

# CT Children's CLASP Guideline

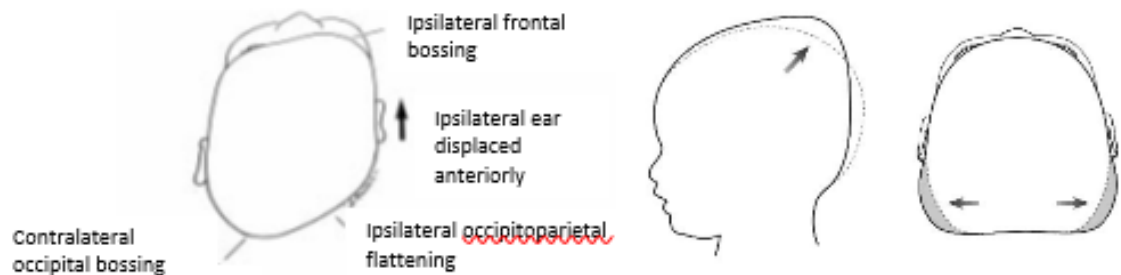
## Plagiocephaly

### INTRODUCTION

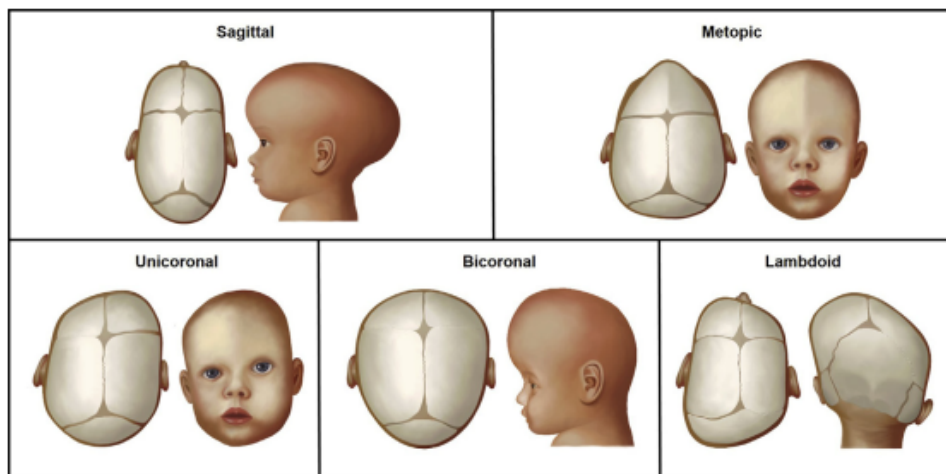
**Positional plagiocephaly** is a cosmetic alteration of the head shape in infants resulting from asymmetric head positioning during a period of rapid brain/skull growth with age-related low muscle tone. While the exact prevalence of positional plagiocephaly is unknown, it is estimated to affect 2-15% of infants. An increased incidence is present in children with torticollis and hypotonia of varying causes. The significance of positional plagiocephaly is purely cosmetic; it does not impact neurocognitive or motor development, nor does it impact auditory function, dentition, or risk of otic infections.

Two common forms of positional deformation are:

1. **Occipital Plagiocephaly (below left)** - In this common variant, unilateral occipital flattening is compensated for by ipsilateral anterior displacement of the ear and frontal bone resulting in a "parallelogram" skull shape.
2. **Occipital Brachycephaly (below right)** - In this form of plagiocephaly, the occipital area flattens symmetrically resulting in a wide, short (from front to back) head. A compensatory increase in head height in the parietal region is common.



Positional deformation can be contrasted to craniosynostosis, a congenital malformation of the skull that results in characteristic phenotypical changes to the face and skull.



**Fig. 6.** The characteristic features of (A) sagittal, (B) metopic, (C) coronal, (D) bilateral coronal, and (E) lambdoid synostosis.

(Hersh, Bookland, Hughes, 2021)

**Table 3**  
**Phenotypic features of craniosynostosis**

Involved Suture	Phenotype	Description
Sagittal	<ul style="list-style-type: none"> <li>• Elongated, narrow head</li> <li>• Frontal bossing</li> <li>• Parietal narrowing</li> <li>• Tapered, prominent occiput</li> <li>• Anteriorly displaced vertex</li> </ul>	<ul style="list-style-type: none"> <li>• Scaphocephaly</li> <li>• Dolichocephaly</li> </ul>
Metopic	<ul style="list-style-type: none"> <li>• Narrow forehead</li> <li>• Hypotelorism</li> <li>• Pterional “pinching”</li> <li>• Prominent midline ridge</li> </ul>	<ul style="list-style-type: none"> <li>• Trigenocephaly</li> </ul>
Coronal	<ul style="list-style-type: none"> <li>• Ipsilateral forehead recession</li> <li>• Elevation of the ipsilateral orbit (Harlequin eye)</li> <li>• Contralateral frontal bossing</li> <li>• Deviation of nasal root to the affected side (variable)</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Anterior plagiocephaly</b></li> </ul>
Bilateral coronal	<ul style="list-style-type: none"> <li>• Short, wide head</li> <li>• Recession of the midface and orbits bilaterally</li> <li>• Proptosis</li> <li>• Bilateral frontal bossing</li> <li>• Increased skull height</li> </ul>	<ul style="list-style-type: none"> <li>• Brachycephaly</li> <li>• Turricephaly</li> </ul>
Lambdoid	<ul style="list-style-type: none"> <li>• Ipsilateral flattening of the occiput</li> <li>• Posterior and inferior displacement of the ipsilateral mastoid and ear</li> <li>• Contralateral frontal bossing</li> <li>• Trapezoid” appearance on vertex view</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Posterior plagiocephaly</b></li> </ul>

(Hersh, Bookland, Hughes, 2021)

**INITIAL EVALUATION AND MANAGEMENT**

**INITIAL EVALUATION:**

- Clinical examination is the preferred means of diagnosis. This includes observation of head shape and circumference, status of the anterior fontanelle, range of motion of the neck, and notation of eye movement abnormalities.
- We discourage routine use of imaging with ionizing radiation (plain radiographs or CT scan) in the evaluation of infant head shape. (see attached #1 recommendation in the attached ABIM Choosing Wisely document from the AAP Section on Neurological Surgery – **Appendix A: Choosing Wisely**).

**INITIAL MANAGEMENT:**

- Reassure and educate parents about plagiocephaly

0-3 months:

- Identify torticollis if present and instruct parents regarding neck stretching exercises (see **Family Handouts: Appendices B and C- Neck Stretches**) and consider offering referral to PT for same.
- Play and interact with babies while they are awake and on their tummy 2 to 3 times each day for a short time (3–5 minutes), increasing the amount of tummy time as babies show they enjoy it. Work up to 15 to 30 minutes each day by 7 weeks (See **Family Handout Appendix D: Tummy Time**)
- Instruct parents regarding **active counter-positioning**. Strategies include alternating head position during periods of sleep, changing crib position or stimuli such as toys of interest to encourage head positioning on unaffected side.

3-6 months:

- Increased “tummy time” during wakeful periods. We suggest a goal of 5-10 minutes per session totaling 2 hours daily.

<b>WHEN TO REFER</b>	<p><b>SEMI-URGENT REFERRAL to Connecticut Children’s Neurosurgery (within 2 weeks):</b></p> <ul style="list-style-type: none"> <li>▪ Children with head shape/deformity not conforming to positional deformation</li> <li>▪ Primary care provider concerned for possible craniosynostosis</li> </ul> <p><b>ROUTINE REFERRAL to Connecticut Children’s Neurosurgery (within 4 weeks) for:</b></p> <ul style="list-style-type: none"> <li>▪ All patients between 4-12 months who demonstrate no improvement and/or for whom parental or PCP concerns remain regarding persistent or residual head shape abnormality.</li> <li>▪ Ideal time for evaluation is 5-6 months if concerns persist following implementation of initial management strategies.</li> </ul>
<b>HOW TO REFER</b>	<p><b>Referral to Neurosurgery Department via CT Children’s One Call Access Center</b>  <a href="http://connecticutchildrens.org">Make a Referral - Connecticut Children's (connecticutchildrens.org)</a>  <b>Phone:</b> 833.733.7669 <b>Fax:</b> 833.226.2329</p> <p><b>Information to be included with the referral:</b></p> <ul style="list-style-type: none"> <li>▪ Growth chart, including head circumference measurements</li> <li>▪ Demographic sheet</li> </ul>
<b>WHAT TO EXPECT</b>	<p><b>What to expect from CT Children’s Visit:</b></p> <ul style="list-style-type: none"> <li>▪ Examination to establish the degree of deformity and establish the diagnosis</li> <li>▪ Explanation and referral for cranial orthosis (i.e. helmet therapy) as appropriate</li> <li>▪ Providers should note that referral for cranial orthosis (i.e. helmet therapy) in children over 1 year of age is not recommended due to decreased velocity of head growth in these children. Most insurers will not cover helmet orthosis in patients over 1 year of age.</li> </ul>



American Academy of Pediatrics  
DEDICATED TO THE HEALTH OF ALL CHILDREN™  
Section on Neurological Surgery  
**Five Things Physicians  
and Patients Should Question**

1

**Do not perform routine imaging for evaluation of infant head shape.**

Routine imaging for the evaluation of infant head shape is not necessary. It exposes the child to unnecessary radiation. Positional plagiocephaly can be diagnosed on clinical examination. Most craniosynostosis presentations can also be discerned on clinical examination. Imaging may be obtained by specialists to make the diagnosis in complex cases and, if necessary, for surgical planning.

2

**Do not obtain imaging of the cervical spine following trauma in an awake and alert patient without considering the use of clinical decision making (CDM) tools for cervical spine clearance.**

Consideration should be given to avoid unnecessary radiation exposure when appropriate. For instance, CDM tools incorporate 3 or more variables from history, physical examination, or simple clinical tests to guide patient management. Results from the National Emergency X-Radiography Utilization Study (NEXUS) and the Pediatric Emergency Care Applied Research Network (PECARN) provide a high negative predictive value for significant cervical spine injuries in pediatric patients. Low-risk criteria from NEXUS include: no posterior midline cervical spine tenderness; no evidence of intoxication; normal level of consciousness; no focal neurological deficit; and no painful distracting injuries. PECARN developed a model that was highly sensitive for a normal cervical spine in the absence of: altered mental status, focal neurologic findings, neck pain, torticollis, substantial torso injury, conditions predisposing to cervical spine injury, high-risk motor vehicle crash, and diving. In comparison to NEXUS, the PECARN model takes into account mechanism of injury and specific extent and location of other associated injuries.

3

**Do not routinely perform imaging or routine elective procedures requiring sedation or general anesthesia for very young children with low-risk asymptomatic lesions.**

Low-risk asymptomatic lesions such as small rubbery scalp masses representing dermoid cysts or shallow midline sacral dimples do not routinely require intervention as a young infant. Routine magnetic resonance imaging requiring anesthesia is typically not recommended. Given the US Food and Drug Administration's Drug Safety Communication on pediatric anesthesia [www.fda.gov/Drugs/DrugSafety/ucm532356.htm](http://www.fda.gov/Drugs/DrugSafety/ucm532356.htm) warning that general anesthesia and sedation drugs used in children younger than 3 years for anesthesia of more than 3 hours or repeated use of anesthetics may affect the development of children's brains, risks and benefits of elective imaging or procedures should be carefully weighed (<http://smarttots.org/>). If imaging is necessary, consider approaches such as feed-and-wrap for MRI in infants or referral to specialists to develop a clinical follow-up plan and timing of intervention as appropriate.

4

**Do not perform routine imaging for evaluation of VP shunt function in a patient without signs or symptoms of shunt malfunction.**

Routine imaging to evaluate ventricle size in an asymptomatic patient with hydrocephalus is not necessary. When imaging is needed, performing a rapid brain MRI is a recommended option to prevent radiation exposure to the child. Surveillance imaging, if needed, should only be ordered by specialists who treat hydrocephalus.

5

**Do not routinely obtain a CT or MRI scan for developmentally normal, clinically asymptomatic infants with macrocephaly.**

Most infants with macrocephaly do not have abnormalities that require neuroimaging or neurosurgical evaluation. Imaging should generally be reserved for infants with clinical concerns such as abnormal neurological examination findings, significant developmental delay, or rapidly increasing head circumference measurements (such as those crossing growth curves). When imaging is indicated, head ultrasonography should typically be considered as the first-line test for infants with an open fontanelle.

These items are provided solely for informational purposes and are not intended as a substitute for consultation with a medical professional. Patients with any specific questions about the items on this list or their individual situation should consult their physician.

Released March 15, 2021

## How This List Was Created

The pediatric neurosurgery Choosing Wisely topics were chosen after discussion among the Section on Neurological Surgery (SONS) Executive Committee members regarding the most common pediatric neurosurgery issues and treatments general pediatricians see in their practices. Various expert committees and sections of the AAP reviewed and approved the list. The AAP Executive Committee then granted final approval of the list.

AAP's disclosure and conflict of interest policy can be found at [www.aap.org](http://www.aap.org).

## Sources

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### About the ABIM Foundation

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### About the American Academy of Pediatrics Section on Neurological Surgery

- The American Academy of Pediatrics is an organization of 67,000 primary care pediatricians, pediatric medical subspecialists and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents, and young adults.
- The Section on Neurological Surgery addresses issues common to pediatric neurosurgery to improve the care of infants, children, adolescents, and young adults with neurosurgical disorders.
- For more information, visit [www.aap.org](http://www.aap.org).



For more information or to see other lists of Things Clinicians and Patients Should Question, visit [www.choosingwisely.org](http://www.choosingwisely.org).



**Head Turning Activity**  
for Children With Right Congenital Torticollis



**1** Lay your baby on his or her back on a flat surface, feet toward you.

**TIP** Have your baby look toward a toy.



**2**

Gently turn your baby's head to face straight ahead. Place your left hand on your baby's left shoulder to keep your baby from rolling.



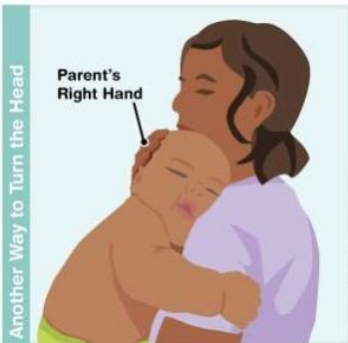
**3**

Place your right hand on the left side of your baby's head. Gently turn the head so your baby's chin is over his or her right shoulder.

Here are two other ways to turn the head.  
Find the way that works best for you.



Lay your baby on his or her belly with the left cheek facing down. Gently hold your baby's head to help your baby stay this way for 10–15 seconds.



Hold your baby up on your left shoulder with his or her left cheek against you. Gently hold your baby's head with your right hand to help your baby stay this way for 10–15 seconds.



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## Head Turning Activity for Children With Left Congenital Torticollis



**1** Lay your baby on his or her back on a flat surface, feet toward you.

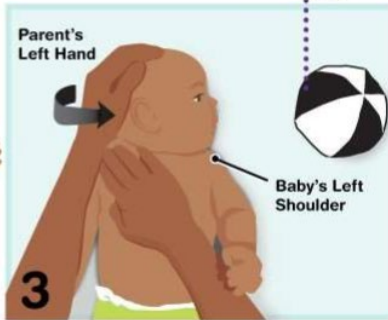
**TIP**

Have your baby look toward a toy.



**2**

Gently turn your baby's head to face straight ahead. Place your right hand on your baby's right shoulder to keep your baby from rolling.



**3**

Place your left hand on the right side of your baby's head. Gently turn the head so your baby's chin is over his or her left shoulder.

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Here are two other ways to turn the head.  
Find the way that works best for you.



Another Way to Turn the Head

Lay your baby on his or her belly with the right cheek facing down. Gently hold your baby's head to help your baby stay this way for 10–15 seconds.



Another Way to Turn the Head

Parent's Left Hand

Hold your baby up on your right shoulder with his or her right cheek against you. Gently hold your baby's head with your left hand to help your baby stay this way for 10–15 seconds.

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## Tummy Time

When lying on the tummy, your baby can practice lifting his or her head and strengthening the neck, arm, and shoulder muscles. At first, make these sessions about 2–5 minutes long, then gradually lengthen them to 10–15 minutes. Do this several times each day. Always watch your baby during tummy time, and never put your child to sleep on the tummy.



Here are ways to practice tummy time.



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**TIP** Use a toy to help keep your baby's interest.



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