracranial occlusions compared with IV tPA up to 8 hours after stroke onset These ground breaking trials include the Multicenter Randomized Clinical Trial of Endovascular Treatment for Acute Ischemic Stroke (MR CLEAN),[7] the Extending the Time for Thrombolysis in Emergency Deficits — Intra-Arterial (EXTEND-IA) trial,[8] the Endovascular Treatment for Small Core and Anterior Circulation Proximal Occlusion with Emphasis on Minimizing CT to Recanalization Times (ESCAPE) trial,[9] the Solitaire with the Intention for Thrombectomy as Primary Endovascular Treatment (SWIFT PRIME) trial,[10] the Randomized Trial of Revascularization with Solitaire FR Device versus Best Medical Therapy in the Treatment of Acute Stroke Due to an Anterior Circulation Large Vessel Occlusion Presenting within Eight Hours of Symptom Onset (REVASCAT),[11] the Assess the Penumbra System in the Treatment of Acute Stroke (THERAPY) trial,[1], and the Trial and Cost Effectiveness Evaluation of Intra-arterial Thrombectomy in Acute Ischemic Stroke (THRACE) trial.[13]

New guidelines have recently been rushed out by the American Heart Association and American Stroke Association.[14] These state that rapid administration of IV tPA to appropriate patients remains the mainstay of early treatment of acute ischemic stroke. The new trials show that some people will benefit from additional treatment with a stent retrieval device or aspiration if a clot continues to obstruct a vessel after tPA is given. There is now class I, level of evidence A that a stent retriever should be used in cases in which all of the following criteria are met: a) Pre-stroke modified Rankin Scale score of 0-1, b) Occlusion located in the internal carotid artery or proximal middle cerebral artery (usually identified on head CT angiography immediately after the initial bolus dose of iv TPA is administered), c) Patient at least 18 years of age, d) NIH Stroke Scale score of at least 6, e) Substantial portion of brain tissue on the side of the stroke is not permanently damaged, f) Treatment can be initiated within 6 hours of symptom onset.

The guidelines underline that endovascular therapy should be performed at an experienced stroke centre

with rapid access to cerebral angiography and qualified neuro-interventionalist. In addition, they outline a variety of scenarios in which use of a stent retriever may be reasonable, meaning benefit is uncertain due to sparse or no randomized evidence for example in basilar artery occlusion.

The cost of IV tPA in the United Kingdom is £1,214 and mechanical thrombectomy is about seven times more expensive (£8,365) because of the cost of the stent, materials and surgery.[15] However, thrombectomy doubles the number of patients with major intracranial artery occlusions who become functionally independent, with improved quality-adjusted life expectancy. The probability analysis has shown therefore that thrombectomy is cost effective.[15]

Despite the high up-front cost, endovascular acute treatment is likely to be taken up by all major stroke centres, as in coronary disease. Malta already has the capacity to administer tPA to eligible patients. In addition, over the last year, stroke thrombectomy has been introduced and is now available for patients that need this advanced treatment The life-altering effect of severe disability after intracranial arterial occlusions behoves that this new dramatic advance in stroke treatment be put into practice as quickly as possible.

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Cover Picture:
'Sighisoara'
Watercolour
By Peter Paul Vassallo

Peter Paul Vassallo graduated Doctor of Medicine and Surgery from the University of Malta in 1992. He proceeed to the United Kingdom where he passed surgical examinations with the Royal colleges of surgeons in Edinburgh and Ireland. He underwent military training at the Royal Military Academy in Sandhurst and saw operational duties in Northern Ireland and Iraq. Upon his return to Malta he was appointed registrar in cardiothoracic surgery but moved on to be commisioned Surgeon Lieutenant Colonel in the Armed Forses of Malta where he currently practices. Among his many interests watercolour painting is a recent addition.