Block 8 Journal Club

Clinical Question: Should EMS bypass a Primary Stroke Center (PSC) with tPA capabilities in favor of a comprehensive Stroke Center (CSC) with endovascular intervention in patients who have evidence of large vessel occlusion (LVO)?

Implied Question: Can we identify a high likelihood of LVO based on clinical criteria alone?"

Clinical Scenario: Paramedics arrive on scene to find a 65 year old male with a history of atrial fibrillation who had sudden onset slurred speech, left facial droop, left sided hemiparesis and left sided neglect 30 minutes prior to EMS arrival. EMS calculates an NIH stroke scale of 14. Based on their findings they suspect a large vessel occlusion. There is a primary stroke center 10 minutes away and a comprehensive stroke center 20 minutes away. Should EMS take the patient to the primary stroke center, or should they bypass it in favor of the comprehensive stroke center because they believe the patient may require endovascular intervention?

Bottom Line:

There is not enough evidence to conclude whether patients with suspected LVO should be taken to a primary stroke center versus directly to a comprehensive stroke center.

There are clinical scales such as the NIH Stroke Scale that can predict large vessel occlusion. There are even scales that can predict large vessel occlusions slightly better than the NIHSS but may be more complicated and the improvement may not be clinically significant.

Going directly to a primary stroke center may allow patients to be seen by a physician quicker and start tPA more quickly, but may delay endovascular intervention.

Bypassing the primary stroke center to go directly to the comprehensive stroke center may allow quicker access to endovascular intervention, but may also unnecessarily barrage the CSC with patients who do not qualify for intervention.

During our journal club discussion, it seemed that more people favored taking patients directly to the PSC so the patient could be seen by a physician and get a CT scan more quickly to determine definitive management.

Article Summaries:

Field Assessment Stroke Triage for Emergency Destination: A Simple and Accurate Prehospital Scale to Detect Large Vessel Occlusion Strokes. Lima FO, Silva GS, Furie KL, Frankel MR, Lev MH, Camargo ÉC, Haussen DC, Singhal AB, Koroshetz WJ, Smith WS, Nogueira RG. Stroke. 2016 Aug;47(8):1997-2002.

Background: Pts with LVOs may have better outcomes if they are directly transferred to CSCs with endovascular capability. This would avoid long delays in treatment. However, there needs to be accurate stroke field triage. We aimed to develop a simple field scale to identify LVOS.

Methods: The Field Assessment Stroke Triage for Emergency Destination (FAST-ED) was based on the National Institutes of Health Stroke Scale (NIHSS) with higher predictive value for LVOS. It was tested in the Screening Technology and Outcomes Project in Stroke (STOPStroke) where patients had CTAs within the first 24 hours of stroke onset. The CTAs were able to identify LVOs defined by total occlusions of the intracranial internal carotid artery, middle cerebral artery-M1 and M2, or basilar arteries. Pts with partial, bihemispheric, and anterior+posterior circulation occlusions were excluded. Receiver operating

characteristic curve, specificity, sensitivity, PPV, and NPV of FAST-ED were compared with the NIHSS, Rapid Arterial Occlusion Evaluation (RACE) scale, and Cincinnati Prehospital Stroke Severity (CPSS) scale.

Results: LVO was found in 33% or 240 of the 727 qualifying patients. FAST-ED had comparable accuracy to predict LVO to the NIHSS and higher accuracy than RACE and CPSS. FAST-ED ≥ 3 had sensitivity of 0.6, specificity of 0.89, PPV of 0.72, and NPV of 0.82 vs RACE ≥ 5 of 0.55, 0.87, 0.68, and 0.79, and CPSS ≥ 2 of 0.56, 0.85, 0.65, and 0.78, respectively.

Conclusions: FAST-ED is a simple scale. If it is able to be validated in the field, it may be utilized by first responders to identify LVOs in the prehospital setting allowing for quick triage of patients.

Prediction of Large Vessel Occlusions in Acute Stroke: National Institute of Health Stroke Scale Is Hard to Beat. Vanacker P, Heldner MR, Amiguet M, Faouzi M, Cras P, Ntaios G, Arnold M, Mattle HP, Gralla J, Fischer U, Michel P. Crit Care Med. 2016 Jun;44(6):e336-43.

Objectives: Endovascular treatment has shown to be effective for acute ischemic stroke with a LVO. We aimed to develop a score for predicting LVO eligible for endovascular treatment in early hospital management.

Design: Retrospective, cohort

Setting: 2 tertiary, Swiss stroke centers

Patients: Consecutive acute ischemic stroke patients and Acute Stroke Registry and Analysis of Lausanne registry who had CTA within 6-12 hours of symptom onset were categorized based on their occlusion site. Demographic and clinical information was also used in logistic regression analysis to derive predictors of LVO. LVO was defined as intracranial carotid, basilar, and middle cerebral artery-M1 occlusions. Based on the regression coefficients, an integer score was created and validated internally and externally.

Interventions: none

Measurements and Main Results: LVOs were present in 21% or 316 patients in the derivation and 28% in the external validation cohort. Five predictors added significantly to the score: NIHSS at admission, hemineglect, female, a-fib, and no history of stroke and prestroke handicap. Diagnostic accuracy in internal and external validation cohorts were 0.84 (area under the receiver operating characteristic curve). The score did slightly better than the NIHSS alone regarding prediction error ($p < 0.001$) and regarding discriminatory power in derivation and pooled cohorts (area under the receiver operating characteristic curve, 0.81 vs 0.80, DeLong test, $p = 0.02$).

Conclusions: Our score predicts the presence of emergent LVOs accurately. However, including additional demographic and historical information provides minimal improvements in predictive value compared with the NIHSS alone.

Suspected Large Vessel Occlusion: Should Emergency Medical Services Transport to the Nearest Primary Stroke Center or Bypass to a Comprehensive Stroke Center With Endovascular Capabilities? Southerland AM, Johnston KC, Molina CA, Selim MH, Kamal N, Goyal M. Stroke. 2016 Jul;47(7):1965-7.

The Question: Should EMS take patients with NIHSS of 14 to the nearest primary stroke center or should they bypass the PSC to go directly to a CSC with endovascular capabilities?

Discussion:

Yes, EMS should take patients to the nearest Primary stroke center. There are numerous prehospital stroke scales that have been validated for EMS use, but are not measures of stroke severity and lack the sensitivity/specificity for diagnosing LVO. There is a large discrepancy between number of stroke patients screened for LVO vs those who are actually eligible for endovascular treatment. If EMS were to take patients directly to a CSC, it would result in many endovascular ineligible patients triaged to facilities where no additional therapy can be offered and delay their treatment with tPA. If a PSC and CSC are equidistant from a patient, then either transport path is reasonable. However, in more rural areas, delays in transport should be avoided and patients should be taken directly to the PSC. There is no argument that EVT vastly improves outcomes for stroke patients, but we are not yet ready to bypass PSC until we have more data.

No, EMS should bypass Primary Stroke Centers. IV tPA is not that effective in LVO. The faster we can achieve reperfusion, the higher the likelihood of a good outcome. EVT is safe and highly effective. Care and expertise is likely improved at CSCs. Patients being transferred directly to a PSC could have delayed EVT. We argue for bypassing the PSC until we can improve our systems of care to rapidly perform non-contrast CT head scan followed immediately by CTA and administer tPA within 30 minutes of arrival. Additionally, the PSCs need to get the patient out the door within 45 minutes. We argue that we bypass the PSC in patients with suspected LVO and go directly to the CSC until further improvements in our system can be made.