Pediatric Neurosurgery
Consult and referral guidelines

Helen DeVos Children's Hospital
Outpatient Center
35 Michigan Street NE

Outreach locations:
Lansing, St. Joseph, Traverse City

About Pediatric Neurosurgery

All referrals are reviewed and triaged by a pediatric neurosurgeon. Based on the review, referrals determined to be urgent may be seen by an advanced practice provider in consultation with the pediatric neurosurgeon to facilitate neurosurgical care. All referrals regarding head shape and or size must have all growth charts, particularly head circumference, included with the referral information.

Most common referrals

- Benign extra-axial spaces
- Chiari
- Low back pain
- Sacral dimples
- Tethered cord
- Plagiocephaly

Pediatric Neurosurgery Appointment Priority Guide

Immediate	Contact HDVCH Direct at 616.391.2345 and ask to speak to the on-call neurosurgeon and/or send to the closest emergency department.
Urgent	Call HDVCH Direct and ask to speak to the on-call neurosurgeon regarding an urgent referral.
Routine	Send referral via Epic Care Link, fax completed referral form to 616.267.2401, or send referral through Great Lakes Health Connect.

Diagnosis/Symptom	Suggested Workup/Initial Management	When to Refer	Information Needed
Benign extra-axial spaces/macrocephaly **Benign extra-cerebral spaces** **Benign extra-hydrocephalus** **Benign extra-axial fluid** **Extra-ventricular hydrocephalus** **Benign subdural effusion**	If performed, MRI for ventricular size or quick brains study Ultrasound is not recommended	• If concerning to PCP or parent • Crossing growth percentiles on a month-to-month basis • Orbitofrontal head circumference greater than 1cm over 2 weeks • Head circumference crosses second percentile after 6 months of age • Neuroimaging reveals increased extra-axial subarachnoid spaces *Note: Increasing orbitofrontal head circumference in children up to approximately 24 months of age, secondary to immature arachnoid granulation preventing the adequate drainage of CSF into the venous system, typically resolves and does not involve neurosurgery intervention*	• Growth chart, including head circumference with notation about large head size
Chiari	Okay to refer without MRI MRI, if performed, should be of cervical spine with, or without, brain. The neurosurgery team only requests addition of brain imaging with an MRI if hydrocephalus may be is present.	• If not caused by trauma, headache located in the back of the head • Valsalva induced (cough, laugh) headache • Unless headache dominates life, treatment is not recommended	

Definitions

- *Chiari I: Characterized by abnormally shaped cerebellar tonsils that are displaced below the level of the foramen magnum*
- *Chiari II: Also known as Arnold-Chiari malformation – characterized by downward displacement of the cerebellar vermis and tonsils, a brainstem malformation with beaked midbrain on neuroimaging, and a spinal myelomeningocele*
- *Chiari III: Rare malformation that combines a small posterior fossa with a high cervical or occipital encephalocele, usually with displacement of the brainstem in a spinal canal*
- *Chiari IV: Now considered to be an obsolete term that describes cerebellar hypoplasia unrelated to the other Chiari malformations*
- *Chiari O (sub-type that is not widely used): Characterized by anatomic aberration of the brainstem (posterior pontine tile, downward displacement of the medulla, low lying obex) but with normally located cerebellar tonsils*
- *Chiari 1.5 (sub-type that is not widely used): Chiari II like malformation, but without spina bifida. Both of these sub-types show crowding at the foramen magnum.*

Diagnosis/Symptom	Suggested Workup/Initial Management	When to Refer	Information Needed
Low Back Pain *Please also refer to Pediatric Orthopedics guidelines*	MRI imaging is not recommended	• Mechanical back pain (pain that is completely relieved when a patient lies down and is brought-on when the patient stands up) • Radicular pain (reproducible pain that radiates down the leg in the same place every time and down the same leg every time) • To obtain a second opinion • Surgery is often not the right treatment option; we will work with patients and families to find alternate care options.	
Sacral Dimples *A pit located within the gluteal cleft, often diagnosed in the first year of life*	An ultrasound of the spine may be considered for patients <2 months of age MRI not recommended	• Only in rare cases do sacral dimples require intervention • An episode of meningitis requires an expedited work-up to determine if the dimple communicates with the intrathecal space • Refer if with other congenital abnormalities	• No special information is required

Important information about low back pain

- *In nearly all cases, surgery will not be able to help a patient with back pain only*
- *Spine surgery is effective for leg pain (radiculopathy). Differentiating radicular leg pain from non-dermatomal leg pain is a key part of a neurosurgery visit*
- *Imaging prior to consultation is discouraged as it will not change management of the condition. Even with radicular pain, conservative management is recommended to most patients.*
- *We recognize the disabling nature of pain and will always support pediatricians in cases where families are seeking answers. Pediatricians do not think that a patient is a candidate for surgery to send a referral. In addition to helping patients who can benefit from surgery, the neurosurgery team will help families and patients learn why surgery could be harmful.*
- *Opioids are never recommended, especially for patients with chronic pain. Our office will not prescribe opioids or any other sensorium-altering medications.*

Diagnosis/Symptom	Suggested Workup/Initial Management	When to Refer	Information Needed
Tethered Cord	MRI of lumbar spine *Note: Some insurance companies only approve this study if the order is written with contrast.*	• Progressive or worsening condition • Progressive orthopedic deformation in a child with other congenital anomalies • Weakness • Back pain/radiculopathy • Leg pain (paresthesia/sensation changes, weakness, reflex changes/spasticity, progressive scoliosis, limb, gait changes) • Bowel/bladder (urinary tract infections, changes in catheterization frequency, loss or change in incontinence, constipation, frequency, loss of bladder function in children who had been potty-trained) • Also consider referrals to primary care, Urology, Orthopedics, physical therapy	

Tethered cord definition

- *Tethered cord: Conus of the spinal cord is at, or lower than, the superior endplate of L3. This is found through imaging.*
- *Tethered cord syndrome: Clinical signs and symptoms secondary to the stretch of the spinal cord and/or the nerve roots*
- *Simple tethered cord: Fatty filum is greater than 2 mm*
- *Complex tethered cord: A tethered cord secondary to etiology of open spina bifida (myelomeningocele) or closed spina bifida which would include lipomyelomeningocele*

Plagiocephaly	Clinical exam including ipsilateral advancement of the occiput, ear and forehead from a “bird’s eye” view X-rays, CTs and MRI are not recommended and rarely indicated Parental report with clinical exam is best criteria to diagnose; anthropometric measure and pictures aren’t needed Consider referral to physical therapy Also consider referral to Plastic Surgery Alter sleep positions	• Feel a palpable ridge • Concerns for significant skull malformation. • Surgical correction of this disorder is almost never indicated • Special care to be given if associated with torticollis	