

# Positional Plagiocephaly

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RAD 4001

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# Clinical History

- 5 week old girl, who was seen by her outpatient pediatrician 9/16 and was noted to have an abnormal head shape
- Born at 37 weeks via C-Section due to breech presentation, head shape normal at birth
- Was in NICU for 5 days after birth for hyperbilirubinemia
- Physical exam unremarkable otherwise
- Meeting milestones appropriately
- Immunizations up to date
- No concern for trauma

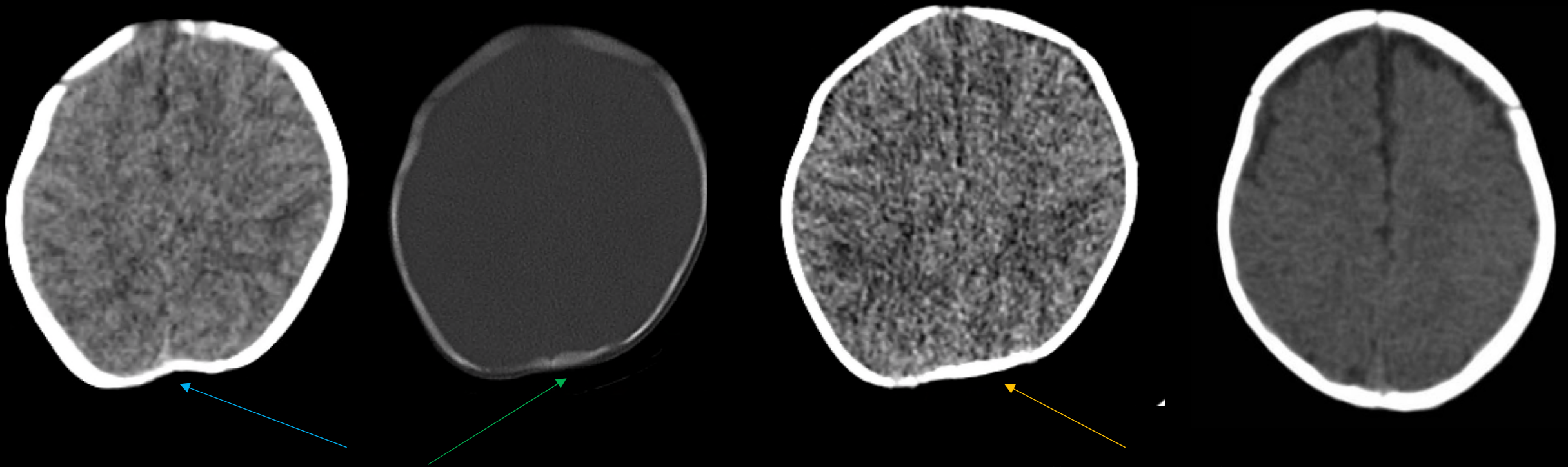
# Work-Up

- Referred by Pediatrician 9/16 following well child check to Pediatric Plastic Surgery clinic due to abnormal head shape
- CT Head scheduled and done 9/30 due to concern for craniosynostosis
- No other labs/imaging obtained

# Imaging – Axial CT Brain

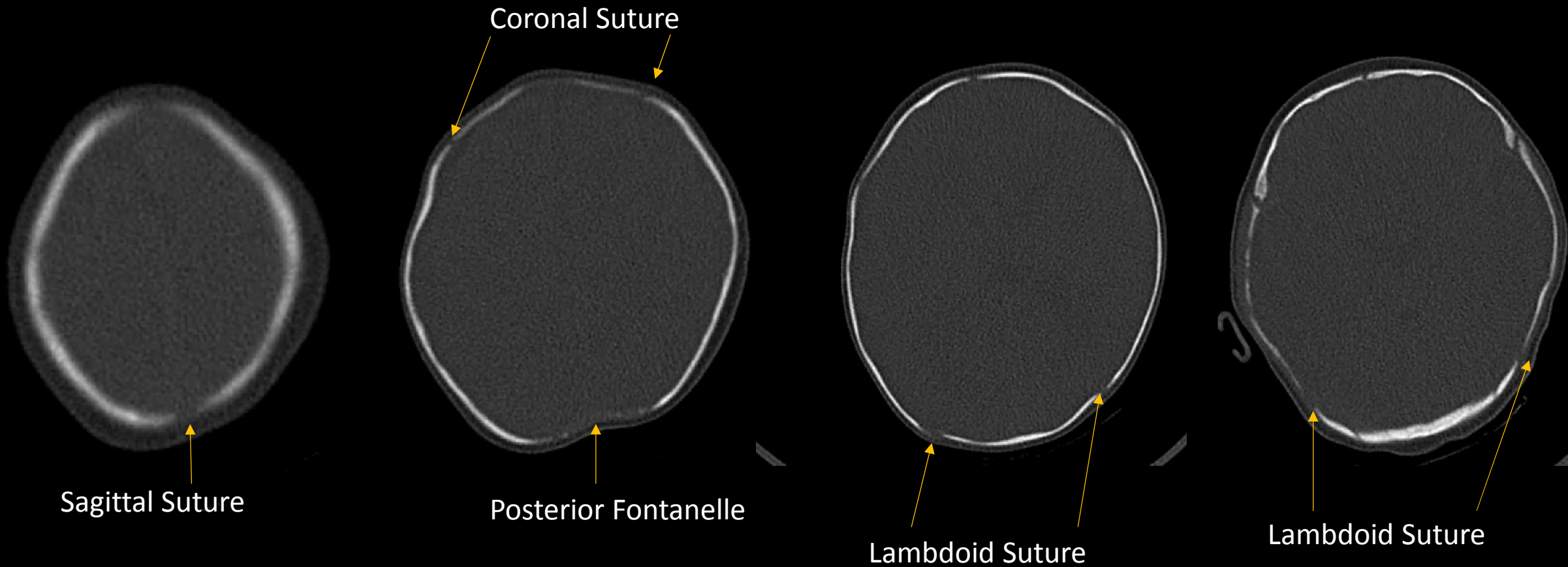
Patient CT

Normal 2 Month CT



<https://radiopaedia.org/cases/normal-brain-ct-2-month-old?lang=us>

# CT Brain – Axial Sutures

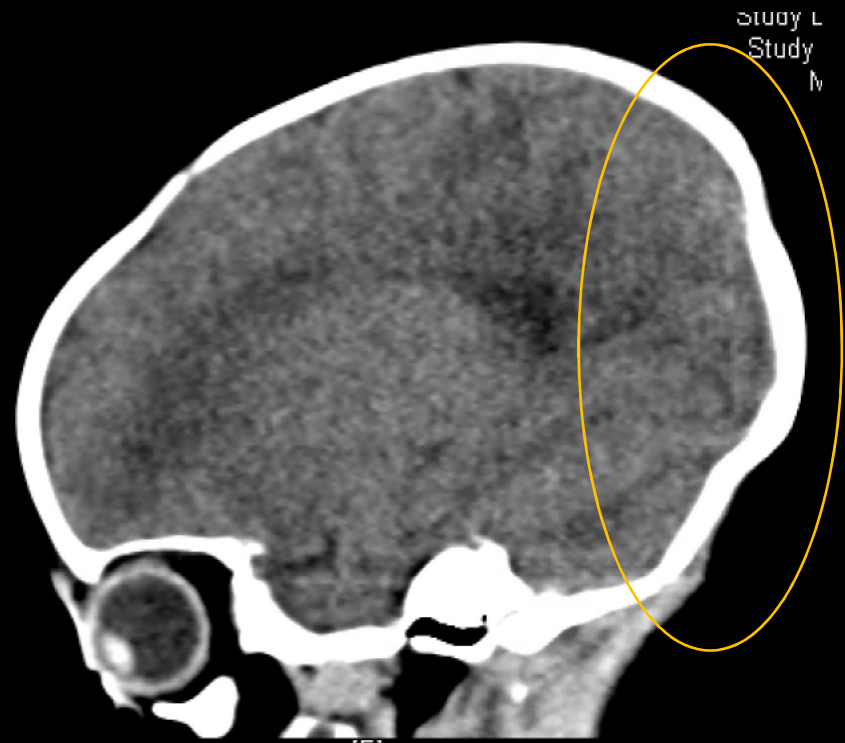


# CT Brain - Saggital

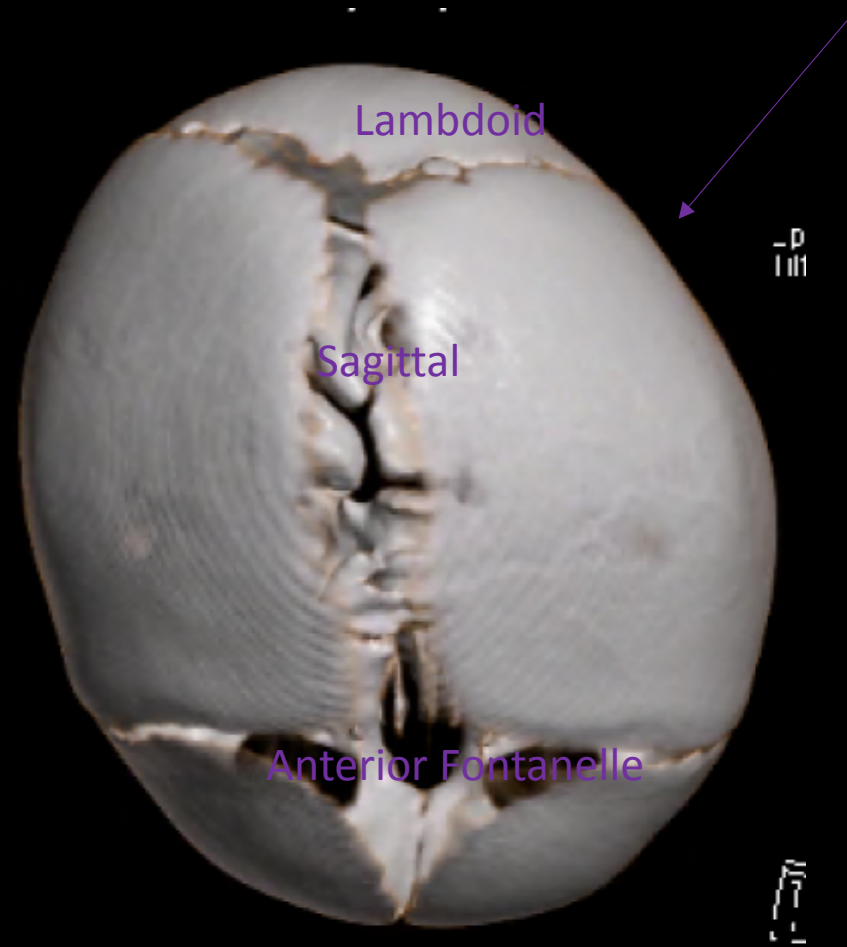
Right Side



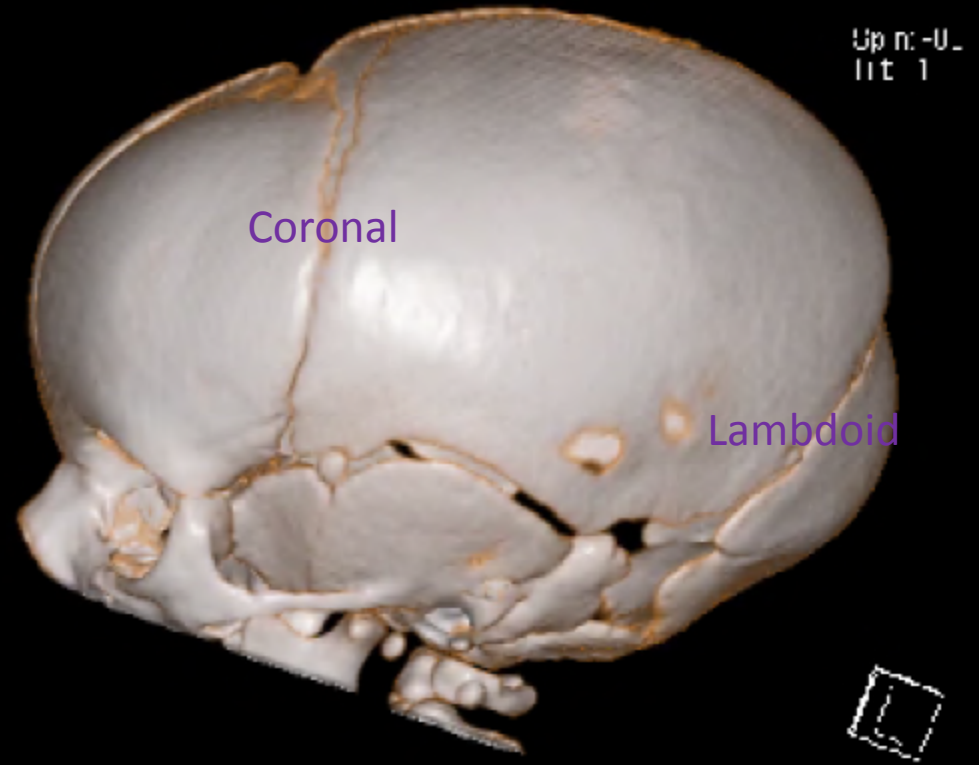
Left Side



# 3D Reconstruction CT Head

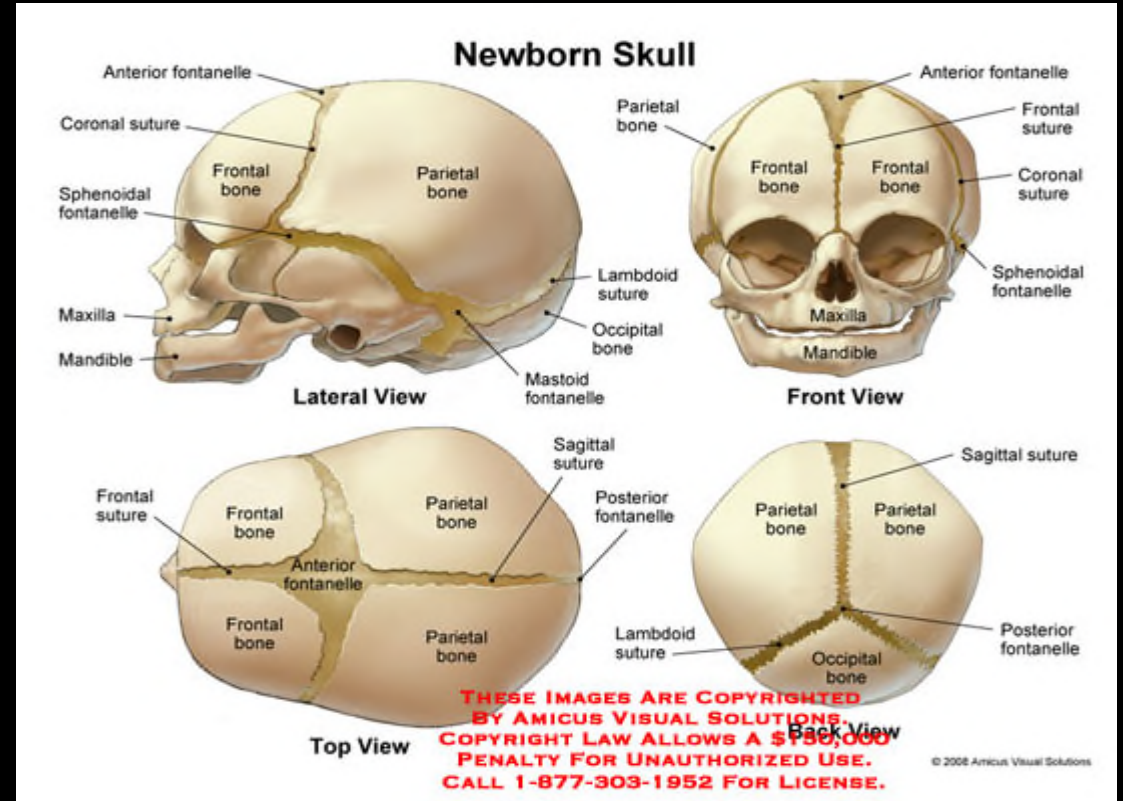
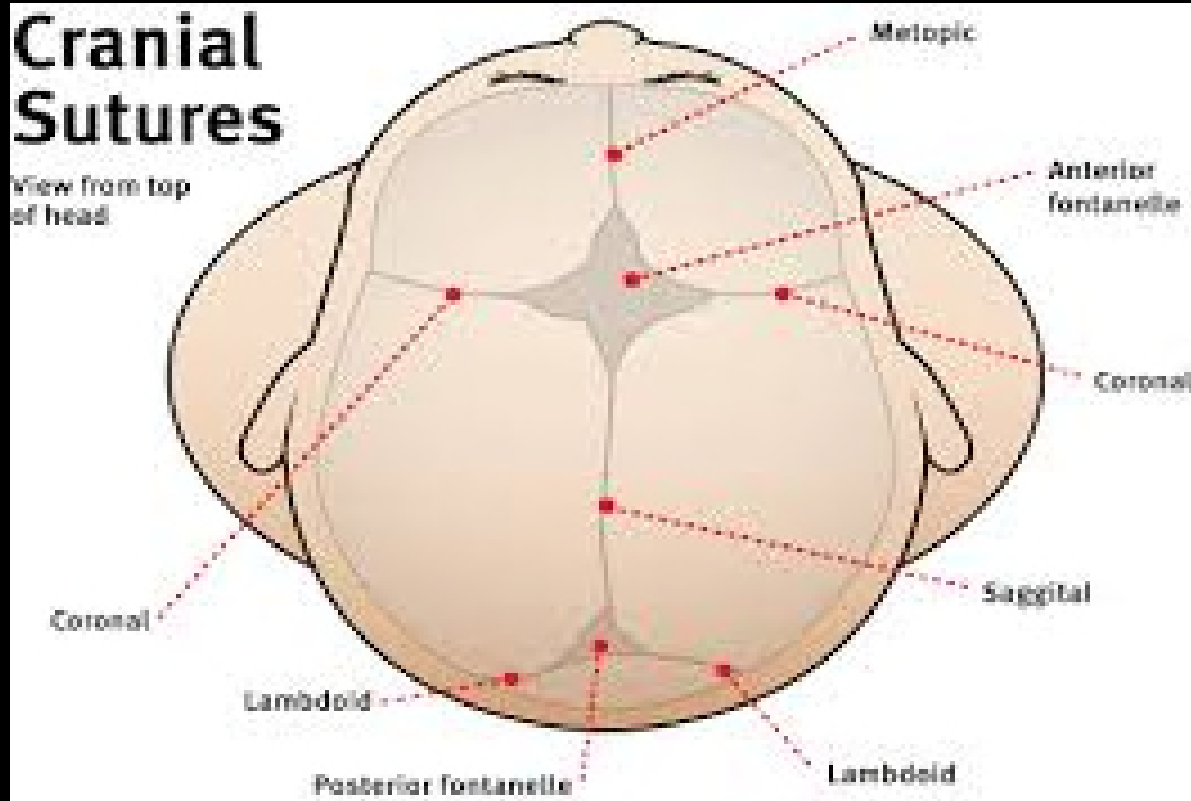


# 3 D reconstruction CT Head Lateral View – Open Sutures





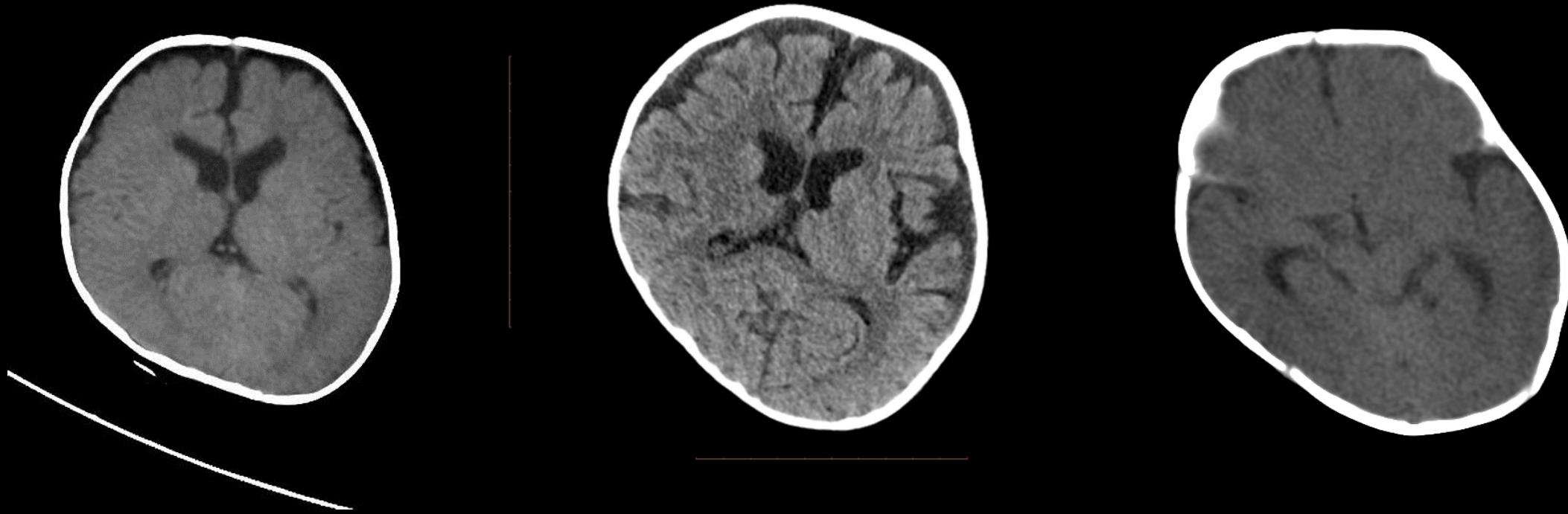
# Normal Anatomy



[http://www.medicalexhibits.com/obrasky/2008/08007\\_04X.jpg](http://www.medicalexhibits.com/obrasky/2008/08007_04X.jpg)

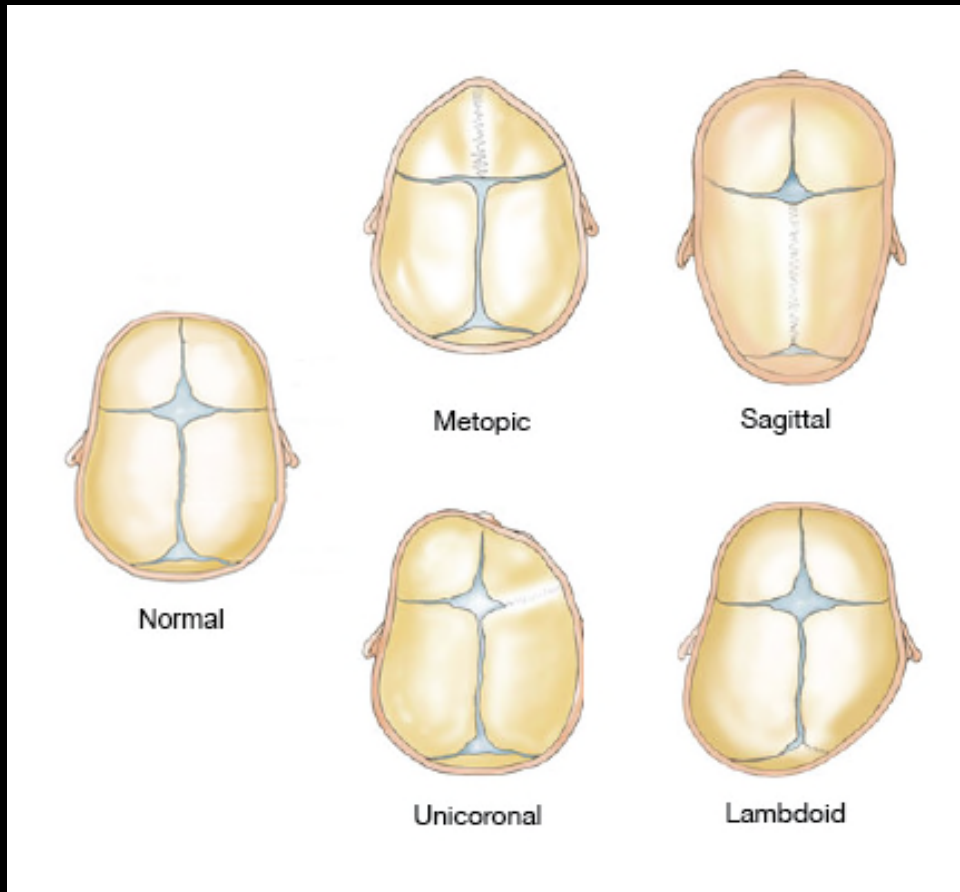
<http://www.childrens.health.qld.gov.au/wp-content/uploads/images/fact-sheets/cranial-sutures-illustration-1.png>

# Severe Examples Positional Plagiocephaly

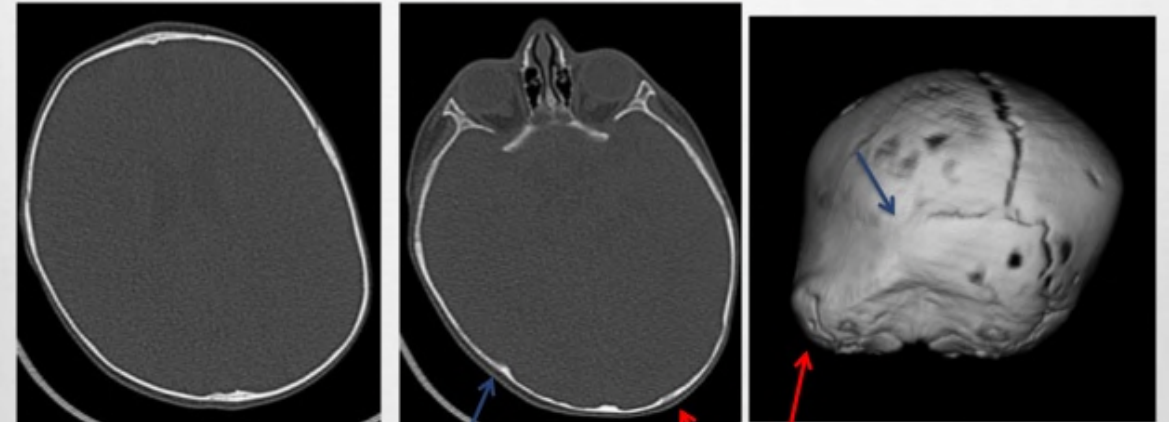


[https://prod-images.static.radiopaedia.org/images/30649428/d3eb429149ff857e9c7e40c7677c62\\_big\\_gallery.jpeg](https://prod-images.static.radiopaedia.org/images/30649428/d3eb429149ff857e9c7e40c7677c62_big_gallery.jpeg)

# Examples Craniosynostosis



## Lambdoid Synostosis



# Fontanelle and Suture Closure

## Age of fontanelle closure

Fontanelle	Closure
Posterior	Two months
Anterior lateral	Three months
Posterior lateral	One year
Anterior	Two years

## Age of suture closure

Suture	Begins closure, months
Metopic	2
Sagittal	22
Coronal	24
Lambdoid	26
Palatal	30 to 35
Frontonasal	68
Frontozygomatic	72

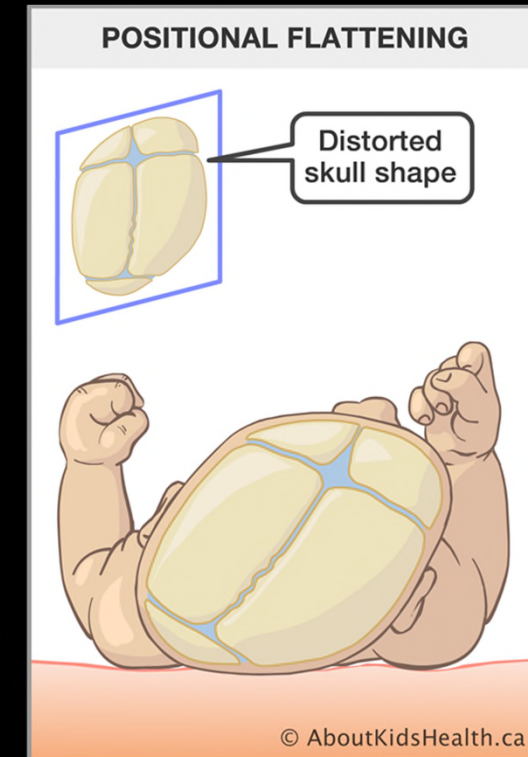
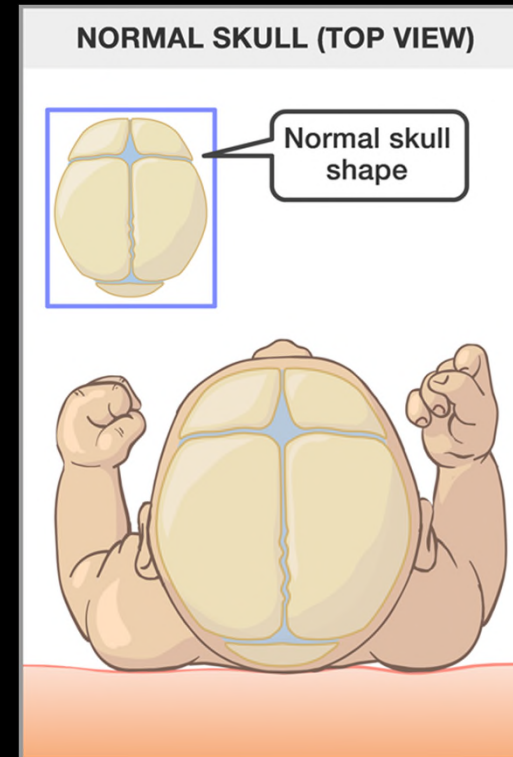
[https://www.uptodate.com/contents/image?imageKey=PEDS%2F70196&topicKey=ALLRG%2F2910&search=craniosynostosis&rank=1~62&source=see\\_link](https://www.uptodate.com/contents/image?imageKey=PEDS%2F70196&topicKey=ALLRG%2F2910&search=craniosynostosis&rank=1~62&source=see_link)

# Differential Diagnosis

- Positional Plagiocephaly: Condition where areas of an infant's head take on a flattened shape
- Craniosynostosis (Particularly Lambdoid): Premature fusion of 1+ cranial suture results in restricted growth and skull deformity
- Parry-Romberg disease: Also known as progressive facial hemiatrophy, characterized by degeneration of half the face, including skin, cartilage, & bone

# Key imaging findings

- Mild flattening of the left occiput as seen on brain and bone window on the CT Head.
- All sutures were found to be open, seen clearly on the 3D remodeling.
- Left ear pushed forward anteriorly, often seen with positional plagiocephaly



# Official Read

Mild asymmetrical flattening on the left occipital as compared to right

The coronal suture, sagittal suture, and lambdoid sutures are unfused and normal in appearance.

The metopic suture is open. The anterior fontanelle is open. The posterior fontanelle is open.

Limited evaluation of the brain does not demonstrate any significant abnormality. Ventricles are normal in size and configuration. No definite pathological extra-axial fluid collection is seen.

There is no significant paranasal sinus, middle ear or mastoid disease.

No evidence of skull fracture or pathological lytic lesion is seen.

## IMPRESSION:

1. No evidence of premature fusion of cranial sutures.
2. Mild asymmetrical flattening of the left occipital as compared to right. Findings are highly suggestive of left-sided positional plagiocephaly. No more imaging follow-up is needed.

# Final Diagnosis

Given the history/physical coupled with imaging findings, the final diagnosis was determined to be positional plagiocephaly



# Discussion

- Plagiocephaly is a condition characterized by asymmetrical distortion of the skull
- Infant skulls are soft and malleable, so infants that sleep or nurse on a specific side, or have torticollis, may develop positional plagiocephaly.
- Incidence has increased, as supine positioning while sleeping has become standard due to the “back to sleep” campaign launched by the AAP to reduce incidence of SIDS
- In this case, the child has imaging that shows open sutures, favoring plagiocephaly over craniosynostosis
- Given the benign nature of the condition, no further imaging or workup is needed to avoid unnecessary radiation exposure

# Treatment

- Follow-up outpatient appointment had not been completed at the time of this presentation, given mild flattening will likely undergo repositioning therapy
- Cosmetic outcomes are typically very good, with most children experiencing substantial improvement of the deformity
- Treatment involves either repositioning therapy, or helmet/band therapy for moderate/severe cases (typically before 6 months of age)



<https://8visuals.com/wp-content/uploads/2016/12/docbandcamo.jpg>

# ACR appropriateness Criteria

- No ACR appropriateness guidelines exist for positional plagiocephaly or craniosynostosis
- However, the ACR-ASNR-SPR practice parameters state that concern for craniosynostosis is an acceptable indication for CT brain
- The CT Head was done outpatient. Per the Memorial Hermann standard pricing page, an outpatient non-contrast CT head is 3,157\$ without insurance and 98\$ with insurance
- Studies have been done to look at use of Ultrasound over CT to spare radiation, however no consensus has been reached and CT is still typically the 1<sup>st</sup> line study done
- Some groups/studies recommend history and physical exam alone, without imaging

# Take Home Points

- Infant skulls are malleable, and pressure can lead benign changes in skull shape
- Concerned parents can be reassured that treatment is readily available and outcomes are very good
- CT Head is still the gold standard imaging modality at this time

# References

- 1) Prevention and Management of Positional Skull Deformities in Infants James Laughlin, Thomas G. Luerssen, Mark S. Dias, the Committee on Practice and Ambulatory Medicine, Section on Neurological Surgery Pediatrics Dec 2011, 128 (6) 1236-1241; **DOI:** 10.1542/peds.2011-2220
- 2) Saeed NR, Wall SA, Dhariwal DK Management of positional plagiocephaly Archives of Disease in Childhood 2008;93:82-84.
- 3) Turk, A E et al. “The ‘Back to Sleep Campaign’ and Deformational Plagiocephaly: Is There Cause for Concern?” *The journal of craniofacial surgery.* 7.1 12–18.
- 4) Cognitive Outcomes and Positional Plagiocephaly Brent R. Collett, Erin R. Wallace, Deborah Kartin, Michael L. Cunningham, Matthew L. Speltz Pediatrics Feb 2019, 143 (2) e20182373; **DOI:** 10.1542/peds.2018-2373
- 5) <https://www.memorialhermann.org/patients-caregivers/memorial-hermann-charge-master/>
- 6) <https://www.ispn.guide/congenital-disorders-of-the-nervous-system-in-children/positional-plagiocephaly-in-children-homepage/evaluation-of-positional-plagiocephaly-in-children/>



Questions?