Stroke

CLINICAL AND POPULATION SCIENCES

Serial ASPECTS in the DAWN Trial

Infarct Evolution and Clinical Impact

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BACKGROUND AND PURPOSE: The impact of baseline ischemia on Alberta Stroke Program Early CT Score (ASPECTS) and evolution over 24 hours may be distinct in late thrombectomy. We analyzed predictors of serial ASPECTS and clinical outcomes in the DAWN trial (Diffusion-Weighted Imaging or CTP Assessment With Clinical Mismatch in the Triage of Wake-Up and Late Presenting Strokes Undergoing Neurointervention With Trevo).

METHODS: The DAWN Imaging Core Laboratory independently scored ASPECTS at baseline and 24 hours. Descriptive statistics characterized ASPECTS on computed tomography/magnetic resonance imaging at baseline and 24 hours, delineating ASPECTS change over 24 hours.

RESULTS: 206 subjects (mean age 70.0±13.7 years; 54.9% (n=113) female; baseline National Institutes of Health Stroke Scale median (interquartile range) 17 (13, 21) were included. Baseline ASPECTS was median (interquartile range) 8.0 (7–8), with 92/205 (44.9%) between 0 and 7 and 113/205 (55.1%) 8 and 10. 24-hour ASPECTS was median 6.0 (4–8), with ASPECTS change or infarct evolution having median −1, ranging from −8 to +2. Multivariable logistic regression showed older age (odds ratio [OR] for 10-year interval, 1.26 [95% CI, 1.02–1.55], *P*=0.030) and dyslipidemia (OR, 1.84 [95% CI, 1.06–3.19], *P*=0.031) were independently associated with higher baseline ASPECTS. Higher 24-hour ASPECTS was predicted by endovascular treatment (OR, 2.76 [95% CI, 1.58–4.81], *P*=0.0004), baseline glucose <150 mg/dL (OR, 2.86 [95% CI, 1.50–5.46], *P*=0.001), lower baseline National Institutes of Health Stroke Scale (OR, 0.93 [95% CI, 0.89–0.98], *P*=0.010), and older age (OR for 10-year interval, 1.25 [95% CI, 1.01–1.55], *P*=0.041). Internal carotid artery lesion location (OR, 0.47 [95% CI, 0.24–0.89], *P*=0.021) was inversely related to 24-hour ASPECTS. Good clinical outcome (day 90 modified Rankin Scale score 0–2) was predicted by 24-hour ASPECTS (OR, 1.46 [95% CI, 1.08–1.96], *P*=0.014). Extensive infarct evolution (ASPECTS decrease ≥6) occurred in 14/201 (7.0%). Elevated baseline serum glucose ≥150 mg/dL was a predictor of ASPECTS decrease of ≥4 points (OR, 2.78 [95% CI, 1.21–6.35] *P*=0.016) as was internal carotid artery occlusion (OR, 2.49 [95% CI, 1.05–5.88]; *P*=0.038). ASPECTS change was influenced by treatment arm (*P*=0.001 by Wilcoxon), including 0 ASPECTS change in 42/105 (40.0%) of the endovascular arm and only 20/96 (20.8%) of the medical arm.

CONCLUSIONS: DAWN subjects enrolled with small infarct cores had a broad range of baseline ASPECTS. Twenty-four-hour ASPECTS, strikingly influenced by endovascular therapy, predicted good clinical outcomes.

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Key Words: dyslipidemia ■ glucose ■ ischemic stroke ■ magnetic resonance imaging ■ odds ratio

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Nonstandard Abbreviations and Acronyms

ASPECTS	Alberta Stroke Program Early CT Score
CT	computed tomography
DAWN	DWI or CTP Assessment With Clinical Mismatch in the Triage of Wake-Up and Late Presenting Strokes Undergoing Neurointervention With Trevo
eTICI	expanded Thrombolysis in Cerebral Infarction
EVT	endovascular treatment
MRI	magnetic resonance imaging
NIHSS	National Institutes of Health Stroke Scale

The Alberta Stroke Program Early CT Score (ASPECTS) grading system is a validated and practical method to characterize the extent of brain injury following stroke in the anterior circulation.[1,2] ASPECTS from the baseline computed tomography (CT) or magnetic resonance imaging (MRI) has been established as a reliable predictor of clinical outcome after endovascular treatment (EVT) of ischemic stroke.[3,4] However, the value of the baseline ASPECTS and its 24 hours evolution to evaluate the effectiveness of reperfusion therapies and to predict clinical outcomes in the late window has not been established, underscoring the need for such analyses. The impact of baseline ischemia on ASPECTS and its evolution may be distinct in the late window as the pathophysiology and the speed of infarct progression may be different in this distinct population. The extent of ischemia rapidly provided by ASPECTS may provide practical information on the optimal selection of thrombectomy candidates beyond 6 hours from stroke onset. In addition, follow-up ASPECTS at 24 hours may provide early estimates of therapeutic effectiveness after endovascular therapy and clinical outcomes in the late presenting or wake up strokes due to large vessel occlusion.

We analyzed ASPECTS on baseline and 24-hour imaging in the DAWN trial (Diffusion-Weighted Imaging [DWI] or CTP Assessment With Clinical Mismatch in the Triage of Wake-Up and Late Presenting Strokes Undergoing Neurointervention With Trevo) to determine the potential prognostic value of the baseline ASPECTS and the ASPECTS change following EVT on clinical outcomes in anterior circulation LVOs presenting in the late window, providing unique data on this subset of patients with stroke increasingly treated in routine clinical practice.[5] We also aimed to determine clinical factors associated with a higher decline in ASPECTS at 24 hours after stroke.

METHODS

The authors declare that all supporting data are available within the article. The DAWN trial was a prospective, randomized, multicenter, adaptive, controlled trial, designed to evaluated efficacy of mechanical thrombectomy using the Trevo Retriever plus medical management versus medical management alone in improving clinical outcomes at 90 days after large vessel occlusion strokes in selected anterior circulation ischemic stroke patients presenting 6 to 24 hours after last seen well. The study protocol and its results have been previously described.[5] Informed consent was obtained at enrollment in the trial.

In brief, to be eligible, patients were required to have an age-adjusted mismatch between the severity of the clinical deficit and the infarct volume. Other inclusion criteria were an age of 18 years or older, an interval between the time that the patient was last known to be well and randomization of 6 to 24 hours, a prestroke score of 0 or 1 on the modified Rankin Scale, no evidence of intracranial hemorrhage, and no evidence of an infarct involving more than one third of the territory of the middle cerebral artery on CT or MRI at baseline.

Measurements

The DAWN Imaging Core Laboratory independently scored ASPECTS at baseline and 24 hours. DWI sequences were used for ASPECTS scoring on MRI.[6] Dramatic infarct progression was defined as a decrease in ASPECTS ≥6 points between the baseline and 24-hour imaging studies. Baseline imaging included 124 CT studies and 82 MRI, with 95 CT and 107 MRI at 24 hours. One additional subject was noted to have had both MRI and CT at 24 hours. ASPECTS changes were calculated based on 81 CT-CT pairs, 56 CT-MRI pairs, and 66 MRI-MRI pairs, at baseline and 24 hours, respectively.

Arterial occlusion site was designated in the internal carotid artery or middle cerebral artery. Reperfusion of the corresponding arterial territory was separately scored with the expanded Thrombolysis in Cerebral Infarction scale, using 2/3 as the threshold for achieving grade 2b reperfusion.[7] Angiographic reperfusion was defined as expanded Thrombolysis in Cerebral Infarction of 2b, 2C, or 3. Good functional outcome at 90 days was defined as modified Rankin Scale score of 0 to 2.

Statistical Analyses

ASPECTS at baseline, 24 hours, and the corresponding changes in each case were recorded. Descriptive statistics characterized ASPECTS on CT or MRI at baseline and 24 hours, delineating ASPECTS change or infarct evolution over 24 hours and analyzing associations with clinical variables, treatment arm, and clinical outcomes. ASPECTS was treated as an ordinal variable. Continuous variables were summarized using the mean and SD, as well as the median and interquartile range. Categorical variables were summarized using proportions and 95% CIs. The univariate relationship of both baseline and 24-hour ASPECTS to continuous variables, such as age, was measured using Spearman's correlation. The relationship of ASPECTS to categorical variables, such as diabetes, and lesion location, was analyzed using the Wilcoxon rank-sum test for 2-level variables and the Kruskal-Wallis test for variables with >2 levels. Variables found to be related to ASPECTS at the univariate level (at $P<0.1$) were entered into multiple logistic regression equations to identify independent predictors (at $P<0.05$) of these end points. Specifically, an ordinal logistic model was employed that

assumed that the relationship between the covariates and the outcome was monotonic across the range of ASPECTS. A similar modeling approach was used to predict good clinical outcome (modified Rankin Scale score 0–2 at 90 days) as well as ASPECTS decrease of ≥4 points, except that the binary logistic model was employed. All statistical analyses were carried out using SAS software (version 9.4).

RESULTS

A total of 206 patients (mean age, 70.0±13.7 years; 54.9% [N=113]) female; baseline National Institutes of Health Stroke Scale (NIHSS) median 17 (IQR, 13–21) were included in this analysis (Table 1). Mean glucose at presentation was 136.1, and 47/206 (22.8%) presented with glucose ≥150 mg/dL. Baseline median core infarct volume was 10.0 (IQR, 0–19), and the median 24-hour core infarct volume was 16 cc (IQR, 4–50). Successful revascularization (expanded Thrombolysis in Cerebral Infarction ≥2b) was achieved in 89/106 (84.0%) in the treatment arm. Table 1 shows baseline characteristics of the patient population.

Baseline ASPECTS was median 8.0 (IQR, 7–8), with 89/193 (46.1%) between 0 and 7 and 104/193 (55.1%) between 8 and 10. The 24-hour ASPECTS median was 6.0 (IQR, 4–8). The median ASPECTS change, or infarct evolution was median −1 (IQR, −3 to 0) and ranged from −8 to +2. The distribution of baseline and 24 hours ASPECTS is demonstrated in Figure [A] and [B] for patients in treatment and control arms.

Multivariable logistic regression showed older age (OR for 10-year interval, 1.26 [95% CI, 1.02–1.55], *P*=0.030) and dyslipidemia (OR, 1.84 [95% CI, 1.06–3.19], *P*=0.031) were independently associated with higher baseline ASPECTS. Higher 24-hour ASPECTS was predicted by endovascular treatment (OR, 2.76 [95% CI, 1.58–4.81], *P*=0.0004), baseline glucose <150 mg/dL (OR, 2.86 [95% CI, 1.50–5.46], *P*=0.001), lower baseline NIHSS (OR, 0.93 [95% CI, 0.89–0.98], *P*=0.010), and older age (OR for 10-year interval, 1.25 [95% CI, 1.01–1.55], *P*=0.041). Internal carotid artery lesion location (OR, 0.47 [95% CI, 0.24–0.89], *P*=0.021) was inversely related to 24-hour ASPECTS.

Extensive infarct evolution (ASPECTS decrease ≥6) occurred in 14/201 (7.0%). Elevated baseline serum glucose (≥150) was an independent predictor of an ASPECTS decrease of ≥4 points (OR, 2.78 [95% CI, 1.21–6.35], *P*=0.016) as was internal carotid artery occlusion (OR, 2.49 [95% CI, 1.05–5.88], *P*=0.038).

Overall, good clinical outcome (day 90 modified Rankin Scale score 0–2) was achieved in 65/202 (32.2%) of participants, and 38/206 (18.5%) died by day 90. Endovascular treatment (OR, 10.35 [95% CI, 3.90–27.45], *P*<0.0001), higher 24-hour ASPECTS (OR, 1.46 [95% CI, 1.08–1.96], *P*=0.014), lower baseline NIHSS score (OR, 0.81 [95% CI, 0.73–0.89], *P*<0.0001), and lower age (OR, 0.96 [95%CI (0.92–0.99), *P*=0.012), were independently associated with good clinical outcome at day 90. An alternative model in which both baseline and 24-hour ASPECTS were categorized as 0 to 4, 5 to 7, and 8 to 10 resulted in these same 4 covariates being identified as significant predictors.

ASPECTS change was influenced by treatment arm (*P*=0.001 by Wilcoxon), including 0 ASPECTS change in 42/105 (40.0%) of the endovascular arm and only 20/96 (20.8%) of the medical arm.

Among the patients who received endovascular therapy, 24-hour ASPECTS remained an independent predictor (model did not include baseline ASPECTS or final TICI) of good outcomes at day 90 (OR, 1.32 [95% CI, 1.04–1.67], *P*=0.023, as did baseline NIHSS (OR, 0.81 [95% CI, 0.73–0.91], *P*=0.0005.

Because the dataset contained 3 subjects noted to have intracranial hemorrhage at baseline, all regression equations were also run with these subjects excluded as a form of sensitivity analysis. In each case, it was found that the results were not affected by these 3 subjects.

Among the 203 subjects included in these analyses, there were 56 for whom the imaging modality differed between the baseline and 24-hour observations, with 41 being CT followed by MRI and 15 having the reverse sequence. Median values for the 3 primary ASPECTS outcomes as a function of imaging modality are shown in Table 2.

As shown in Table 2, there is some indication that the 24-hour ASPECTS, as well as the ASPECTS change, was sensitive to the imaging modality. More specifically, the sequence of baseline CT versus 24-hour MRI appears to produce differing results from the other 2 sequences.

The potential impact of this issue on the results was explored in 2 ways. First, a binary variable denoting same versus different imaging was included in the multivariable models for baseline ASPECTS, 24-hour ASPECTS, and baseline to 24-hour ASPECTS change. Second, instead of a binary variable, a 3-level variable denoting (1) same modality, (2) CT–MRI, and (3) MRI-CT was included in these same 3 models. In all cases, neither the 2-level nor the 3-level variable was a significant predictor of any outcome. Further, the significant predictors of each outcome were the same with or without these 2- or 3-level variables. From this, it was concluded that the results and conclusions of the study were not affected by the issue of differing imaging modalities.

DISCUSSION

In this secondary analysis of the DAWN trial, the 24-hour ASPECTS was a robust marker of ischemic changes in the late window presenting stroke. Endovascular therapy

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Table 1. Baseline Demographics and ASPECTS Distribution in DAWN

Age	
Mean±SD (N), median (Q1–Q3), range (min–max; (95% CI)*	70.0±13.7 (206) 73.0 (60.0 to 80.0) (31.0 to 96.0) (68.2 to 71.9)
<60	23.3% (48/206)
60–80	51.9% (107/206)
>80	24.8% (51/206)
Sex	
Male (95% CI)†	45.2% (93/206) (38.4% to 51.9%)
Baseline NIHSS score	
Mean±SD (N), median (Q1–Q3), range (min–max) (95% CI)*	17.6±5.2 (206) 17.0 (13.0 to 21.0) (10.0 to 37.0) (16.9 to 18.3)
≤10	6.8% (14/206)
11–20	66.0% (136/206)
>20	27.2% (56/206)
BMI	
Mean±SD (N), median (Q1–Q3), range (min–max) (95% CI)*	29.2±6.8 (202) 28.3 (24.8 to 33.1) (11.1 to 75.9) (28.3 to 30.2)
Systolic blood pressure, mm Hg	
Mean±SD (N), median (Q1–Q3), range (min–max) (95% CI)*	149.9±23.1 (206) 150.0 (134.0 to 164.0) (101.0 to 230.0) (146.7 to 53.0)
Diastolic blood pressure, mm Hg	
Mean±SD (N), median (Q1–Q3), range (min–max) (95% CI)*	83.6±16.3 (206) 83.0 (71.0 to 94.0) (44.0 to 126.0) (81.4 to 85.9)
Glucose, mg/dL	
Mean±SD (N), median (Q1–Q3), range (min–max) (95% CI)*	136.1±50.8 (206) 120.5 (106.0 to 147.0) (73.0 to 360.0) (129.1 to 143.1)
Glucose <150	77.2% (159/ 206) (71.5% to 82.9%)
Occlusion location by CTA/MRA	
ICA	19.9% (41/206)
M1	77.7% (160/206)
M2	2.4% (5/206)
Right	43.7% 90/206)
Left	56.3% (116/206)
IV lytic (95% CI)†	8.7% (18/206) (4.9% to 12.6%)
Medical history and risk factors	
Hypertension (95% CI)†	77.5% (158/204) (71.7% to 83.2%)
Heart failure (95% CI)†	17.2% (34/198) (11.9% to 22.4%)
Coronary artery disease (95% CI)†	27.8% 55/198) (21.5% to 34.0%)
Extracranial carotid artery disease (95% CI)†	10.0% (19/190) (5.7% to 14.3%)
PVD (95% CI)†	8.8% (17/193) (4.8% to 12.8%)
Atrial fibrillation (95% CI)†	33.5% (67/200) (27.0% to 40.0%)
Diabetes (95% CI)†	28.4% (57/201) (22.1% to 34.6%)
Dyslipidemia (95% CI)†	59.1% (117/198) (52.2% to 65.9%)
Current smoker (95% CI)†	21.9% (44/201) (16.2% to 27.6%)
Previous (TIA) (95% CI)†	7.7% (15/196) (3.9% to 11.4%)
Previous ischemic stroke (95% CI)†	11.6% (23/198) (7.2% to 16.1%)
Previous intracerebral hemorrhage (95% CI)†	0.5% (1/199) (0.0% to 1.5%)
Baseline core infarct volume (core laboratory)	
Mean±SD (N), median (Q1–Q3), range (min–max) (95% CI)*	12.1±11.7 (183) 10.0 (0.0 to 19.0) (0.0 to 49.0) (10.4 to 13.8)
Baseline ASPECTS	
Mean±SD (N), median (Q1–Q3), range (min–max) (95% CI)*	7.4±1.5 (205) 8.0 (7.0 to 8.0) (3.0 to 10.0) (7.2 to 7.6)
0–7	44.9% (92/205)
8–10	55.1% (113/ 205)
24-h core infarct volume (core laboratory)	
Mean±SD (N), median (Q1–Q3), range (min–max) (95% CI)*	40.8± 62.4 (192) 16.0 (4.0 to 50.0) (0.0 to 497.0) (31.9 to 49.7)
24 h ASPECTS	
Mean±SD (N) Median (Q1–Q3) Range (min–max) (95% CI)*	5.5±2.6 (202) 6.0 (4.0 to 8.0) 0.0 to 9.0) (5.2 to 5.9)
ASPECTS change from baseline to 24 h	
Mean±SD (N) Median (Q1–Q3) Range (min–max) (95% CI)*	−1.8± 2.0 (201) −1.0 (−3.0 to 0.0) (−8.0 to 2.0) (−2.1 to −1.5)
Dramatic infarct progression (ASPECTS decrease ≥6) (95% CI)†	7.0% (14/201) (3.5% to 10.5%)
Postprocedural outcomes	
Revascularization (eTICI≥2b) (95% CI)†	84.0% (89/106) (77.0% to 91.0%)
90-d safety outcome	
90-d mRS score	
Mean±SD (N), median (Q1–Q3), range (min–max) (95% CI)*	3.4±1.9 (202) 4.0 (2.0 to 5.0) (0.0 to 6.0) (3.2 to 3.7)
0	6.9% (14/202)
1	14.4% (29/202)
2	10.9% (22/202)
3	14.4% (29/202)
4	23.3% (47/202)
5	11.4% (23/202)
6	18.8% (38/202)
90-d good outcome (mRS score 0–2) (95% CI)†	32.2% (65/202) (25.7% to 38.6%)
90-d death	18.5% (38/206) (13.2% to 23.7%)

ASPECTS indicates Alberta Stroke Program Early CT Score; BMI, body mass index; DAWN, Diffusion-Weighted Imaging or CTP Assessment With Clinical Mismatch in the Triage of Wake-Up and Late Presenting Strokes Undergoing Neurointervention With Trevo; eTICI, expanded Thrombolysis in Cerebral Infarction; mRS, modified Rankin Scale; NIHSS, National Institutes of Health Stroke Scale; PVD, peripheral vascular disease; and TIA, transient ischemic attack.

was a strong predictor of higher 24-hour ASPECTS, whereas higher baseline NIHSS, higher glucose levels at presentation and young age predicted more ischemic progression at 24 hours, possibly reflecting collateral failure.[8] In this randomized study of endovascular therapy, the deleterious effects of collateral failure and more extensive infarct progression in the control arm may be apparent, even in younger patients. ASPECTS at 24 hours was the best predictor of clinical outcomes at 3 months after endovascular therapy in the late window. This finding is consistent with prior reports on the prognostic value of the 24-hour ASPECTS following EVT in the early treatment window and supports ASPECTS as a practical and simple measure of stroke outcome following EVT.[4]

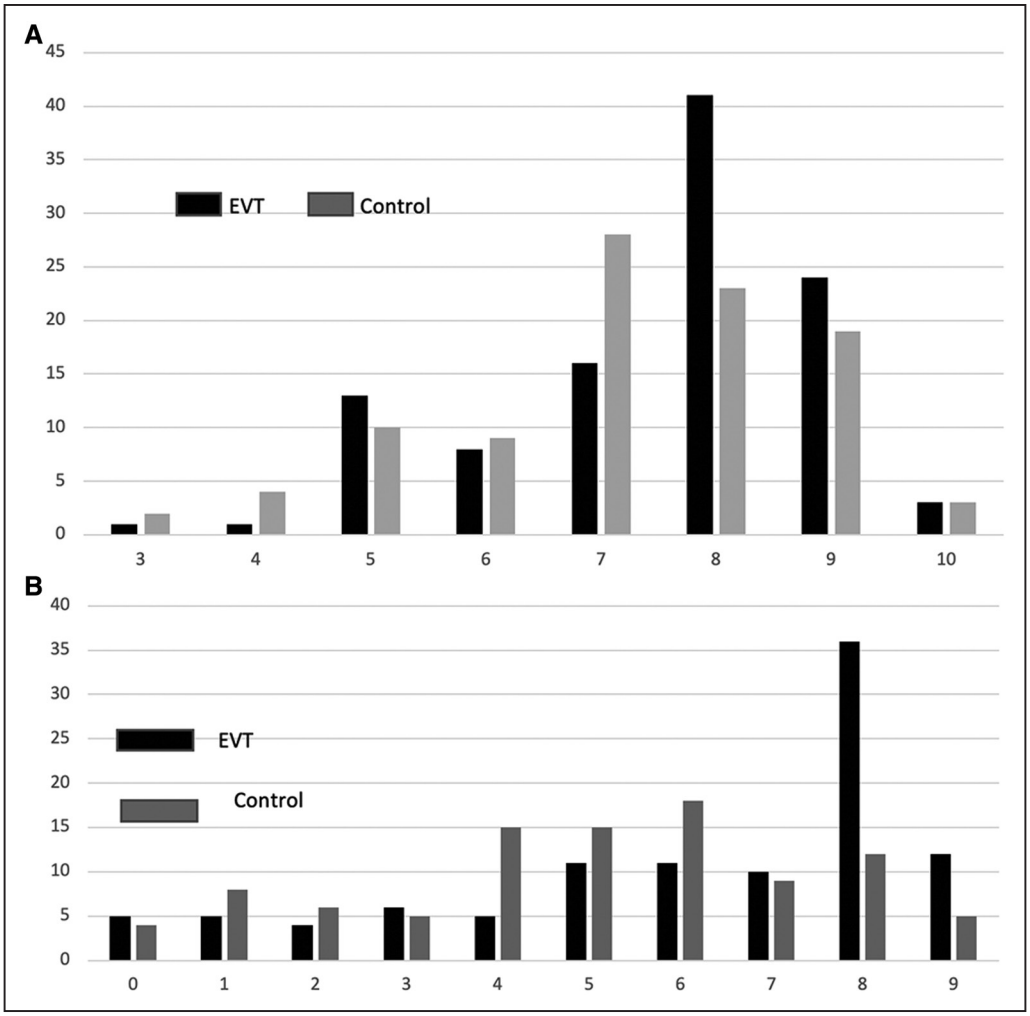

Figure. A, Distribution of baseline Alberta Stroke Program Early CT Score (ASPECTS) in endovascular treatment (EVT) and control groups.
B, Distribution of 24-h ASPECTS Scores in EVT and control groups.

The Highly Effective Reperfusion evaluated in Multiple Endovascular Stroke trials collaboration has recently shown a clear association between favorable clinical outcome after MT and ASPECTS of ≥6.[9] However, a considerable proportion of treated patients did not achieve favorable outcomes despite early recanalization mainly due to early infarct progression.[9] As such, there is a need to identify practical markers for early assessment of treatment efficacy and prediction of outcomes following stroke in day to day practice. Although ASPECTS has been established as a marker of ischemic progression in thrombectomy within traditional time windows,[10,11] the extent of ischemia on ASPECTS at baseline and evolution over 24 hours remains unknown in the late time window after stroke onset. In a prior study of patients with successful endovascular recanalization within 6 hours from symptoms onset, the mean ASPECTS difference at 24 hours versus baseline imaging was 2.7 versus 1.6 (P=0.04) between hyperacute (<1.85 hours) and acute (≥1.85 hours) presenters, suggesting a nonlinear and variable infarct growth pattern in hyperacute versus acute ischemic phase.[12] In this secondary analysis of the DAWN trial, the mean ASPECTS change from baseline to 24 hours was −1.8 (SD 2) among all late window patients, −1.4 among patients treated with EVT, and −1.1 among patients with successful recanalization. In a secondary analysis of the SWIFT trial, ASPECTS was found to be a powerful measure of ischemic evolution and prediction of 90-day function after stroke.[4] Similar to patients presenting in an early time window, ASPECTS within the first 24 hours was a potent predictor of 90-day

Table 2. ASPECTS Values as a Function of Imaging Modality

	Same modality	MRI-CT	CT-MRI	*P* value*
Baseline ASPECTS	8.0	8.0	7.5	0.708
24-h ASPECTS	6.0	6.0	5.0	0.064
ASPECTS change†	−1.0	−1.0	−2.0	0.008

*By Kruskal-Wallis Test.
†Denotes 24-h−baseline value.

outcomes in patients presenting in the late window, providing a practical prognostication marker that may be used as a surrogate of response to treatment.[13]

In the SWIFT trial, although the majority 109/139 (79%) of cases had ASPECTS of 8 to 10 at baseline, only 44/139 (32%) had ASPECTS of 8 to 10 at 24 hours. Dramatic infarct progression occurred in only 14/201 (7.0%) in DAWN as compared with 31/109 (28%) of patients in the SWIFT trial.[4] One explanation could be the fact that patients included in DAWN were more likely to be slow progressors and therefore, had a slower progression of stroke in the subsequent 24-hour interval. The presence of substantial mismatch in the extended time window can be associated with the presence of robust collaterals, which is known to be associated with the slow progression of infarct growth. Therefore, by design, the DAWN trial studied a patient population enriched with respect to slow progressors, as it was assumed that these patients with substantial mismatch would be associated with more robust collaterals. Higher rates of final TICI scores due to the evolution and improvements in endovascular therapies may have also contributed to this discrepancy. Nevertheless, these findings support the hypothesis that the 24-hour ASPECTS is a robust imaging marker of 90-day clinical outcome in both early and late presenting anterior circulation LVOs.

Elevated glucose levels at baseline was an important predictor of ASPECTS decline at 24 hours after stroke, and baseline glucose levels ≥150 mg/dL was independently associated with lower 24 hours ASPECTS likely reflecting the fact that hyperglycemia at baseline is associated with impaired collateral flow. This is in line with the analysis of 3 prospective Solitaire stent retriever studies (SWIFT, SWIFT PRIME, and STAR) where among patients with poor collaterals (collateral grades, 0–2), higher glucose levels did not alter the outcome, whereas among patients with good collaterals (3–4), higher glucose levels reduced the likelihood of a good outcome at 90 days.[14] These results suggest that late presenting strokes may benefit from better glycemic control in the acute phase of stroke.

The limitations of this study include the post hoc nature of this secondary analysis, as well as the use of both CT and MRI for scoring ASPECTS. Furthermore, there are inherent scale limitations of the ASPECTS system. We used a dichotomized measure for defining favorable outcomes, and it may be more powerful to consider the full range of disability using ordinal approaches to functional outcomes.

CONCLUSIONS

DAWN subjects enrolled with small infarct cores in the late time window had a broad range of baseline ASPECTS. Twenty-four hour ASPECTS, strikingly influenced by endovascular therapy, predicted good clinical outcomes. Infarct evolution on serial ASPECTS provides robust biomarker data for endovascular therapy up to 24 hours from onset.

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Disclosures

Dr Liebeskind is consultant at imaging core lab for Cerenovus, Genentech, Medtronic, Rapid Medical, Stryker, Vesalio. Dr Yoo received research grant support from Stryker, Medtronic, Neuravi/Cerenovus, Genentech, and Penumbra; Consultant for Cerenovus and Genentech, and has equity ownership interest in Insera Therapeutics, Inc. Dr Haussen is consultant for Vesalio; stock options from Vizai. Dr Bonafe is consultant for Stryker, Microvention, Balt, and Phenox. Dr Yavagal is consultant for Medtronic, Neural Analytics, Cerenovus, Rapid Medical (Steering Committee Member of TIGER Clinical Trial & Consultant); Stryker (funding for patient enrollment in DAWN trial as sponsor of the trial). Dr Hanel received research Grant from Medtronic, Stryker, Microvention, Cerenovus Consultant: Stryker, Medtronic, Cerenovus, Microvention; Stockholder in Neurvana, Elum, EndoStream, Three Rivers Medical, Inc, Rist, Cerebrotech, InNeuroCo.; Scientific Advisor for MIVI, Elum, Three Rivers Medical, Inc, Shape Medical. Dr Ribo is a consultant for Cerenovus, Medtronic, Stryker, Apta Targets, Anaconda Biomed and has equity ownership interest in Anaconda Biomed. Dr Cognard is a consultant for Stryker, Microvention, Medtronic, and Cerenovus. Dr Sila performed Honoraria and administrative analysis from Medtronic and received Grants from Stryker. Dr Hassan is consultant, speaker, and proctor for Medtronic, Stryker, and Microvention and a consultant/speaker for Penumbra, BALT, GE Healthcare, Vizai. Dr Smith received compensation from Stryker, Inc as DSMB chair for the study; ownership interest in MindRhythm and inventor on a University of California Patent. Dr Saver is an employee of the University of California; The University of California has patent rights in retrieval devices for stroke; served as an unpaid site investigator in multicenter trials sponsored by Medtronic, Stryker, and Neuravi/Cerenovus for which the UC Regents received payments on the basis of clinical trial contracts for the number of subjects enrolled; received contracted hourly payments from Medtronic, Stryker, and Neuravi/Cerenovus and contracted stock options from Rapid Medical for services as a scientific consultant advising on rigorous trial design and conduct. Dr Nogueira: reports potential conflicts with Stryker Neurovascular (DAWN Trial Principal Investigator–no compensation, TREVO Registry Steering Committee–no compensation, Trevo-2 Trial Principal Investigator–modest; Consultant–modest), Medtronic (SWIFT Trial Steering Committee–modest; SWIFT-Prime Trial Steering Committee–no compensation; STAR Trial Angiographic Core Lab–significant), Penumbra (3D Separator Trial Executive Committee–no compensation), Cerenovus/Neuravi (ENDOLOW Trial Principal Investigator, EXCELLENT Registry Principal Investigator, ARISE-2 trial Steering Committee–no compensation, Physician Advisory Board, modest), Phenox (Physician Advisory Board, modest), Anaconda (Physician Advisory Board, modest), Genentech (Physician Advisory Board–modest), Biogen (Physician Advisory Board–modest), Prolong Pharmaceuticals (Physician Advisory Board–modest), Allm, Inc. (Physician Advisory Board–no compensation), IschemaView (Speaker, modest), Brainomix (Research Software Use–no compensation), Sensome (Research Device Use–no compensation), Viz-AI (Physician Advisory Board, stock options), Philips (Research Software Use–no compensation, Speaker–modest), and Corindus Vascular Robotics (Physician Advisory Board, stock options). Dr

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