

# Vestibular Evaluation with Videonystagmography and Positional Nystagmus Exam in Predicting Decompression Success in a Case with Chiari Malformation

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## Introduction

Chiari malformation has a prevalence of 0.1-0.5% and is associated with cerebellar symptoms, headaches, vestibular symptoms, and apnea. Sleep apnea affects 9%-25% of the middle aged population and symptoms overlap with CM. Patients with these other conditions and CM present a diagnostic dilemma, since decompression may not provide relief if symptoms are due to these more-common disorders. For this reason, we refer these patients for neuro-otologic and vestibular evaluation with videonystagmography to determine if pathologic nystagmus is consistent with CM.

## Learning Objectives

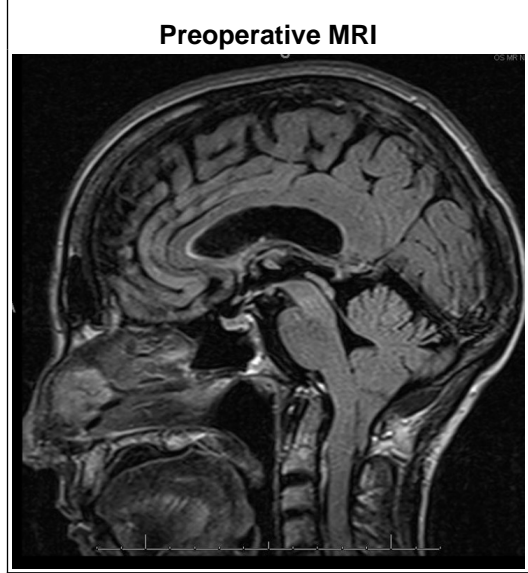
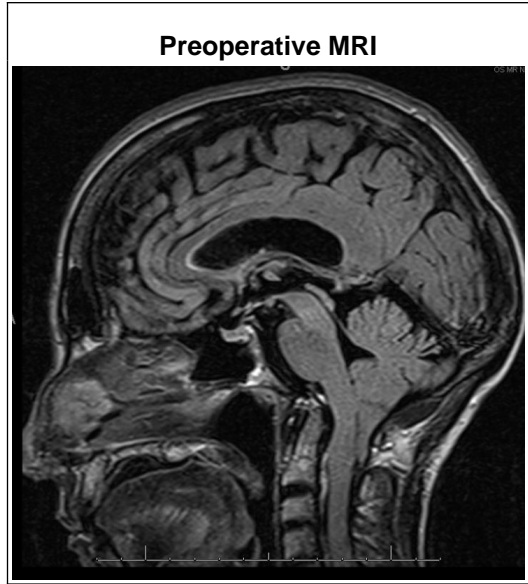
By conclusion of this session, participants should be able to 1) discuss the utility of chiari decompression in the treatment of central sleep apnea and 2) describe the importance of vestibular testing in concluding that the CM is the source of symptoms

## Methods

We present a case of a 61-year-old female with CM presenting with dizziness, imbalance, migraines, nystagmus, and severe sleep apnea diagnosed by polysomnography.

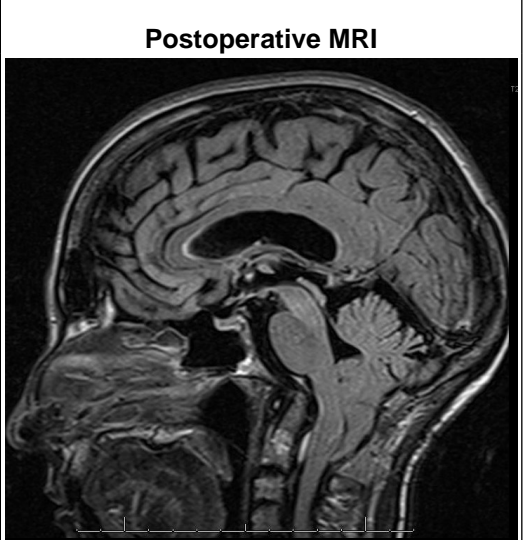
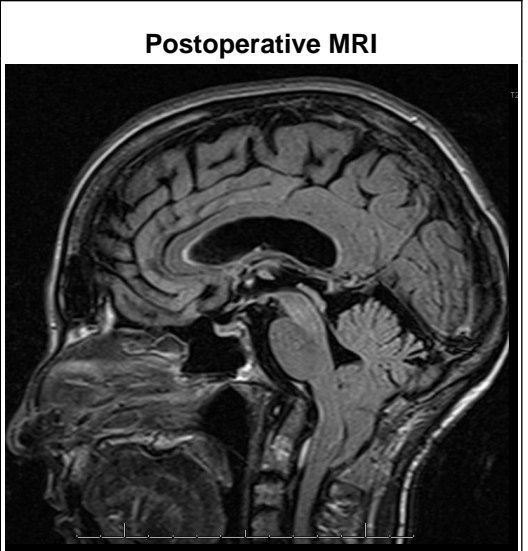
## Results

She underwent operative decompression. At her 3 month follow-up she reported improvement in gait, general well-being and sleep apnea. She had discontinued nighttime oxygen. A post-operative pulse oximetry on room air demonstrated improvement with an SpO2 < 89% for 3 mins 8 secs (a 93% improvement); there were 5.3 desaturation events per hour (a 55% improvement. At 5 months post op she reported that her constant "swimming" feeling had resolved. Her central nystagmus was no longer present on exam. AT 1 year post-op she continued to endorse improvement in her vestibular symptoms and gait.



## Conclusions

Dizziness and headache due to CM are difficult to differentiate from similar symptoms due to sleep apnea, migraine, or peripheral vestibular disorders. In this case the patient experienced positional nystagmus, dizziness, migraine headaches and sleep apnea, all of which improved after decompression, suggesting that all of her symptoms were secondary to the malformation. If a patient is determined to have sleep apnea without other causes in the setting of a Type I malformation, suboccipital decompression should be considered as a viable treatment option. Formal evaluation of nystagmus with vestibular testing was useful in determining that the source of the nystagmus was the CM.



## References

1. Dauvilliers Y, Stal V, Coubes P, Bobin S, Touchon J, Escourrou P, Parker F, Bourgin P: CM and sleep related breathing disorders. *J Neurol Neurosurg Psychiatry* 78:1344-1348 2007
2. Yoshimi A, Nomura K, Furune S: Sleep apnea syndrome associated with type I CM: *Brain & development* 24:49-51, 2002
3. Greenberg MS: *Handbook of Neurosurgery*. New York, NY, Thieme, 7th edition 2010
4. Bronstein AM, Rudge P. Vestibular disorders due to multiple sclerosis, Arnold-Chiari malformation, and basal ganglia disorders. In: Baloh RW & Halmagyi GM, Eds. *Disorders of the Vestibular System*, New York: Oxford University Press, p.488-493
5. Victor TW, Hu X, Campbell JC, Buse DC, Lipton RB. Migraine prevalence by age and sex in the United States: a life-span study. *Cephalgia*. 20: 1065-72, 2010
6. Marshal NS, Wong KH, Liu PY, Cullen SRJ, Kuniman MW, Gruinstein RR; Sleep apnea as an independent risk factor for all-cause mortality: The Brusselton health study. *Sleep*. 31: 1079-85, 2008
7. Tran K, Hukins CA: Obstructive and central sleep apnea in Arnold- CM: resolution following surgical decompression. *Sleep Breath* 15:611-613, 2011
8. Keefover R, Sam M, Bodensteiner J, Nicholson A: Hypersomnolence and pure central sleep apnea associated with the Chiari I malformation. *J Child Neurol* 10:65-67, 1995
9. Balk RA, Hiller FC, Lucas EA, Scrima L, Wilson FJ, Wooten V: Sleep apnea and the Arnold-CM. *Am Rev Respir Dis* 132:929-930, 1985
10. Ruff ME, Oakes WJ, Fisher SR, Spock A: Sleep apnea and vocal cord paralysis secondary to type I CM. *Pediatrics* 80:231-234, 1987
11. Levitt P, Cohn MA: Sleep apnea and the CM: case report. *Neurosurgery* 23:508-510, 1988
12. Dauvilliers Y, Stal V, Abril B, Coubes P, Bobin S, Touchon J, Escourrou P, Parker F, Bourgin P. CM and sleep related breathing disorders. *J Neurol*