Acute ischemic stroke case series

Patients with acute ischemic stroke presenting consecutively to Groote Schuur Hospital between 1 January 2018 to 1 January 2022 with proximal intracranial occlusion in the anterior circulation treated with mechanical thrombectomy within 6 h from onset using computed tomography (CT) and CT angiography imaging-based protocols were evaluated. Demographic, clinical, radiological and procedural data were obtained from the stroke unit database. Recanalization was evaluated post-procedure by modified Treatment in Cerebral Infarction score (mTICI). Functional independence (modified Rankin scores 0-2) and mortality at 90 days were also assessed.

Thrombectomy were performed in 84 patients during the study period. The median age was 56 years (interquartile range, IQR) and 51% of participants were female. Median National Institute of Health Stroke Score was 18 and median baseline Alberta Stroke Programme Early CT score was 8. Bridging thrombolysis was given to 65% of participants. Median time from symptom onset to reperfusion was 339 min (IQR). Successful recanalisation (mTICI 2b/3) was obtained in 62%. At 90 days, 34% of participants gained functional independence and mortality was 34%.

This study demonstrated similar rates of recanalisation and functional independence to that seen in trials in high-income countries using basic imaging despite a higher mortality and longer median time to reperfusion. This data supports the effectiveness of MT in a tertiary level public hospital in South Africa despite the challenges of providing emergent stroke care in a resource-constrained setting [1)].

2022

Of the acute ischemic stroke patients undergoing EVT for acute posterior circulation large vessel occlusion enrolled in the multicenter observational registry from December 2013 to February 2021, patients with BA occlusion were included. A favorable outcome was defined as achieving a modified Rankin Scale score of 0-3 at 90 days. The effect of pc-ASPECTS including the distribution on favorable outcomes was evaluated.

Results: One hundred patients were analyzed. Fifty-one patients (51%) achieved favorable outcome. Patients achieving a favorable outcome were younger, had a lower National Institutes of Health Stroke Scale score before EVT, and had a higher pc-ASPECTS before EVT than those not achieving a favorable outcome. Multivariable logistic analysis showed a significant association between higher pc-ASPECTS and a favorable outcome (odds ratio [OR] 1.24; 95% confidence interval [CI] 1.02-1.52; p = 0.028). Considering the infarct location, bilateral cerebellar infarction was significantly associated with a lower frequency of favorable outcomes than those without cerebellar infarction (OR 0.16; 95% CI 0.04-0.51; p = 0.002).

Conclusions: A higher pc-ASPECTS before EVT could be a predictor of a favorable outcome after EVT for BA occlusion. In particular, the presence of bilateral cerebellar infarction before EVT was significantly associated with a lower likelihood of a favorable outcome [2)].

From January 2020 to June 2021, 536 patients with AIS within 24 h of symptom onset were admitted to Samsung Changwon Hospital, via the ER. Based on the type of doctors who provided initial care for AIS in the ER, patients were divided into two groups: (a) neurosurgeon group (n = 119, 22.2%) and (b)

neurologist group (n = 417, 77.8%).

Intravenous tissue plasminogen activator (tPA) was administered in 82 (15.3%) of 536 patients (n = 17 [14.3%] in the neurosurgeon group and n = 65 [15.6%] in the neurologist group). The door-to-tPA time was not significantly different between both groups (median 53 min, IQR [interquartile range] [45-58] vs. median 54 min, IQR [46-74], p = 0.372). MT was performed in 69 (12.9%) patients (n = 25, 36.2% in the neurosurgeon group and n = 44, 63.8% in the neurologist group). The neurosurgeon group achieved a shorter door-to-puncture time than the neurologist group (median 115 min, IQR [107-151] vs. median 162 min, IQR [117-189], p = 0.049). Good clinical outcomes (3-month modified Rankin scale 0-2) did not differ significantly between the two groups (96/119 [80.7%] vs. 322/417 [77.2%], p = 0.454).

The neurosurgeon group showed similar door-to-needle time and clinical outcomes to the neurologist group in patients with AIS in the ER. This study suggests that neurosurgeons have comparable abilities to care for patients with AIS in the ER [3)]

In a study, patients with acute ischemic stroke who received acute reperfusion therapy in 351 Close The Gap-Stroke-participating hospitals were analyzed retrospectively. The primary outcomes were changes in trends for adherence to the defined Quality Indicators QIs by difference-in-difference analysis and the effects of adherence to distinct QIs on in-hospital outcomes at the individual level. A mixed logistic regression model was adjusted for patient and hospital characteristics (eg, age, sex, number of beds) and hospital units as random effects.

Between 2013 and 2017, 21 651 patients (median age, 77 years; 43.0% female) were assessed. Of the 25 defined measures, marked and sustainable improvement in the adherence rates were observed for a door-to-needle time, door-to-puncture time, proper use of endovascular thrombectomy, and successful revascularization. The in-Hospital mortality rate was 11.6%. Adherence to 14 QIs lowered the odds of in-Hospital mortality (odds ratio [95% CI], door-to-needle <60 min, 0.80 [0.69-0.93], door-to-puncture <90 min, 0.80 [0.67-0.96], successful revascularization, 0.40 [0.34-0.48]), and adherence to 11 QIs increased the odds of functional independence (modified Rankin Scale score 0-2) at discharge.

They demonstrated national marked and sustainable improvement in adherence to door-to-needle time, door-to-puncture time, and successful reperfusion from 2013 to 2017 in Japan in patients with acute ischemic stroke. Adhering to the key QIs substantially affected in-hospital outcomes, underlining the importance of monitoring the quality of care using evidence-based QIs and the nationwide Close The Gap-Stroke program [4)].

2021

103 patients with IS within 24 h of their hospital admission and assessed demographic data, IS severity using the National Institutes of Health Stroke Scale (NIHSS), carotid intima-media thickness test (cIMT), and degree of stenosis, as well as laboratory variables including immune-inflammatory, coagulation, and endothelial dysfunction biomarkers. The IS patients were categorized as survivors and non-survivors 1 year after admission. Non-survivors showed higher NIHSS and cIMT values, lower antithrombin, Protein C, platelet counts, and albumin, and higher Factor VIII, von Willebrand Factor (vWF), white blood cells, tumor necrosis factor (TNF)-α, interleukin (IL)-10, high-sensitivity C-reactive

protein (hsCRP), and vascular cellular adhesion molecule 1 (VCAM-1) than survivors. Neural network models separated non-survivors from survivors using NIHSS, cIMT, age, IL-6, TNF-α, hsCRP, Protein C, Protein S, vWF, and platelet endothelial cell adhesion molecule 1 (PECAM-1) with an area under the receiver operating characteristic curve (AUC/ROC) of 0.975, cross-validated accuracy of 93.3%, sensitivity of 100% and specificity of 85.7%. In conclusion, imaging, immune-inflammatory, and coagulation biomarkers add predictive information to the NIHSS clinical score and these biomarkers in combination may act as predictors of 1-year mortality after IS. An early prediction of IS outcome is important for personalized therapeutic strategies that may improve the outcome of IS [5)]

2018

Cilostazol, an antiplatelet drug that inhibits phosphodiesterase 3, is beneficial for patients with atherothrombosis. In contrast to other anti-platelet drugs such as aspirin and thienopyridines, little information is available on the relationship between platelet responses to cilostazol and clinical outcomes.

Ikeda et al. from the Ehime University Graduate School of Medicine in Japan, conducted a prospective study on patients with cerebral infarction who were treated with cilostazol. The platelet response to cilostazol was assessed with a new assay for the phosphorylation of vasodilator-stimulated phosphoprotein (VASP) subsequent to the pharmacological action of cilostazol. Patients were followed up for 2 years and the relationship between VASP assay results and the recurrence of thrombotic events was examined. We also investigated the effects of CYP3A5 and CYP2C19 genotypes involved in the metabolism of cilostazol on the platelet response to cilostazol.

Among the 142 patients enrolled, 130 completed the 2-year follow-up and the recurrence of thrombotic events was noted in 8 (6.2%). VASP phosphorylation levels were significantly lower in patients with than in those without recurrence. The combined genotype of CYP3A5*1/*3 and CYP2C19*1/*1 was associated with a low level of VASP phosphorylation, while either genotype was not. A multivariate analysis showed that high residual platelet reactivity during the cilostazol treatment, which was defined by a low response of platelet VASP phosphorylation to cilostazol, was an independent risk factor for the recurrence of thrombotic events.

A low platelet response to cilostazol determined by a new platelet assay was associated with the recurrence of thrombotic events in patients with cerebral infarction [6)].

Miura et al. investigated the efficacy of a combined approach with stent retriever-assisted aspiration catheter for distal intracranial vessel occlusion (distal combined technique: DCT).

They evaluated consecutive acute ischemic stroke patients with distal occlusion in anterior circulation, including occlusions of the M2/M3 or A2/A3 segment, who received endovascular therapy (EVT) in a single center. Modified Thrombolysis in Cerebral Infraction [mTICI] score including TICI 2c category, processing time from puncture to reperfusion, proportion of a favorable clinical outcome at discharge (modified Rankin Scale [mRS] ≤ 2), and incidence of symptomatic intracranial hemorrhage (sICH) were compared between the DCT and single device approach technique (non-DCT) groups.

Of 65 patients, 28 were treated with DCT and 37 with EVT for non-DCT. In the DCT group, a higher reperfusion rate at the first pass (mTICI ≥ 2b, 92% vs. 54%, p=0.0008; mTICI ≥ 2c, 71% vs. 16%, p < 0.0001; mTICI3 57% vs. 14%, p=0.0004) and shorter time from puncture to successful reperfusion

(median 31 min. vs. 43 min., p=0.0006) were achieved. The final successful reperfusion rate was also higher in the DCT group than in the non-DCT group (mTICI ≥ 2c, 85% vs. 51% p=0.004; mTICI3, 75% vs. 43%, p=0.012). sICH occurred in two patients in the non-DCT group. Patients with mRS ≤ 2 at discharge were more prevalent in the DCT than in the non-DCT group (57% vs. 27% p=0.021).

This retrospective analysis indicated that DCT is a useful and safe strategy for patients with distal anterior intracranial vessel occlusion.

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retrospective study reviewed data from consecutive patients with AIS and an occluded M1 segment of the middle cerebral artery who underwent pretreatment perfusion CT between May 2009 and August 2017. The maximum cerebral blood flow (CBF) of collateral vessels (cCBFmax) within the Sylvian fissure was calculated for each patient. Good outcome was defined as a 90-day modified Rankin scale score of 0-2. Multivariable logistic regression analysis was used to determine the relationship between cCBFmax and (a) hemorrhagic transformation and (b) clinical outcome.

The final analysis included 204 patients (median age, 73 years; interquartile range, 62-80 years; 82 [40.2%] women). Multivariable logistic regression analysis showed that higher cCBFmax was an independent predictor for (a) a lower risk of hemorrhagic transformation (odds ratio [OR], 0.99; 95% confidence interval [CI]: 0.98, 1.00; P = .009) after adjusting for baseline National Institute of Health Stroke Scale (NIHSS), endovascular thrombectomy, baseline infarct core volume, and recanalization and (b) better outcome (OR, 1.02; 95% CI: 1.01, 1.03; P = .001) after adjusting for age, baseline NIHSS score, endovascular thrombectomy, hypertension, baseline infarct core volume, and recanalization, respectively.

The measurement of maximum cerebral blood flow of collateral vessels within the Sylvian fissure is a feasible quantitative collateral assessment at perfusion CT. Maximum cerebral blood flow of collateral vessels was associated with clinical outcome in patients with acute ischemic stroke. [7].

Nozoe et al., from the Department of Physical Therapy, Faculty of Nursing and Rehabilitation, Konan Women's University, Kobe, Department of Rehabilitation, Neurosurgical Hospital, Itami, Japan, compared the heart rate variability (HRV) during early mobilization in patients with or without neurological deterioration (ND). They enrolled 7 acute ischemic patients with ND and 14 without ND and measured their HRV in the rest and mobilization by electrocardiography. There was a significant difference in sympathetic nervous activity during mobilization between the 2 groups. However, no significant differences in blood pressure, heart rate, and parasympathetic nerve activity were observed. In patients with acute ischemic stroke, it is likely that the increase in sympathetic nervous activity during mobilization is associated with ND [8].

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Kiriinya MM, Bateman K, Qureshi A, Feuvre DL, Taylor A. Outcomes of mechanical thrombectomy at a single-centre tertiary level public healthcare hospital in South Africa. Interv Neuroradiol. 2023 May 31:15910199231178163. doi: 10.1177/15910199231178163. Epub ahead of print. PMID: 37259571.
2)
Ishiwada T, Fujita K, Hirai S, Fujii S, Yamaoka H, Ishikawa M, Yoshimura M, Shigeta K, Sato Y, Sawada K, Yamada K, Yamamura T, Ishii Y, Obata Y, Tone O, Hara M, Kawano Y, Aoyagi M, Nemoto S, Maehara T, Sumita K. Influence of bilateral cerebellar infarction on functional outcome after endovascular treatment for basilar artery occlusion. World Neurosurg. 2022 Dec 14:S1878-8750(22)01759-4. doi:

10.1016/j.wneu.2022.12.054. Epub ahead of print. PMID: 36528323.
3)

Lee SH, Nam TM, Jang JH, Kim YZ, Kim KH, Ryu KH, Kim DH, Kwan BS, Lee H, Kim SH. Role of Neurosurgeons in the Treatment of Acute Ischemic Stroke in the Emergency Room. J Korean Neurosurg Soc. 2022 Aug 17. doi: 10.3340/jkns.2022.0085. Epub ahead of print. PMID: 35974432.
4)

Ren N, Ogata S, Kiyoshige E, Nishimura K, Nishimura A, Matsuo R, Kitazono T, Higashi T, Ogasawara K, Iihara K; Close The Gap-Stroke, J-ASPECT Study Collaborators. Associations Between Adherence to Evidence-Based, Stroke Quality Indicators and Outcomes of Acute Reperfusion Therapy. Stroke. 2022 Aug 16:101161STROKEAHA121038483. doi: 10.1161/STROKEAHA.121.038483. Epub ahead of print. PMID: 35971841.
5)

Lehmann ALCF, Alfieri DF, de Araújo MCM, Trevisani ER, Nagao MR, Pesente FS, Gelinski JR, de Freitas LB, Flauzino T, Lehmann MF, Lozovoy MAB, Breganó JW, Simão ANC, Maes M, Reiche EMV. Immune-inflammatory, coagulation, adhesion, and imaging biomarkers combined in machine learning models improve the prediction of death 1 year after ischemic stroke. Clin Exp Med. 2021 Jun 12. doi: 10.1007/s10238-021-00732-w. Epub ahead of print. PMID: 34120242.
6)

Ikeda Y, Yamanouchi J, Kumon Y, Yasukawa M, Hato T. Association of platelet response to cilostazol with clinical outcome and CYP genotype in patients with cerebral infarction. Thromb Res. 2018 Oct 10;172:14-20. doi: 10.1016/j.thromres.2018.10.003. [Epub ahead of print] PubMed PMID: 30342278.
7)

Shi F, Gong X, Liu C, Zeng Q, Zhang M, Chen Z, Yan S, Lou M. Acute Stroke: Prognostic Value of Quantitative Collateral Assessment at Perfusion CT. Radiology. 2019 Jan 8:181510. doi: 10.1148/radiol.2019181510. [Epub ahead of print] PubMed PMID: 30620255.
8)

Nozoe M, Yamamoto M, Kobayashi M, Kanai M, Kubo H, Shimada S, Mase K. Heart Rate Variability During Early Mobilization in Patients with Acute Ischemic Stroke. Eur Neurol. 2018 Sep 11;80(1-2):50-54. doi: 10.1159/000492794. [Epub ahead of print] PubMed PMID: 30205405.