SMRT Student Scope Submission

Title and Author(s)

Title: Chiari I Malformations and Syrinx

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Introduction or Patient History

A 37-year-old female presents with headaches, severe migraines, and right-sided weakness. She has known Chiari malformation previously diagnosed with MRI at another institution and was being seen at the University of Iowa Hospitals and Clinics for the first time. A c-spine MRI was ordered to asses her neck in flexion and extension views.

Patient Preparation and Scan Set up

A Siemens 1.5 Tesla MRI scanner was used for this exam. The patient was screened prior to entering the room to comply with MR safety guidelines. Along with the phased array spine coil, the posterior portion of a neck coil was placed on the table and the patient was positioned supine on the coil. An additional anterior coil was then attached to the posterior portion of the neck coil to ensure that good signal would be received from both anterior and posterior aspects of the patient. The neck was positioned in a neutral position and the patient was made comfortable with pillows under her knees to support her back. Earplugs were provided to protect her hearing. Images were acquired both with and without contrast with the neck in its natural position. The patient was then repositioned with a cushion placed under her head to put the neck in flexion and again with a cushion under the neck to extend it. Images were acquired in both of these positions.

MR Imaging Parameters

	TR	TE	Slice Thickness	Interspace	FOV	Bandwidth	Matrix	Signal Ave.
Loc	24	6	10	5.0	300	130	256x512	1
Sag T1	400	9	3	0.6	220	201	192x256	3
Sag T2	4000	119	3	0.6	220	195	224x320	1
Ax T1	414	8.6	4	1.0	220	219	192x256	3
Sag T1 FS with contrast	568	8.6	3	0.6	220	241	192x256	3
Ax T1 FS with contrast	620	8.6	4	1.0	220	241	192x256	2
Loc after flexion	24	6	10	5.0	300	130	256x512	1
Sag T2 flexion	4000	119	3	0.6	220	195	224x320	1
Loc after extension	24	6	10	5.0	300	130	256x512	1
Sag T2 extension	4000	119	3	0.6	220	195	224x320	1

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Findings and Discussions

Chiari malformation is a herniation of the cerebellum through the foramen magnum into the spinal canal. Chiari malformations are graded on a scale from one to three with three being the most severe. In this particular case, the patient had a known level one Chiari malformation. While scanning the neck in its neutral position, we noticed that the patient had a possible syrinx, which was previously undiagnosed. The protocol from the referring physician and the radiologist called for neutral, flexion, and extension views of the c-spine without contrast. After noticing the syrinx, a radiologist was paged and asked about giving contrast. The radiologist decided contrast was necessary; therefore post contrast images were acquired before moving the patient into flexion and extension positions. This ensured that the pre and post contrast images were taken with patient in the same position so they could be compared to one another, and the newly discovered syrinx could be evaluated. The flexion and extension views helped diagnose the severity of the Chiari. It was found that this patient had a level one Chiari protruding 11mm while the neck was in the neutral position and became more prominent with flexion and extension. A definite syrinx was diagnosed starting at the level of Chiari protrusion and stretching inferiorly. No other abnormalities or lesions were found. Other than the newly diagnosed syrinx, there was no progression of her disease.

This study was beneficial to the patient. The exam included three different views of the c-spine and its surrounding structures, which helped evaluate the extent of her movement and her Chiari malformation. It was also helpful to compare these images with the previous study to check for any progression of her disease. Noticing the syrinx and informing the radiologist allowed a decision to be made about giving contrast prior to moving the patient's position. Since only pre-contrast images were ordered, it also saved the possibility of the patient having to come back for additional post contrast images.

The newly discovered syrinx is most likely associated with this patient's Chiari malformation. A syrinx is a cavity formed when there is a collection of cerebrospinal fluid within the spinal cord. Since a syrinx is treated surgically, the patient will need to discuss this possibility with her neurosurgeon.

Conclusions

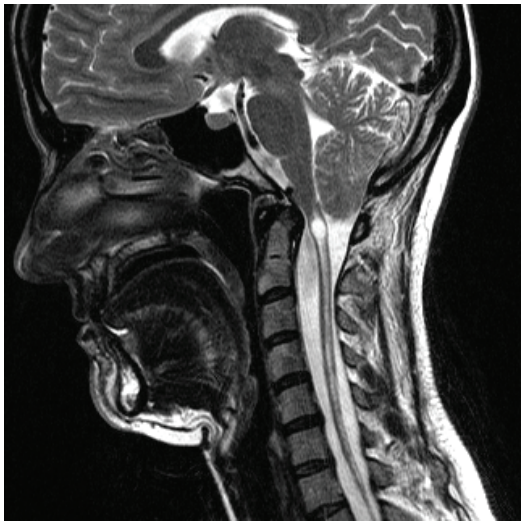
I learned that a Chiari malformation could, in some cases, cause a syrinx. This can occur due to the downward displacement of the brain past the base of the skull which can constrict the flow of cerebrospinal fluid and cause it to create and fill an abnormal cavity within the spinal cord. It was beneficial to have noticed the syrinx on the pre-contrast images. This was helpful to the patient because the study was reviewed and the decision to give contrast was made while the patient was still on the exam table. It was also interesting to see how the Chiari malformation was affected by the flexion and extension of the neck.

References

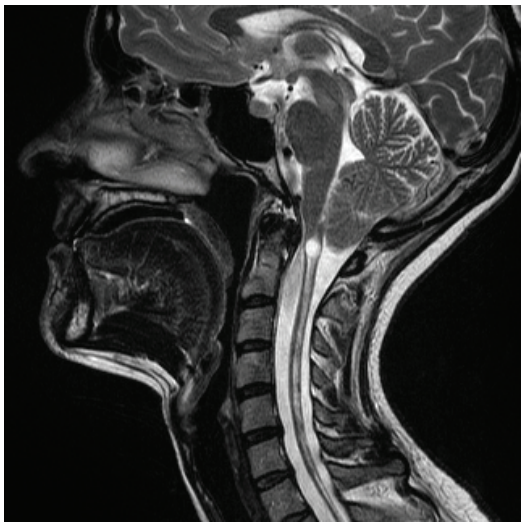
Chiari Malformations and syringomyelia. (2004). Penn State Milton S. Hershey Medical Center. Retrieved November 28, 2005 from the World Wide Web: http://www.hmc.psu.edu/pediatricneurosurgery/services/chiari.htm

Lee M.D., Ho Kyu. MRI dictation. Staff Radiologist. University of Iowa Hospitals and Clinics. 23 November 2005.

Images



Sagittal T2 with neck in flexion
Chiari malformation and syrinx shown



Sagittal T2 with neck in extension
Chiari malformation and syrinx shown