

A Piscioti<sup>1</sup>, D Hsu<sup>1</sup>, Y Glick<sup>1</sup>, A Abramyan<sup>1</sup>, G Gupta<sup>1</sup>, S Roychowdhury<sup>1,2</sup>, S Sundararajan<sup>1,2</sup>

1. Rutgers Robert Wood Johnson Medical School & RWJBarnabas-RWJUH, New Brunswick, NJ 08901, USA

2. University Radiology Group, East Brunswick, NJ, 08816, USA

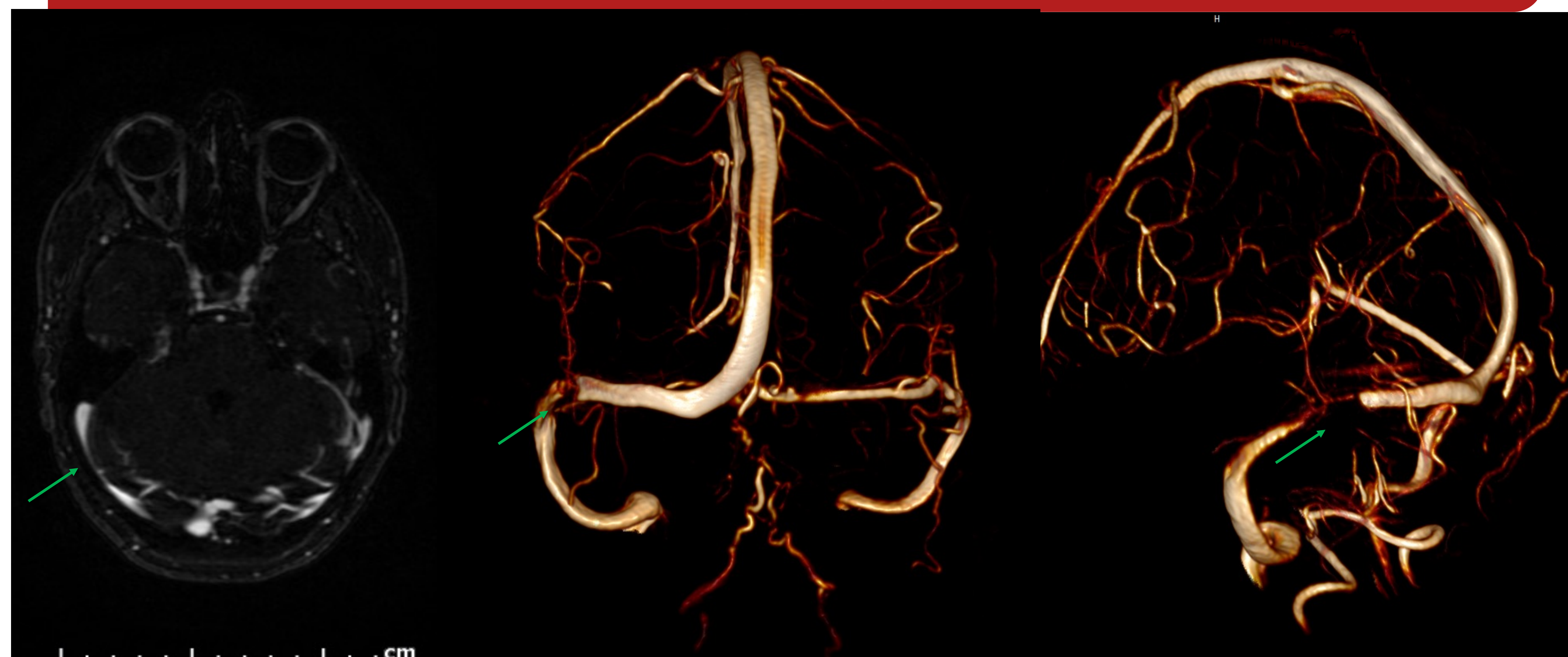
## Purpose

Idiopathic intracranial hypertension (IIH) refers to elevated intracranial pressure with no cause on neuroimaging or other evaluations. While the pathogenesis remains largely unknown, literature has found links between dural venous sinus abnormalities IIH, and venous pulsatile tinnitus. On imaging, venous sinus stenosis is often unrecognized due to MRV's technical and interpretive challenges as more preference is often given to the presence or absence of frank thrombosis or occlusion rather than degrees of stenosis. Our goal is to suggest the significance of undercalling venous sinus stenosis in the context of IIH and to raise awareness for the importance of this finding.

## Methods

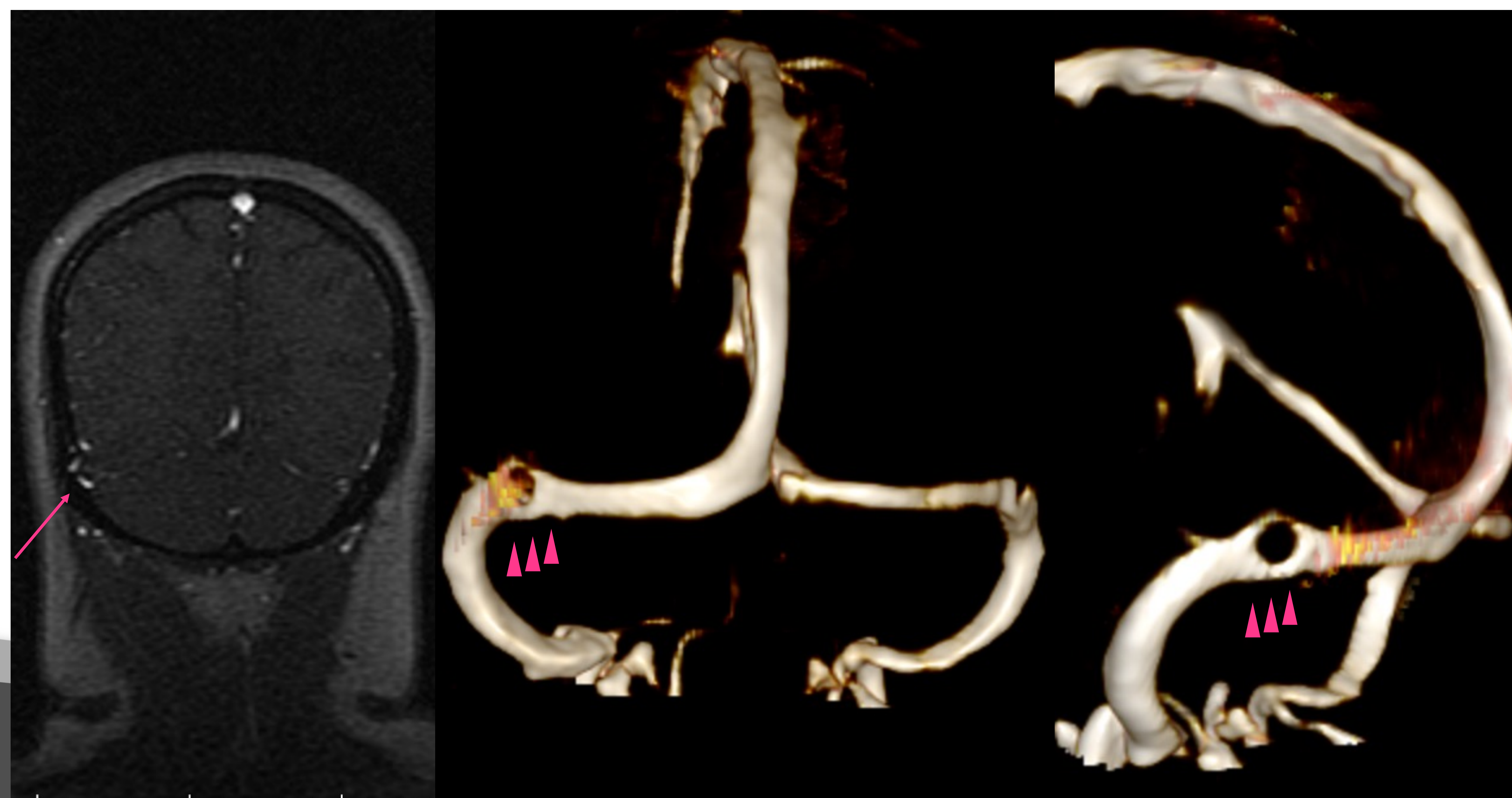
We conducted a retrospective chart review of 125 MR venograms reported as normal examinations that occurred over the last 5 years at an outpatient center for patients presenting with headache or tinnitus, common features of IIH. An attending neuroradiologist with CAQ in neuroradiology reviewed all studies independently with a second attending available for indeterminate case review. Patient and original reporting radiologists were anonymized. Upon review, cases were categorized as normal (no significant findings), abnormal (contributory findings identified retrospectively), or indeterminate (findings of uncertain significance).

## Cases and Imaging



**Case 1** (top) shows a case of severe extrinsic stenosis which could be misinterpreted as normal. Axial source image (top left) does not fully demonstrate the extent of extrinsic stenosis in the distal right transverse sinus (arrows). The 3D reformat image (top middle and right) better demonstrates loss of signal (dotted lines) in the same area due to extrinsic stenosis. The case highlights the importance of reviewing 3D reconstruction images in addition to the source images in identifying venous sinus stenosis.

**Case 2** (bottom) demonstrates a case of intrinsic stenosis that was misinterpreted as normal. The distal right transverse sinus demonstrates a focal rounded intraluminal region (bottom left) which could be misinterpreted as potential artifact or quickly scrolled-by during image review (arrow). The 3D reconstruction (bottom middle and right) show a 2 cm arachnoid granulation in the right transverse sinus (arrowheads) causing severe intrinsic stenosis. The combination of source and 3D reconstruction views can help with reassuring the interpreting radiologist that the focal finding is real and not artifact/turbulent flow related. Contrast-enhanced MRVs can help with better visualization of intrinsic stenosis and can be considered as clinically indicated



## Results

Of the 125 MR venograms, 68 (56.8%) were confirmed normal upon review, 35 (28%) studies revealed significant abnormalities, and 19 (15.2%) studies were indeterminate. Common findings included large internal jugular bulb diverticula > 1 cm, sigmoid sinus wall diverticula, and intrinsic and extrinsic venous sinus stenoses. Notably, all patients ultimately received adequate and suitable care related to their presenting symptoms.

## Conclusion

The prominent undercalling of venous sinus abnormalities in this review suggests a role for careful examination in patients presenting with IIH. Patients with IIH may suffer from a combination of severe headaches, venous pulsatile tinnitus, and papilledema (with risk for permanent vision loss). In most patients, symptoms progressively worsen over time if untreated. Detection of venous findings is critical, as venous sinus stenosis can be successfully managed with venous sinus stenting in patients with medically refractory IIH and venous pulsatile tinnitus.

## References

- [1] Zhao K, Gu W, Liu C, et al. Advances in the Understanding of the Complex Role of Venous Sinus Stenosis in Idiopathic Intracranial Hypertension. *J Magn Reson Imaging* 2022;56:645-54.
- [2] Morris PP, Black DF, Port J, et al. Transverse sinus stenosis is the most sensitive MR imaging correlate of idiopathic intracranial hypertension. *Am J Neuroradiol* 2017;38:471-7.
- [3] Sadigh G, Mullins ME, Saindane AM. Diagnostic performance of MRI sequences for evaluation of dural venous sinus thrombosis. *Am J Roentgenol* 2016;206:1298-306.
- [4] Sundararajan SH, Ramos AD, Kishore V, et al. Dural Venous Sinus Stenosis: Why Distinguishing Intrinsic-versus- Extrinsic Stenosis Matters. *Am J Neuroradiol* 2021;42:288-96.
- [5] Kashyap P V., Kashyap M, Dhiran A, et al. Missed Cerebral Venous Thrombosis: A Diagnostic Challenge. *Ann Neurosci* 2023;30.
- [6] Lee AG. Idiopathic intracranial hypertension (pseudotumor cerebri): Clinical features and diagnosis. In: *UpToDate*, Post TW (Ed), UpToDate, Waltham, MA. (Accessed on December 16, 2023)
- [7] Lee AG. Idiopathic intracranial hypertension (pseudotumor cerebri): Epidemiology and pathogenesis. In: *UpToDate*, Post TW (Ed), UpToDate, Waltham, MA. (Accessed on December 16, 2023)
- [8] Wall M. Idiopathic intracranial hypertension (pseudotumor cerebri): Prognosis and treatment. In: *UpToDate*, Post TW (Ed), UpToDate, Waltham, MA. (Accessed on December 16, 2023)