POPULATION-BASED VALIDATION OF PREHOSPITAL STROKE SCALES FOR THE DETECTION OF LARGE VESSEL OCCLUSION : DIJON STROKE REGISTRY.

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Introduction

Mechanical thrombectomy (MT) dramatically changed the management of patients with acute ischemic stroke due to large vessel occlusion (LVO). Orientation of patients suspected of large vessel occlusion is a major point in the care with strategies of either drip and ship (addressing patient to a local center that perform intraveinous thrombolysis first), or mothership (addressing patients directly to a center that perform both intraveinous thrombolysis and MT). Several prehospital scales were developed to attempt to identify patients with LVO. However, they were only evaluated on predefined patients recruited in stroke units. The aim of this study was to assess diagnostic accuracy of these scales in routine practice using data from a population-based registry.

Materials and Methods

971 patients with ischemic stroke in whom imaging of vessels was performed were prospectively identified among residents of Dijon in France, using a population-based registry between 1st January 2013 and 31st December 2017. Clinical signs at first evaluation were registered. Stroke severity at onset was quantified using the National Institutes of Health Stroke Scale. In 29% of cases, the NIHSS score was estimated retrospectively on the basis of medical records and charts. Individual score were calculated for sixteen scales according to the published risk scoring system for each scale.

Results

Among the 971 patients with available data on arterial imaging, 284 (29,2%) had a visible arterial occlusion including 123 (12,7%) patients with LVO defined as occlusion of terminal Internal Carotid Artery (ICA), M1 segment of the MCA (including tandem occlusions) or basilar artery and 174 (17,9%) patients with LVO when definition included the M2 segment of the MCA, When considering the restricted definition of LVO, we distinguish two groups of scales (Graph 1). Some scales were specific but lacked sensitivity with as a minimum twenty five percent with LVO not detected by these scales. The other scales were more sensitive but less specific. The aNIHSS scale had the best sensitivity (98%) but the worst specificity (33%). ASTRAL has the best specificity (86%). Considering the wider definition of LVO sensitivity was slightly lower. Only three scales out of sixteen exceeded eighty percent sensitivity. aNIHSS still had the best sensitivity (93%), the FAST-ED had the best specificity.(87%).

Discussion

Our study demonstrated that currently available prehospital scales failed to combine both a good sensitivity and specificity to detect LVO in routine clinical practice. In clinical examinations of patients, 22% of our patients had no association of cortical sign (aphasia, visual trouble, gaze deviation, hemineglect) and motor deficit These patients did not meet the criteria for a clinical scale.

Therefore, future prehospital stroke scales will need to include additional variables for a more reliable detection of patients with LVO,.

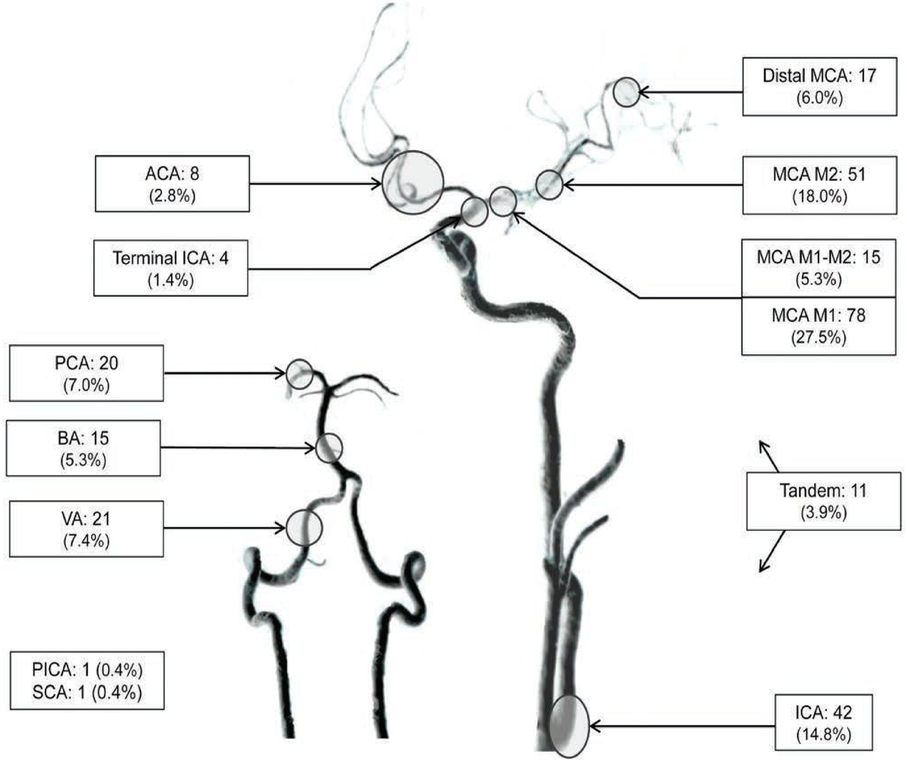

Figure 1 : Distribution of occlusion site in ischemic stroke patients with a visible arterial occlusion (n+284)

ACA indicates anterior cerebral artery; BA, basilar artery; ICA, internal carotid artery, MCA middle cerebral artery; PCA posterior cerebral artery; PICA, posterior inferior cerebellar artery; SCA superior cerebellar artery; and VA, vertebral artery

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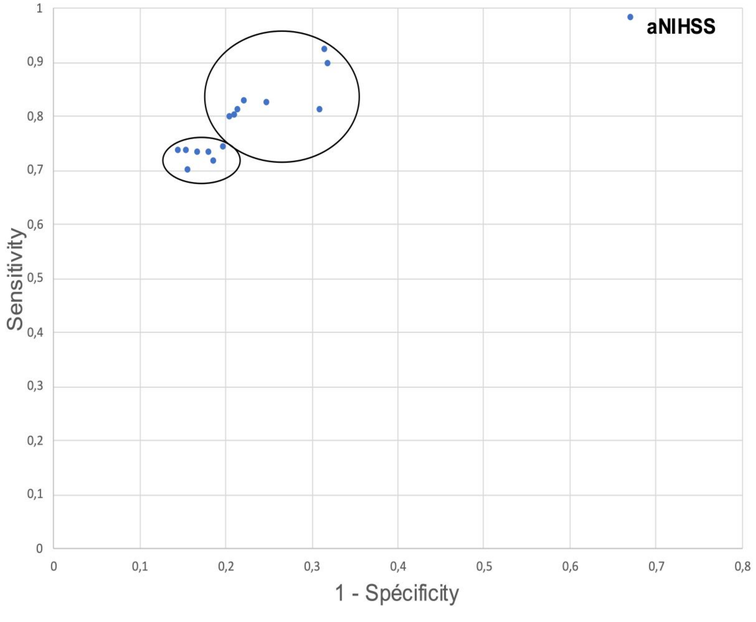
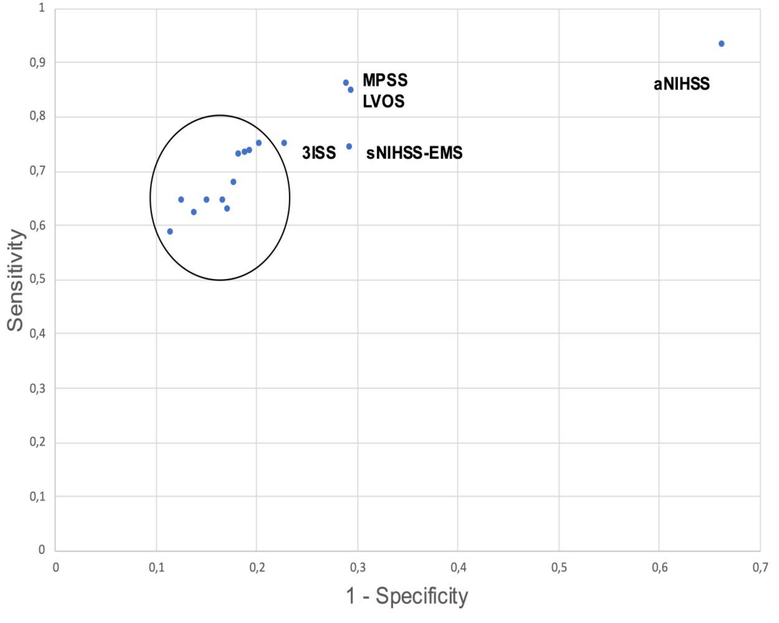


Low sensitivity (<0,8), high specificity (> 0,8) :
- G-FAST (Se = 0,70 ;Sp = 0,84)
- CPSSS (Se = 0,72 ;Sp = 0,81)
- PASS (Se = 0,73 ;Sp = 0,82)
- RACE (Se = 0,73 ;Sp = 0,83)
- sNIHSS (Se = 0,74 ;Sp = 0,80)
- FAST-ED (Se = 0,74 ;Sp = 0,85)
- ASTRAL (Se = 0,74 ;Sp = 0,86)

High sensitivity (> 0,8), low specificity (<0,8) :
- ROSIER (Se = 0,80 ;Sp = 0,79)
- mNIHSS (Se = 0,80 ;Sp = 0,80)
- 3ISS (Se = 0,81 ;Sp = 0,69)
- NIHSS (Se = 0,81 ;Sp = 0,79)
- sNIHSS-EMS (Se = 0,83 ;Sp = 0,75)
- VAN (Se = 0,83 ;Sp = 0,78)
- LVOS (Se = 0,90 ;Sp = 0,68)
- MPSS (Se = 0,92 ;Sp = 0,69)

Very high sensitivity, very low specificity :
- aNIHSS (Se = 0,98 ;Sp = 0,33)

Graph 1 : Receiver operating characteristic curve (ROC) for the different scales for the identification of occlusion of terminal internal carotid artery, M1 segment of middle cerebral artery or basilar artery.



Low sensitivity (<0,8), high specificity (> 0,8) :
- FAST-ED (Se = 0,59 ;Sp = 0,89)
- G-FAST (Se = 0,62 ;Sp = 0,86)
- CPSSS (Se = 0,63 ;Sp = 0,83)
- PASS (Se = 0,65 ;Sp = 0,83)
- RACE (Se = 0,65 ;Sp = 0,85)
- ASTRAL (Se = 0,65 ;Sp = 0,88)
- sNIHSS5 (Se = 0,68 ;Sp = 0,82)
- ROSIER (Se = 0,73 ;Sp = 0,81)
- mNIHSS (Se = 0,73 ;Sp = 0,82)
- NIHSS (Se = 0,74 ;Sp = 0,81)
- VAN (Se = 0,75 ;Sp = 0,80)

High sensitivity (>0,8), low specificity (<0,8) :
- LVOS (Se = 0,85 ;Sp = 0,71)
- MPSS (Se = 0,86 ;Sp = 0,71)
- aNIHSS (Se = 0,93 ;Sp = 0,34)

Low sensitivity (<0,8), low specificity (<0,8):
- 3ISS (Se = 0,75 ;Sp = 0,71)
- sNIHSS-EMS (Se = 0,75 ;Sp = 0,77)

Graph 2 : Receiver operating characteristic curve (ROC) for the different scales for the identification of occlusion of terminal internal carotid artery, M1 and M2 segment of middle cerebral artery or basilar artery.