**Relationship between leukocyte counts and large vessel occlusion in acute ischemic stroke**

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**Supplementary material**

**Table S1.** Univariable associations between baseline characteristics and the presence of LVO in acute ischemic stroke

|  |  |  |
| --- | --- | --- |
|  | Crude odds ratio(95% CI) | P value |
| **Demographic characteristics** |  |  |
| Age, 1-year increase | 1.011 (0.994 to 1.027) | 0.200 |
| Gender, female gender | 1.738 (1.170 to 2.581) | 0.006\* |
| **Elapsed times** |  |  |
| Onset-to-sample time, 1 min increase | 0.998 (0.995 to 1.002) | 0.396 |
| Sample-to-CTA time, 1 min increase | 0.998 (0.988 to 1.008) | 0.715 |
| **Parameters on admission** |  |  |
| NIHSS score on admission, 1-point increase | 1.230 (1.173 to 1.289) | <0.001\* |
| On admission SBP, 1 mmHg increase | 0.990 (0.983 to 0.997) | 0.005\* |
| On admission DBP, 1 mmHg increase | 0.983 (0.970 to 0.996) | 0.010\* |
| Body temperature, 10C increase | 0.437 (0.190 to 1.006) | 0.052­\* |
| Blood glucose, 1 mmol/L increase | 1.010 (0.947 to 1.077) | 0.758 |
| INR, 1-point increase | 10.947 (2.383 to 50.287) | 0.002\* |
| **Vascular risk factors** |  |  |
| Smoking | 1.401 (0.896 to 2.192) | 0.139 |
| Hypertension | 1.267 (0.770 to 2.085) | 0.353 |
| Diabetes mellitus | 0.626 (0.392 to 1.000) | 0.050\* |
| Hyperlipidaemia | 0.887 (0.588 to 1.338) | 0.569 |
| Atrial fibrillation | 2.357 (1.469 to 3.781) | <0.001\* |
| Coronary artery disease | 1.258 (0.790 to 2.004) | 0.333 |
| Chronic heart failure | 2.137 (1.118 to 4.084) | 0.022\* |
| Previous stroke/TIA | 0.634 (0.384 to 1.048) | 0.075\* |
| Malignancy | 1.915 (1.037 to 3.537) | 0.038\* |
| **Therapy at stroke onset** |  |  |
| Antiplatelet | 1.201 (0.792 to 1.819) | 0.388 |
| Anticoagulant | 2.003 (1.101 to 3.643) | 0.023\* |
| Lipid lowering | 1.330 (0.836 to 2.115) | 0.229 |
| Antihypertensive | 1.345 (0.863 to 2.098) | 0.191 |
| Antidiabetic | 0.620 (0.368 to 1.043) | 0.071\* |

Abbreviation: LVO, large vessel occlusion; CI, Confidence Interval, NIHSS, National Institutes of Health Stroke Scale; SBP, systolic blood pressure; DBP, diastolic blood pressure; INR, International Normalized Ratio; TIA, transient ischemic attack.

\* Variables included in the multivariable analysis.

**Table S2.** Baseline characteristics of patients according to the site of occlusion in the anterior circulation

|  |  |  |  |
| --- | --- | --- | --- |
|  | Proximal occlusion(N=105) | Distal occlusion(N=42) | P value |
| **Demographic characteristics** |  |  |  |
| Age, years, median (IQR) | 69 (62-78)  | 70 (64-81) | 0.346 |
| Gender, female, % (n) | 52.3 (55) | 54.8 (23) | 0.794 |
| **Elapsed times** |  |  |  |
| Onset-to-sample time, min, median (IQR) | 75 (52-112) | 91 (70-143) | 0.032 |
| Sample-to-CTA time, min, median (IQR) | 14 (6-22) | 16 (5-28) | 0.985 |
| **Parameters on admission** |  |  |  |
| NIHSS score on admission, median (IQR) | 15 (11-19) | 8 (6-11) | **<0.001** |
| On admission SBP, mmHg, median (IQR) | 159 (136-180) | 154 (140-169) | 0.514 |
| On admission DBP, mmHg, median (IQR) | 84 (76-96) | 89 (80-96) | 0.489 |
| Body temperature, oC, median (IQR) | 36.4 (36.1-36.5) | 36.4 (36.0-36.7) | 0.680 |
| Blood glucose, mmol/L, median (IQR) | 6.77 (5.84-7.92) | 6.57 (5.80-7.94) | 0.874 |
| INR, ratio, median (IQR) | 1.02 (0.95-1.09) | 1.02 (0.99-1.12) | 0.259 |
| **Vascular risk factors** |  |  |  |
| Smoking, % (n), 33 missing | 36.6 (30) | 35.3 (12) | 0.895 |
| Hypertension, % (n), 4 missing | 78.2 (79) | 85.7 (36) | 0.304 |
| Diabetes mellitus, % (n), 8 missing | 22.2 (22) | 17.5 (7) | 0.535 |
| Hyperlipidaemia, % (n), 17 missing | 52.2 (48) | 47.4 (18) | 0.618 |
| Atrial fibrillation, % (n), 9 missing | 31.6 (31) | 45.0 (2) | 0.170\* |
| Coronary artery disease, % (n), 10 missing | 28.9 (28) | 30.0 (12) | 0.894 |
| Chronic heart failure, % (n), 7 missing | 15.2 (15) | 17.1 (7) | 0.776 |
| Previous stroke/TIA, % (n), 8 missing | 18.4 (18) | 14.6 (6) | 0.595 |
| Malignancy, % (n), 13 missing | 18.8 (18) | 15.8 (6) | 0.687 |
| **Therapy at stroke onset** |  |  |  |
| Antiplatelet, % (n), 9 missing | 46.9 (45) | 30.0 (12) | 0.069 |
| Anticoagulant, % (n), 12 missing | 14.4 (14) | 31.6 (12) | 0.023 |
| Lipid lowering, % (n), 10 missing | 29.2 (28) | 24.4 (10) | 0.567 |
| Antihypertensive, % (n), 10 missing | 71.9 (69) | 75.6 (31) | 0.652 |
| Antidiabetic, % (n), 11 missing | 17.7 (17) | 15.0 (6) | 0.701 |
| **Leukocyte counts (1x109/L)** |  |  |  |
| Total WBC, median (IQR) | 8.75 (7.13-11.00) | 9.13 (7.22-10.42) | 0.585 |
| Neutrophil, median (IQR) | 5.93 (4.29-7.57) | 5.79 (3.87-7.66) | 0.646 |
| Lymphocyte, median (IQR) | 1.97 (1.38-2.67) | 1.75 (1.33-2.84) | 0.528 |
| Monocyte, median (IQR) | 0.67 (0.49-0.83) | 0.62 (0.50-0.79) | 0.759 |
| Eosinophil, median (IQR) | 0.12 (0.07-0.21) | 0.12 (0.07-0.20) | 0.666 |
| Basophil, median (IQR) | 0.05 (0.03-0.07) | 0.05 (0.04-0.07) | 0.642 |
| **NLR, median (IQR)** | 2.79 (1.99-4.73) | 2.79 (1.95-6.04) | 0.959 |

Abbreviation: LVO, large vessel occlusion; NIHSS, National Institutes of Health Stroke Scale; SBP, systolic blood pressure; DBP, diastolic blood pressure; IQR, interquartile range; INR, International Normalized Ratio; TIA, transient ischemic attack; NLR, neutrophil-to-lymphocyte ratio.

Proximal occlusion: ICA and MCA M1; distal occlusion: MCA M2, M3 and ACA A1 and A2

\* Fischer exact test

**Table S3.** Baseline characteristics of patients according to collateral status in the anterior circulation

|  |  |  |  |
| --- | --- | --- | --- |
|  | Good collaterals(N=86) | Poor collaterals (N=56) | P value |
| **Demographic characteristics** |  |  |  |
| Age, years, median (IQR) | 69 (62-79)  | 71 (62-81) | 0.448 |
| Gender, female, % (n) | 52.3 (55) | 54.8 (23) | 0.794 |
| **Elapsed times** |  |  |  |
| Onset-to-sample time, min, median (IQR) | 79 (50-128) | 83 (60-115) | 0.594 |
| Sample-to-CTA time, min, median (IQR) | 13 (5-22) | 17 (6-26) | 0.256 |
| **Parameters on admission** |  |  |  |
| NIHSS score on admission, median (IQR) | 11 (6-16) | 16 (12-19) | **<0.001** |
| On admission SBP, mmHg, median (IQR) | 158 (139-170) | 155 (140-179) | 0.685 |
| On admission DBP, mmHg, median (IQR) | 82 (78-92) | 90 (80-99) | 0.337 |
| Body temperature, oC, median (IQR) | 36.4 (36.0-36.5) | 36.4 (36.1-36.5) | 0.876 |
| Blood glucose, mmol/L, median (IQR) | 6.63 (5.90-7.70) | 6.69 (5.75-8.60) | 0.943 |
| INR, ratio, median (IQR) | 1.00 (0.95-1.07) | 1.03 (0.97-1.12) | 0.141 |
| **Vascular risk factors** |  |  |  |
| Smoking, % (n), 30 missing | 36.6 (26) | 34.1 (15) | 0.783 |
| Hypertension, % (n), 4 missing | 82.9 (68) | 76.3 (45) | 0.328 |
| Diabetes mellitus, % (n), 8 missing | 23.1 (18) | 18.6 (11) | 0.529 |
| Hyperlipidaemia, % (n), 17 missing | 54.7 (41) | 47.2 (25) | 0.403 |
| Atrial fibrillation, % (n), 11 missing | 35.4 (28) | 36.8 (21) | 0.867 |
| Coronary artery disease, % (n), 10 missing | 28.2 (22) | 31.6 (12) | 0.672 |
| Chronic heart failure, % (n), 7 missing | 12.5 (10) | 20.7 (12) | 0.195 |
| Previous stroke/TIA, % (n), 8 missing | 17.5 (14) | 17.5 (10) | 0.995 |
| Malignancy, % (n), 13 missing | 16.9 (13) | 20.0 (11) | 0.647 |
| **Therapy at stroke onset** |  |  |  |
| Antiplatelet, % (n), 10 missing | 41.0 (32) | 43.9 (25) | 0.742 |
| Anticoagulant, % (n), 11 missing | 18.2 (14) | 21.2 (12) | 0.678 |
| Lipid lowering, % (n), 10 missing | 30.8 (24) | 24.6 (14) | 0.428 |
| Antihypertensive, % (n), 10 missing | 79.5 (58) | 71.9 (41) | 0.753 |
| Antidiabetic, % (n), 10 missing | 20.5 (16) | 12.3 (7) | 0.209 |
| **Leukocyte counts (1x109/L)** |  |  |  |
| Total WBC, median (IQR) | 9.23 (7.84-10.97) | 8.55 (6.50-10.42) | 0.105 |
| Neutrophil, median (IQR) | 6.04 (4.47-7.57) | 5.64 (3.87-7.54) | 0.198 |
| Lymphocyte, median (IQR) | 1.96 (1.36-2.86) | 1.97 (1.25-2.40) | 0.226 |
| Monocyte, median (IQR) | 0.67 (0.50-0.87) | 0.61 (0.48-0.78) | 0.203 |
| Eosinophil, median (IQR) | 0.13 (0.07-0.24) | 0.12 (0.07-0.18) | 0.998 |
| Basophil, median (IQR) | 0.05 (0.03-0.08) | 0.04 (0.03-0.06) | 0.360 |
| **NLR, median (IQR)** | 2.69 (1.97-5.08) | 2.83 (1.85-5.38) | 0.822 |

Abbreviation: LVO, large vessel occlusion; NIHSS, National Institutes of Health Stroke Scale; SBP, systolic blood pressure; DBP, diastolic blood pressure; IQR, interquartile range; INR, International Normalized Ratio; TIA, transient ischemic attack; NLR, neutrophil-to-lymphocyte ratio.

**Table S4.** Demography and clinical characteristics of LVO patients according to the location of LVO

|  |  |  |  |
| --- | --- | --- | --- |
|  | Anterior LVO (N=147) | Posterior LVO(N=20) | P value |
| **Demographic characteristics** |  |  |  |
| Age, years, median (IQR) | 69 (62-79)  | 62 (60-69) | **0.016** |
| Gender, female, % (n) | 53.1 (78) | 45.0 (9) |  0.498 |
| **Elapsed times** |  |  |  |
| Onset-to-sample time, min, median (IQR) | 82 (54-119) | 94 (61-160) | 0.244 |
| Sample-to-CTA time, min, median (IQR) | 14 (6-24) | 22 (10-31) | 0.060 |
| **Parameters on admission** |  |  |  |
| NIHSS score on admission, median (IQR) | 13 (8-18) | 6 (4-12) | **0.004** |
| On admission SBP, mmHg, median (IQR) | 158 (140-174) | 165 (143-190) | 0.213 |
| On admission DBP, mmHg, median (IQR) | 85 (80-96) | 80 (74-99) | 0.767 |
| Body temperature, oC, median (IQR) | 36.4 (36.1-36.5) | 36.5 (36.2-36.5) | 0.871 |
| Blood glucose, mmol/L, median (IQR) | 6.70 (5.81-7.94) | 7.63 (6.49-9.97) | **0.014** |
| INR, ratio, median (IQR) | 1.02 (0.95-1.09) | 0.99 (0.96-1.03) | 0.087 |
| **Vascular risk factors** |  |  |  |
| Smoking, % (n), 34 missing | 36.2 (42) | 58.8 (10) | 0.104\* |
| Hypertension, % (n), 4 missing | 80.4 (115) | 90.0 (18) | 0.374\* |
| Diabetes mellitus, % (n), 8 missing | 20.9 (29) | 25.0 (5) | 0.771\* |
| Hyperlipidaemia, % (n), 17 missing | 50.8 (66) | 50.0 (10) | 0.949 \* |
| Atrial fibrillation, % (n), 9 missing | 35.6 (49) | 15.0 (3) | **0.078\*** |
| Coronary artery disease, % (n), 11 missing | 29.2 (40) | 16.7 (3) | 0.402\* |
| Chronic heart failure, % (n), 7 missing | 15.7 (22) | 10.0 (2) | 0.741\* |
| Previous stroke/TIA, % (n), 8 missing | 17.3 (24) | 25.0 (4) | 0.756\* |
| Malignancy, % (n), 15 missing | 17.9 (24) | 5.6 (1) | 0.310\* |
| **Therapy at stroke onset** |  |  |  |
| Antiplatelet, % (n), 13 missing | 41.9 (57) | 27.8 (5) | 0.312\* |
| Anticoagulant, % (n), 14 missing | 19.3 (26) | 5.6 (1) | 0.200\* |
| Lipid lowering, % (n), 12 missing | 27.7 (38) | 27.8 (5) | 0.997\* |
| Antihypertensive, % (n), 12 missing | 73.0 (100) | 72.2 (13) | 0.945\* |
| Antidiabetic, % (n), 14 missing | 16.9 (23) | 11.8 (2) | 0.741\* |
| **Leukocyte counts (1x109/L)** |  |  |  |
| Total WBC, median (IQR) | 8.77 (7.13-10.97) | 10.46 (9.30-12.41) | 0.005 |
| Neutrophil, median (IQR) | 5.89 (4.20-7.60) | 7.06 (5.98-9.99) | 0.010 |
| Lymphocyte, median (IQR) | 1.94 (1.34-2.70) | 2.22 (1.60-3.32) | 0.224 |
| Monocyte, median (IQR) | 0.64 (0.49-0.83) | 0.76 (0.54-0.93) | 0.114 |
| Eosinophil, median (IQR) | 0.12 (0.07-0.20) | 0.09 (0.05-0.21) | 0.226 |
| Basophil, median (IQR) | 0.05 (0.03-0.07) | 0.05 (0.04-0.08) | 0.682 |
| **NLR, median (IQR)** | 2.79 (1.97-5.28) | 3.13 (2.29-5.44) | 0.344 |

Abbreviation: LVO, large vessel occlusion; NIHSS, National Institutes of Health Stroke Scale; SBP, systolic blood pressure; DBP, diastolic blood pressure; IQR, interquartile range; INR, International Normalized Ratio; TIA, transient ischemic attack; NLR, neutrophil-to-lymphocyte ratio.

\* Fischer exact test.

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**Figure S1.** Receiver operating characteristic curves demonstrating the ability of total and differential leukocyte counts to discriminate the presence of LVO in AIS. Area under the curve (AUC) values and 95% confidence intervals are presented.