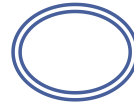


Management of Chiari Malformation in Pregnancy and Delivery



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Director of the Neurosciences clinic

Assistant Professor, Department of Neurology, Harvard Medical School



Janet Waters, MD, MBA

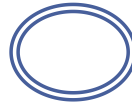
Division Chief, Women's Neurology

Associate Professor, University of Pittsburgh, Medical Center

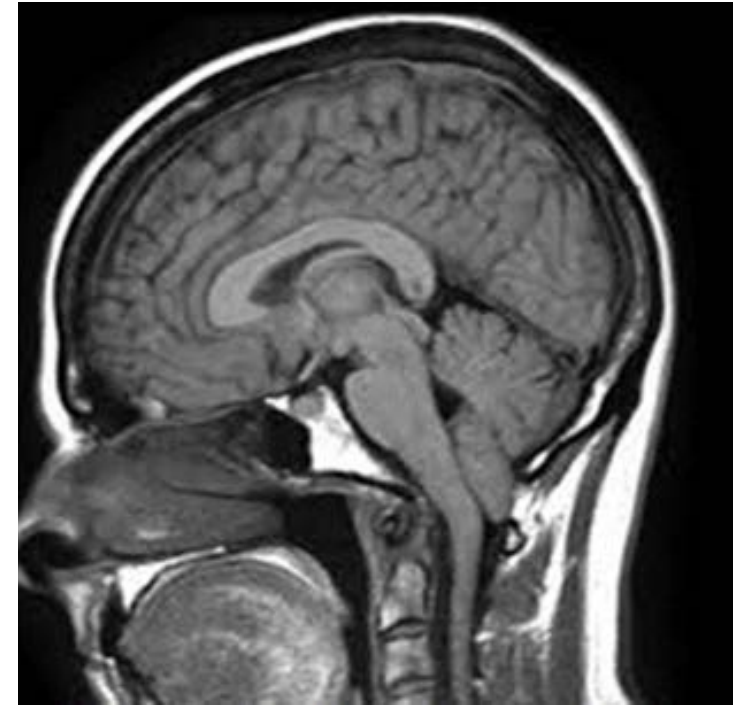
Pittsburgh, Pennsylvania



Chiari Type I

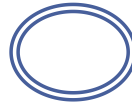


- Downward displacement of the cerebellar tonsils below the foramen magnum of more than 5 mm
- May be associated with syringomyelia

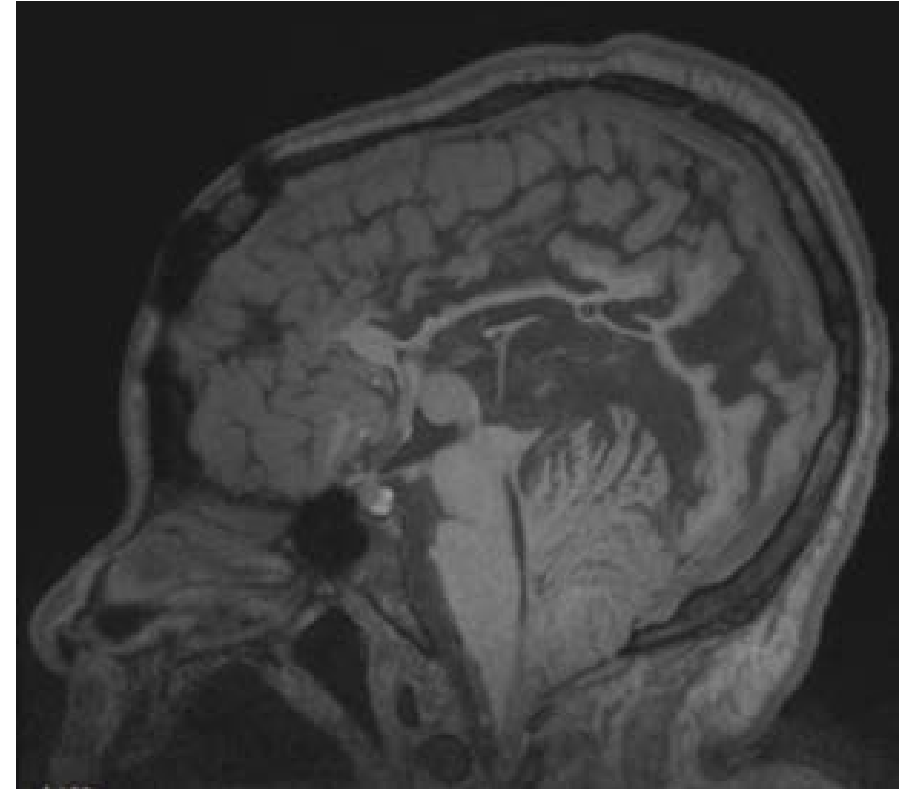


Images provided courtesy of Dr. Sanjay Prabhu; Staff Pediatric Neuroradiologist;
Boston Children's Hospital

Chiari Type II

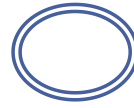


- Downward displacement of the cerebellar vermis and tonsils
- Kink in the medulla
- Hydrocephalus
- Syringomyelia
- Spinal myelomeningocele

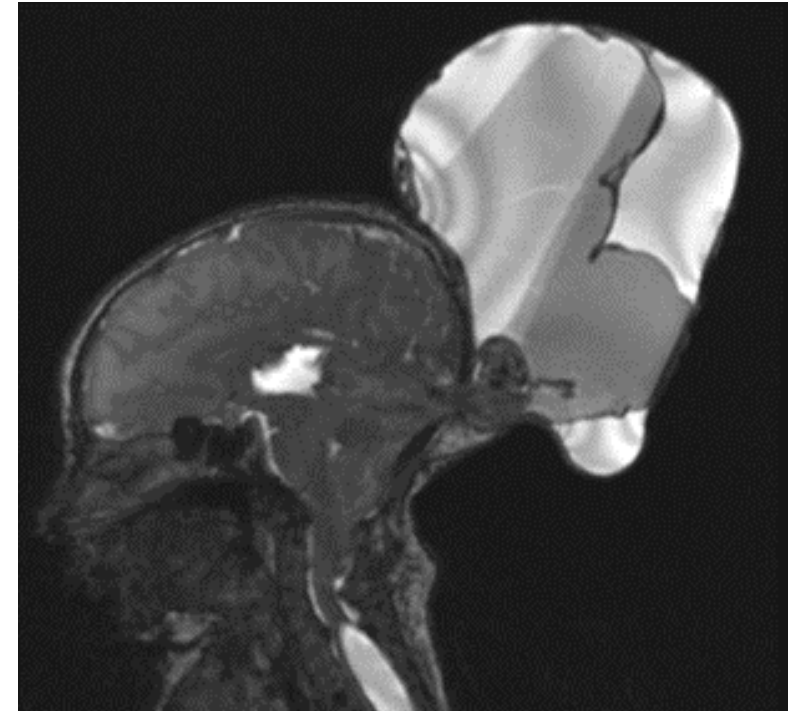


Images provided courtesy of Dr. Sanjay Prabhu; Staff Pediatric Neuroradiologist; Boston Children's Hospital

Chiari Type III

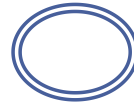


- Downward displacement of the cerebellum and brainstem
- Cervical or occipital encephalocele
- Spina bifida

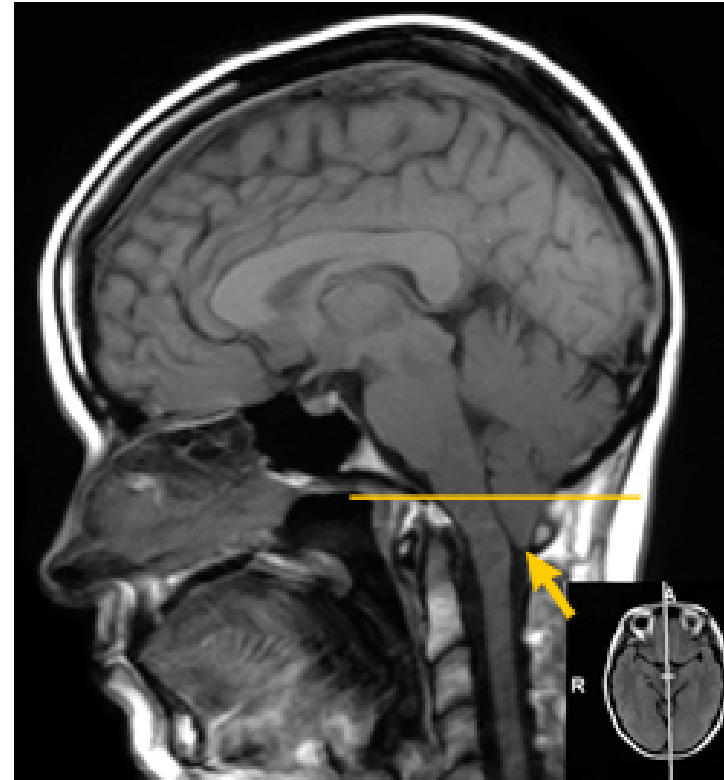


Images provided courtesy of Dr. Sanjay Prabhu; Staff Pediatric Neuroradiologist; Boston Children's Hospital

Chiari I

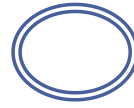


- Incidence
- Symptoms
- Labor concerns



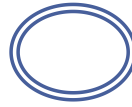
Ropper AH, Samuels, MA, Klein, JP. Developmental diseases of the nervous system. In Sydor AM, Davis KJ ed. Adams and Victor's Principles of Neurology. 10th ed. New York, NY: McGraw Hill; 2014:1015-1017
Hullander, RM, Bogard TP, Leivers, D, Moran D, Dewan, DM. Chiari I malformation presenting as recurrent spinal headache. Anesth Analg. 1992;75:1025-6.

Methods



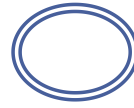
- EMRs were used to identify all women who delivered at Magee Women's Hospital & Brigham and Women's Hospital between 1/2010 – 12/2015 with Chiari I malformation based on neuroimaging
- Excluded women who had undergone surgical decompression prior to delivery
- Retrospective chart review: demographics, neurologic history, radiology reports, choice of mode of delivery, anesthetic method and outcome were recorded

Results

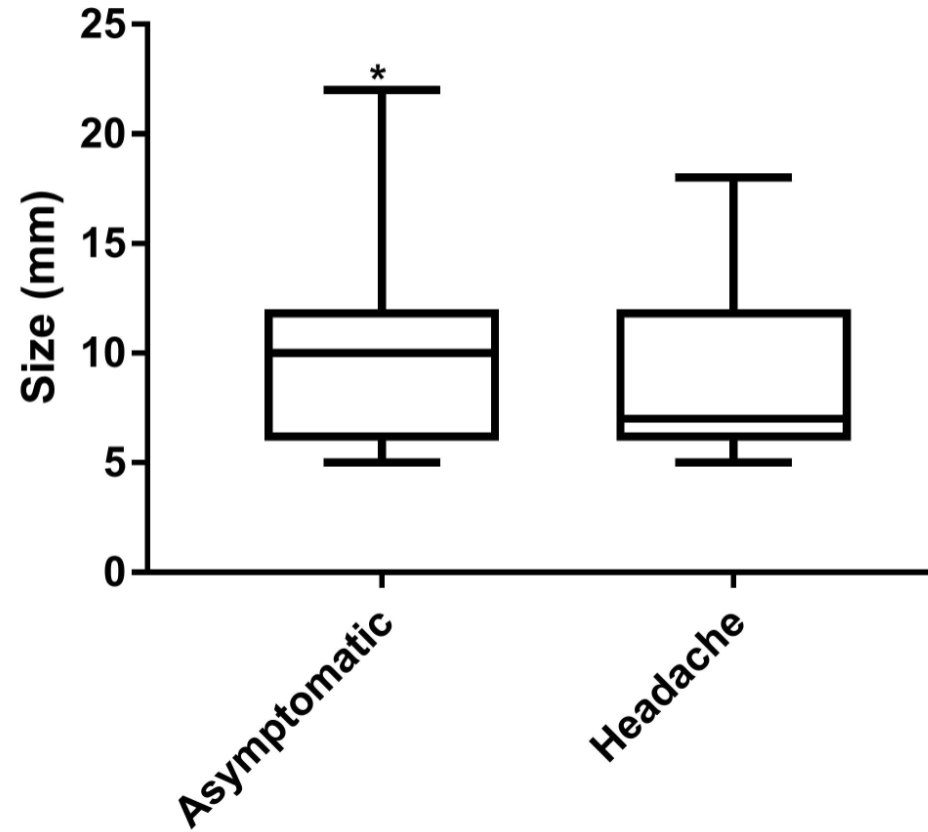


Age (n = 95) (years)	28.7 ± 6.6
Gravity (n = 95)	2.1 ± 1.3
Parity (n = 95) 0/1/2/3+	42/35/8/10
Gestational Age (n = 95) (weeks)	38.0 ± 3.4
Mode of Delivery (Vaginal/Cesarean Section) (n = 95)	51/44
Anesthesia Type (Spinal/Epidural/General/Local or none/unknown) (n = 94)	24/38/12/20/1
Chiari size (n = 92) (mm)	9.3 ± 4.3
Asymptomatic/Headache (n = 94)	58/36

Symptoms

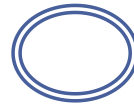


All

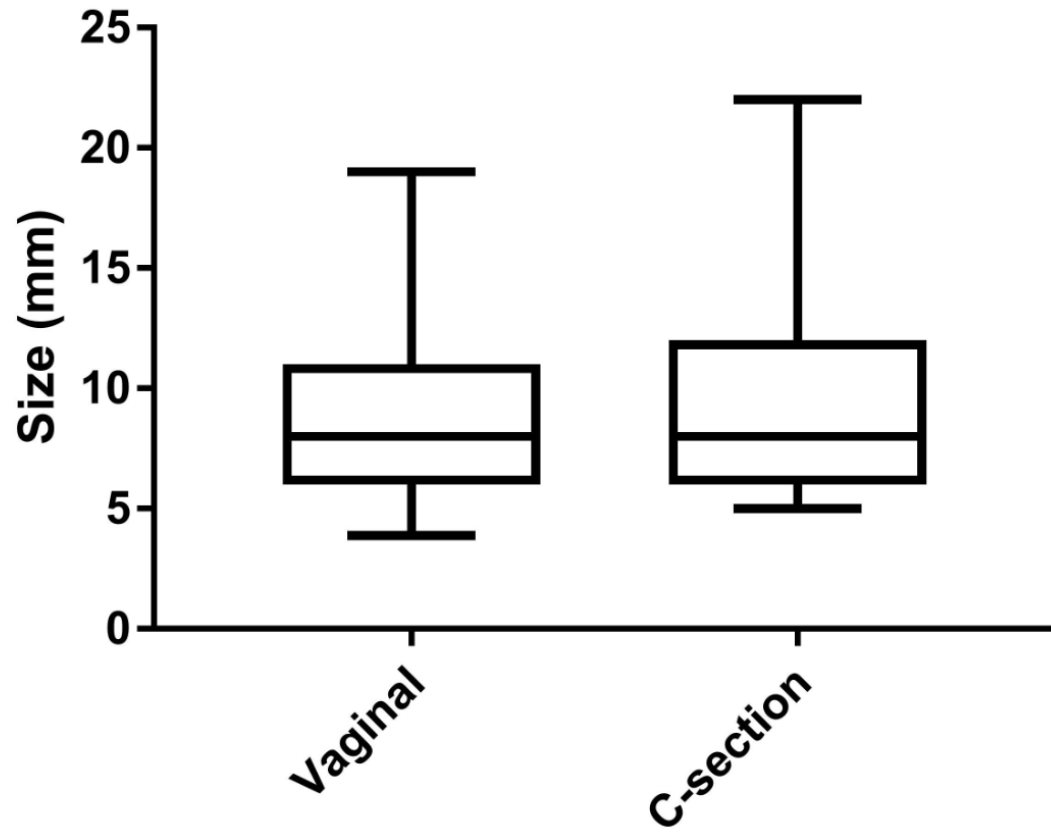


- Chiari size and symptoms

Mode of Delivery

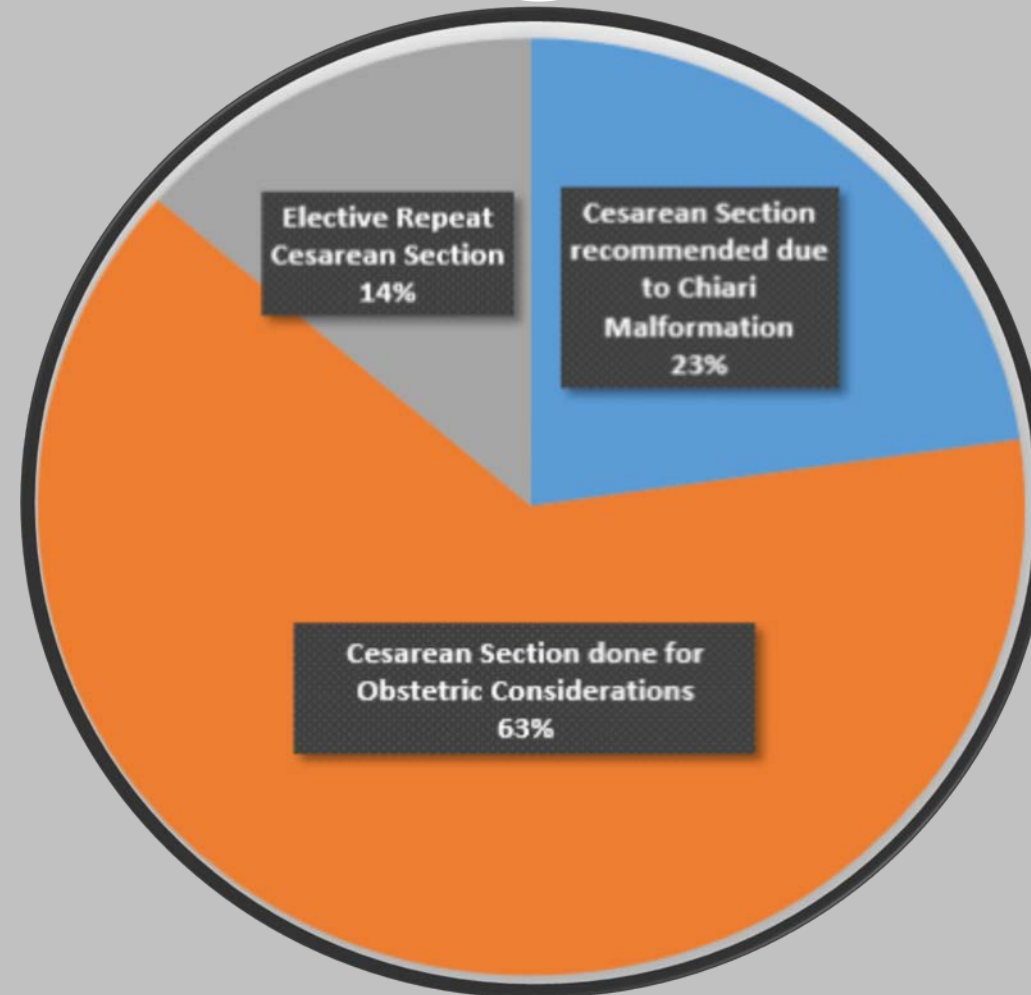


Size

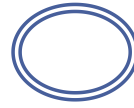


- No difference in the median size Chiari for women who underwent C-section vs vaginal delivery
- 10 C-sections done at physician recommendation due to Chiari- no difference in size of the Chiari when compared to the women who had C-section for obstetrical indications

Women with Chiari Malformation that underwent C-section

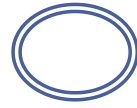


Patients referred for Cesarean Section due to Chiari I



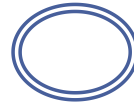
Number	Reason
3	Hydrocephalus
1	Papilledema
1	Headache and paresthesias
3	Headache alone
2	Asymptomatic

Women with Chiari who had a vaginal delivery (51)



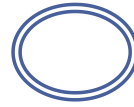
- 21 Headaches
- 30 Asymptomatic
- No reported worsening in either group

Women with Chiari who had Neuraxial Anesthesia- 62



- 38 Epidural
- 24 Spinal
- 0 Combined
- No complications reported which could be attributed to the Chiari

Discussion

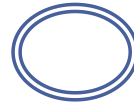


- **62 deliveries in women with Chiari I malformation, neuraxial anesthesia was administered without worsening headaches or any symptoms of tonsillar herniation.**
- **51 women with Chiari malformation were able to labor and deliver vaginally without neurologic deterioration**

-Orth T, Gerkovich M, Babbar S, Porter B, Lu G. Maternal and pregnancy complications among women with Arnold chiari malformation: a national database review. American J of Obstet & Gyn 2015; 212: S349.

-Garvey GP, Wasade VS, Murphy KE, Balki M. Anesthetic and Obstetric Management of Syringomyelia During Labor and Delivery: A Case Series and Systematic Review. Anesth Analg. 2017;125(3):913-24.

Proposed Guidelines



- **Choice of mode of delivery in women with asymptomatic should be based upon obstetrical considerations.**
- **Women with Chiari I malformation who are experiencing headache as the only manifestation of their Chiari I malformation can be delivered based upon obstetrical considerations.**
- **Women with Chiari I malformation with hydrocephalus and papilledema (with or without headache) may be considered to be high risk for both vaginal delivery and neuraxial anesthesia.**



“This is a teaching hospital”