A single-center, retrospective study of Intraventricular thrombolysis outcome on intra-ventricular haemorrhage (IVH)

LI Jing Woei[1], MAK Wai Kit[1], CHAN David Yuen Chung[1], WONG George Kwok Chu[1]

1. Division of Neurosurgery, Department of Surgery, Prince of Wales Hospital, Hong Kong.

Objective

- Intraventricular haemorrhage (IVH) poses significant morbidity and mortality. External ventricular drain (EVD) control intracranial pressure but is often occluded by coagulated blood.
- Intraventricular thrombolysis has been only demonstrated to reduce mortality. This study aims to evaluate the usage of Tissue plasminogen activator (tPA) on neurologic outcome.

Methods

- A retrospective study was conducted in a university neurosurgical unit in Hong Kong.
- All Neurosurgery patients presented into in Prince of Wales Hospital within April 2013 to August 2021 who were prescribed with tPA were retrieved from the Clinical Data Analysis & Reporting System. All the medical records and CT films were reviewed.
- Patient demographics, Glasgow coma scale score, Graeb score pre-drainage and post-drainage, tPA regimen, bleeding tendency, mortality rate and functional & neurological outcome were evaluated. Statistical analysis was done with SPSS v.25.0. Logistic regression analysis was used to identify predictors of poor functional outcome, which was defined with with modified Rankin Scale (mRS) >3 at 1-year of discharge from acute hospitalisation.

Results

- A majority of tPA (90%; 23/26) were indicated for blocked EVD in IVH. tPA were used for patency of subdural drains in two patients and for Segmental PE in the remaining case.

- Gender ratio (M:F) was balanced (11:12). Age of IVH onset ranged from 28 to 66 year-old (median: 55). The Graeb scores for the IVH ranged from 2 to 12 (median: 10), and the post-drainage Graeb score ranged from 0 to 10 (median: 0). One of the patients suffered from coagulopathy, whom was on warfarin for mechanical heart valve. All patients (2) on anticoagulant / anti-platelets were all associated with poor neurological outcome.

- The causes for the IVH were parenchymal thalamic, cerebellar and caudate haemorrhage (56%), primary vascular abnormalities (22%), including ruptured aneurysm (17%) and Moyamoya disease (5%); hypertensive pure IVH (17%) and post-operative IVH (5%).

- The most common regimen was 1mg daily but occasionally 0.5mg to 2.5mg daily or twice per day were used. Total doses of tPA ranged from 1 to 6 (median: 2). Regardless of regimen used, the patency of a majority of EVD (95%) were resumed.

- Logistic regression showed that patients with good functional outcome were younger (mean 47y vs 58y; p-value 0.032), had shorter duration of EVD drainage (although not reaching statistical significance; p-value: 0.065).

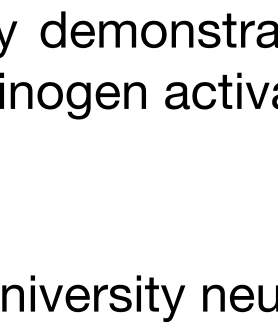
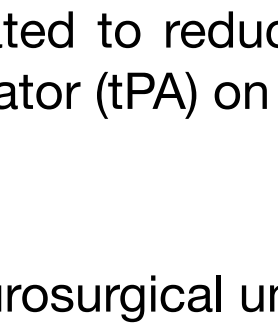
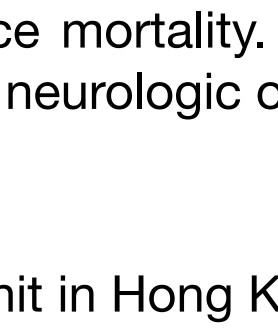
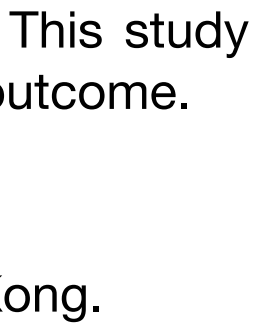
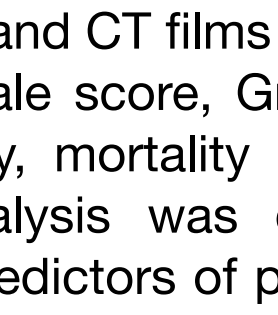
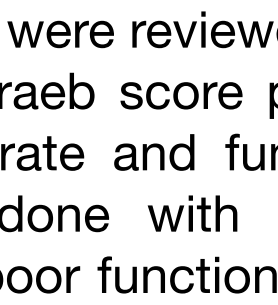
			
Day 0 • E1VTM1, bilateral pupil 1mm constricted • Bilateral EVD fashioned	Day 3 • Good ICP control with intermittent drainage • E3V4M6	Day 5 • Drainage 1-2 times /h • 1.5mg tPA to Right EVD	Day 7 • Infrequent drainage • ICP 5-19 mmHg • 1mg tPA to Right EVD • Left EVD slipped out
			
Day 11 • E3V4M6 • ICP 11-17 • Very infrequent drainage	Day 13 • E4V4M6 • Resolved IVH		

Table 1. 44/M, Left thalamic ICH w/ IVH with mRS 0

			
Day 0 • On admission • E1V2M5; PEARL • Right thalamic ICH w/ IVH • Pre-EVD insertion	Day 0 • Post-EVD (Left) insertion • ICP 53mmHg, bilateral fixed dilated pupil • Interval increased IVH • Endoscopic clot evacuation + bilateral EVD • Post-op ICP 5-10, Rt. 5mm, Lt. 3mm N.R.	Day 1 • ICP 14-25 • EVDs blocked twice. Patency resumed by NS flush • Continuous drainage needed for ICP control	Day 2 • Continuous drainage needed for ICP control • EVDs blocked for three times, each time aspirated and patency resumed • New dilated Left pupil (7mm). ICP up to 56mmHg • Decided for **tPA** via Right EVD • Patency resumed and heavily blood stained CSF drained • Left pupil back to 3mm N.R.
			
Day 5 • Poor Left EVD drainage, **tPA** 1mg given • Intermittent drainage 1-2times /h • ICP 15-20mmHg	Day 7 • EVD blocked again • 1mg **tPA** given to Rt. EVD • Still no ICP waveform • Both pupil fixed and dilated • No output from EVD, difficult manual aspiration, ICP 75 cmH20		

Table 2. 51/M, Right thalamic ICH w/ IVH with mRS 6

Conclusions

- tPA is associated with interventional repatency of EVD
- Intraventricular thrombolytic therapy using tPA is a safe and effective method of managing intraventricular haemorrhage and may confers functional benefit, although we described here one case of probably tPA related mortality case.
- Institutional intraventricular thrombolysis protocol shall be adopted.