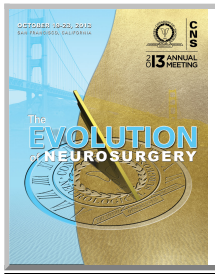

Automated Penumbra Volumetric Analysis with COMBAT Stroke Identifies a Decision Support Tool for Interventional Therapy in Stroke

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Introduction

The volume of the ischemic penumbra and the ratio between the volume of penumbra and permanent injured tissue are two markers that are used to help triage stroke patients into interventional or supportive treatment pathways. The time and expertise required to perform these calculations, along with inter-observer variability are potential factors that may limit utilization and efficacy.

Methods

An automated software tool, 'COMputer-BAsed decision support system for Thrombolysis in Stroke' (COMBAT Stroke), was used to evaluate stroke patients. It operates under the assumption that thrombolysis could potentially be administered in cases were PWI-DWI mismatch ratio > 1.2 and penumbra volume > 10 mL. A confusion matrix analysis was performed to visualize the performance of treatment algorithms.

Results

A consecutive, retrospective cohort of 228 patients with anterior circulation strokes was identified. 186 underwent thrombolytic treatment, with the remaining 42 receiving supportive treatment only. Assessment of the cohort based on COMBAT Stroke classified 142 patients as potential candidates for thrombolytic treatment and 86 for supportive treatment; 60% sensitivity and 29% specificity. The comparison of COMBAT Stroke with manual calculation demonstrated excellent agreement with 93% sensitivity and 95% specificity. In instances where COMBAT Stroke identified potential candidates for thrombolysis who actually were administered rt-PA, there were significantly better outcomes in terms of penumbra salvage, reduction in NIHSS score, and higher rates of recanalization, compared to those patients where disagreement occurred.

Conclusions

COMBAT Stroke, in addition to clinical assessment may provide an optimal framework for a fast, efficient, and standardized clinical support tool for patient selection to undergo thrombolysis.

Learning Objectives

By the conclusion of this session, participants should be able to recognize that:

1. Patients who did not meet radiographic treatment criteria based on the COMBAT Stroke algorithm and did not receive treatment had better outcomes compared to the patients who similarly did not meet radiographic treatment criteria, yet received thrombolysis.

2. Patients that COMBAT Stroke identified for potential treatment and were actually treated had significantly better neurological improvement, penumbra salvage, and higher rates of recanalization compared to the other groups.

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