Acute Ischemic Cerebrovascular Accident (CVA)

Acute ischemic CVA, or ischemic stroke, is a sudden loss of brain function due to reduced
blood flow, requiring rapid diagnosis and intervention.

Definition and Epidemiology

- **Definition:** Acute ischemic CVA is a focal neurological deficit caused by cerebral
infarction from vascular occlusion (thrombotic or embolic).
- **Prevalence:** ~800,000 strokes/year in the U.S.; 87% ischemic; leading cause of disability.
- **Risk Factors:** Hypertension, diabetes, smoking, atrial fibrillation (AF), hyperlipidemia,
substance use (cocaine), age >55.

Pathophysiology

- **Mechanisms:** Occlusion (thrombus or embolus) → ↓ cerebral blood flow → Infarction
(core) and penumbra (salvageable tissue).
- **Effects:** Neuronal death → Focal deficits (e.g., hemiparesis); penumbra at risk if untreated.
- **Key Pathway:** Atherosclerosis or embolism → Vessel occlusion → Ischemia → Glutamate excitotoxicity → Cell death.

Causes and Risk Factors

Category	Causes/Risk Factors	Notes
Thrombotic	-Large vessel: Atherosclerosis (carotid, MCA). -Small vessel: Lacunar (hypertension, diabetes).	Lacunar: 20% of ischemic strokes; deep brain structures.
Embolic	-Cardioembolic: Atrial fibrillation, MI, endocarditis. -Artery-to-artery: Carotid plaque embolism.	AF: 5x stroke risk; anticoagulation key.

Category	Causes/Risk Factors	Notes
Other	-Hypercoagulable: Antiphospholipid syndrome, OCP use. - Substance use: Cocaine (vasospasm).	Cocaine: ↑ Risk via HTN, vasospasm.
Rare	-Moyamoya disease (vessel stenosis). -Fibromuscular dysplasia (FMD). - Cerebral vasculitis (e.g., Takayasu).	Moyamoya: Progressive occlusion, young patients.

NIHSS for Stroke Severity

Score	Severity	Deficit Examples
0	No deficit	Normal exam.
1-4	Minor	Mild facial droop, drift.
5-15	Moderate	Hemiparesis, aphasia.
16-20	Moderate-Severe	Hemiplegia, severe aphasia.
>20	Severe	Coma, dense deficits.

Clinical Presentation

- *Symptoms:*
  - ***Sudden onset:*** *Hemiparesis, facial droop, aphasia (MCA).*
  - ***Vision loss:*** *Amaurosis fugax (carotid), homonymous hemianopia (PCA).*
  - ***Vertigo, ataxia:*** *Posterior circulation (cerebellar, brainstem)*
- *Exam:*
  - ***Focal Deficits:*** *Hemiparesis, sensory loss, dysarthria.*
  - ***NIHSS:*** *Score for severity (see table).*
  - ***Cranial Nerves:*** *CN III-VI (eye movement), CN VII (facial droop).*
  - ***Cerebellar:*** *Dysmetria, nystagmus (posterior stroke).*

Substance Use: Cocaine → HTN crisis, vasospasm → Stroke mimic or true CVA.

Red Flags: NIHSS >20, BP >220/120 mmHg, coma.

Diagnostic Workup

- Imaging:
  - **Non-contrast CT Head:** Rule out hemorrhage (1st step); early ischemic changes
    (loss of gray-white differentiation).
  - **CT Angiography (CTA):** Large vessel occlusion (LVO; MCA, basilar).

- **MRI Brain:** DWI for acute infarction (gold standard); detects small strokes.
- **CT Perfusion:** Identifies penumbra (mismatch: salvageable tissue).

- Labs:
  - **Glucose:** Hypoglycemia mimics stroke.
  - **CBC, Coags:** Rule out coagulopathy (PT/INR, aPTT).
  - **Cardiac:** Troponin, EKG (AF).
  - **Urine Drug Screen:** Cocaine, amphetamines.
- Other:
- o **Carotid Ultrasound:** Stenosis (>70% → Revascularization).
- o **Echocardiogram:** Cardioembolic source (e.g., AF, thrombus). Complete with bubble study to eval for shunt

Key Tip: "Time is brain"; CT within 20 min of arrival; 1.9 million neurons lost/ minute of untreated stroke.

Treatment Timeline Flowsheet: Acute Ischemic CVA

- 0-60 min (Arrival):
  - Non-contrast CT → Rule out hemorrhage.
  - NIHSS → Assess severity.
  - **BP:** <185/110 mmHg for tPA (labetalol 10-20 mg IV).
- 0-4.5h (tPA Window):
  - tPA (alteplase 0.9 mg/kg IV, max 90 mg; 10% bolus, 90% over 1h).
    - **Contraindications:** BP >185/110, recent ICH, INR >1.7.
- 0-6h (Thrombectomy Window):
  - CTA → LVO → Endovascular thrombectomy (up to 24h if perfusion mismatch).
- Post-Acute:
  - **Aspirin** 325 mg (within 24-48h).
  - **Statin:** Atorvastatin 40-80 mg daily.
  - **Monitor:** Neuro checks q1-2h (post-tPA bleed risk).
- Secondary Prevention:
  - **AF:** Anticoagulation (apixaban 5 mg BID).
  - **Carotid stenosis:** CEA if >70%.
  - **Lifestyle:** Smoking cessation, BP control (<130/80 mmHg).

Treatment

- General Principles:
  - **ABCs:** Airway (intubate if GCS <8), breathing, circulation.

    - **Time-critical:** Door-to-needle (tPA) <60 min; door-to-groin (thrombectomy) <90 min.
- Acute Reperfusion:
    - **tPA:** 0-4.5h window; alteplase 0.9 mg/kg IV (max 90 mg).
    - **Thrombectomy:** 0-6h (up to 24h if mismatch); for LVO (MCA, ICA).
- BP Management:
    - **tPA eligible:** <185/110 mmHg (labetalol 10-20 mg IV).
    - **No tPA:** <220/120 mmHg (permissive HTN to maintain perfusion).
- Supportive Care:
    - **DVT prophylaxis:** Heparin 5000 U SC BID (if no tPA). Ask neurology when safe to start (risk of hemorrhagic conversion
    - **Swallow screen:** Prevent aspiration (NPO until passed).
    - **Glucose:** 140-180 mg/dL (insulin if needed).
- Secondary Prevention:
    - **Antiplatelet:** Aspirin 81 mg daily or clopidogrel 75 mg daily.
    - **Statin:** Atorvastatin 40-80 mg daily (LDL <70 mg/dL).
    - **Risk factor control:** BP <130/80, smoking cessation, A1c <7%.

Substance Use: Cocaine → Stop use, manage HTN (benzodiazepines for agitation).

Key Tip: Avoid early BP lowering unless tPA given or BP >220/120 mmHg (risk of hypoperfusion).

Examples

1. Case 1: MCA Stroke (Embolic from AF)

- **Presentation**: 70 y/o F, sudden left hemiparesis, aphasia, NIHSS 12, onset 2h ago, EKG shows AF.
- **Workup**: **CT:** No hemorrhage; CTA: Right MCA occlusion; glucose 110 mg/dL.
- **Interpretation**: Acute ischemic CVA (MCA, embolic from AF), moderate severity (NIHSS 12).
- **Management**: tPA (alteplase 0.9 mg/kg IV, BP <185/110), thrombectomy (MCA occlusion), aspirin 325 mg (24h post-tPA), apixaban (after 7-14 days), atorvastatin 80 mg daily.

2. Case 2: Posterior Circulation Stroke (Thrombotic)

- **Presentation**: 65 y/o M, HTN, smoking, sudden vertigo, ataxia, right-sided weakness, NIHSS 8, onset 5h ago.
- **Workup**: **CT:** No hemorrhage; CTA: Basilar artery occlusion; MRI: Cerebellar infarct.
- **Interpretation**: Acute ischemic CVA (posterior, basilar artery), moderate severity (NIHSS 8).
- **Management**: Thrombectomy (basilar occlusion, <6h), aspirin 325 mg, atorvastatin 80 mg, smoking cessation, BP control (<130/80).

Complications

- Acute: Hemorrhagic transformation (post-tPA, 6%), cerebral edema, seizures.
- Long-Term: Disability (hemiparesis, aphasia), depression, recurrent stroke (5%/year).

Prognosis

- Mortality: 15-20% at 30 days; higher with LVO, NIHSS >20.
- Recovery: 50% have disability at 6 months; early reperfusion improves outcomes.

Key Pearls

- **Time is brain:** tPA within 4.5h, thrombectomy within 6h (up to 24h if mismatch).
- NIHSS >20 → Severe stroke, high mortality.
- CT first to rule out hemorrhage.
- AF → Anticoagulation after 7-14 days (bridge with aspirin).
- Cocaine use → Screen and manage HTN.

References

- **UpToDate:** “Acute Ischemic Stroke” (2025).
- **AHA/ASA Guidelines:** Stroke Management (2023).
- **NEJM:** “Thrombectomy for Stroke” (Goyal, 2016).