

Stroke (GENERAL)

Last updated: April 20, 2019

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Cerebrovascular disease causes 7.1% of all deaths in USA!

DEFINITIONS

STROKE (S. CEREBROVASCULAR ACCIDENT, BRAIN APOPLEXY, BRAIN ATTACK, CEREBRAL INFARCT)

– acute (!) clinical event:

- focal (localized to brain portion supplied by one vascular system)
- nonconvulsive.
- related to *focal impairment of cerebral circulation*.
- lasts > 24 hours.

TRANSIENT ISCHEMIC ATTACK (TIA) – focal, nonconvulsive ischemic neurological dysfunction (of brain, spinal cord, or retina) that **resolves without (permanent) infarction**.

- obsolete operational definitions used arbitrary 24 hour cutoff for duration of symptoms, i.e. TIAs resolve **within 24 hours** (most TIAs last only 15-20 minutes*)

see also p. Vas3 >>

*once dense neurological dysfunction has lasted > 1-4 hrs, it is likely to be classified as presumptive stroke (often associated with permanent brain injury – seen on CT).

N.B. no clear temporal threshold separates TIA from stroke!

- ≥ 3 TIAs occurring within 72 hours are termed **crescendo TIAs**.

TIA is warning that more catastrophic and permanent neurologic deficit is imminent!

10-15% of patients with TIA have stroke within 3 months (50% of which occur within 48 hours)!!!

Historical, not clinically useful, term - **REVERSIBLE ISCHEMIC NEUROLOGIC DEFICIT (RIND)** - neurological dysfunction that lasts > 24 hours but completely resolves within 3 weeks (vs. **STROKE**).

- it is nothing other than **minor stroke**.

TYPES

It is always preferable to use more precise terms: cerebral ischemia, cerebral infarction, intracerebral hemorrhage, etc.

- A. **ISCHEMIC STROKE** (70-90% strokes) – brain tissue lacks O₂ and glucose, metabolites accumulate (esp. lactate); prolonged ischemia → infarction (neuron death).
- a) **bland ischemic infarction**
 - b) **hemorrhagic ischemic infarction** (infarcted tissue becomes *secondarily hemorrhagic*).

In United States, term “**stroke**” is generally used specifically to mean cerebral infarction.

N.B. INFARCTION is pathological correlate of STROKE!

- B. **HEMORRHAGIC STROKE** (≈ 20% strokes)
- a) **intracerebral (ICH)** ≈ 8-15% strokes (up to 30% in blacks and Asians).
 - b) **subarachnoid (SAH)** – frequency only 1/3-1/2 that of ICH.
- may be accompanied by *secondary ischemia* (vasospasm, mass effect).
 - smooth onset of symptoms over minutes to hours, severe HIA, frequent vomiting, prominent depression of consciousness (vs. ischemic infarct - significant motor or sensory deficit with little or no impairment of consciousness [except with massive or brainstem stroke])

Subdural and **epidural hematomas** are usually traumatic – see p. TrH11 >>, TrH13 >>

PROGNOSIS

30-day mortality:

- ICH** 50%
- SAH** 45%
- Ischemic stroke** 8-20%

SPECIAL SITUATIONS

PREGNANCY

Stroke is responsible for **4.3% maternal deaths!**

Pregnancy increases risk for both types of stroke (complicated selection of preventive treatments):

1. **Ischemic stroke** - most common in 3rd trimester and puerperal period.
 - pregnancy and puerperium are associated with **hypercoagulable state**.
 - up to 30% strokes are due to intracranial **VENOUS THROMBOSIS** (predisposed by dehydration, sepsis).
2. **Cerebral hemorrhage**.

Causes:

- 1) **hypertension** (esp. older women with chronic hypertension)
- 2) **eclampsia** - main cause of both ischemic (50% ischemic strokes) and hemorrhagic stroke.
- 3) premature **atheroma** (25% strokes).
- 4) **uncommon causes**: amniotic embolism, choriocarcinoma, reversible postpartum cerebral angiopathy, arterial dissection, postpartum cardiomyopathy, paradoxical embolism, border zone infarction, use of ergot, pregnancy-related cardiac diseases, antiphospholipid antibody syndrome, homocystinuria.

Ischemia prevention strategies:

- **WARFARIN** is not recommended during pregnancy (concerns of fetal safety).
- **HEPARINS** (incl. LMWH) are **safe**.
- low-dose **ASPIRIN** (< 150 mg/d) is safe **after 1st trimester**.

Pregnant women with ischemic stroke or TIA and **high-risk thromboembolic conditions** (e.g. coagulopathy, mechanical heart valves):

- a) **HEPARIN** throughout pregnancy

- b) **HEPARIN** until week 13 → **WARFARIN** until middle of 3rd trimester → reinstitute **HEPARIN** until delivery.

Pregnant women with **lower-risk conditions** → **HEPARIN** in 1st trimester → low-dose **ASPIRIN** for remainder of pregnancy.

ALCOHOL

- **low-to-moderate amounts** of ethanol decrease stroke risk, whereas **higher amounts** increase it.
 - some studies indicate **increased risk for HEMORRHAGIC stroke at any dose**.
 - **binge drinking** temporally increased stroke risk.
- ethanol can either **prevent** or **cause** stroke by several mechanisms:
 - ethanol causes **hypertension**.
 - ethanol lowers blood levels of **LDL**, raises levels of **HDL**, decreases *fibrinolytic* activity, increases or inhibits *platelet* reactivity, dilates or constricts cerebral *vessels*, indirectly reduces cerebral blood flow through **dehydration**.
 - alcoholic **cardiomyopathy** predisposes to **embolic stroke**.

BIBLIOGRAPHY for ch. “Neurovascular Disorders” → follow this [LINK >>](#)