NEUROLOGICAL SYSTEM

Cerebral Aneurysm

A weakened, ballooning section of a cerebral artery wall that can rupture, causing subarachnoid hemorrhage (SAH) — one of the highest-mortality neurological emergencies on the NCLEX.

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Source disclosure: *This topic was not present in the uploaded reference notes. Content was synthesized from standard NGN NCLEX 2026 references (Saunders Comprehensive Review, ATI Medical-Surgical, Lippincott NCLEX-RN, and AANN/AHA stroke guidelines) and aligned with the 2026 NGN test plan.*

1 Definition & Overview

What it is — and why it matters

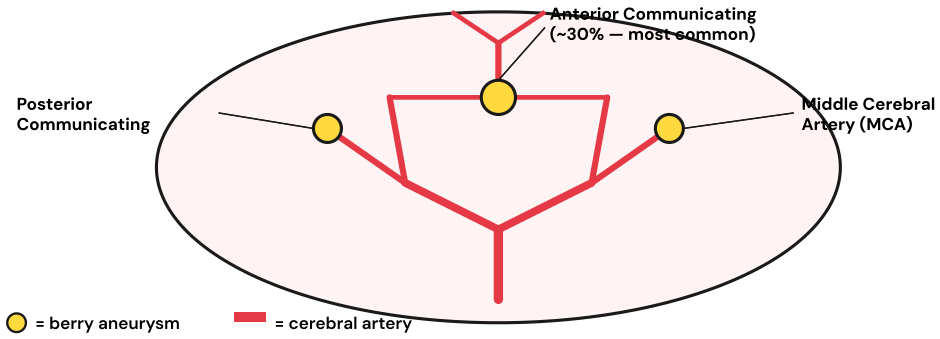
The Lesion

- An **outpouching/ballooning** of a cerebral artery caused by weakening of the vessel wall.
- Most form at **arterial bifurcations** in the **Circle of Willis** ("berry" or saccular aneurysm).
- May be unruptured (silent, often incidental) or ruptured (life-threatening SAH).

Why It Matters 🚨

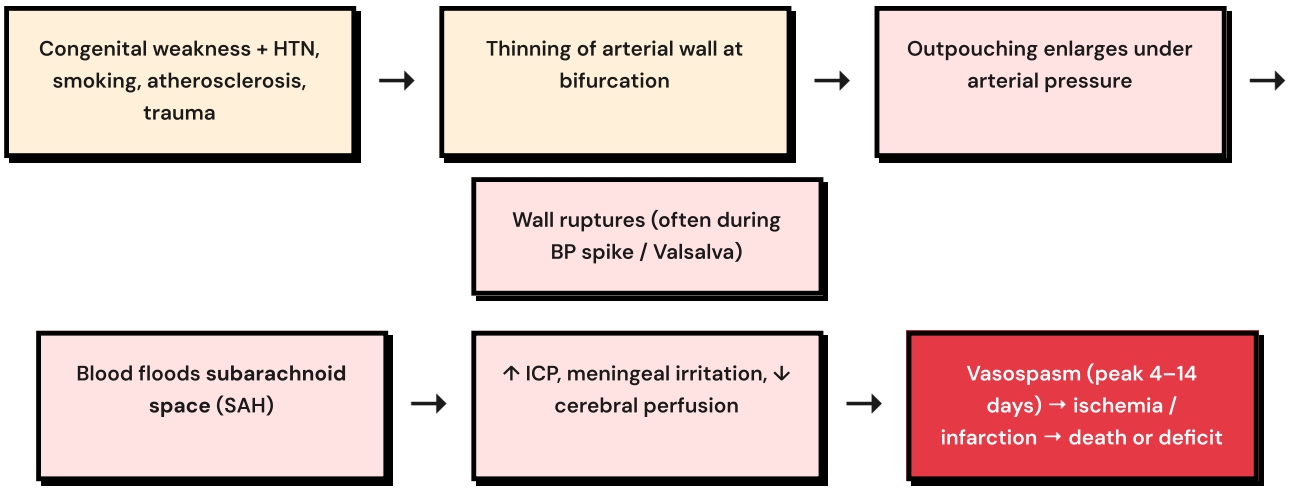
- Rupture causes **subarachnoid hemorrhage (SAH)** — bleeding between the arachnoid and pia mater.
- **~40–50% mortality**; survivors face vasospasm, rebleeding, hydrocephalus, and lasting deficits.
- Hallmark complaint: *"the worst headache of my life."*

Circle of Willis — Common Berry Aneurysm Sites



2 Pathophysiology

From weak wall → catastrophic bleed



Major Risk Factors

- **HTN** — #1 modifiable risk factor
- **Smoking** — independent risk factor for formation AND rupture
- **Family history** of aneurysm or SAH (1st-degree relatives)
- **Polycystic kidney disease**, connective tissue disease (Ehlers-Danlos, Marfan)
- Cocaine / stimulant use, heavy alcohol use
- Female sex, age > 40

3 Signs & Symptoms

Unruptured vs Ruptured — know the difference

Unruptured / Warning Leak

- Often **asymptomatic** (incidental finding)
- Mild, intermittent **headache**
- **Sentinel bleed** — sudden brief headache days–weeks before rupture
- **CN III palsy**: ptosis, dilated pupil, "down-and-out" eye (PCom aneurysm)
- Visual changes, diplopia
- Localized neck or facial pain

Ruptured (SAH) 🚨

- RED FLAG **"Thunderclap" headache** — sudden, severe, "worst of my life"
- **Nuchal rigidity** (stiff neck) — meningeal irritation
- **Photophobia**, N/V
- **LOC change**: confusion → stupor → coma
- Seizures, hemiparesis, aphasia
- + **Kernig's** & **Brudzinski's** signs
- LATE **Cushing's triad**: ↑ SBP, ↓ HR, irregular respirations = herniation imminent
- Fixed/dilated pupils, posturing (decorticate → decerebrate)

Hunt & Hess Grading Scale (severity at presentation)

GRADE	CLINICAL PRESENTATION
I	Asymptomatic OR mild headache, slight nuchal rigidity
II	Moderate–severe headache, nuchal rigidity, no neuro deficit (except CN palsy)
III	Drowsy, confused, OR mild focal deficit
IV	Stuporous, moderate–severe hemiparesis
V	Deep coma, decerebrate posturing — moribund

4 Priority Nursing Interventions

"Aneurysm Precautions" — ABCs first, then prevent rebleed

ABC & Neuro Priorities

- **Assess airway** — ↓ LOC may require intubation
- **Neuro checks q1h** — GCS, pupils, motor, speech
- **Monitor for ↑ ICP**: Cushing's triad, posturing, pupil changes
- **HOB 30°** (head midline) — promotes venous drainage, ↓ ICP
- **BP control** — keep SBP < 140–160 mmHg (per protocol) before securing, MAP-guided after
- **Seizure precautions** — padded rails, suction at bedside
- Monitor for **vasospasm** days 4–14: new deficit, ↓ LOC, transcranial Doppler

Aneurysm Precautions (Prevent Rebleed)

- **Quiet, dark, low-stimulation room**
- **Bedrest**, limit visitors, no TV/phone
- **No Valsalva** — give stool softeners (docusate), no straining
- **No coffee, no nicotine, no stimulants**
- No bending at waist, no lifting > 10 lbs
- **Avoid suctioning** when possible (Valsalva trigger)
- DVT prevention: **SCDs only** — NO heparin until aneurysm secured
- Cluster nursing care to allow rest periods

Definitive Treatment Options

Endovascular Coiling

- Catheter via femoral artery → coils packed into aneurysm sac
- Less invasive; preferred for high-risk patients
- Post-op: assess **groin site & distal pulses**, bedrest 4–6 hrs flat

Surgical Clipping

- Craniotomy → metal clip across aneurysm neck
- Definitive but more invasive
- Post-op: ICU, ICP monitoring, neuro q1h, watch for infection & CSF leak

5 Pharmacology

High-yield drugs for the NGN test plan

DRUG	CLASS / ACTION	INDICATION	KEY NURSING CONSIDERATIONS
Nimodipine	Calcium channel blocker (cerebroselective)	Prevent & treat vasospasm × 21 days post-SAH	**PO/NG ONLY — never IV (fatal hypotension).** Monitor BP — hold & notify if SBP drops. Give on empty stomach.
Labetalol / Nicardipine	Antihypertensives (β-blocker / CCB)	BP control to prevent rebleed	Titrate to target SBP. Continuous BP monitoring. Watch HR with labetalol (bradycardia).
Mannitol	Osmotic diuretic	↑ ICP / cerebral edema	Monitor I&Os, serum osmolality, K^+, renal function. Use filter tubing. Watch for crystallization.
Phenytoin / Levetiracetam	Antiepileptics	Seizure prophylaxis & treatment	Phenytoin: therapeutic 10–20 mcg/mL; monitor gingival hyperplasia, IV push slow (≤ 50 mg/min) — cardiac arrhythmia risk.
Docusate (Colace)	Stool softener	Prevent Valsalva from straining	Routine for ALL aneurysm patients. No enemas, no suppositories.
Acetaminophen	Non-opioid analgesic	Headache, fever	**Drug of choice.** Avoid aspirin / NSAIDs (bleeding risk).
Aminocaproic acid	Antifibrinolytic (rare/short-term use)	Prevent rebleed before securing aneurysm	Short-term only — increases DVT/PE risk. Monitor for clot formation.

6 NCLEX Test Traps ⚠️

Wrong answer → right answer

✗ WRONG	✅ RIGHT
Give nimodipine IV push for severe vasospasm.	Nimodipine is **PO or via NG only**. IV administration has caused fatal hypotension and cardiac arrest.
Position the SAH patient flat to maintain cerebral perfusion.	**HOB at 30°, head midline.** Promotes venous drainage and reduces ICP.
Give aspirin or ibuprofen for the patient's headache.	Use **acetaminophen**. ASA and NSAIDs inhibit platelets → ↑ rebleed risk.
Start subcutaneous heparin on admission for DVT prophylaxis.	**SCDs only** until the aneurysm is secured (clipped or coiled). Pharmacologic prophylaxis usually held 24h post-procedure.
Confuse vasospasm with rebleed — both worsen LOC.	**Rebleed**: sudden severe HA, abrupt deterioration, often within 24h. **Vasospasm**: gradual deficit, days 4–14, focal signs, treated with nimodipine + euvolemia.
Stimulate the patient frequently to assess responsiveness.	**Cluster care** & minimize stimulation. Quiet, dark room. Each stimulation transiently spikes BP and ICP.
Perform a lumbar puncture without imaging if you suspect SAH.	**CT scan first**. LP is contraindicated with ↑ ICP — can cause herniation. LP only if CT negative and SAH still suspected.

7 Patient & Family Education

Discharge teaching after coiling or clipping

Lifestyle & Risk Reduction

- **Control BP** — take antihypertensives as prescribed; daily home BP log
- **Stop smoking** — single biggest modifiable risk for rupture/recurrence
- Avoid cocaine, stimulants, & binge alcohol use
- Avoid **Valsalva**: no heavy lifting (>10 lb early), no straining at stool
- Low-sodium, heart-healthy diet
- Manage stress; regular gentle activity once cleared

When to Call 911 🚨

- **Sudden severe headache** — "worst headache of my life"
- Stiff neck, light sensitivity, vomiting
- Sudden numbness, weakness, vision changes, slurred speech
- Confusion, drowsiness, or loss of consciousness
- New seizure activity
- Family of patient: 1st-degree relatives should discuss **screening MRA** with provider

8 Memory Boosters

Mnemonics & pattern recognition

"QUIET" Aneurysm Precautions

- **Q** **Quiet** & dark room, limit visitors
- **U** **Unstimulating** environment — no TV/phone
- **I** **ICP** monitoring & q1h neuro checks
- **E** **Elevate** HOB 30°, head midline
- **T** **Tylenol** only — no ASA/NSAIDs; stool softeners

"Thunder & Stiff"

Thunderclap headache + **Stiff** neck = SAH until proven otherwise. Get CT NOW.

Cushing's Triad = LATE ICP

- ↑ **Systolic BP** with widening pulse pressure
- ↓ **Heart rate** (bradycardia)
- ~ **Irregular respirations** (Cheyne-Stokes)

If you see this — herniation is imminent. Act now.

"Nimodipine NEVER IV"

Cerebroselective CCB given **PO or NG only for 21 days**. IV = fatal hypotension. Prevents the deadly day 4–14 vasospasm.

Timeline of Death after SAH

Day 0: Rupture — initial bleed
Day 1–3: Rebleed risk highest
Day 4–14: **VASOSPASM** — leading cause of late death/disability
Day 14+: Hydrocephalus risk

9 NCJMM Clinical Judgment Scenario

Six-step Next Generation Clinical Judgment Measurement Model

Scenario: A 52-year-old female with a history of HTN and 30-pack-year smoking presents to the ED. While gardening, she suddenly collapsed clutching her head, stating it was *"the worst headache of my life."* On arrival: **BP 188/102, HR 56, RR 22 irregular, SpO_2 94% RA, Temp 99.1°F.** She is lethargic but arousable, c/o photophobia and stiff neck, with one episode of emesis in the ambulance. Pupils 4 mm, sluggish but equal. Moves all extremities to command. CT head pending.

1 Recognize Cues

- **Thunderclap headache** ("worst of my life")
- Nuchal rigidity + photophobia + vomiting
- ↓ LOC (lethargic)
- BP 188/102 (severe HTN), HR 56 (bradycardia), irregular RR — **Cushing's triad emerging**
- Risk factors: HTN + smoking

2 Analyze Cues

- Sudden severe headache + meningeal signs = **subarachnoid hemorrhage from a ruptured cerebral aneurysm**
- Cushing's triad → **rising ICP**, herniation risk
- ↑ BP = ongoing rebleed risk; needs urgent control
- ↓ LOC + irregular respirations = airway compromise possible

3 Prioritize Hypotheses

- **#1 Ruptured cerebral aneurysm with SAH and ↑ ICP** (highest priority — life-threatening)
- #2 Impending herniation (Cushing's triad)
- #3 Aspiration / airway loss with further ↓ LOC
- Rule out: hypertensive emergency, meningitis, migraine (lower priority given presentation)

4 Generate Solutions

- Confirm dx: **STAT non-contrast CT head**; if neg + high suspicion → LP
- Airway/breathing readiness; suction at bedside
- HOB 30°, head midline; institute **aneurysm precautions**
- BP control with IV labetalol or nicardipine — target SBP < 140–160
- Seizure precautions; antiepileptic prophylaxis
- Prepare for neurosurgery / endovascular consult (clip vs coil)
- Begin **nimodipine** PO/NG × 21 days to prevent vasospasm

5

Take Action

- Apply O_2, prepare for intubation if LOC drops further
- Two large-bore IVs; draw labs, type & cross
- HOB 30°, midline; quiet, dark room; cluster care
- Start **nicardipine drip**, titrate per protocol
- Administer ondansetron for nausea; **acetaminophen** for headache (NO ASA/NSAIDs)
- **SCDs for DVT prophylaxis** — hold heparin until aneurysm secured
- Q15min neuro checks; continuous cardiac, BP, SpO_2 monitoring
- Page neurosurgery; transport to CT and then ICU

6

Evaluate Outcomes

- **Expected:** SBP 130–150, HR > 60, GCS stable or improving, no new deficits, pupils equal & reactive
- **Vasospasm watch (days 4–14):** new focal deficit, ↓ LOC, transcranial Doppler shifts → escalate
- **Worsening signs that require rapid escalation:** GCS drop ≥ 2 points, pupil asymmetry, posturing, recurrence of thunderclap headache (rebleed)
- Reassess airway, BP control, ICP, & pain management every hour
- Patient/family teaching on warning signs, BP control, smoking cessation before discharge

Cerebral Aneurysm — Quick Recall

Thunderclap HA + stiff neck = SAH → CT scan → aneurysm precautions (QUIET) → HOB 30° → BP control → nimodipine PO × 21 days → clip or coil → vasospasm watch days 4–14.

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