

# Caring for Your Post-Hemicraniectomy Patient

Julie Tang PA-C

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**RWJ**Barnabas  
HEALTH

Robert Wood Johnson  
University Hospital

# Learning Objectives

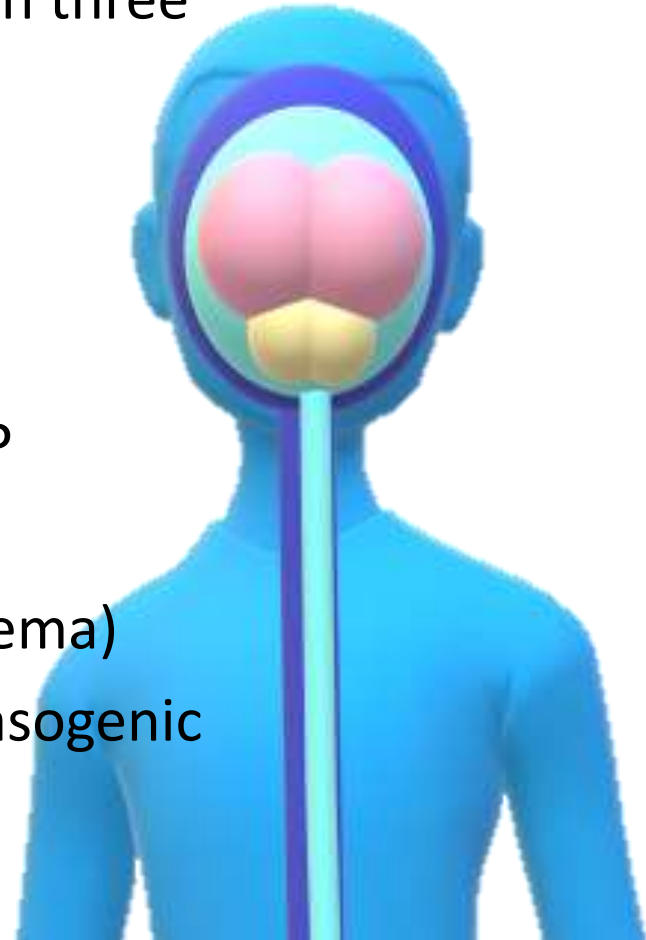
- Discuss Monro-Kelli doctrine
- Recognize signs and symptoms of increased intracranial pressure (ICP)
- Management of a patient with suspected high ICP
- Understand craniotomy vs. craniectomy
- **Assessment of your post-hemicraniectomy patient**
- **Discuss complications post-hemicraniectomy**
- **Discuss Syndrome of Trephine and Cranioplasty**

# Disclosures

- No financial interest or affiliation

# Monro Kellie Doctrine

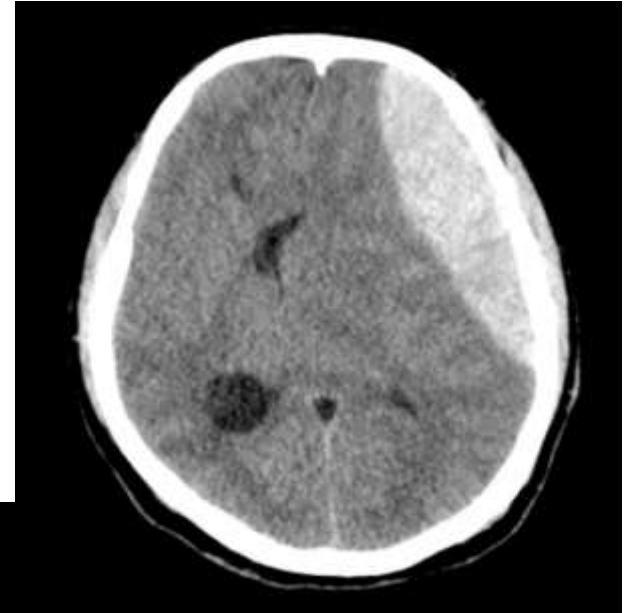
- Cranium has a fixed amount of space with three main components:
  - CSF
  - Brain
  - Blood
- Conditions Associated with Increased ICP
  - Intracranial space-occupying lesions
  - Increased brain volume (cytotoxic edema)
  - Increased brain and blood volume (vasogenic edema)
  - Increased CSF



# Conditions Associated with Increased ICP



<https://www.neurosurgicalatlas.com/volumes/neuro-radiology/cranial-disorders/trauma/primary-traumatic-abnormalities/subdural-hemorrhage-hematoma-sdh>



<https://radiopaedia.org/cases/epidural-haematoma-4>



<https://en.wikipedia.org/wiki/Hydrocephalus>

# Conditions Associated with Increased ICP



# Signs and Symptoms of high ICPs

- Headaches, nausea, vomiting
- Depressed level of consciousness, Confusion, Disorientation
- Blurred vision, Double vision
- Cushing Triad
  - Hypertension
  - Bradycardia
  - Irregular respirations

TO OPERATE OR NOT TO OPERATE...  
THAT IS THE QUESTION!

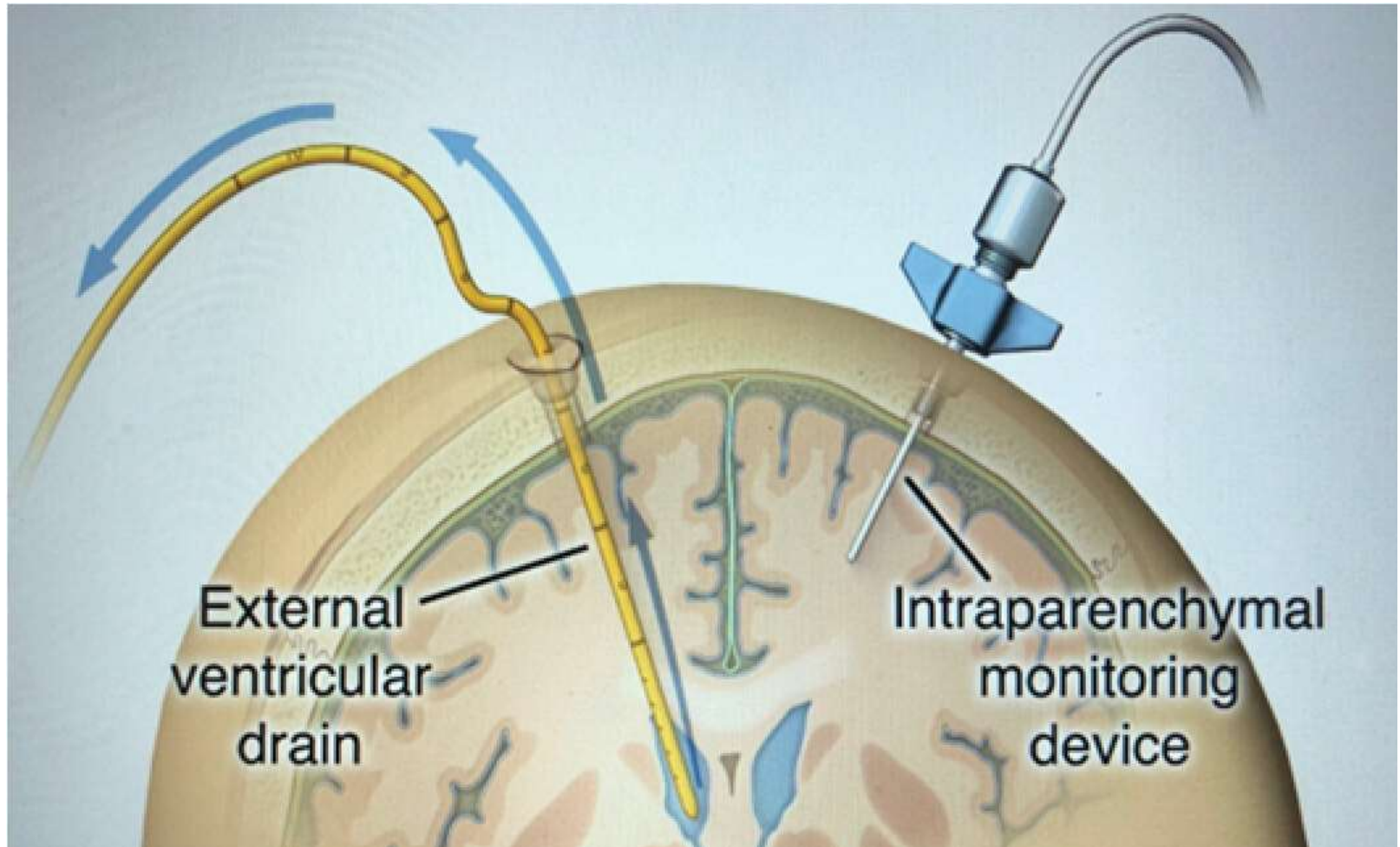




# Medical Management of Elevated ICPs

- HOB elevated 30 degrees after cervical trauma cleared
- Mannitol or Hypertonic saline with frequent electrolyte/fluid checks
- Antibiotics
- Steroids
- Close neuro checks
- Serial imaging
- ICP Monitoring

# ICP Monitoring

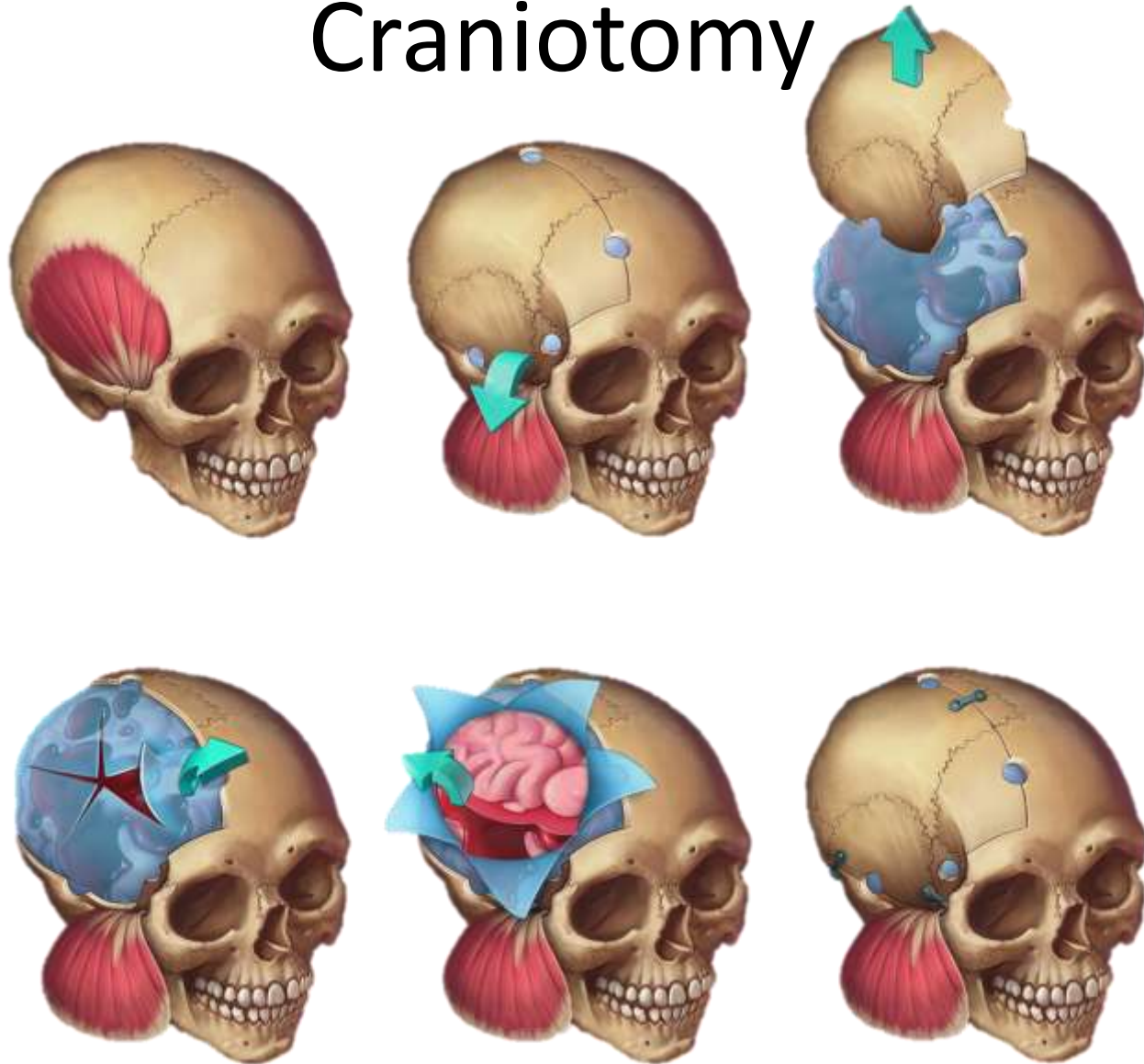


Dossani R, Patra D, Terrell D, Willis B. Placement of an External Ventricular Drain. *N Engl J Med*. 2021;384(2):e3. <a href="https://doi.org/10.1056/nejmvcm1805314">doi:10.1056/nejmvcm1805314</a> - <a href="https://www.ncbi.nlm.nih.gov/pubmed/33497549">PubMed</a>

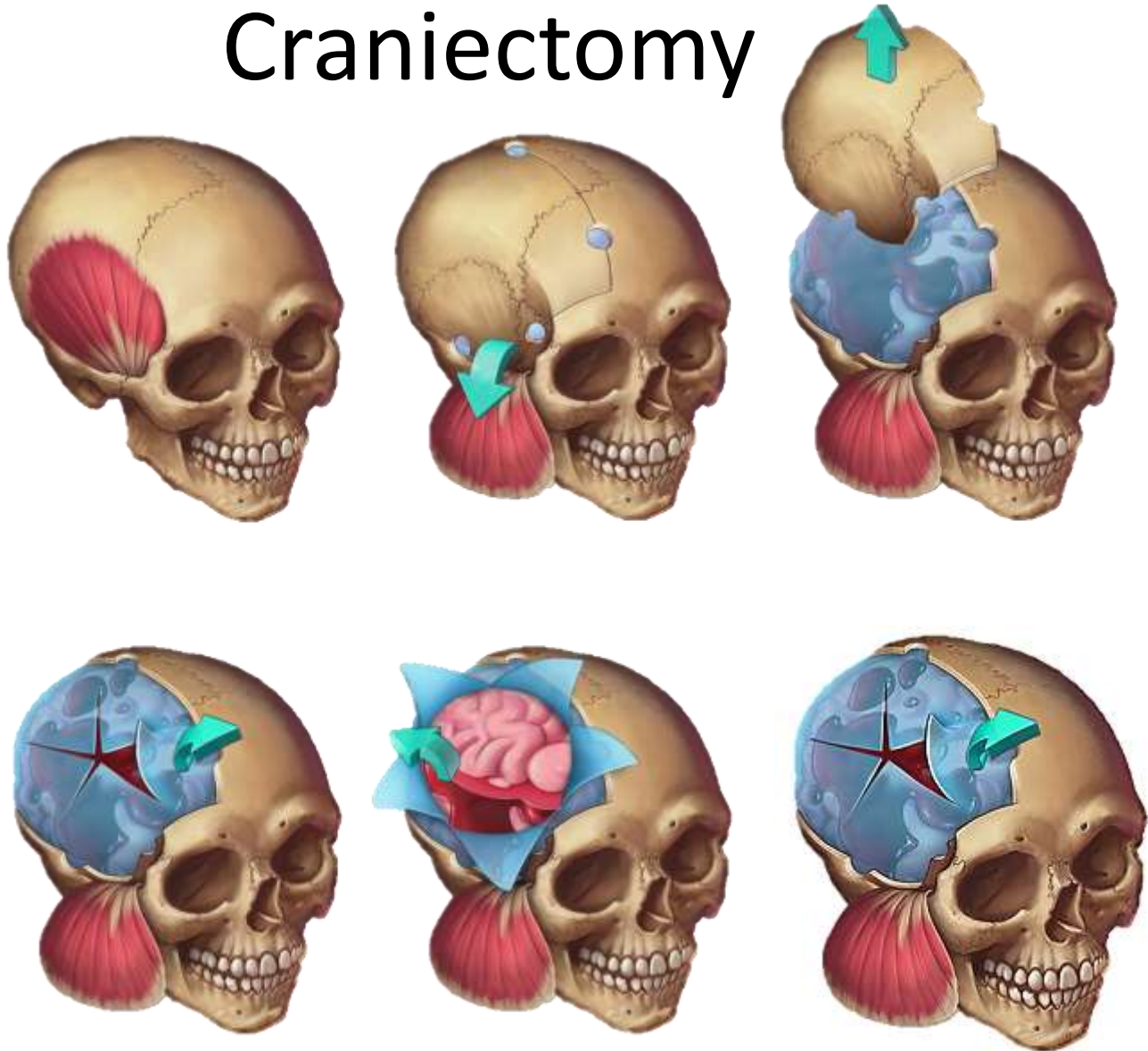
# Surgical Management

- Craniotomy for evacuation of space-occupying lesion
- Craniectomy for evacuation of space-occupying lesion AND to allow room for brain to expand
  - Otherwise, risk of severe brain compression, brain herniation, death!

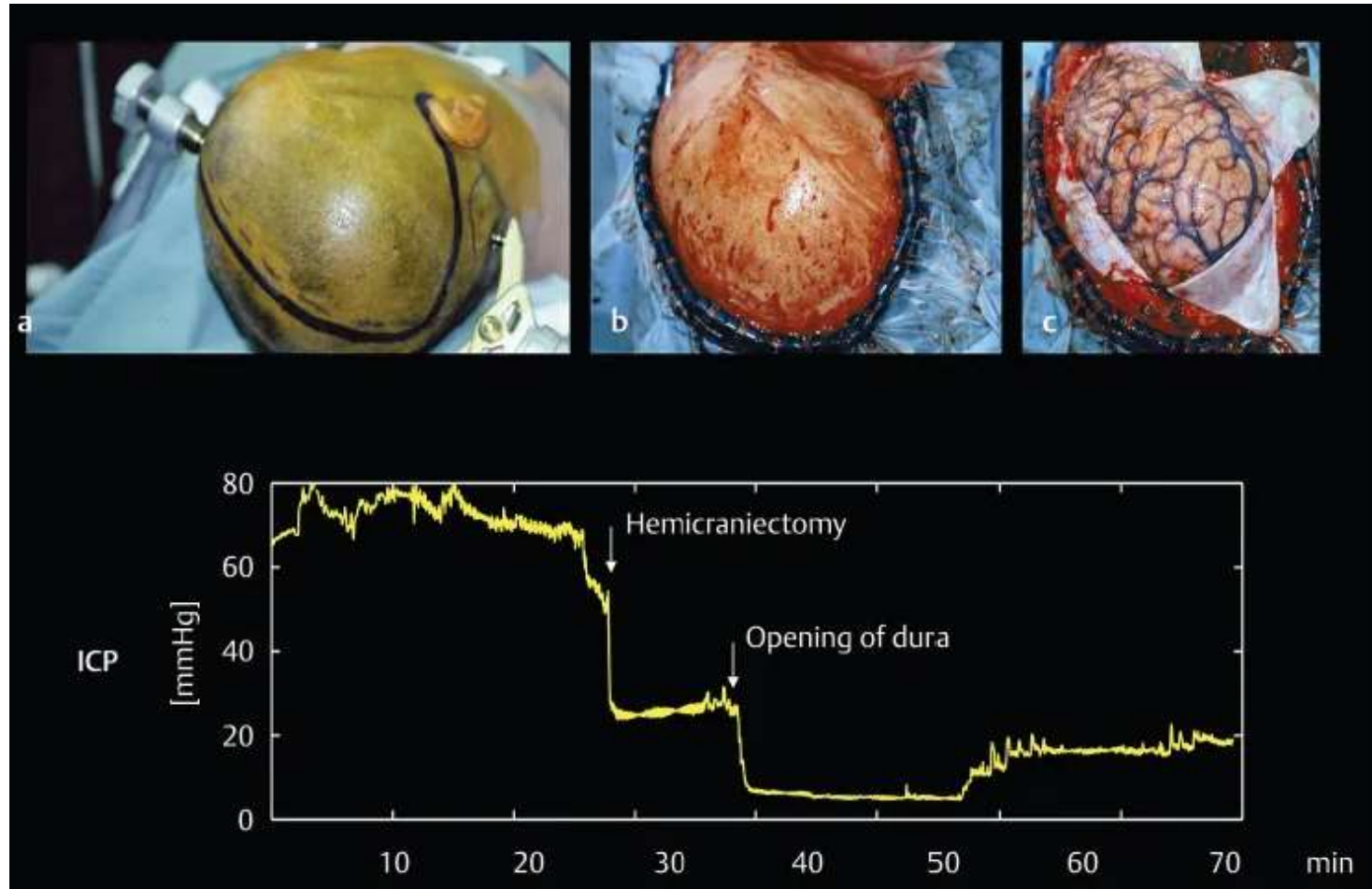
# Craniotomy



# Craniectomy



# In Surgery



8 Decompressive Hemicraniectomy. Neupsy Key. - [8 Decompressive Hemicraniectomy | Neupsy Key](#)>

# Craniectomy



# Post-operative Hemicraniectomy

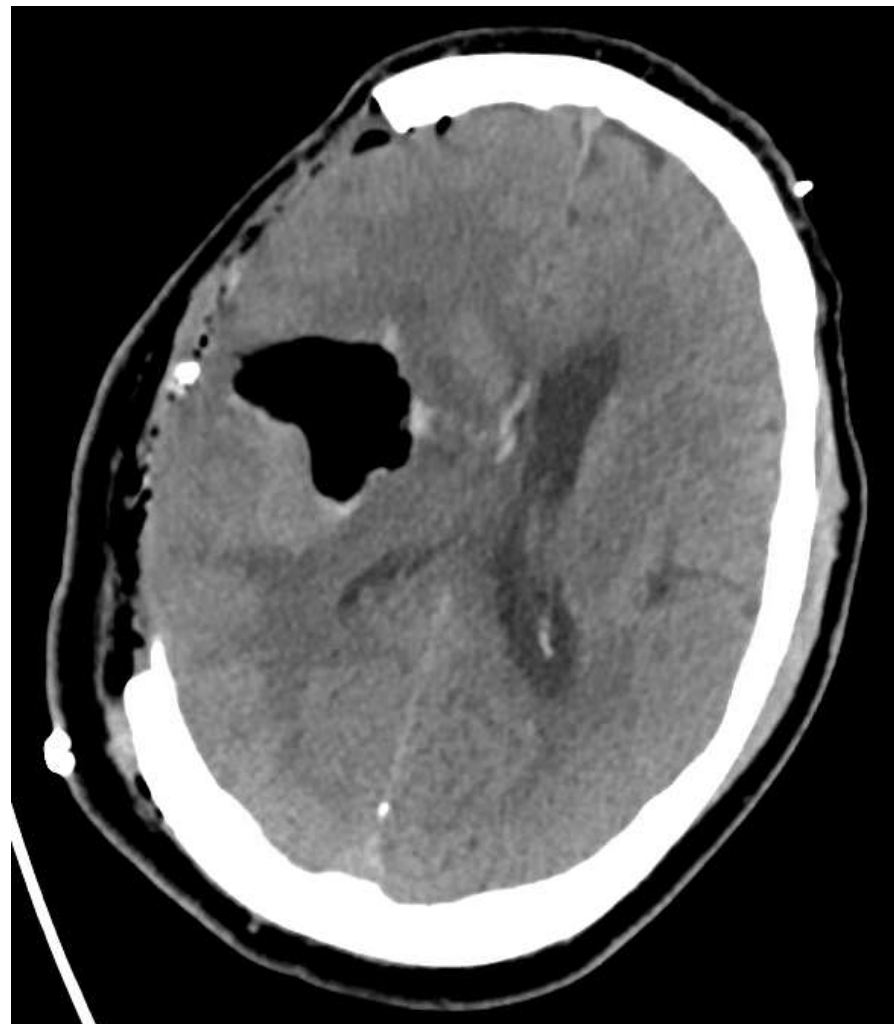
- Postop care is crucial for optimal recovery
- What should we be doing?



# Nursing Care: Post-operative Hemicraniectomy

- Frequent neuro checks, assessment of vital signs
  - Hemodynamics – BP control
  - Seizure prophylaxis
  - Analgesia and Sedation
  - Nausea and vomiting
  - Fever
  - Sodium abnormalities
  - DVT prophylaxis
- Postop CT Head wo imaging

# CT Head imaging



# Nursing Care: Post-operative Hemicraniectomy

- Drain monitoring
  - Serosanguinous fluid is expected
  - If drain output is high or output looks like CSF, likely CSF
- Incision check/Flap check
  - Monitor for skin approximation, redness, discharge
  - Assess flap, can be full or sunken, but it should be soft!
  - Avoid direct pressure over cranial defect
  - Non-absorbable sutures or staples typically removed 14 days after surgery
  - Typically can wash hair on POD#2 or surgeon preference
    - Can use mild shampoo, water, pat dry
    - No tub baths, or swimming
  - Helmet when OOB
  - Gauze if wearing eyeglasses

# Long Term Post-operative Care

- Physical therapy
- Occupational therapy
- Speech therapy
- Cognitive therapy
- Emotional support
- Social services
- Eventual Cranioplasty

# Post-hemicraniectomy Complications

- Expansion of contusion
- Cerebral infarction
- Seizures
- Bleeding complications
- Hydrocephalus
- Subdural hygroma
- Surgical Site Infections – dehiscence, ulceration, necrosis
- Tension pneumocephalus
- Herniation toward craniectomy
- Syndrome of Trepaine

# Syndrome of Trephine

- [Sunken flap syndrome, Sinking Skin Flap Syndrome, Paradoxical herniation]
- Occurs weeks to months after craniectomy
- Due to atmospheric pressure → decreased cerebral blood flow, decreased CSF flow, impaired glucose metabolism
- S/S: headaches, dizziness, pain, discomfort at site of cranial defect, mood swings, deterioration of abilities
- Resolves after cranioplasty

# Syndrome of Trephine



<https://www.cns.org/nexus/vascular/case/right-cranioplasty-decompressive-hemicraniectomy-w>

# Where in the world is the bone flap?



[https://en.wikipedia.org/wiki/Carmen\\_Sandiego\\_%28character%29](https://en.wikipedia.org/wiki/Carmen_Sandiego_%28character%29)



NATIONAL

## Atlanta hospital is accused of losing part of patient's skull following brain surgery

AUGUST 22, 2024 · 7:04 PM ET



Jonathan Franklin



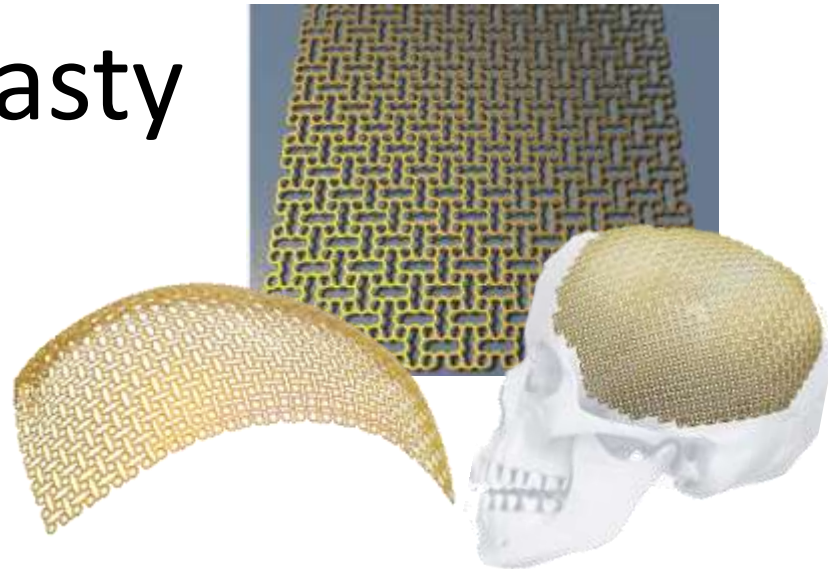
<https://www.npr.org/2024/08/22/nx-s1-5084267/georgia-atlanta-lost-skull-brain-surgery-lawsuit>

# Bone Flap Storage



# Cranioplasty

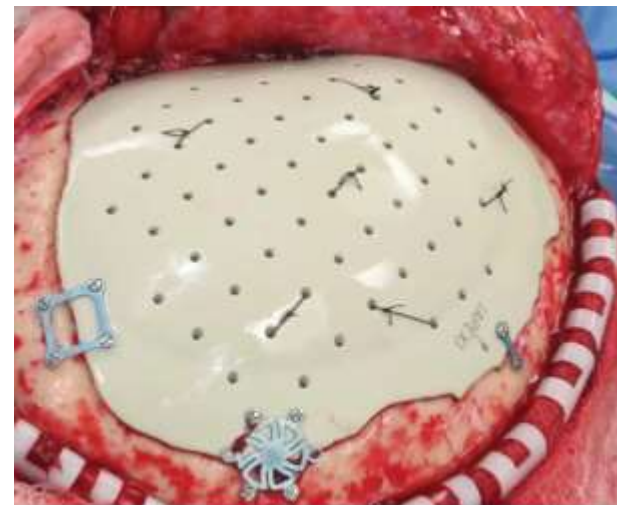
- Autologous bone flap
- Titanium mesh
- Synthetic implant



[https://www.researchgate.net/figure/Skull-cranial-titanium-mesh-grade-3-pure-titanium-as-received-from-the-supplier\\_fig1\\_328569074](https://www.researchgate.net/figure/Skull-cranial-titanium-mesh-grade-3-pure-titanium-as-received-from-the-supplier_fig1_328569074)

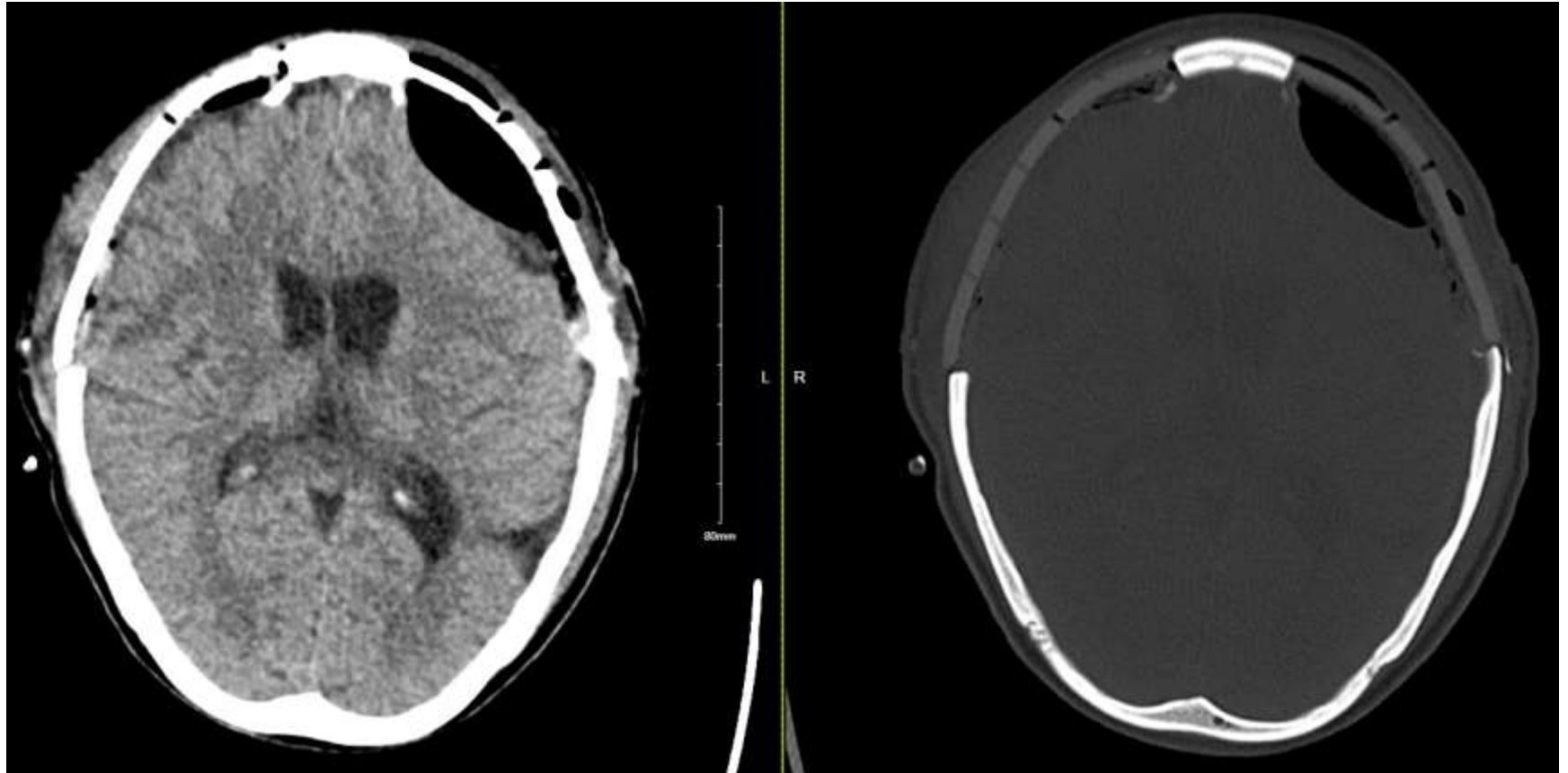


<https://neupsykey.com/cranioplasty-2/>



<https://www.neurosurgery-blog.com/archives/7893>

# Post-cranioplasty CT Head



# What did you learn today?

- ✓ Monro-Kelli Doctrine
- ✓ Signs and symptoms of increased ICP
- ✓ Management of a patient with high ICP
- ✓ Craniotomy vs. craniectomy
- ✓ Needs of a post-hemicraniectomy patient
- ✓ Complications of a post-hemicraniectomy
- ✓ Cranioplasty surgery

And...

# Nursing Care is Important

WE  
LOVE  
YOU



THANK YOU NURSES!

- Not everyone makes it to get their cranioplasty surgery
- Nursing care helps prevent complications and promote recovery

Whenever you need Neurosurgery...

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PEDIATRIC EPILEPSY SURGERY



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Surgery-Neurological



**Jonathan H. Sherman,  
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# References

- Lee, Kiwon. The NeuroICU Book. Second Edition. McGraw Hill. 2017
- Pandit AS, Singhal P, Khawari S, Luoma AMV, Ajina S, Toma AK. The Need for Head Protection Protocols for Craniectomy Patients during Rest, Transfers and Turning. *Front Surg*. 2022 May 20;9:918886. doi: 10.3389/fsurg.2022.918886. PMID: 35686210; PMCID: PMC9172832.
- Dossani R, Patra D, Terrell D, Willis B. Placement of an External Ventricular Drain. *N Engl J Med*. 2021;384(2):e3. <a href="https://doi.org/10.1056/nejmvcm1805314">doi:10.1056/nejmvcm1805314</a> - <a href="https://www.ncbi.nlm.nih.gov/pubmed/33497549">Pubmed</a>
- Kearns, C., Kearns, N., & Paisley, A. M. (2019). The art of consent: visual materials help adult patients make informed choices about surgical care. *Journal of Visual Communication in Medicine*, 43(2), 76–83. <https://doi.org/10.1080/17453054.2019.1671168>
- Robertson FC, Dasenbrock HH, Gormley WB. Decompressive Hemicraniectomy for Stroke in Older Adults: A Review. *J Neurol Neuromedicine*. 2017;2(1):1-7. doi: 10.29245/2572.942X/2017/2.942X/2017/1.1103. Epub 2016 Nov 22. PMID: 30506063; PMCID: PMC6261377.
- Arai N, Abe H, Nishitani H, Kanemaru S, Yasunaga M, Yamamoto S, Seki S, Metani H, Hiraoka T, Hanayama K. Characteristics of Patients with Trephine Syndrome: A Retrospective Study. *Prog Rehabil Med*. 2022 Feb 23;7:20220008. doi: 10.2490/prm.20220008. PMID: 35280326; PMCID: PMC8858714.