Intra-arterial Thrombolysis in Acute Brainstem Infarct

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Abstract
A young male presented with vertebrobasilar ischaemic stroke. He was given intra-arterial thrombolysis, following which he showed gradual partial recovery.

INTRODUCTION
Vertebrobasilar thrombosis has a high mortality rate, between 75% to 80%. The clinical diagnosis of these patients is sometimes difficult and their medical management is not well defined. Various multicentre, controlled studies have been conducted to demonstrate the role of neuro-endovascular therapy in acute cerebral infarct.1 We present a case of a young male with acute thrombotic occlusion of the basilar artery (BA) and left vertebral artery (LVA), was treated with multidisciplinary management and intra-arterial thrombolysis.

CASE REPORT
A male aged 33 years presented with headache and vomiting, followed by loss of consciousness and quadriaparesis the next day. The CT scan brain showed small early infarction in left posterior parietal occipital region and left pontine region. A four vessel DSA showed normal internal carotid, anterior cerebral, middle cerebral arteries. The posterior cerebral arteries (PCA) were seen filling via the internal carotid artery injections and circle of Willis. There was a thrombotic occlusion of the basilar and left vertebral arteries (Fig. 1). One million units of Inj. Urokinase was injected intra-arterially. It was infused in small aliquots in the left vertebral artery (LVA) at progressive intervals and distances right up to the basilar artery. By the time the thrombolysis was completed, the patient had been unconscious for 20 hours. Follow up check angiogram showed a fairly normal appearance of arteries with good flow in retrograde fashion in right vertebral artery (RVA). Intravenous heparin was given at 1000 u/hr for six hours. There were no haemorrhagic complications.

All hematological and biochemical investigations, tests for plasma homocysteine, fibrinogen, protein C, protein S, antithrombin III, sucrose lysis and sickling test did not reveal any abnormality. Lipoprotein A level was 64 mg/dl (n < 30 mg/dl). Patient was treated with multidisciplinary medical management including nutritional support, physiotherapy and antiplatelet drugs.

The patient remained in a locked in state for two weeks and subsequently showed gradual improvement in terms of movement of limbs, comprehension, bowel and bowel control over the next four months.

DISCUSSION
Thrombolytic therapy has been used in patients with acute ischaemic stroke to restore cerebral blood flow, ischaemia and limit neurologic disability. The hypothesis is that recanalization of an occluded cerebral artery may assist the recovery of reversibly ischaemic tissue. During the past decade, several thrombolytic substances have been tested with either intra-arterial or intravenous (IV) administration.2 The most thoroughly studied thrombolytics are streptokinase and recombinant tissue-type plasminogen activator (rTPA) followed by urokinase (UK) and pro-UK. Improved clinical outcome has been demonstrated with IV rTPA within 3-6 hours of stroke onset. Local intraarterial thrombolysis (LIT) helps to achieve a higher concentration of thrombolytic drug in the affected vascular territory without an excess systemic dose rate. Angiography performed before LIT depicts vascular disorders and provides information on collateral flow.3 LIT has a higher recanalization rate - 60-90% versus 30-50% with IV.1 Disadvantages lie in the cost and delay.

Timely recanalization with UK/SK has been shown to benefit patients with carotid or basilar artery occlusion. Important prediction of successful recanalization include occlusion site, thrombus age, presence and efficacy of collateral circulation.2 The first clinical series of LIT for acute vertebrobasilar ischaemia was published by Zeumer et al in 1983. In the posterior circulation, there does not exist a limit as to the amount of time elapsed from the beginning of the symptoms to perform thrombolysis, like exists in anterior circulation of 3-6 hrs. This is because thrombosis of the basilar artery has extremely high mortality.

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and therefore thrombolysis is the only viable therapeutic alternative. It should be noted that the neuronal tissue in the pons which is predominantly axonal may be less vulnerable to ischaemia. It is therefore, the clinical presentation and not the time elapsed that directs the therapeutic conduct. If the patient is still not in coma, or if in coma only for a short duration, patient is a candidate for thrombolysis.\textsuperscript{1}

Angiographic factors which are associated with a better outcome are the localization of the occlusion in the BA in its distal segment and the presence of bilateral PCA, since from these can arise small perforating vessels that also supply the territory of thalamoperforators, in addition to the both PCA. Also important is localization and severity of the brainstem infarct.\textsuperscript{1} Our patient had occlusion of BA and LVA, with a left pontine infarct. PCA were visualized as described above. To identify the zone of hypoperfusion, ischaemic penumbra, follow up after LIT, HMPAO SPECT study is a useful aid.\textsuperscript{1} Co-administration with heparin is recommended.\textsuperscript{1} An ongoing trial is evaluating intra-arterial UK + heparin versus intra-arterial heparin alone in patients with angiographically proven vertebrobasilar occlusion within 24 hours of stroke onset.\textsuperscript{4}

Successful reperfusion is associated with better outcome and the prevalence of haemorrhage does not exceed that which occurs in the natural history of embolic stroke. Poor outcome or death is associated with non-recanalization and older age.\textsuperscript{4} The risks of haemorrhage are also offset by a reduction in disability in survivors, so that there is overall a significant net reduction in the proportion of patients dead or dependent in activities of daily living. Less hazard and more benefit appears to be associated with rTPA.\textsuperscript{3} Careful selection of patients by excluding patients with sulcal effacement, mass effect, cerebral oedema, possible haemorrhage, more than 80 years of age reduces the complications.\textsuperscript{3}

To summarize, advances in thrombolytic therapy, brain imaging and neurointerventional techniques provide new therapeutic options for acute ischaemic stroke. In vertebrobasilar thrombosis, which has a very high mortality, endovascular recanalization is a potent therapeutic tool, when the technical, institutional facilities and expertise is available. There was a delay in giving LIT to our patient. Neverthless, there was good recanalization and the patient had partial recovery. The message is that in suspected brain stem infarcts, especially in young patients, investigations and decisions should be swift and early. There is evidence mounting about the potential benefits and lower haemorrhagic risk of LIT combined with transluminal angioplasty. As thrombolysis enters the race perhaps it is a new era for acute ischaemic stroke.

\textbf{References}


