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REVIEW ARTICLE

Electroencephalography (EEG) and Quantitative EEG for Acute Stroke Triage and Post-Reperfusion Monitoring: A Systematic Review

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Abstract: **Introduction:** Electroencephalography (EEG) and quantitative EEG (QEEG) are candidate functional biomarkers that may complement clinical examination and imaging for acute ischemic stroke triage and post-reperfusion monitoring. However, diagnostic targets, recording systems, thresholds, and post-treatment monitoring endpoints are heterogeneous. This review aimed to evaluate acute-care EEG applications in ischemic stroke by separately synthesizing evidence on pre-treatment diagnostic triage and post-EVT/MT monitoring. **Methods:** A systematic search was performed in PubMed, Embase, Scopus, and Web of Science on 4 February 2026, with supplementary backward and forward citation tracking. Eligible studies evaluated EEG, QEEG, processed EEG, visual EEG grading, or EEG-derived physiological markers for acute stroke/transient ischemic attack (TIA) classification, large-vessel occlusion (LVO)/medium-vessel occlusion (MeVO) detection, lesion-related classification, stroke-control/severity classification, or post-endovascular treatment/mechanical thrombectomy (EVT/MT) monitoring. Diagnostic components were interpreted in line with PRISMA 2020 and PRISMA-DTA principles. Risk of bias was assessed using QUADAS-2 for diagnostic/classification evidence and QUIPS-oriented criteria for post-EVT/MT monitoring studies. **Results:** From 4,796 database records, 3,179 unique records were screened, 51 full texts were assessed, and 15 study records were retained: seven diagnostic/classification studies and eight post-EVT/MT monitoring studies. Acute triage evidence suggested candidate value for EEG/QEEG in acute stroke/TIA or LVO/MeVO identification, with promising individual-study signals for slow-to-fast ratios, hemispheric asymmetry/pdBSI, relative alpha/theta power, and clinical-plus-EEG models. However, devices, settings, target conditions, thresholds, and validation status varied, and no diagnostic domain was poolable. No diagnostic meta-analysis was performed because target conditions, thresholds, reference standards, EEG systems, and intended-use settings were too heterogeneous. Post-EVT/MT monitoring studies suggested candidate value for QEEG slowing/frontal DAR, relative alpha loss, visual EEG grading, NCSE detection, BIS/NIRS, and EEG-TCD NVC in relation to END, edema, seizure-related complications, infarct growth, or functional outcome. Certainty was very low for diagnostic domains and low for post-EVT/MT monitoring. **Conclusions:** EEG/QEEG is a promising but still investigational adjunct for acute ischemic stroke triage and post-reperfusion monitoring. Current evidence does not support a universal diagnostic threshold, pooled diagnostic accuracy estimate, or stand-alone clinical implementation. Larger intended-use validation studies with complete diagnostic accuracy reporting and externally validated thresholds are required.

Keywords: Ischemic Stroke; Electroencephalography; Quantitative EEG; Diagnostic Accuracy; Triage; Large-Vessel Occlusion; Endovascular Treatment; Monitoring

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1. Introduction

Stroke remains a leading cause of death and long-term disability worldwide, and its absolute burden remains substantial despite improvements in age-standardized rates in some regions (1). In emergency departments, acute ischemic stroke is a time-critical diagnosis because early decisions determine eligibility for reperfusion therapy, transfer pathways, and long-term neurological outcome. Endovascular thrombectomy has improved outcomes for selected patients with large-vessel occlusion, but its benefit is highly time-dependent and relies on rapid recognition, accurate triage, and timely access to thrombectomy-capable centers. This creates a need for rapid, repeatable, bedside biomarkers that complement neurological examination and imaging (2, 3).

The acute diagnostic challenge extends beyond confirming stroke. Clinicians must distinguish ischemic stroke from mimics, identify transient ischemic attack, detect large- or medium-vessel occlusion, and recognize early neurological deterioration after reperfusion. CT, CT angiography, CT perfusion, and MRI remain central to diagnosis and treatment selection (2, 3), but they may be less accessible in prehospital or resource-limited settings. A noninvasive functional test that can be performed quickly at the bedside or before hospital arrival could therefore support triage, provided that it is validated in the intended clinical population (4-6).

Electroencephalography records cortical electrical activity with high temporal resolution, whereas quantitative EEG converts these signals into numerical features such as spectral power, slow-to-fast ratios, hemispheric asymmetry indices, connectivity measures, and neurovascular-coupling metrics (4, 5, 7). Cerebral ischemia is typically associated with increased slow-frequency activity and reduced faster background rhythms. This pattern reflects impaired neuronal

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function under reduced perfusion and metabolic stress and is consistent with the concept that electrical dysfunction may occur before irreversible tissue injury is complete (8, 9).

Several QEEG markers have therefore been evaluated for acute stroke triage. Delta/alpha ratio, delta-theta/alpha-beta ratio, theta-alpha ratio, relative alpha or theta power, Brain Symmetry Index, and pairwise-derived Brain Symmetry Index have been studied for stroke/TIA classification, large-vessel occlusion detection, lesion confirmation, and severity assessment (10-17). Simplified and dry-electrode systems are particularly relevant to emergency and prehospital care because they may reduce setup time and permit recording outside specialist neurophysiology laboratories (10-14). However, these studies address different clinical questions, and a threshold developed for anterior-circulation large-vessel occlusion cannot be assumed to apply to mimics, lacunar syndromes, posterior circulation stroke, or post-treatment deterioration.

Post-reperfusion monitoring represents a separate acute-care application. Although EVT/MT restores macrovascular patency, outcome may still be affected by edema, hemorrhagic transformation, seizures, infarct evolution, impaired tissue reperfusion, and disturbed neurovascular coupling (2, 3, 18, 19). Routine EEG, continuous EEG, QEEG, visual EEG grading, processed EEG, and EEG-transcranial Doppler coupling have been studied for detecting cortical dysfunction, early deterioration, nonconvulsive seizures, cerebral edema, and abnormal post-treatment physiology (6, 20-26). Serial EEG may provide dynamic functional information that is not captured by angiographic recanalization or static imaging alone.

The evidence remains heterogeneous in device type, montage, timing, target condition, threshold selection, and reference standard. Many studies are small, proof-of-concept, or internally validated, and external validation is limited. This systematic review therefore evaluates acute-care EEG and QEEG applications in ischemic stroke by separately synthesizing evidence on pre-treatment diagnostic triage and post-EVT/MT monitoring. These domains were not pooled because they differ in target condition, timing, reference standard, and clinical workflow.

2. Methods

2.1. *Design and reporting framework*

This systematic review evaluated the diagnostic, triage, and acute monitoring value of EEG and QEEG in ischemic stroke and occlusion-related care. The review focused on two clinically linked but analytically distinct use cases: acute diagnostic or classification applications, including stroke/TIA classification and LVO/MeVO detection; and post-reperfusion monitoring after EVT/MT. These two use cases were linked by their relevance to acute stroke-care workflows but were analyzed separately because diagnostic triage and post-EVT/MT monitoring differ in intended-use population, clinical timing, reference standard, endpoint definition, and decision-making context. This study was not prospectively registered, and no formal protocol registration number is available.

The review was reported according to PRISMA 2020 principles and the diagnostic accuracy components were aligned with PRISMA-DTA concepts where applicable (27, 28). Because the included studies evaluated different intended-use populations, target conditions, EEG devices, thresholds, and reference standards, the primary synthesis was descriptive and domain-specific rather than based on broad diagnostic pooling. Diagnostic accuracy evidence was interpreted according to the clinical target condition, index test, reference standard, threshold derivation, and intended care setting.

For post-EVT/MT studies, EEG/QEEG was considered a monitoring biomarker when it was used to detect, characterize, or predict post-treatment deterioration, cerebral edema, nonconvulsive seizures/status epilepticus, visual EEG worsening, reperfusion-related cortical dysfunction, or neurovascular-coupling physiology. In this review, post-reperfusion monitoring was defined broadly to include EEG/QEEG measurements acquired during or after EVT/MT that were evaluated against early complications, physiological changes, or subsequent clinical outcomes. Studies using only baseline EEG for long-term recovery prediction were outside the scope.

2.2. *Eligibility criteria*

The review question was structured according to a Population–Index Test–Target Condition (PIT) framework. The population comprised patients with suspected or confirmed ischemic stroke, transient ischemic attack, anterior-circulation large-vessel occlusion, medium- or large-vessel occlusion, or recent endovascular or mechanical thrombectomy, evaluated in prehospital, emergency department, acute stroke unit, angiography-suite, intensive-care, or early post-treatment settings. The index tests included conventional EEG, quantitative EEG, processed EEG, visual EEG grading systems, and physiological markers derived from EEG recordings. The target conditions and intended clinical applications were the acute diagnosis or classification of ischemic stroke or TIA, detection of LVO or MeVO, lesion-related classification of ischemic stroke syndromes, discrimination between stroke and stroke mimics or non-stroke controls, detection of early neurological deterioration after endovascular treatment, and post-procedural monitoring for cortical dysfunction, cerebral edema, seizures, nonconvulsive status epilepticus, visual EEG deterioration, or impaired neurovascular coupling. Healthy individuals, stroke mimics, and other clinical comparison groups were considered eligible only when they directly contributed to a diagnostic or classification analysis.

Eligible studies included human participants with suspected or confirmed ischemic stroke, TIA, anterior-circulation LVO, MeVO/LVO, or post-EVT/MT status. Studies were included when they evaluated EEG, QEEG, processed EEG, visual EEG grading, or EEG-derived physiological markers in relation to one of the following clinical purposes: a) acute stroke or TIA classification; b) LVO/MeVO detection; c) lesion-related classification in ischemic stroke syndromes; d) stroke-control or stroke-mimic discrimination; e) END detection after EVT; f) post-EVT/MT monitoring of cortical dysfunction, cerebral edema, seizures, NCSE/status epilepticus, visual EEG worsening, or neurovascular-coupling physiology.

Studies were eligible if they were conducted in ED, prehospital, acute stroke unit, angiography-suite, intensive-care, or early post-treatment settings. Healthy controls, stroke mimics, or other clinical comparators were eligible only when they directly informed a diagnostic or classification question.

Studies were excluded from this article when their primary contribution was a general severity association, long-term functional prognosis, motor recovery, language recovery, chronic rehabilitation response, or mechanistic recovery biol-

ogy without a diagnostic or acute monitoring use case. Case reports, animal studies, purely technical EEG studies without clinical stroke outcomes, duplicate reports, protocols without results, and secondary commentaries without independent clinical cohorts were excluded.

2.3. *Information sources and search strategy*

A systematic search was performed on 4 February 2026 in PubMed, Embase, Scopus, and Web of Science. Search strategies combined controlled vocabulary and free-text terms for stroke or brain ischemia, large-vessel or intracranial occlusion, and EEG/QEEG-related measures. No language or date restriction was specified in the database search strings. The complete database-specific search strategies and yields are provided in Supplementary Appendix 1. In addition to database searching, backward and forward citation tracking of included studies and relevant reviews was performed. No additional eligible study record was retained solely from grey-literature or preprint searching. Studies were retained when they contributed acute diagnostic/classification evidence or post-reperfusion monitoring evidence.

2.4. *Study selection process*

All records identified in the review underwent title/abstract screening and full-text assessment using predefined eligibility criteria. For this diagnostic and monitoring article, records were classified according to intended clinical use: acute diagnostic triage, LVO/MeVO detection, lesion-related classification, stroke-control or stroke-severity classification, post-EVT/MT deterioration monitoring, seizure or NCSE detection, visual EEG monitoring, processed EEG monitoring, or neurovascular-coupling monitoring.

Two reviewers independently assessed the titles and abstracts of the search records. Disagreements were resolved by discussion, with a third reviewer available for adjudication. Full-text assessment, data extraction, and risk-of-bias assessment were also performed independently by two reviewers, with disagreements resolved by discussion or third-reviewer adjudication. When multiple reports came from a related research program, such as ELECTRA-STROKE, they were retained only when they addressed distinct settings or phases, such as emergency-room versus prehospital LVO detection. Related reports were not treated as independent validation studies for pooled inference when cohort overlap or shared program structure was possible.

2.5. *Data extraction*

Data were extracted using a structured diagnostic and monitoring extraction form. Extracted items included first author, year, country, study design, clinical setting, intended use case, population, sample size, number of EEG-analyzable participants, control or comparator group, stroke subtype, occlusion type where applicable, baseline severity, timing from symptom onset or treatment to EEG, EEG device, montage, recording duration, preprocessing method where reported, index EEG/QEEG features, target condition, reference standard, threshold-selection method, diagnostic or monitoring performance metrics, and validation status.

For diagnostic studies, extracted performance metrics included sensitivity, specificity, area under the receiver operating characteristic curve (AUC), positive and negative predictive values when available, 95% confidence intervals when reported, 2×2 data when reported or reconstructable, and whether thresholds were prespecified or data-derived. Reconstructed values were calculated from reported sensitivity, specificity, and sample counts when exact 2×2 tables were not provided; these values were interpreted cautiously because of possible rounding.

When studies reported multiple EEG features from the same cohort, feature-level estimates were summarized at the study level to avoid implying independence of correlated results. For machine-learning, classification-tree, deep-learning, or threshold-based studies, the model type, predictor set, internal validation approach, and external validation status were extracted when available.

2.6. *Evidence classification*

Included studies were categorized into four diagnostic and monitoring domains:

Acute vascular triage and LVO/MeVO detection: studies evaluating EEG/QEEG for suspected acute stroke, acute stroke/TIA classification, anterior-circulation LVO detection, or medium-/large-vessel occlusion detection.

Other diagnostic or classification applications: studies evaluating lesion confirmation, stroke-control discrimination or stroke severity classification.

Post-EVT/MT deterioration and complication monitoring: studies evaluating EEG/QEEG markers of END, cerebral edema, poor early post-treatment course, visual EEG worsening, or NCSE/status epilepticus.

Post-reperfusion physiological monitoring: studies evaluating processed EEG, BIS/NIRS, or EEG and transcranial Doppler (EEG-TCD) neurovascular-coupling measures during or after EVT/MT.

These domains were considered clinically distinct. A single pooled diagnostic estimate was not planned because stroke/TIA classification, LVO detection, early neurological deterioration (END) detection, and post-EVT monitoring represent different target conditions and intended-use contexts.

2.7. *Risk of bias assessment*

Diagnostic studies were assessed using QUADAS-2 domains: patient selection, index test, reference standard, and flow/timing (29). Applicability concerns were judged according to whether the study population, index test, and reference standard matched the intended diagnostic use case. Particular attention was given to spectrum bias, enriched LVO samples, small target-event counts, EEG signal-quality exclusions, unblinded interpretation, data-derived thresholds, and lack of external validation.

For post-EVT/MT monitoring studies that evaluated outcome prediction rather than diagnostic classification, risk of bias was assessed using QUIPS-oriented considerations, including study participation, attrition, prognostic-factor measurement, outcome measurement, confounding, and statistical analysis/reporting (30). Studies of prediction models, deep-learning models, classification trees, K-means classification, or threshold-based models were summarized descriptively; formal PROBAST assessment was not performed because the article focused on biomarker evidence rather than full prediction-model validation (31). Model-development concerns, including small event counts, data-derived thresholds, incomplete validation, and selective reporting of multiple candidate features, were nevertheless captured in the QUADAS-2 or QUIPS-

oriented judgments. Reporting interpretation was informed by CHARMS, TRIPOD, TRIPOD+AI, and STARD principles (28, 32-35). Risk of bias was not used as an exclusion criterion. Instead, it informed certainty judgments and interpretation of diagnostic or monitoring readiness.

2.8. *Synthesis strategy*

The primary synthesis was structured and descriptive. Diagnostic and monitoring studies were summarized by intended clinical use case, EEG/QEEG feature family, target condition, clinical setting, and performance pattern. Diagnostic accuracy estimates were not pooled across domains because target conditions, reference standards, thresholds, patient spectra, and index tests were clinically non-equivalent.

Pooling was considered only if at least three studies evaluated the same target condition in the same clinical setting, using comparable EEG/QEEG features, similar reference standards, and extractable 2×2 data or comparable diagnostic accuracy metrics. This requirement was not met for any diagnostic or monitoring domain. Therefore, results were presented as study-level diagnostic or monitoring evidence, with 95% CI reported as not reported when unavailable in the source article or extraction data.

For post-EVT/MT monitoring, synthesis focused on whether EEG/QEEG abnormalities were associated with clinically relevant post-treatment complications, physiological changes, or subsequent clinical outcomes. Studies were not pooled because the monitoring studies used non-equivalent post-treatment time windows, index tests, clinical endpoints, and reference constructs, including END, cerebral edema, seizures, visual EEG worsening, intraprocedural physiology, infarct evolution, and neurovascular-coupling measures.

2.9. *Certainty assessment*

Certainty was judged at the domain level using GRADE guidance for diagnostic tests and strategies (36). Core GRADE considerations were risk of bias, inconsistency, indirectness, imprecision, and publication-bias concerns. Because several included studies were feasibility, threshold-development, or model-development studies, study independence and external validation were considered as contextual interpretation factors related to applicability, indirectness, and imprecision, but they were not treated as separate GRADE domains.

Post-EVT/MT monitoring certainty was judged separately from acute diagnostic evidence. Certainty was downgraded when studies used different monitoring windows, index tests, outcomes, or internally derived thresholds. Domain-level certainty ratings were interpreted as evidence-maturity ratings rather than outcome-specific GRADE ratings for every EEG feature and target condition.

3. Results

3.1 Study selection and characteristics of the diagnostic and monitoring evidence

The searches identified 4,796 records. After removal of 1,617 duplicates, 3,179 records underwent title and abstract screening. Fifty-one full-text articles were assessed, and 36 were excluded. 15 non-overlapping study records were retained for the present diagnostic and acute monitoring review (Figure 1). These studies addressed either acute diagnostic/classification questions or post-reperfusion monitoring questions in suspected or confirmed ischemic stroke. The included records comprised seven diagnostic or classification studies (10-15, 17) and eight post-EVT/MT monitoring or post-treatment monitoring studies (20-26). To avoid double counting, each study record was counted once in the descriptive synthesis.

The 15 included study records represented 1,265 stroke or suspected-stroke participants, of whom approximately 1,036 contributed EEG, QEEG, BIS, EEG-TCD, or related neurophysiological data. In addition, 43 healthy or clinical control participants were included across comparative studies. Sample sizes ranged from small proof-of-concept or feasibility cohorts to larger prospective prehospital or post-EVT cohorts. Clinical settings included emergency-department suspected-stroke assessment, prehospital LVO triage, lacunar or posterior circulation lesion-related classification, portable EEG severity classification, and post-EVT/MT monitoring for early neurological deterioration, cerebral edema, NCSE, visual EEG worsening, and neurovascular-coupling physiology.

EEG acquisition and index-test methods varied substantially. Diagnostic studies used dry-electrode EEG, subhairline EEG, portable low-cost EEG, 16- to 32-channel conventional or quantitative EEG, and combined clinical-plus-EEG models. Post-treatment monitoring studies used continuous EEG, 16- or 19-lead QEEG, visual EEG grading, routine EEG for NCSE/status epilepticus detection, BIS monitoring, near-infrared spectroscopy (NIRS)-assisted physiological monitoring, and simultaneous EEG-TCD neurovascular-coupling assessment. Because the included studies addressed different clinical targets, used different devices and thresholds, and reported different effect metrics, evidence was synthesized descriptively rather than pooled.

3.1. *Acute stroke/TIA classification and vascular occlusion triage*

Five studies evaluated acute diagnostic triage or LVO/MeVO-related detection (10-14). These studies focused on whether EEG or QEEG could support rapid recognition of acute stroke/TIA, anterior-circulation LVO, or medium/large-vessel occlusion in emergency or prehospital settings.

In an emergency-department diagnostic model study, Erani et al. (10) evaluated dry-electrode EEG features combined with clinical variables among patients with suspected acute stroke. The combined clinical-plus-EEG deep-learning model improved discrimination for acute stroke/TIA versus non-stroke/TIA, with an AUC of 0.878. The model also discriminated acute stroke with LVO from no LVO, with an AUC of 0.864. This study supported the feasibility of integrating EEG-derived features into acute stroke diagnostic models, but exact 2×2 data were not available and the number of LVO events was small. Therefore, the study was retained as ROC-only diagnostic evidence rather than as a source for pooled diagnostic accuracy.

Three studies from the ELECTRA-STROKE program evaluated simplified EEG for anterior-circulation LVO detection (11-13). In the emergency-room phase, van Meenen et al. (11) reported that theta-alpha ratio achieved an AUC of 0.83, with 75.0% sensitivity and 81.8% specificity for LVO-a detection. Relative alpha power also showed useful discrimination, with an AUC of 0.80, 75.0% sensitivity, and 87.3% specificity. A combined relative theta power plus weighted phase lag index (wPLI) rule achieved 100% sensitivity and 84% specificity within the same cohort, suggesting that spectral and connectivity-related features may improve acute vascular triage when used together.

Because this rule was evaluated within the same cohort, it should be interpreted as hypothesis-generating until externally validated.

Groenendijk et al. (12) evaluated subhairline EEG for LVO-a detection and reported that theta-band pairwise-derived BSI (pdBSI) had the strongest extracted within-study diagnostic discrimination, with an AUC of 0.90, sensitivity of 85.7%, and specificity of 82.9%. This study supported the potential value of asymmetry-based EEG markers in simplified montages. However, multiple feature-level results came from the same cohort and thresholds were evaluated within a modest sample, limiting independent generalizability.

In the prehospital ELECTRA-STROKE cohort, van Stigt et al. (13) evaluated dry-electrode prehospital EEG among suspected-stroke patients. The prespecified theta-alpha ratio showed an AUC of 0.80, sensitivity of 50.0%, and specificity of 83.0%. Delta-band pdBSI showed the highest secondary-feature performance, with an AUC of 0.91, sensitivity of 80.0%, and specificity of 92.7%. This study was clinically important because it tested EEG in the intended prehospital triage environment, but the low event count, technical exclusions, and secondary-feature thresholding limited certainty.

Peterson et al. (14) examined EEG feasibility for MeVO/LVO detection in a proof-of-concept emergency-department study. MeVO/LVO-positive cases showed hemispheric asymmetry in delta and alpha bands, particularly in frontal and temporal regions, as well as global power attenuation. However, only four MeVO/LVO-positive cases were analyzable and complete diagnostic 2×2 data were not available. This study therefore supported feasibility and signal-pattern generation rather than validated diagnostic accuracy.

Overall, the acute triage studies suggested that EEG/QEEG may provide candidate information for identifying acute stroke/TIA or vascular occlusion, particularly through slow-to-fast ratios, hemispheric asymmetry, relative alpha/theta power, wPLI, and combined clinical-plus-EEG models. However, these studies differed in setting, device, target condition, montage, threshold selection, and validation status. No single diagnostic threshold or pooled LVO-detection estimate was supported.

3.2. *Non-LVO diagnostic and classification evidence*

Two studies addressed diagnostic or classification questions outside primary LVO/MeVO triage (15, 17). These studies evaluated lesion-related classification in selected lacunar/posterior circulation syndromic cohorts and portable stroke-control or stroke-severity classification. Because the target conditions were clinically distinct, they were not considered part of a single diagnostic accuracy domain.

Sheorajpanday et al. (15) evaluated pdBSI and DTABR for definite ischemic lesion classification in lacunar and posterior circulation syndromes. In posterior circulation syndrome, pdBSI achieved an AUC of 0.72, with sensitivity of 71.4% and specificity of 66.7%. In lacunar syndrome, pdBSI achieved an AUC of 0.76, with sensitivity of 66.7% and specificity of 66.7%, whereas DTABR achieved an AUC of 0.78, with sensitivity of 73.3% and specificity of 66.7%. These findings suggest that asymmetry and slow-to-fast ratio markers may support lesion-related classification in selected ischemic syndromes, but performance was moderate and syndrome-specific.

Wilkinson et al. (17) assessed a low-cost portable Muse EEG system for stroke versus control/mimic classification and stroke severity classification. The stroke versus control/mimic classification tree showed sensitivity of 75.0% and specificity of 33.3%, indicating limited specificity for broad diagnostic discrimination. Classification of moderate/large stroke versus minor stroke/control showed sensitivity of 63.6% and specificity of 85.7%. DAR and DTABR increased with stroke severity, suggesting that portable EEG may capture severity-related physiological abnormality, although the study was small and feasibility-oriented.

Taken together, non-LVO diagnostic evidence supports the concept that EEG/QEEG can classify selected stroke-related states, including lesion presence and severity category, but these findings should not be interpreted as validation for broad clinical diagnosis of lacunar or posterior circulation stroke. Each study addressed a different target condition; therefore, pooled diagnostic accuracy would be clinically misleading.

3.3. *Post-EVT/MT monitoring and post-treatment physiological assessment*

Eight study records contributed post-EVT/MT monitoring or post-treatment monitoring evidence (16, 20-26). These studies evaluated EEG/QEEG after reperfusion therapy or during endovascular treatment and focused on early outcome prediction, cerebral edema, END, visual EEG worsening, NCSE/status epilepticus, intraprocedural physiology, or neurovascular coupling.

Spectral QEEG studies after EVT/MT generally suggested that greater slowing or reduced faster-frequency activity was associated with worse post-treatment status or outcome. These studies were interpreted as monitoring/prognostic-monitoring evidence because EEG was acquired during or after EVT/MT and evaluated against early complications, physiological changes, or subsequent clinical outcomes.

Zhang et al. (21) evaluated serial QEEG in anterior-circulation acute ischemic stroke patients after MT. Delta power at 24 h after MT had the strongest receiver operating characteristic (ROC) performance for poor 3-month outcome, with AUC 0.893, sensitivity 92.9%, and specificity 84.6%. DTABR at 7 days correlated with 3-month modified Rankin Scale (mRS), and DAR at 7 days correlated with National Institutes of Health Stroke Scale (NIHSS) at 7 days. These findings support serial QEEG as a marker of evolving post-thrombectomy cortical dysfunction, but variability in EEG timing and sample availability across time points limited pooling.

Shen et al. (22) examined QEEG 24 ± 6 h after mechanical thrombectomy and reported that global and frontal DAR were independently associated with cerebral edema severity, END, and 90-day functional dependence. Frontal DAR showed AUCs of approximately 0.78-0.81 across these outcomes, and a frontal DAR threshold ≥3.3 yielded adjusted odds ratios for edema, END, and functional dependence. This study provided relatively coherent evidence for post-MT monitoring because it linked a simple frontal QEEG marker to edema and deterioration outcomes. Nevertheless, the threshold requires external validation.

Routine and visual EEG also contributed to the post-treatment monitoring domain. Yang et al. (24) evaluated serial visual EEG grading after EVT and found that EEG grade predicted poor 3-month outcome. AUCs increased across time points, from 0.811 at 24 h to 0.909 at day 3 and 0.955 at day 7. Day-3 and

day-7 moderate/severe EEG abnormality achieved high sensitivity with improving specificity. These findings suggest that serial visual EEG grading may provide clinically useful post-EVT trajectory information, although thresholds were internally derived.

Prandin et al. (23) assessed early routine EEG within 72 h after mechanical thrombectomy and identified status epilepticus in 9 of 138 patients, all of whom had NCSE. Status epilepticus was associated with lower NIHSS improvement at discharge. This study highlighted the role of routine EEG in detecting seizure-related complications after EVT, particularly when neurological deterioration is not fully explained by imaging or recanalization status.

Batra et al. (26) evaluated BIS and NIRS monitoring during EVT. BIS changes were retained as paired pre/post-recanalization physiological monitoring evidence, although they did not show a clear independent prognostic association with clinical outcome. NIRS-derived measures changed more consistently with successful recanalization. This study suggested that processed EEG may capture selected intraprocedural physiological signals, but its clinical prognostic value remains uncertain.

Zhang et al. (25) added a mechanistically distinct post-EVT monitoring approach using simultaneous EEG-TCD neurovascular-coupling assessment. In 52 LVO stroke patients after EVT, contralateral neurovascular coupling was successfully computed in 48 participants. Theta-band contralateral coupling was associated with 7-day NIHSS improvement, and delta- and theta-band contralateral coupling were inversely associated with infarct growth. Higher delta and theta contralateral coupling independently predicted favorable 90-day outcome after adjustment for clinical and imaging covariates. This study suggested that recovery after EVT may depend not only on recanalization but also on system-level coupling between neuronal activity and cerebral blood-flow velocity.

Overall, post-EVT/MT studies support EEG/QEEG as a candidate monitoring framework for reperfusion-related cortical dysfunction, edema, END, seizure-related complications, serial visual worsening, and neurovascular-coupling physiology. In Yan et al. (16), healthy controls were used as normative/comparative EEG controls and should not be interpreted as the clinically relevant comparator or reference standard for END detection after EVT. Index tests and outcomes were too diverse for a pooled post-treatment estimate; the evidence was therefore summarized by monitoring use case.

3.5 Risk of bias and certainty of diagnostic and monitoring evidence

All diagnostic studies were judged to have high or high/unclear risk of bias. The main concerns were patient selection, small target-event numbers, technical exclusions, data-derived or incompletely prespecified thresholds, multiple candidate EEG features, and limited external validation. These concerns were especially important in proof-of-concept, feasibility, and model-development studies.

For LVO/MeVO/LVO-a detection, certainty was very low. Although feature-level discrimination was promising, studies used different devices, thresholds, recording settings, and target populations. Event counts were often small, and several operating points were internally derived. Diagnostic certainty was downgraded for high risk of bias, feasibility or proof-of-concept design, small numbers of target events, internally derived thresholds, incomplete reporting of 2×2 data, and lack of external validation. Other diagnostic classification domains, including lesion confirmation and stroke severity classification, were also very low certainty because they represented different clinical questions. END detection after EVT was interpreted within the post-EVT/MT monitoring domain.

Post-EVT/MT monitoring evidence had stronger clinical coherence than broad diagnostic evidence because all studies were situated in the post-treatment or procedural stroke-care pathway, and several studies showed directionally consistent associations between post-treatment EEG/QEEG abnormality and edema, END, seizure-related complications, infarct growth, or functional outcome. Nevertheless, certainty remained low because index tests differed markedly, sample sizes were limited, and thresholds were generally not externally validated. The monitoring domain was therefore interpreted as promising but not yet ready for routine clinical implementation.

3.4. *Summary of diagnostic and monitoring findings*

The diagnostic and monitoring evidence supports EEG/QEEG as a candidate adjunctive biomarker framework for acute ischemic stroke triage and post-reperfusion monitoring. In acute triage, dry-electrode, subhairline, portable, and simplified EEG systems showed potential for stroke/TIA classification and LVO/MeVO detection. The most frequently reported or highest-performing candidate features within individual studies were TAR, delta-band pdBSI, relative alpha/theta power, wPLI, hemispheric asymmetry, and combined clinical-plus-EEG model outputs.

In post-EVT/MT care, QEEG slowing, frontal DAR, relative alpha loss, visual EEG grade, NCSE detection, BIS/NIRS physiological changes, and EEG-TCD neurovascular coupling were associated with deterioration, edema, functional outcome, seizure-related complications, or infarct growth in selected studies. However, the evidence does not support a universal diagnostic threshold, a pooled LVO-detection estimate, or a single post-EVT monitoring cutoff. Future studies should define the intended clinical use case, prespecify EEG features and thresholds, report complete 2×2 data and model performance according to STARD and prediction-model reporting/appraisal principles (31-34), and validate findings in larger independent emergency, prehospital, and post-EVT cohorts (Figure 2).

4. Discussion

This systematic review synthesized EEG and QEEG evidence for acute diagnostic triage and post-reperfusion monitoring in ischemic stroke and occlusion-related care. From an emergency-medicine perspective, the main clinical question was whether EEG/QEEG can provide rapid, bedside, noninvasive information that complements neurological examination and imaging during time-sensitive stroke pathways. From a neurophysiological perspective, the central question was whether acute ischemic vascular syndromes and post-reperfusion complications produce reproducible scalp-recorded signatures that can be captured by simplified EEG, QEEG ratios, asymmetry indices, visual EEG grading, seizure detection, or neurovascular-coupling measures.

Overall, the evidence suggests that EEG/QEEG has potential as an adjunctive tool for acute vascular triage and post-EVT/MT monitoring, but not as a validated stand-alone diagnostic test. The most clinically relevant diagnostic studies evaluated acute

stroke/TIA classification and LVO or MeVO/LVO detection using dry-electrode, subhairline, or portable EEG systems [9-13]. These studies are important for emergency stroke systems because early LVO recognition influences routing decisions, transfer pathways, and access to thrombectomy-capable centers. However, the evidence remains heterogeneous, with differences in target condition, patient spectrum, EEG device, montage, timing, thresholds, and reference standards. Therefore, a single pooled diagnostic accuracy estimate would not be clinically meaningful.

The emergency department and prehospital LVO studies are promising because they suggest that simplified EEG can detect physiological consequences of large-vessel ischemia within clinically relevant time windows. Erani et al. reported that a combined clinical-plus-EEG model improved discrimination for acute stroke/TIA and acute stroke with LVO (10). ELECTRA-STROKE-related studies showed that theta-alpha ratio, relative alpha/theta power, wPLI, and pdBSI may discriminate anterior-circulation LVO in emergency-room or prehospital settings (11-13). Peterson et al. extended this concept toward MeVO/LVO feasibility, although the number of occlusion-positive cases was very small (14). For emergency medicine, these findings support EEG/QEEG as a possible adjunct to clinical scales and imaging access, especially where immediate CTA or advanced imaging may be delayed. They do not justify replacing vascular imaging or established acute stroke workflows.

The main diagnostic limitation is that the included studies do not address a single diagnostic question. Acute stroke/TIA classification, anterior-circulation LVO detection, MeVO/LVO feasibility, lesion-related classification in lacunar or posterior circulation syndromes, stroke severity classification, and post-EVT END detection are clinically different targets (10-17). A threshold developed for LVO-a detection cannot be assumed to apply to lacunar syndromes, posterior circulation ischemia, stroke mimics, or post-treatment deterioration. This is an important emergency-medicine point: diagnostic tests must be evaluated in the intended-use population. A prehospital LVO triage tool should be validated in consecutive suspected-stroke patients before transport decisions; an emergency-department stroke/TIA classifier should be tested against mimics and hemorrhagic stroke; and a post-EVT deterioration marker should be validated against clinically relevant deterioration mechanisms rather than baseline occlusion status.

From a neurophysiological perspective, the observed diagnostic signals are biologically plausible. Cerebral ischemia is associated with reduced perfusion and metabolic stress, leading to increased slow-frequency activity and attenuation of faster background rhythms (4, 5, 7). Classic ischemic penumbra work established that neuronal function can fail before irreversible membrane failure and infarction occur (8, 9). EEG is sensitive to this functional failure because synaptic activity and oscillatory organization are energy-dependent and can deteriorate before the final structural lesion is fully established (4, 6). This explains why slow-to-fast ratios, alpha attenuation, theta-alpha ratio, delta power, and hemispheric asymmetry may be informative in acute ischemic syndromes (10-14).

Nevertheless, physiological plausibility does not equal clinical validation. EEG manifestations of ischemia depend on vascular territory, cortical involvement, collateral flow, infarct core versus penumbra, time from onset, arousal, medications, seizures, edema, and electrode coverage. This helps explain why diagnostic thresholds varied across studies. A large anterior-circulation cortical LVO may produce prominent hemispheric slowing or asymmetry, whereas a small subcortical infarct, posterior circulation lesion, well-collateralized occlusion, or early reperfused stroke may produce subtler or spatially different EEG abnormalities. Therefore, future diagnostic studies should define both the clinical and physiological intended-use case: prehospital LVO triage, emergency-department stroke-mimic discrimination, early ischemic dysfunction detection, posterior circulation syndrome classification, or post-EVT deterioration monitoring.

The post-reperfusion monitoring domain is distinct from baseline diagnostic triage. EVT has transformed acute ischemic stroke care, but outcome remains variable even after technically successful recanalization (2, 3). From an emergency and acute stroke systems perspective, this creates a need for bedside tools that can monitor neurological deterioration, cerebral edema, seizure-related complications, reperfusion injury, and evolving cortical dysfunction in the hours and days after thrombectomy. The included post-EVT/MT studies suggest that EEG/QEEG may contribute to this monitoring role. Wang et al. and Zhang et al. linked post-EVT/MT DAR, DTABR, delta power, and alpha activity with 90-day outcome or early neurological status (20, 21). Shen et al. reported associations between frontal DAR and cerebral edema, END, and 90-day functional dependence after MT (22). Yan et al. found that relative alpha power and DAR were associated with END detection after EVT (16). Yang et al. suggested that serial visual EEG grading after EVT may provide prognostic information across the first week (24). Prandin et al. highlighted the relevance of early routine EEG for detecting post-EVT NCSE/status epilepticus (23).

These findings have practical implications for acute care. Post-EVT deterioration is often multifactorial and may reflect edema, hemorrhagic transformation, re-occlusion, infarct progression, seizures, metabolic factors, or incomplete tissue reperfusion. EEG/QEEG cannot replace clinical examination or imaging, but it may provide continuous or repeatable functional information at the bedside. Routine EEG is particularly relevant when patients have altered mental status, fluctuating deficits, unexplained deterioration, or suspected nonconvulsive seizures after EVT (6, 23). Visual EEG grading and simplified QEEG may be more feasible than advanced connectivity pipelines in many stroke units, whereas advanced EEG-TCD or neurovascular-coupling methods remain mechanistic and research-oriented.

The neurophysiology of post-EVT/MT monitoring is particularly important. Recanalization restores macrovascular patency, but tissue outcome depends on microvascular reperfusion, collateral flow, edema, blood-brain barrier injury, seizures, spreading depolarizations, and recovery of neurovascular coupling (18, 19). The neurovascular unit links neuronal activity, glial signaling, endothelial function, smooth muscle responses, and cerebral blood flow (19). After EVT, electrical recovery may therefore depend not only on opening the occluded artery but also on whether neuronal activity is adequately coupled to local perfusion. Zhang et al. provided mechanistically relevant evidence by linking contralateral EEG-CBFV coupling with 7-day NIHSS improvement, infarct growth, and 90-day outcome after EVT (25). This supports the concept that post-reperfusion outcome reflects system-level physiology rather than angiographic recanalization alone.

Spreading depolarization is another relevant mechanism when interpreting EEG after severe ischemia or reperfusion. Spreading depolarizations can silence electrical activity and, in metabolically compromised tissue, may be associated with inverse neurovascular responses and lesion progression (18). Scalp EEG cannot reliably detect all spreading depolarizations, but the concept reinforces why serial electrophysiological monitoring may provide dynamic information that differs from static imaging. In this context, post-EVT EEG/QEEG should be interpreted as a functional monitoring tool that may detect evolving cortical dysfunction, not simply as a one-time prognostic marker.

4.1. *Limitations*

The current evidence also highlights several methodological limitations. Most diagnostic and monitoring studies were small, feasibility-oriented, internally thresholded, or model-development studies. External validation was limited. Several studies reported multiple EEG features from the same cohort, creating a risk of overinterpreting feature-level performance. QUADAS-2 concerns were common in diagnostic studies, especially because of patient selection, signal-quality exclusions, limited event counts, and data-derived thresholds. These limitations explain why the current evidence supports candidate utility rather than clinical implementation.

Additional limitations should also be acknowledged. First, although grey literature, preprint servers, and backward/forward citation tracking were searched, publication bias could not be formally assessed because most diagnostic and monitoring domains contained few heterogeneous studies. Second, the search strategy was enriched for ischemic stroke and occlusion-related care; therefore, the findings should not be interpreted as an exhaustive review of all EEG applications in non-occlusive stroke syndromes or chronic rehabilitation. Third, several studies reported incomplete diagnostic accuracy information, particularly missing 95% confidence intervals, calibration measures, or complete 2×2 tables, which limited precision assessment. Fourth, post-EVT/MT monitoring studies mixed early complications, physiological endpoints, and later clinical outcomes; these were retained because they used EEG/QEEG during or after reperfusion therapy, but they should not be interpreted as a single diagnostic accuracy question. Fifth, formal PROBAST assessment was not performed for model-development studies, so model-level risk of bias and applicability remain incompletely characterized.

From an emergency-medicine standpoint, future studies should be designed around clearly defined workflow questions. For prehospital LVO triage, studies should enroll consecutive suspected-stroke patients and compare EEG/QEEG with CTA-confirmed LVO, clinical scales, transport decisions, and treatment times. For emergency-department diagnosis, EEG/QEEG should be tested against stroke mimics, TIA, hemorrhage, and non-LVO ischemic stroke. For post-EVT monitoring, studies should define standardized monitoring windows, clinically meaningful deterioration endpoints, imaging comparators, seizure outcomes, and incremental value beyond NIHSS, Alberta Stroke Program Early CT Score (ASPECTS), modified Thrombolysis in Cerebral Infarction (mTICI), perfusion imaging, and infarct volume. Diagnostic and prediction-model studies should report complete 2×2 data, AUCs with confidence intervals, calibration, threshold selection, internal validation, and external validation according to STARD, TRIPOD, TRIPOD+AI, CHARMS, and prediction-model appraisal principles (28, 31-35).

5. Conclusions

In summary, EEG/QEEG is a promising but still investigational adjunctive framework for acute ischemic stroke triage and post-reperfusion monitoring. Its ED value lies in potential speed, portability, repeatability, and bedside applicability. Its neurophysiological value lies in the ability to measure cortical function, ischemic slowing, hemispheric asymmetry, seizure activity, and neurovascular coupling. However, current evidence remains insufficient for a universal diagnostic threshold, a broad pooled diagnostic accuracy estimate, or stand-alone implementation. EEG/QEEG should currently be viewed as a candidate adjunct to clinical assessment and imaging, requiring larger intended-use validation studies before integration into routine emergency stroke pathways.

6. Declarations

6.1. *Acknowledgments*

None declared.

6.2. *Conflict of interests*

The authors declare no competing interests.

6.3. *Funding and supports*

None.

6.4. *Authors' contributions*

All authors meet all four criteria for authorship of ICMJE guideline.

6.5. *Ethical statement*

Not applicable.

6.6. *Informed consent*

Not applicable.

6.7. *Availability of supporting data*

All the data are presented in the paper.

6.8. *Using artificial intelligence chatbots statement*

Artificial intelligence-assisted tools were used only for English-language editing and instruction of graphical abstract. The authors reviewed and verified all content and take full responsibility for the integrity and accuracy of the manuscript.

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Table 1: Characteristics of studies evaluating EEG/QEEG for acute stroke diagnosis and classification

Ref.	Study	Design	Population and sample	Age and sex	Baseline severity	Timing and method	Target or outcome
9	Erani 2020 United States	Prospective emergency-department diagnostic model study	Suspected acute stroke; discharge diagnosis stroke/TIA in 63; IS 43 intracerebral hemorrhage 7 TIA 13; ischemic LVO 7 Stroke/suspected N= 100; controls N= 0; EEG/QEEG N= 100	All patients mean 64.5 ± 15.8 years; acute stroke/TIA subgroup mean 64.8 ± 16.7 years; LVO subgroup mean 68.9 ± 12.54 years 53/47 (53.0% male)	All patients NIHSS mean 4.4 ± 5.6; acute stroke/TIA NIHSS mean 5.0 ± 6.3; acute stroke with LVO NIHSS mean 12.4 ± 7.7. NIHSS range 0-27.	Median last-known-well to EEG 9:27 h; ED arrival to EEG 3:47 h; 3-min eyes-open EEG Dry-electrode EEG; spectral band features and clinical+EEG diagnostic models	Acute stroke/TIA and acute stroke with LVO diagnosis
10	van Meenen 2022 Netherlands	Prospective diagnostic study, ELECTRA-STROKE emergency-room phase	Suspected stroke / LVO-a detection; 35/65 AIS, 9/65 LVO-a Stroke/suspected N= 100; controls N= 0; EEG/QEEG N= 65	Analyzed cohort mean 73 ± 15 years; LVO-a mean 78 ± 6, no LVO-a mean 72 ± 15 47/18 (72.0% male)	Analyzed cohort NIHSS median 2 (IQR 0-6); LVO-a median 18 (IQR 12-22), no LVO-a median 1 (IQR 1-4)	Single EEG in ER before EVT where applicable; symptom onset to EEG within 24 h inclusion window 8-electrode dry EEG; spectral powers, theta-alpha ratio, wPLI, pdBSI	Diagnostic LVO-a detection
11	Groenendijk 2023 Netherlands	Prospective investigator-initiated diagnostic accuracy study	Suspected stroke; target anterior-circulation LVO (LVO-a) Stroke/suspected N= 52; controls N= 0; EEG/QEEG N= 51	Analyzed cohort by group: LVO-a mean 75 ± 12 years (n=16); no LVO-a mean 70 ± 13 years (n=35); approximate weighted mean 71.6 29/22 (56.9% male)	NIHSS median 16 (IQR 8-19) in LVO-a group and 2 (IQR 0-5) in no-LVO-a group	Median symptom-onset-to-EEG time 266 min (IQR 130-709); single 3-min recording; before EVT when EVT performed 9-electrode subhairline EEG; frequency band powers and pairwise-derived BSI	Diagnostic accuracy for LVO-a stroke detection
12	van Stigt 2023 Netherlands	Prospective multicenter prehospital diagnostic study, ELECTRA-STROKE	Suspected stroke in prehospital setting; LVO-a detection Stroke/suspected N= 311; controls N= 0; EEG/QEEG N= 212	Final analysis median 74 years (IQR 66-81) 122/90 (58.0% male)	Final analysis NIHSS median 1 (IQR 0-4); LVO-a median 14 (IQR 7-17), no LVO-a median 1 (IQR 0-3)	Prehospital dry-electrode EEG; median duration 151 s Dry electrode scalp EEG; TAR, delta pdBSI and related features	Diagnostic prehospital LVO-a detection
13	Peterson 2025 United States	Single-center proof-of-concept diagnostic feasibility study	Suspected stroke; target medium or LVO (MeVO/LVO) Stroke/suspected N= 34; controls N= 0; EEG/QEEG N= 27	Patient ages ranged 24-93; analyzed MeVO/LVO group mean 55.75 ± 27; non-MeVO/LVO group mean 54.87 ± 19; approximate weighted mean 55.0 18/9 (66.7% male)	NIHSS mean 3.75 ± 1.89 in MeVO/LVO group and 3.96 ± 2.38 in non-MeVO/LVO group	ED EEG after initial assessment/treatment plan; symptom onset <6 h; 5-10 min EEG recording 32-channel cap using dry or wet electrodes; 19 consistently analyzed channels; spectral/asymmetry biomarkers	Diagnostic feasibility for MeVO/LVO detection
14	Sheorajpanday 2011 Belgium	Prospective diagnostic/prognostic cohort from MISS-EEG project	Lacunar syndrome (n=24) or posterior circulation syndrome (n=36) of presumed ischemic origin Stroke/suspected N= 60; controls N= 0; EEG/QEEG N= 60	POCS median 71 years (range 33-86); LACS median 66.5 years (range 40-87) NR	Median NIHSS: POCS 3 (IQR 0-5), LACS 2 (IQR 0-3)	Majority underwent EEG within 72 h of symptom onset (reported 81% POCS and 92% LACS) Quantitative EEG; pdBSI and DTABR	Diagnostic lesion confirmation and short-term outcome in LACS/POCS

Ref.	Study	Design	Population and sample	Age and sex	Baseline severity	Timing and method	Target or outcome
16	Wilkinson 2020 Canada	Prospective feasibility/diagnostic classification study	Acute/subAIS vs control/mimic; stroke severity classification Stroke/suspected N= 16; controls N= 9; EEG/QEEG N= 25	Participants age range 19-91 years; overall mean age 66; group means: control 60.8, small stroke 64.5, moderate stroke 70.6, large stroke 70.7 NR	Average NIHSS 7.7; small stroke mean NIHSS 2.25, moderate 9.78, large 11.33	Mean recording time 3.85 days post-stroke onset Muse portable EEG, TP9/TP10-derived qEEG measures; DAR, DTABR, pdBSI	Diagnostic/stroke severity classification

AIS, acute ischemic stroke; BSI, Brain Symmetry Index; DAR, delta/alpha ratio; DTABR, delta-theta/alpha-beta ratio; ED, emergency department; EEG, electroencephalography; ER, emergency room; EVT, endovascular treatment; IQR, interquartile range; IS, ischemic stroke; LACS, lacunar syndrome; LVO, large-vessel occlusion; LVO-a, anterior-circulation large-vessel occlusion; MeVO, medium-vessel occlusion; NIHSS, National Institutes of Health Stroke Scale; NR, not reported; pdBSI, pairwise-derived Brain Symmetry Index; POCS, posterior circulation syndrome; QEEG/qEEG, quantitative electroencephalography; TAR, theta-alpha ratio; TIA, transient ischemic attack; WPLI/wPLI, weighted Phase Lag Index.

Table 2: Diagnostic and classification performance of EEG/QEEG in acute stroke

Study	Clinical question / outcome	EEG/QEEG marker(s)	Main findings for Results narrative
Erani 2020 [9]	ED classification of acute stroke/TIA and acute stroke with LVO	Dry-electrode EEG features combined with clinical variables; Lasso-selected spectral lead-band pairs; deep-learning model	The combined clinical+EEG deep-learning model improved discrimination for acute stroke/TIA versus non-stroke/TIA (AUC 0.878) and for acute stroke with LVO versus no LVO (AUC 0.864). Exact 2×2 data were not available; retained as ROC-only diagnostic evidence. Reported 95% CIs were NR in the extraction.
van Meenen 2022 [10]	LVO-a detection in suspected stroke or known LVO-a patients in the emergency-room phase of ELECTRA-STROKE	Dry-electrode EEG; theta-alpha ratio, relative alpha/theta power, DAR, wPLI, pdBSI	Theta-alpha ratio: AUC 0.83, sensitivity 75.0%, specificity 81.8%. Relative alpha power: AUC 0.80, sensitivity 75.0%, specificity 87.3%. A combined relative theta power plus wPLI rule achieved sensitivity 100% and specificity 84% within the same cohort. Reported 95% CIs were NR in the extraction.
Groenendijk 2023 [11]	Subhairline EEG for LVO-a detection in suspected stroke or known LVO-a ED patients	Subhairline EEG; relative band powers, DAR/TAR/DTABR, pdBSI	Among 51 analyzable patients, theta-band pdBSI had the strongest extracted diagnostic performance for LVO-a detection (AUC 0.90; sensitivity 85.7%; specificity 82.9%). Multiple feature rows came from the same cohort and should be summarized descriptively. Reported 95% CIs were NR in the extraction.
van Stigt 2023 [12]	Prehospital LVO-a detection among suspected stroke patients in ELECTRA-STROKE	Dry-electrode prehospital EEG; theta-alpha ratio; delta-band pdBSI; relative band powers	The prespecified theta-alpha ratio had AUC 0.80, sensitivity 50.0%, and specificity 83.0%. Delta-band pdBSI showed the highest secondary-feature performance (AUC 0.91; sensitivity 80.0%; specificity 92.7%). Reported 95% CIs were NR in the extraction.
Peterson 2025 [13]	Proof-of-concept ED feasibility study for MeVO/LVO detection	Quantitative EEG biomarkers including delta/alpha and theta/alpha asymmetry, spectral attenuation, and wet versus dry electrode feasibility	MeVO/LVO-positive cases showed hemispheric asymmetry in delta and alpha bands, especially in frontal and temporal regions, and global power attenuation. No complete diagnostic 2×2 data were available; supports feasibility and signal-pattern generation rather than pooled accuracy.
Sheorajpanday 2011 [14]	Definite ischemic lesion classification in lacunar and posterior circulation syndromes	pdBSI and DTABR	Posterior circulation syndrome: pdBSI AUC 0.72, sensitivity 71.4%, specificity 66.7%. Lacunar syndrome: pdBSI AUC 0.76, sensitivity 66.7%, specificity 66.7%; DTABR AUC 0.78, sensitivity 73.3%, specificity 66.7%. In an NIHSS=0 subgroup, reconstructed pdBSI thresholds showed a sensitivity-specificity trade-off. Reported 95% CIs were NR in the extraction.
Wilkinson 2020 [16]	Portable Muse EEG for stroke versus control/mimic classification and stroke severity classification	Low-cost EEG; DAR, DTABR, pdBSI, and classification-tree models	Stroke versus control/mimic classification tree: sensitivity 75.0%, specificity 33.3%. Moderate/large stroke versus minor stroke/control classification tree: sensitivity 63.6%, specificity 85.7%. DAR and DTABR increased with stroke severity but were feasibility/severity-classification evidence.

AUC, area under the receiver operating characteristic curve; CI, confidence interval; DAR, delta/alpha ratio; DTABR, delta-theta/alpha-beta ratio; ED, emergency department; EEG, electroencephalography; LVO, large-vessel occlusion; LVO-a, anterior-circulation large-vessel occlusion; MeVO, medium-vessel occlusion; NIHSS, National Institutes of Health Stroke Scale; NR, not reported; pdBSI, pairwise-derived Brain Symmetry Index; QEEG, quantitative electroencephalography; ROC, receiver operating characteristic; TAR, theta-alpha ratio; TIA, transient ischemic attack; WPLI/wPLI, weighted Phase Lag Index.

Table 3: Characteristics of studies evaluating EEG/QEEG monitoring after endovascular treatment or mechanical thrombectomy

Ref.	Study	Design	Population and sample	Age and sex	Baseline severity	Timing and method	Target or outcome
15	Yan 2025 China	Prospective cohort with nested case-control END diagnostic analysis	Anterior circulation LVO stroke treated with EVT Stroke/suspected N= 47; controls N= 34; EEG/QEEG N= 47	Stroke patients median 66.0 years (IQR 60.0-72.0); controls median 62.5 (IQR 46.5-66.3) 30/17 (63.8% male)	Baseline NIHSS median 12.0 (IQR 8.0-16.0); after EVT median 9.5 (IQR 6.0-14.0)	Baseline EEG on admission and after EVT/recanalization; END EEG within 20 min of END onset if applicable Quantitative EEG system; relative powers, DAR/TAR/DTABR, coherence, small-world metrics	Post-EVT END detection/monitoring
19	Wang 2021 China	Preliminary prospective cohort	Acute IS after EVT Stroke/suspected N= 31; controls N= 0; EEG/QEEG N= 31	Mean 67.7 ± 9.0 years 21/10 (67.7% male)	Baseline NIHSS median 16 (IQR 13-19); discharge NIHSS median 17 (IQR 8-20)	24-hour EEG monitoring within 48 h after EVT Continuous EEG; global relative powers, DAR and DTABR	Post-EVT 90-day functional outcome
20	Zhang 2022 China	Prospective/observational post-thrombectomy QEEG study	Anterior circulation AIS after MT; good 3-month mRS 0-2 n=13, poor mRS 3-6 n=16 Stroke/suspected N= 29; controls N= 0; EEG/QEEG N= 29	Good outcome group 64.9 ± 7.3 years (n=13); poor outcome group 67.9 ± 12.3 years (n=16); approximate weighted mean 66.6 21/8 (72.4% male)	NIHSS before MT: good outcome 13.5 ± 5.5, poor outcome 17 ± 3.9; approximate weighted mean 15.4	EEG before MT (n=20), 12 h after MT (n=29), 24 h after MT (n=27), and 7 d after MT (n=22) 16-lead QEEG; delta power, DAR, DTABR; CTP comparators	Post-MT functional outcome and NIHSS
21	Shen 2024 China	Prospective cohort	Anterior circulation AIS after MT Stroke/suspected N= 105; controls N= 0; EEG/QEEG N= 105	Median 70 years (IQR 59-78) 66/39 (63.0% male)	Baseline NIHSS median 14 (IQR 11-17); NIHSS 24 h after MT median 10 (IQR 5-23)	EEG 24 ± 6 h after MT 19-electrode EEG; global and frontal DAR, DTABR, relative delta power	Post-MT cerebral edema, END, hemorrhagic transformation, and 90-day functional outcome
22	Prandin 2024 Italy	Retrospective single-center cohort	Large vessel occlusion/large stroke treated with EVT; status epilepticus monitoring Stroke/suspected N= 138; controls N= 0; EEG/QEEG N= 138	Non-SE median 77 years (IQR 68-83); SE median 79 years (IQR 74-81); aggregate age not reported 57/81 (41.3% male)	Admission NIHSS by SE group; no-SE median 13 (IQR 8-20), SE median 17 (IQR 12-18)	Conventional EEG within 72 h from symptom onset/admission; median EEG recording time 1 day (IQR 0-2) Routine 21-electrode conventional EEG; SE/NCSE assessment	Post-EVT status epilepticus and outcome
23	Yang 2025 China	Retrospective EVT prognostic EEG grading study	Acute anterior-circulation LVO treated with EVT; ICA infarction 15, MCA infarction 25 Stroke/suspected N= 40; controls N= 0; EEG/QEEG N= 40	Age reported categorically: <70 years n=28 (70%), ≥70 years n=12 (30%); no mean/median reported 23/17 (57.5% male)	Preoperative NIHSS categories: <6 n=2 (5%), 6-16 n=28 (70%), >16 n=10 (25%)	EEG at 24 h, day 3, and day 7 after EVT Visual/routine EEG grading: normal, mild, moderate, severe abnormality	Post-EVT qualitative EEG prognosis
24	Zhang 2025 China	Single-center retrospective observational analysis of a prospectively collected EVT registry	Large-vessel occlusive ischemic stroke treated with EVT; 52 enrolled; contralateral neurovascular coupling (NVC) computed in 48 participants Stroke/suspected N= 52; controls N= 0; EEG/QEEG/NVC N= 48	Mean 61.5 ± 10.4 years 47/52 (90.4% male)	Median preprocedural NIHSS 14 (IQR 10-17)	Synchronous EEG-TCD monitoring within 48 h after EVT; 10-20 EEG with selected bipolar MCA-region channels and bilateral MCA CBFV monitoring EEG-CBFV contralateral neurovascular coupling using phase-amplitude cross-frequency coupling	Post-EVT neurovascular coupling; 7-day NIHSS change, infarct volume progression, and 90-day mRS outcome

Ref.	Study	Design	Population and sample	Age and sex	Baseline severity	Timing and method	Target or outcome
25	Batra 2025 Germany	Post-hoc analysis of SIESTA randomized clinical trial monitoring data	AIS due to anterior-circulation LVO undergoing EVT Stroke/suspected N= 150; controls N= 0; EEG/QEEG N= 58	BIS-monitoring subgroup median 77 years (IQR 66-84); included monitoring group median 76.5 years (IQR 66-84) 31/27 (53.4% male)	BIS-monitoring subgroup baseline NIHSS median 15 (IQR 14-19); baseline ASPECTS ≥8 in 45/58 (78%).	Continuous BIS monitoring during EVT from angiography-suite arrival until 5 min after procedure BIS / processed frontal EEG; NIRS ancillary monitoring	Intra-procedural recanalization physiology

AIS, acute ischemic stroke; ASPECTS, Alberta Stroke Program Early CT Score; BIS, bispectral index; CBFV, cerebral blood-flow velocity; CTP, computed tomography perfusion; DAR, delta/alpha ratio; DTABR, delta-theta/alpha-beta ratio; EEG, electroencephalography; END, early neurological deterioration; EVT, endovascular treatment; ICA, internal carotid artery; IQR, interquartile range; IS, ischemic stroke; LVO, large-vessel occlusion; MCA, middle cerebral artery; mRS, modified Rankin Scale; MT, mechanical thrombectomy; NCSE, nonconvulsive status epilepticus; NIHSS, National Institutes of Health Stroke Scale; NIRS, near-infrared spectroscopy; NVC, neurovascular coupling; QEEG, quantitative electroencephalography; SE, status epilepticus; TAR, theta-alpha ratio.

Table 4: Prognostic and monitoring findings of EEG/QEEG after endovascular treatment or mechanical thrombectomy

Study	Clinical question / outcome	EEG/QEEG marker(s)	Main findings for Results narrative
Batra 2025 [25]	Intra-procedural monitoring during EVT and recanalization physiology	BIS plus NIRS monitoring	BIS changes were retained as paired pre/post recanalization monitoring measures and did not show a clear prognostic association with clinical outcome. NIRS-derived measures changed more consistently with successful recanalization. Physiological monitoring evidence, not QEEG outcome-prediction evidence.
Prandin 2024 [22]	Status epilepticus after EVT and post-EVT outcome	Early routine EEG within 72 hours; NCSE detection	Among 138 EVT patients with early EEG, 9 (6.5%) had status epilepticus, all NCSE. SE was associated with lower NIHSS improvement at discharge (2/9 versus 84/129 improved; p=0.025; unadjusted OR 6.53 for no significant improvement).
Shen 2024 [21]	Post-mechanical-thrombectomy monitoring; cerebral edema, END, and 90-day dependence	Global/frontal DAR, DTABR, relative delta power	Global and frontal DAR were independently associated with cerebral edema severity, END, and 90-day functional dependence. Frontal DAR had AUC 0.81 for edema, AUC 0.81 for END, and AUC 0.78 for functional dependence (95% CIs NR in extraction); threshold ≥3.3 yielded adjusted ORs 7.3, 8.8, and 6.3.
Wang 2021 [19]	AIS after EVT; poor 90-day functional outcome (mRS 4-6)	DAR, DTABR, relative alpha power	Higher DAR and DTABR and lower relative alpha power characterized poor outcome. DAR ≥14.3 had AUC 0.93 (95% CI NR), sensitivity 90.9% (reconstructed Wilson 95% CI 62.3%-98.4%), specificity 90.0% (reconstructed Wilson 95% CI 69.9%-97.2%), and reconstructed counts TP 10, FP 2, FN 1, TN 18. DTABR showed lower discrimination (AUC 0.75; 95% CI NR).
Yan 2025 [15]	Anterior-circulation LVO stroke after EVT; NIHSS and infarct volume	Relative band powers, DAR/TAR/DTABR, coherence, small-world metrics	Relative delta power in the affected hemisphere correlated positively with infarct volume (r=0.73), while relative beta power correlated negatively with infarct volume (r=-0.62). Alpha/beta/gamma powers tended to be negatively related to NIHSS/infarct volume, whereas DAR/TAR/DTABR tended to be positively related. Healthy controls were normative/comparative EEG controls and were not the clinically relevant comparator or reference standard for END detection after EVT.
Yang 2025 [23]	Visual EEG grading after EVT; 3-month prognosis	Serial visual EEG grading at 24 h, day 3, and day 7	EEG grade predicted poor 3-month outcome after EVT. AUCs increased across time points: 0.811 at 24 hours, 0.909 at day 3, and 0.955 at day 7. Day-3 and day-7 moderate/severe abnormality achieved sensitivity 100% with specificity 81.8% and 90.9%, respectively. Reported 95% CIs were NR in the extraction.
Zhang 2022 [20]	AIS after mechanical thrombectomy; serial QEEG, NIHSS, and 3-month mRS	Delta power, DAR, DTABR at pre-MT, 12 h, 24 h, and 7 d	Delta power at 24 h after MT had the best ROC performance for poor 3-month outcome (AUC 0.893; 95% CI NR; sensitivity 92.9%, 95% CI NR; specificity 84.6%, 95% CI NR). DTABR at 7 days correlated with 3-month mRS (r=0.71), and DAR at 7 days correlated with NIHSS at 7 days (r=0.718).
Zhang 2025 [24]	Stroke outcome, infarct growth, and collateral/coupling physiology	EEG-CBFV coupling indices, alpha/delta ratio (ADR), autoregulation metrics	Favorable outcome was associated with higher contralateral coupling in delta and theta bands and higher stroke-side alpha/delta ratio (ADR). Contralateral delta and theta coupling correlated inversely with infarct growth (r=-0.461 and r=-0.358), suggesting exploratory neurovascular-coupling evidence.

ADR, alpha-to-delta power ratio; AIS, acute ischemic stroke; AUC, area under the receiver operating characteristic curve; BIS, bispectral index; CBFV, cerebral blood-flow velocity; CI, confidence interval; DAR, delta/alpha ratio; DTABR, delta-theta/alpha-beta ratio; EEG, electroencephalography; END, early neurological deterioration; EVT, endovascular treatment; FN, false negative; FP, false positive; LVO, large-vessel occlusion; mRS, modified Rankin Scale; MT, mechanical thrombectomy; NCSE, nonconvulsive status epilepticus; NIHSS, National Institutes of Health Stroke Scale; NIRS, near-infrared spectroscopy; NR, not reported; OR, odds ratio; QEEG, quantitative electroencephalography; ROC, receiver operating characteristic; SE, status epilepticus; TAR, theta-alpha ratio; TN, true negative; TP, true positive.

Table 5: QUADAS-2 risk-of-bias assessment of EEG/QEEG studies for acute stroke diagnosis and classification

Study	Overall ROB	Domain-level judgments	Applicability	Main basis for judgment
Erani 2020 [9]	High	Patient selection: High; Index test: High; Reference standard: Low; Flow/timing: Low	Low/unclear	Single-center suspected-stroke ED cohort; EEG added to clinical/deep-learning models; validation split used but multiple models and limited LVO events; no primary extractable 2×2 table in the dataset.
Groenendijk 2023 [11]	High	Patient selection: High; Index test: High; Reference standard: Low; Flow/timing: Low	Low/unclear	Prospective diagnostic study but selectively enriched for LVO-a; multiple EEG features and ROC-derived thresholds; high data reliability and imaging reference standard.
Peterson 2025 [13]	High	Patient selection: High; Index test: High; Reference standard: Low/unclear; Flow/timing: High	High/unclear	Proof-of-concept ED feasibility study with only four MeVO/LVO-positive analyzable cases and exclusions/attrition due to signal quality; no locked diagnostic threshold.
Sheorajpanday 2011 [14]	High/unclear	Patient selection: Unclear; Index test: High; Reference standard: Low; Flow/timing: Unclear	Low/unclear	Diagnostic classification of definite ischemic lesion in selected lacunar/posterior circulation syndromes; qEEG cutoffs were ROC-derived and some 2×2 data were algebraically reconstructed.
Wilkinson 2020 [16]	High	Patient selection: High; Index test: High; Reference standard: Low/unclear; Flow/timing: Unclear	High/unclear	Small feasibility study with portable EEG classification trees and limited controls/mimics; model development/testing not externally validated.
van Meenen 2022 [10]	High	Patient selection: High; Index test: High; Reference standard: Low; Flow/timing: Unclear	Low/unclear	Emergency-room ELECTRA-STROKE phase enriched for suspected/known LVO-a; multiple candidate EEG features and combined rules; imaging/adjudicated LVO reference standard.
van Stigt 2023 [12]	High	Patient selection: Low/unclear; Index test: High; Reference standard: Low; Flow/timing: High	Low/unclear	Prehospital suspected-stroke cohort, but major EEG-quality/technical exclusions and very low LVO-a event count; primary TAR prespecified but secondary operating points were data-derived.

ED, emergency department; EEG, electroencephalography; LVO, large-vessel occlusion; LVO-a, anterior-circulation large-vessel occlusion; MeVO, medium-vessel occlusion; qEEG, quantitative electroencephalography; ROB, risk of bias; ROC, receiver operating characteristic; TAR, theta-alpha ratio.

Table 6: QUIPS-based risk-of-bias assessment of post-EVT/MT EEG/QEEG prognostic and monitoring studies

Study	Overall ROB	Domain-level judgments	Main basis for judgment
Batra 2025 [25]	High	Participation: High/unclear; Attrition: High/unclear; Prognostic factor: Low/unclear; Outcome: Low/unclear; Confounding: High; Analysis/reporting: High	Post-hoc EVT monitoring subgroup with BIS/NIRS physiological measures; selection into monitored subgroup and outcome-model reporting limit prognostic inference.
Prandin 2024 [22]	High	Participation: High/unclear; Attrition: Unclear; Prognostic factor: Low/unclear; Outcome: Low; Confounding: High; Analysis/reporting: High	Retrospective single-center EVT cohort; EEG within 72 h only in a subset; small SE subgroup and no multivariable model due event count.
Shen 2024 [21]	Moderate	Participation: Moderate; Attrition: Low/unclear; Prognostic factor: Low; Outcome: Low; Confounding: Moderate; Analysis/reporting: Moderate	Post-MT cohort with 105 patients, adjusted models for DAR and clinical endpoints; single-center design and data-derived thresholds remain concerns.
Wang 2021 [19]	High	Participation: High; Attrition: Low/unclear; Prognostic factor: Low; Outcome: Low; Confounding: High; Analysis/reporting: High	Small post-EVT cohort (31 patients) with adjusted ORs and derived cutoffs; limited events and single-center threshold derivation.
Yan 2025 [15]	High	Participation: High/unclear; Attrition: Unclear; Prognostic factor: Low/unclear; Outcome: Low/unclear; Confounding: High; Analysis/reporting: High	Post-EVT qEEG/END monitoring study with multiple features, hemispheres and electrode locations; modest sample and exploratory thresholds.
Yang 2025 [23]	High	Participation: High/unclear; Attrition: Unclear; Prognostic factor: Low/unclear; Outcome: Low; Confounding: High; Analysis/reporting: High	Small post-EVT visual EEG grading cohort; serial thresholds and prognostic 2×2 tables derived from the same sample.
Zhang 2022 [20]	High	Participation: High; Attrition: Low/unclear; Prognostic factor: Low; Outcome: Low; Confounding: High; Analysis/reporting: High	Small serial post-MT QEEG cohort with varying EEG availability across time points and multiple ROC/correlation analyses.
Zhang 2025 [24]	High	Participation: High; Attrition: Moderate/unclear; Prognostic factor: Low/unclear; Outcome: Low; Confounding: Moderate/High; Analysis/reporting: High	Single-center retrospective analysis of a prospectively collected EVT registry. The analyzed cohort was highly selected (52 enrolled from 265 EVT patients; exclusions for posterior circulation stroke, age, premorbid disability, severe comorbidity, poor acoustic window, intolerance/sedation and consent). Cont…

BIS, bispectral index; DAR, delta/alpha ratio; EEG, electroencephalography; END, early neurological deterioration; EVT, endovascular treatment; MT, mechanical thrombectomy; NIRS, near-infrared spectroscopy; QEEG/qEEG, quantitative electroencephalography; ROB, risk of bias; ROC, receiver operating characteristic; SE, status epilepticus.

Table 7: GRADE-informed certainty of evidence for diagnostic and post-EVT/MT EEG/QEEG applications

Evidence domain / outcome	Studies (participants)	Effect / finding	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Overall certainty	Key explanation
LVO / MeVO-LVO / LVO-a detection	5 (455 EEG-analyzable; 597 recruited/suspected)	Promising feature-level discrimination; no pooled DTA estimate.	Very serious	Serious	Serious	Serious	Not formally assessable; concern possible because most evidence comes from small positive feasibility studies.	VERY LOW	Most diagnostic ROB judgments were high; few LVO events, different devices and thresholds, and feasibility/proof-of-concept designs.
Other diagnostic classification	2 (85 EEG-analyzable plus 9 controls/comparators)	Separate evidence for lesion-related classification and portable stroke-control/severity classification.	Very serious	Serious	Very serious	Serious	Not formally assessable; concern possible because evidence comes from small feasibility/classification studies.	VERY LOW	Targets are not the same diagnostic question; performance was moderate or feasibility-oriented and pooling would be clinically misleading.
Post-EVT/MT monitoring	8 (496 EEG/QEEG/BIS/NVC-analyzable plus 34 controls)	DAR/DTABR/frontal DAR, relative alpha, visual grade, NCSE, and NVC associated with post-treatment outcomes in separate studies.	Serious	Serious	Not serious to serious	Serious	Not formally assessable; concern possible.	LOW	Clinical coherence and directionally consistent post-treatment associations across distinct monitoring studies supported LOW rather than VERY LOW certainty, but index tests and outcomes were too diverse for pooling.

BIS, bispectral index; DAR, delta/alpha ratio; DTA, diagnostic test accuracy; DTABR, delta-theta/alpha-beta ratio; EEG, electroencephalography; EVT, endovascular treatment; LVO, large-vessel occlusion; LVO-a, anterior-circulation large-vessel occlusion; MeVO, medium-vessel occlusion; MeVO-LVO, medium-/large-vessel occlusion; MT, mechanical thrombectomy; NCSE, nonconvulsive status epilepticus; NVC, neurovascular coupling; QEEG, quantitative electroencephalography; ROB, risk of bias.

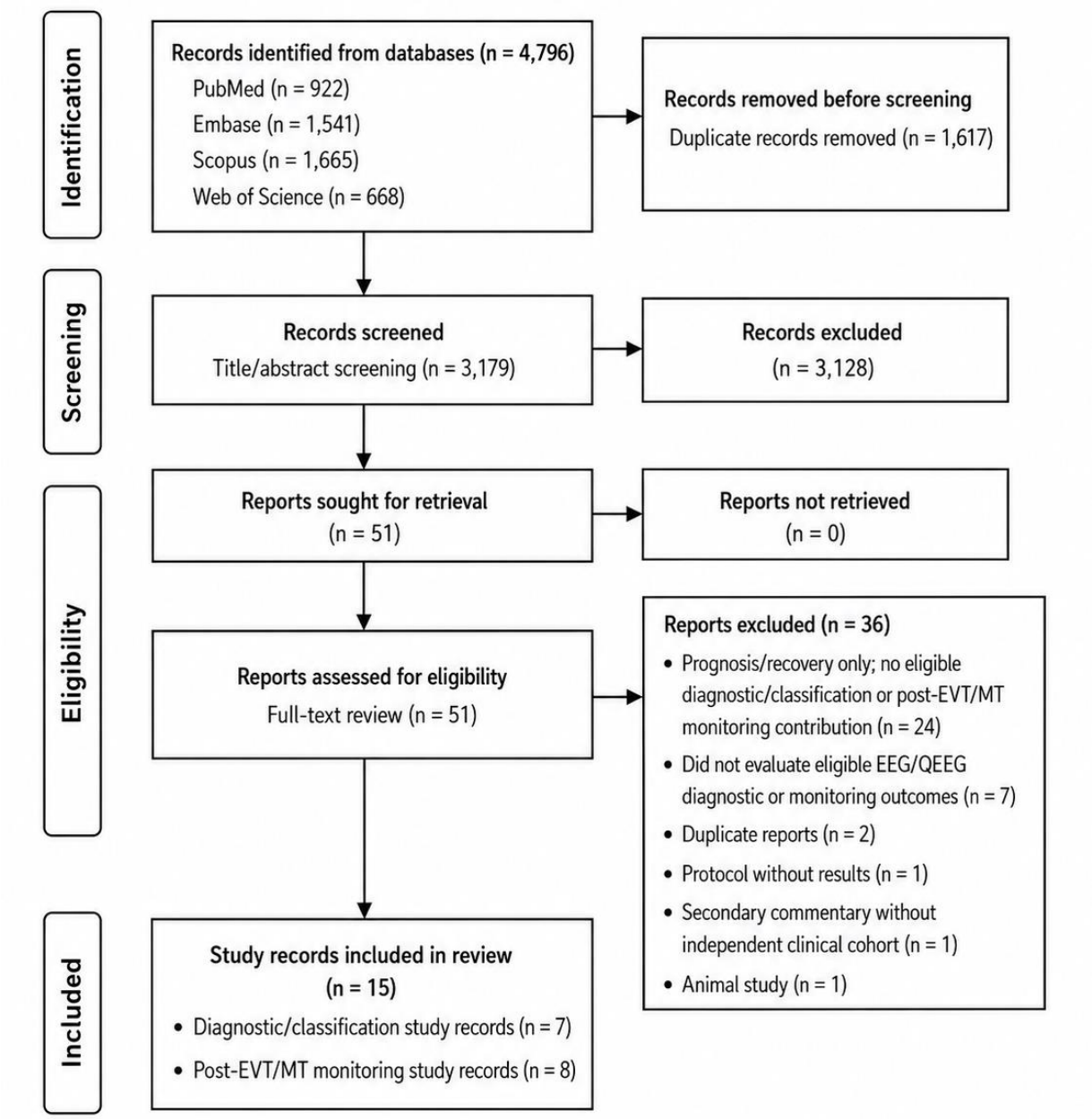

Figure 1: PRISMA 2020 flow diagram for this standalone diagnostic and post-EVT/MT monitoring systematic review.

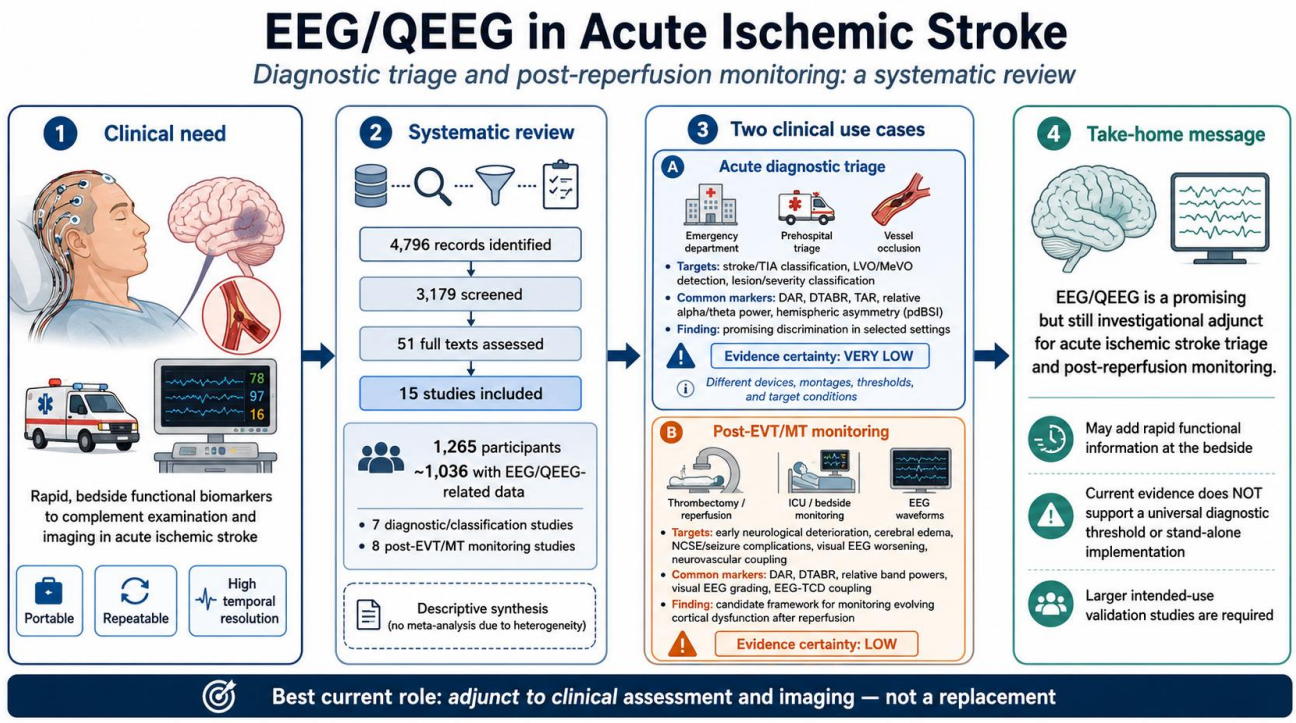

Figure 2: Conceptual overview of EEG/QEEG as an adjunctive acute-care biomarker framework in ischemic stroke. The review identified two analytically distinct domains: acute diagnostic triage, including stroke/TIA classification and LVO/MeVO detection, and post-reperfusion monitoring after EVT/MT. Candidate EEG/QEEG markers included slow-to-fast ratios, relative alpha/theta power, hemispheric asymmetry indices, visual EEG grading, processed EEG, and EEG-TCD neurovascular-coupling measures. Current evidence remains heterogeneous and does not support a universal diagnostic threshold, pooled diagnostic accuracy estimate, or stand-alone clinical implementation.

Appendix

Supplementary Appendix 1: Database search strategies

PubMed:
("Stroke"[Mesh] OR "Brain Ischemia"[Mesh] OR stroke*[tiab] OR "ischemic stroke"[tiab] OR "acute ischemic stroke"[tiab] OR "cerebral infarct*"[tiab] OR "cerebral ischemia"[tiab]) AND ("large vessel occlusion"[tiab] OR LVO[tiab] OR "intracranial occlusion"[tiab] OR ("internal carotid"[tiab] OR ICA[tiab]) OR ("middle cerebral"[tiab] OR MCA[tiab] OR M1[tiab]) OR basilar[tiab] OR "basilar artery"[tiab] OR "proximal occlusion"[tiab]) AND ("Electroencephalography"[Mesh] OR electroencephalogra*[tiab] OR EEG[tiab] OR qEEG[tiab] OR "quantitative EEG"[tiab] OR "quantitative electroencephalograph*"[tiab] OR "spectral analys*"[tiab] OR "frequency domain"[tiab] OR "delta alpha ratio"[tiab] OR DAR[tiab] OR DTABR[tiab] OR "alpha delta ratio"[tiab])
Embase:
('stroke'/exp OR 'brain ischemia'/exp OR stroke*:ti,ab,kw OR 'ischemic stroke':ti,ab,kw OR 'acute ischemic stroke':ti,ab,kw OR 'cerebral infarct*':ti,ab,kw OR 'cerebral ischemia':ti,ab,kw) AND ('large vessel occlusion':ti,ab,kw OR lvo:ti,ab,kw OR 'intracranial occlusion':ti,ab,kw OR 'internal carotid':ti,ab,kw OR ica:ti,ab,kw OR 'middle cerebral':ti,ab,kw OR mca:ti,ab,kw OR m1:ti,ab,kw OR basilar:ti,ab,kw OR 'basilar artery':ti,ab,kw OR 'proximal occlusion':ti,ab,kw) AND ('electroencephalography'/exp OR electroencephalogra*:ti,ab,kw OR eeg:ti,ab,kw OR qeeg:ti,ab,kw OR 'quantitative eeg':ti,ab,kw OR 'quantitative electroencephalograph*':ti,ab,kw OR 'spectral analys*':ti,ab,kw OR 'frequency domain':ti,ab,kw OR 'delta alpha ratio':ti,ab,kw OR dar:ti,ab,kw OR dtabr:ti,ab,kw OR 'alpha delta ratio':ti,ab,kw)
Scopus:
TITLE-ABS-KEY(stroke* OR "ischemic stroke" OR "acute ischemic stroke" OR "cerebral infarct*" OR "brain ischemia" OR "cerebral ischemia") AND TITLE-ABS-KEY("large vessel occlusion" OR LVO OR "intracranial occlusion" OR "internal carotid" OR ICA OR "middle cerebral" OR MCA OR M1 OR basilar OR "basilar artery" OR "proximal occlusion") AND TITLE-ABS-KEY(electroencephalogra* OR eeg OR qeeg OR "quantitative eeg" OR "quantitative electroencephalograph*" OR (spectral W/2 analys*) OR "frequency domain" OR "delta alpha ratio" OR DAR OR DTABR OR "alpha delta ratio")
Web of Science:
((TS=(stroke* OR "ischemic stroke" OR "acute ischemic stroke" OR "cerebral infarct*" OR "brain ischemia" OR "cerebral ischemia")) AND TS=("large vessel occlusion" OR LVO OR "intracranial occlusion" OR ("internal carotid" OR ICA) OR ("middle cerebral" OR MCA OR M1) OR basilar OR "basilar artery" OR "proximal occlusion")) AND TS=(electroencephalogra* OR EEG OR qEEG OR "quantitative EEG" OR "quantitative electroencephalograph*" OR ("spectral" NEAR/2 analys*) OR "frequency domain" OR "delta alpha ratio" OR DAR OR DTABR OR "alpha delta ratio")