Intravenous Thrombolysis in Acute Ischaemic Stroke

Nature of the Treatment

Ischaemic stroke is caused by the blockage of blood vessel(s) in the brain, usually within few hours. The blockage can cause circulatory insufficiency and potential permanent tissue damage (death) in the brain which may lead to permanent functional loss e.g. hemiplegia. Apart from the standard treatments such as anti-platelet therapy and multi-disciplinary care in an Acute Stroke Unit, according to the recommendations from the American Heart Association and American Stroke Association, giving intravenous recombinant tissue plasminogen activator (tPA) within 3 hours of stroke onset in selected patients may increase chance of recanalisation of the blocked vessel(s), thereby reducing the degree of brain tissue damage and improve patient's functional outcomes.

In acute ischemic stroke, the benefits of giving intravenous tPA diminish with time. If it is given beyond 3 hours from stroke onset, the benefit of treatment will be less prominent and the risk of bleeding will be higher. Majority of the hypoperfused brain tissues will be permanently damaged after 4.5 hours; giving intravenous tPA cannot save the damaged brain tissues and increase the risk of cerebral hemorrhage (Ref 1).

Potential Benefit of the Treatment

Studies showed that one in seven patients treated with intravenous tPA will get functional independent if it is given within 3 hours. However, the ratio of same treatment outcome will fall down to one in fourteen patients if it is given between 3 - 4.5 hours (Ref 2). Nonetheless, studies revealed that the overall death rate remains similar between patients received tPA and those who did not. Not all patients received the therapy will have good outcome. Over half of them do suffer from various degree of disability from their stroke. A good outcome is not guaranteed (Ref 2, 3).

Potential Harm

The action of tPA is to recanalise the blocked vessel by dissolving the blood clots. This may alter normal clotting function and result in bleeding, especially cerebral bleeding. It is because the risk of bleeding will be increased when the damaged brain tissue gets reperfused. Intracerebral haemorrhage may worsen the stroke or even lead to death. This type of bleeding can also occur naturally after an ischaemic stroke even without thrombolysis treatment. Incidence rate of intracerebral hemorrhage for patient receiving tPA is nearly 10-fold higher than those who did not receive tPA. They were 6.4% and 0.6% respectively (Ref 2).

Other than intracerebral bleeding, bleeding at other sites is also possible. In addition, intravenous tPA may cause allergic reactions e.g. angioedema may happen but rare, it may cause airway swelling and tracheal intubation may be needed to protect airway (Ref 1).

Important Considerations

- Treatment is usually given within 4.5 hours from onset of the ischaemic stroke. Delayed treatment could reduce therapeutic effect and increase bleeding risk (Ref 4).
- For patients with minor stroke, since the potential benefit of giving intravenous tPA was limited, and tPA itself has risk of haemorrhage, the benefit to risk ratio for these patients may be lower and whether or not to give intravenous tPA is individualized and subject to clinical judgement (Ref 1).
- Close monitoring and strict blood pressure control is essential throughout tPA treatment to reduce risk of complication.
- Even if a patient is not eligible or chooses not to receive thrombolytic therapy, he or she will continue to receive the usual standard care for acute stroke.

Remarks

This is general information only and the list of complications is not exhaustive. Other unforeseen complications may occasionally occur. In special patient groups, the actual risk may be different. If a complication developed, another life-saving procedure or treatment might be required immediately. For further information, please contact our medical staff.

References

1. Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of ischemic stroke. A Guideline for Healthcare Professionals from the American Heart Association/American Stroke Association. Stroke, 50, e344-418.

2. The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group. Tissue Plasminogen Activator for Acute Ischemic Stroke. N Engl J Med 1995; 333: 1581-1588.

3. Werner Hacke, MD; Markku Kaste, MD; Cesare Fieschi, et al. Intravenous Thrombolysis With Recombinant Tissue Plasminogen Activator for Acute Hemispheric Stroke The European Cooperative Acute Stroke Study (ECASS). JAMA 1995; 274(13): 1017-1025.

4. Thrombolysis with alteplase 3 to 4.5 hours after acute ischemic stroke. N Engl J Med. 2008;359(13):1317–1329.