

CRITICAL CARE · DECOMPRESSIVE SURGERY

Nursing Care: *Left vs Right* Side Craniectomy

Positioning is life-or-death — the brain has no bone protection on the operative side.

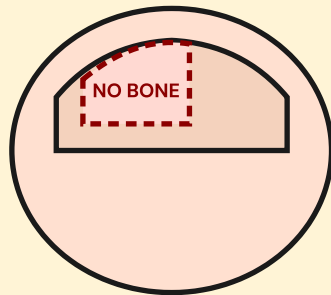
NEUROLOGICAL SYSTEM



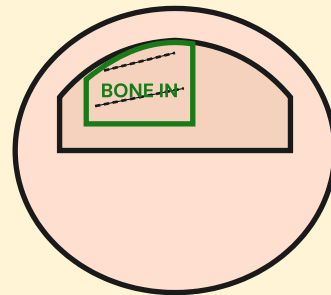
Content sourcing note: This topic was not included in Diane's uploaded reference notes. Content has been drawn from standard NGN NCLEX 2026 references: **Saunders Comprehensive Review (Silvestri)**, **ATI Adult Medical-Surgical Nursing**, **Lippincott Manual of Nursing Practice**, and **AANN (American Association of Neuroscience Nurses) Core Curriculum** — all aligned to the 2026 NCLEX test plan.

1 Definition & Overview

- ▶ **Craniectomy** = Surgical removal of a portion of the skull (bone flap) that is **NOT replaced** at the end of surgery. The brain is left with only skin and dura as protection on the operative side.
- ▶ **Performed to** relieve refractory intracranial pressure (ICP) when the brain is too swollen to fit inside its rigid skull — common indications: severe TBI, malignant MCA infarction, large hemorrhagic stroke, expanding hematoma, tumor with mass effect.
- ▶ **Bone flap is stored** in a sterile freezer or implanted in the patient's abdominal subcutaneous tissue — replaced later via **cranioplasty** (typically 6–12 weeks after swelling resolves).
- ▶ **Craniectomy vs. Craniotomy**: Craniectomy = bone **OUT** (no protection). Craniotomy = bone **REPLACED** (protected). **This distinction drives all positioning rules.**



vs.



2 Pathophysiology (*Why Decompression?*)

The Monro–Kellie Doctrine

The adult skull is a **rigid, sealed container** holding three components: brain tissue ($\approx 80\%$), blood ($\approx 10\%$), and cerebrospinal fluid ($\approx 10\%$). If any one increases, another must decrease — or **ICP rises catastrophically**.



*But now — the brain on the operative side has **NO BONE PROTECTION**.
Positioning becomes a critical safety intervention.*

Left vs Right Hemispheric Anatomy

LEFT HEMISPHERE

Usually the dominant hemisphere (in $\sim 95\%$ of right-handed people and $\sim 70\%$ of left-handed people).

Controls: **right side of body**, language (Broca's + Wernicke's), logic, analysis, math, sequencing.

If injured → right-sided weakness + **aphasia**.

RIGHT HEMISPHERE

Non-dominant in most patients.

Controls: **left side of body**, spatial-perceptual awareness, facial recognition, music, creativity, judgment.

If injured → left-sided weakness + **left neglect** + impulsivity.

3 Signs & Symptoms

Early ICP Signs *(catch these — act before late signs appear)*

- ▶ **Decreased LOC** — the **earliest and most sensitive** sign. Subtle confusion, drowsiness, restlessness.
- ▶ **Restlessness / irritability** — do NOT medicate first; assess neuro status.
- ▶ **Headache** — often worse in the morning or with positioning changes.
- ▶ **Nausea & vomiting** — often **projectile, without nausea preceding it**.
- ▶ **Pupillary changes** — sluggish reaction, mild anisocoria.
- ▶ **Subtle motor changes** — pronator drift, slight weakness, gait change.

Late ICP Signs — **HERNIATION IMMINENT**



Cushing's Triad = HTN with widened pulse pressure + Bradycardia + Irregular respirations (Cheyne-Stokes or apneustic). This is a LATE, pre-terminal sign — by the time you see it, the brainstem is being compressed.

- ⚠ **Cushing's Triad** (see above) — neurosurgical emergency.
- ⚠ **Fixed, dilated pupil** on the operative side = uncal herniation (compressing CN III).
- ⚠ **Posturing** — decorticate (arms flexed inward to "core") → decerebrate (arms extended/rigid) → flaccid = progressively worse.
- ⚠ **Coma, loss of brainstem reflexes** (no corneal, no gag, no cough).
- ⚠ **Sudden bulging at craniectomy site** — brain swelling outward through the defect.

Hemisphere-Specific Deficits

LEFT-SIDE CRANIECTOMY (LEFT BRAIN INJURED)	RIGHT-SIDE CRANIECTOMY (RIGHT BRAIN INJURED)
RIGHT-sided hemiplegia/hemiparesis	LEFT-sided hemiplegia/hemiparesis
Aphasia — expressive (Broca's), receptive (Wernicke's), or global	Left-sided neglect — ignores left visual field, left arm, left side of plate
Slow, cautious, aware of deficits → depression, anxiety	Impulsive, unaware of deficits (anosognosia) → safety risk
Right-sided homonymous hemianopsia	Left-sided homonymous hemianopsia

LEFT-SIDE CRANIECTOMY (LEFT BRAIN INJURED)

Difficulty with math, logic, reading, writing

RIGHT-SIDE CRANIECTOMY (RIGHT BRAIN INJURED)

Difficulty with spatial tasks, facial recognition, judgment

4

Priority Nursing *Interventions*

🏠 POSITIONING — The #1 Priority & #1 Tested Concept

RULE: NEVER position the patient on the operative (no-bone-flap) side. Doing so compresses unprotected brain tissue and can cause herniation or shift.

LEFT-SIDE CRANIECTOMY

Bone flap is OUT on the LEFT

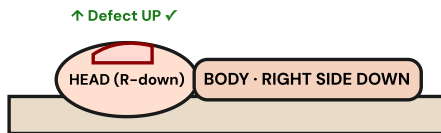
- ✅ **SAFE positions:** RIGHT lateral or supine
- ❌ **NEVER:** Left lateral (operative side down)

RIGHT-SIDE CRANIECTOMY

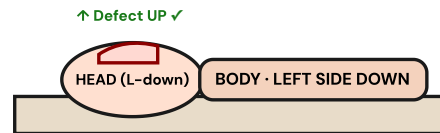
Bone flap is OUT on the RIGHT

- ✅ **SAFE positions:** LEFT lateral or supine
- ❌ **NEVER:** Right lateral (operative side down)

LEFT CRANIECTOMY → LIE RIGHT



RIGHT CRANIECTOMY → LIE LEFT



The defect always faces UP — never compressed against bed.

A Airway, Breathing, Circulation

- ✓ **Maintain patent airway** — suction PRN, but **limit to ≤10 seconds** and pre-oxygenate (suctioning ↑ ICP).
- ✓ **Monitor SpO₂ > 94%**; hypoxia worsens cerebral edema. Avoid hyperventilation unless ordered.
- ✓ **Monitor BP closely** — maintain CPP (cerebral perfusion pressure = MAP - ICP) typically > 60–70 mmHg.

🛡️ Safety

- ✓ **Helmet ALWAYS when out of bed** — ambulation, chair, transport, therapy. No exceptions.
- ✓ **Place a clearly visible bedside sign:** " **NO BONE FLAP — DO NOT POSITION ON [LEFT/RIGHT] SIDE** "
- ✓ **Seizure precautions** — padded side rails, suction + oral airway at bedside, IV access.
- ✓ **Fall precautions** — especially with right-side craniectomy (impulsive, anosognosia).
- ✓ **Aspiration precautions** if cranial nerve deficits (gag, swallow); HOB up, evaluate swallow.



Neuro Monitoring

- ✓ **GCS q1h** initially → q2–4h once stable. Trend is more important than a single score.
- ✓ **Pupils (PERRLA)** q1h — note size, shape, reactivity. **Sluggish → blown** is an emergency.
- ✓ **Motor strength bilaterally** — compare sides; check for drift.
- ✓ **Speech assessment** if left-sided craniectomy — name objects, follow commands, repeat phrases.
- ✓ **Assess the craniectomy site** — should feel **soft and pulsating**; bulging = swelling, sunken = sunken flap syndrome.



Prevent ICP Spikes

- ✓ **HOB 30°** — promotes venous drainage from the head. Head **midline / neutral** (no flexion or rotation — kinks jugular veins).
- ✓ **Avoid hip flexion > 90°** — impedes venous return.
- ✓ **Prevent Valsalva** — stool softeners, **NO straws**, no straining, instruct to exhale when moving.
- ✓ **Cluster care** — group activities to allow rest; over-stimulation ↑ ICP.
- ✓ **Quiet, dimly-lit environment**; minimize procedures, limit visitors initially.
- ✓ **Treat fever aggressively** — every 1°C ↑ raises cerebral metabolism ~10%.



Other Priority Care

- ✓ **DVT prophylaxis: SCDs first.** Pharmacological prophylaxis (LMWH) typically delayed 24–72h post-op (bleed risk).
- ✓ **Monitor for CSF leak** — clear drainage on dressing, "halo sign" (clear ring around blood), salty taste, rhinorrhea. **Do NOT pack nose;** notify provider.
- ✓ **Strict I&O**; monitor for DI or SIADH (post-op pituitary/hypothalamic involvement).
- ✓ **Glucose control** — hyperglycemia worsens neuro outcomes.
- ✓ **Skin and nutrition** — reposition q2h on permitted sides; early enteral nutrition when safe.

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Pharmacology & Drips

DRUG / CLASS	MECHANISM	KEY SIDE EFFECTS	NURSING CONSIDERATIONS
Mannitol (<i>Osmotic diuretic</i>)	Pulls fluid from brain tissue into vascular space → excreted by kidneys → ↓ ICP	Dehydration, electrolyte imbalance (↓ K, ↓ Na), rebound ICP, AKI, pulmonary edema	Use in-line filter (crystals form); strict I&O; monitor serum osmolality (goal 300–320), Na, K, BUN/Cr
3% Hypertonic Saline	↑ Serum osmolality → pulls fluid from brain → ↓ ICP	Hypernatremia, central pontine myelinolysis if corrected too fast, fluid overload	Central line preferred ; monitor Na q4–6h (goal < 160); pump only
Levetiracetam (Keppra) <i>Phenytoin (Dilantin)</i>	Seizure prophylaxis — post-craniectomy seizure risk is high	Keppra: agitation, mood changes. Phenytoin: gingival hyperplasia, ataxia, rash	Phenytoin therapeutic level 10–20 mcg/mL ; flush IV with NS only (precipitates in D5W)
Docusate (Colace) <i>Stool softener</i>	Softens stool → prevents straining (Valsalva) → prevents ICP spikes	Mild GI cramping	Standing order in neuro patients — strain = spike
Acetaminophen	Antipyretic + mild analgesic; first-line fever control	Hepatotoxicity (max 4g/day)	Scheduled, not PRN, for aggressive fever control
Short-acting opioids (<i>Fentanyl</i>)	Pain control without prolonged sedation	Respiratory depression, masks neuro changes	Short half-life preferred so neuro exam isn't obscured; avoid morphine (histamine release ↑ ICP)
Propofol (<i>if intubated</i>)	Sedation; lowers cerebral metabolism + ICP	Hypotension, ↑ triglycerides, propofol infusion syndrome	Daily sedation interruption for neuro exam; monitor lipase, triglycerides, CK
Dexamethasone (<i>Decadron — TUMOR only</i>)	↓ Vasogenic edema around tumors. NOT used for TBI/stroke (no benefit, increased mortality).	Hyperglycemia, immunosuppression, GI bleed	Only for craniectomy patients with tumor-related edema; taper, don't stop abruptly



AVOID initially: Therapeutic anticoagulants and antiplatelets (bleed risk). Use SCDs for VTE prophylaxis until cleared. AVOID: Hypotonic fluids (D5W) — they worsen cerebral edema. Use NS or LR.

6 NCLEX Test Traps ⚠️

❌ COMMON WRONG ANSWER	✅ CORRECT NCLEX ANSWER
"Position the patient on the operative side to prevent pressure on the unaffected side."	NEVER position on the operative (no bone flap) side. Position OPPOSITE side or supine.
Treat craniectomy and craniotomy positioning the same way.	Different rules. Craniotomy patients can usually be positioned on either side. Craniectomy = NEVER on operative side.
"Wait for Cushing's triad to confirm increased ICP."	Cushing's triad is a LATE sign — herniation is imminent. Act on EARLY signs: decreased LOC, restlessness, headache.
"The restless patient is anxious — give a sedative."	Restlessness in a neuro patient = early ICP sign. Assess neuro status FIRST before medicating.
"Left-sided craniectomy causes left-sided weakness."	Opposite! Left brain → RIGHT-sided weakness (motor tracts cross at the medulla). Same applies to right brain → left weakness.
"The patient with right-side craniectomy and left-sided weakness can use a regular call light on the left."	Right brain damage = left neglect. Patient may not even acknowledge the left side. Place call light on the unaffected (right) side.
"Wide pulse pressure of 160/60 with HR 50 — patient is doing well, asleep."	Cushing's triad! Widened PP + bradycardia + irregular respirations = neurosurgical emergency. Notify provider STAT.
"Helmet is only needed during ambulation; chair-sitting is fine without it."	Helmet for ALL out-of-bed activity — chair, bathroom, transport, therapy. The brain is unprotected.
"Give morphine for the patient's headache."	Avoid morphine (histamine release → vasodilation → ↑ ICP). Acetaminophen first; fentanyl if opioid needed.
"Pack the bloody-tinged nose drainage with gauze."	NEVER pack the nose after craniectomy — could be CSF leak. Check halo sign and glucose; notify provider.
"Give D5W to keep the IV open."	D5W is hypotonic — worsens cerebral edema. Use NS or LR in neuro patients.

7 Patient & Family Education

Helmet & Protection

- ▶ **Wear the helmet ANY TIME you're out of bed** — until cranioplasty. No exceptions, even for short trips to the bathroom.
- ▶ Avoid any activity that could result in a bump to the head — no contact sports, no horseback riding, no roller coasters.
- ▶ Family must understand the positioning rule. Show them the bedside sign and explain why.

Activity Restrictions

- ▶ **NO Valsalva maneuver** — no heavy lifting (> 10 lbs), no straining at stool, no bending over with head below heart.
- ▶ Use a stool softener daily; report constipation.
- ▶ Exhale (don't hold breath) when moving, lifting, or repositioning.
- ▶ **No air travel** without provider clearance — air trapped under skin can expand at altitude.
- ▶ Gradual return to activity as cleared; rehabilitation (PT/OT/SLP) is essential.

Report IMMEDIATELY

- ⚠ Severe or worsening **headache** (especially morning headache, or worse with bending)
- ⚠ **New or worsening weakness, numbness, vision change, or trouble speaking**
- ⚠ **New confusion, drowsiness, or personality change**
- ⚠ **Vomiting** — especially without nausea or projectile
- ⚠ **Seizure activity**
- ⚠ **Fever > 101°F**, drainage, redness, or swelling at incision
- ⚠ **Sunken appearance** at the craniectomy site with new symptoms (sunken flap syndrome / syndrome of the trephined)
- ⚠ Clear fluid from nose or ear (possible CSF leak)

Wound & Skin Care

- ▶ Keep incision clean and dry; **showers OK after sutures/staples removed** (typically 7–10 days) — pat dry, don't rub.
- ▶ No soaking in tubs or pools until fully healed and cleared.

- ▶ Hair will grow back over the site; gentle washing with mild shampoo once cleared.

17 Cranioplasty Timeline

- ▶ The bone flap will be replaced surgically (or a synthetic implant placed) once brain swelling resolves — **typically 6–12 weeks**, sometimes longer.
- ▶ Until cranioplasty: **positioning rules + helmet remain in effect.**
- ▶ After cranioplasty: gradual return to normal activity; helmet no longer needed once provider confirms healing.

8 Memory Boosters

#1 Positioning Rule — "FLAP UP"

The side **WITHOUT** the bone flap is the side that goes **UP**.

Left craniectomy = Left up = lie on Right.

Right craniectomy = Right up = lie on Left.

If you can remember "flap up," you'll never miss this question.

Hemisphere Function — "L = LANGUAGE / R = RECOGNITION"

L Left brain = LANGUAGE + LOGIC. Damage → aphasia, right-sided weakness, depression.

R Right brain = RECOGNITION + spatial. Damage → left neglect, left-sided weakness, impulsivity.

Motor crosses at the brainstem — the side that hurts is OPPOSITE the lesion.

Cushing's Triad — "HBI" (High BP, Brady, Irregular)

H HYPERTENSION with widening pulse pressure (systolic rises, diastolic stays low)

B BRADYCARDIA

I IRREGULAR RESPIRATIONS (Cheyne-Stokes, apneustic, ataxic)

LATE SIGN — herniation is happening. Notify provider immediately.

Helmet Rule — "H.E.L.M.E.T."

H Head is unprotected — bone is OUT

E Every time out of bed (chair, walk, bathroom)

L Label the bed clearly (NO BONE FLAP — [side])

M Midline neutral head, HOB 30°

E Educate family before discharge

T Timeline: until cranioplasty (6–12 weeks)

ICP Signs — "Early Catches, Late Kills"

EARLY (treat now): Decreased LOC → Restlessness → Headache → Pupillary changes → N/V

LATE (emergency): Cushing's Triad → Posturing → Fixed/dilated pupil → Coma

"LOC is the EARLIEST and MOST SENSITIVE sign of ↑ ICP."

Avoid the "ICP Boosters"

- ✗ Hypotonic IV fluids (D5W) → worsens edema
- ✗ Morphine → histamine → vasodilation
- ✗ Valsalva (straining, straws, heavy lifting)
- ✗ Neck flexion or rotation → kinks jugular drainage
- ✗ Suctioning > 10 seconds without pre-oxygenation
- ✗ Fever → ↑ cerebral metabolism
- ✗ Hypoxia/hypercapnia → cerebral vasodilation

9 NCJMM Clinical Judgment Scenario

CASE SCENARIO

A 58-year-old male is admitted to the neuro ICU 24 hours post-emergent **LEFT-sided decompressive craniectomy** for malignant left middle cerebral artery (MCA) infarction. The bone flap is stored in the tissue bank. He is awake but groggy, intubated on minimal sedation, and has a bedside sign reading "**NO BONE FLAP — LEFT SIDE.**" You are conducting your 0800 assessment.

Step 1

Recognize Cues

What information is relevant?

- ▶ VS: BP 168/72 (pulse pressure 96), HR 52, RR 10 and irregular, SpO₂ 96%, Temp 38.4°C
- ▶ GCS decreased from 12 to 9 over the last hour
- ▶ Right pupil 3 mm, brisk; **LEFT pupil 5 mm, sluggish**
- ▶ Right arm flaccid with no withdrawal; left arm withdraws to pain
- ▶ Craniectomy site palpates **tense and bulging** on the left
- ▶ Patient turned to **LEFT lateral position** by night shift for sacral skin care
- ▶ HOB at 15°; head rotated toward the right shoulder

Step 2

Analyze Cues

What do the cues mean together?

- ▶ **Cushing's triad present** — wide pulse pressure, bradycardia, irregular respirations → severe ↑ ICP
- ▶ **Unilateral LEFT pupil dilation** = uncal herniation on the operative side (compression of CN III)
- ▶ **GCS drop (12 → 9)** = deteriorating perfusion
- ▶ **Right-sided flaccidity** = worsening LEFT hemisphere injury (consistent with left craniectomy)
- ▶ **Positioning is WRONG** — patient is on the LEFT (operative) side, compressing unprotected brain
- ▶ **HOB too low + head rotated** — impedes jugular venous drainage, ↑ ICP
- ▶ Fever (38.4°C) further increases cerebral metabolic demand

Step 3

Prioritize Hypotheses

What's the most urgent problem?

- ⚠️ **#1 Severely ↑ ICP with impending uncal herniation** (HIGHEST priority — life-threatening)
- ▶️ **#2** Inadequate cerebral perfusion → further ischemic injury
- ▶️ **#3** Improper positioning compressing unprotected brain
- ▶️ **#4** Fever increasing cerebral metabolic demand
- ▶️ **#5** Risk for seizure

Step 4

Generate Solutions

What interventions could help?

- ▶️ **IMMEDIATELY reposition** off the LEFT (operative) side → supine or RIGHT lateral
- ▶️ **Elevate HOB to 30°** with head **midline and neutral**
- ▶️ **Notify the neurosurgeon STAT** and call rapid response
- ▶️ Prepare to administer **mannitol or 3% hypertonic saline** per order
- ▶️ Optimize oxygenation; consider hyperventilation only as ordered (temporary)
- ▶️ Aggressive fever control with **acetaminophen + cooling measures**
- ▶️ Minimize stimulation — quiet room, cluster care, limit suctioning
- ▶️ Prepare for possible **STAT CT head** and possible return to OR
- ▶️ Ensure IV access patent (large-bore); type and crossmatch

Step 5

Take Action

In priority order:

- ▶️ **1.** Roll patient OFF the left side to supine with HOB 30°, head midline — **FIRST and FASTEST action**
- ▶️ **2.** Call rapid response / notify neurosurgeon STAT
- ▶️ **3.** Administer mannitol 1 g/kg IV (with in-line filter) per standing order
- ▶️ **4.** Hang acetaminophen 1000 mg per protocol; place cooling blanket
- ▶️ **5.** Continuous VS, SpO₂, end-tidal CO₂, GCS, pupil checks q15 min
- ▶️ **6.** Dim room, minimize all non-essential stimulation
- ▶️ **7.** Re-verify and reinforce the "NO BONE FLAP — LEFT SIDE" sign for all staff
- ▶️ **8.** Prepare patient and chart for STAT CT head / possible OR

Step 6

✓ Evaluate Outcomes

EFFECTIVE

- ✓ GCS returns to baseline (12 or better)
- ✓ Pupils equal and reactive bilaterally
- ✓ VS normalize — BP < 160/90, HR > 60, regular respirations
- ✓ Pulse pressure narrows back toward normal
- ✓ Craniectomy site soft and pulsatile (no longer bulging)
- ✓ Temperature < 37.5°C
- ✓ Motor exam improving

INEFFECTIVE — ESCALATE

- ✗ Further GCS decline (≤ 8)
- ✗ Bilateral pupil dilation / fixed pupils
- ✗ Continued or worsening Cushing's triad
- ✗ New posturing (decorticate → decerebrate → flaccid)
- ✗ Persistent site bulging
- ✗ → Return to OR; possible second decompression or evacuation; consider ICP monitor placement; family conference

Diane's NGN NCLEX 2026 Visual Study Library

NEUROLOGICAL SYSTEM · DECOMPRESSIVE CRANIECTOMY · NCJMM-ALIGNED · PRINT-READY