

Multiple Sclerosis in Disguise: A Case Study in an Emergency Room Setting

Introduction

Optic neuritis will affect roughly 5 per 100,000 people in the United States per year, and the symptoms associated with optic nerve inflammation will often result in a visit to an emergency department¹. Optic neuritis typically presents as a unilateral loss of visual acuity that is preceded by painful eye movements and is highly associated with multiple sclerosis (MS)². The visual disturbances associated with Multiple Sclerosis can also relapse and remit in about 95% of cases². However, about 1/3 of optic neuritis cases can present with atypical symptoms such as optic disc edema¹ which does not directly indicate MS as a diagnosis and may be mistaken as papilledema. It is important that optic neuritis and papilledema are differentiated in an emergency department setting as they require different treatment plans.

Case

History of Present Illness:

A 34-year-old female with a remote history of breast cancer presented multiple times to the emergency department with complaints of headache and blurry vision in both eyes.

Physical Exam Highlights:

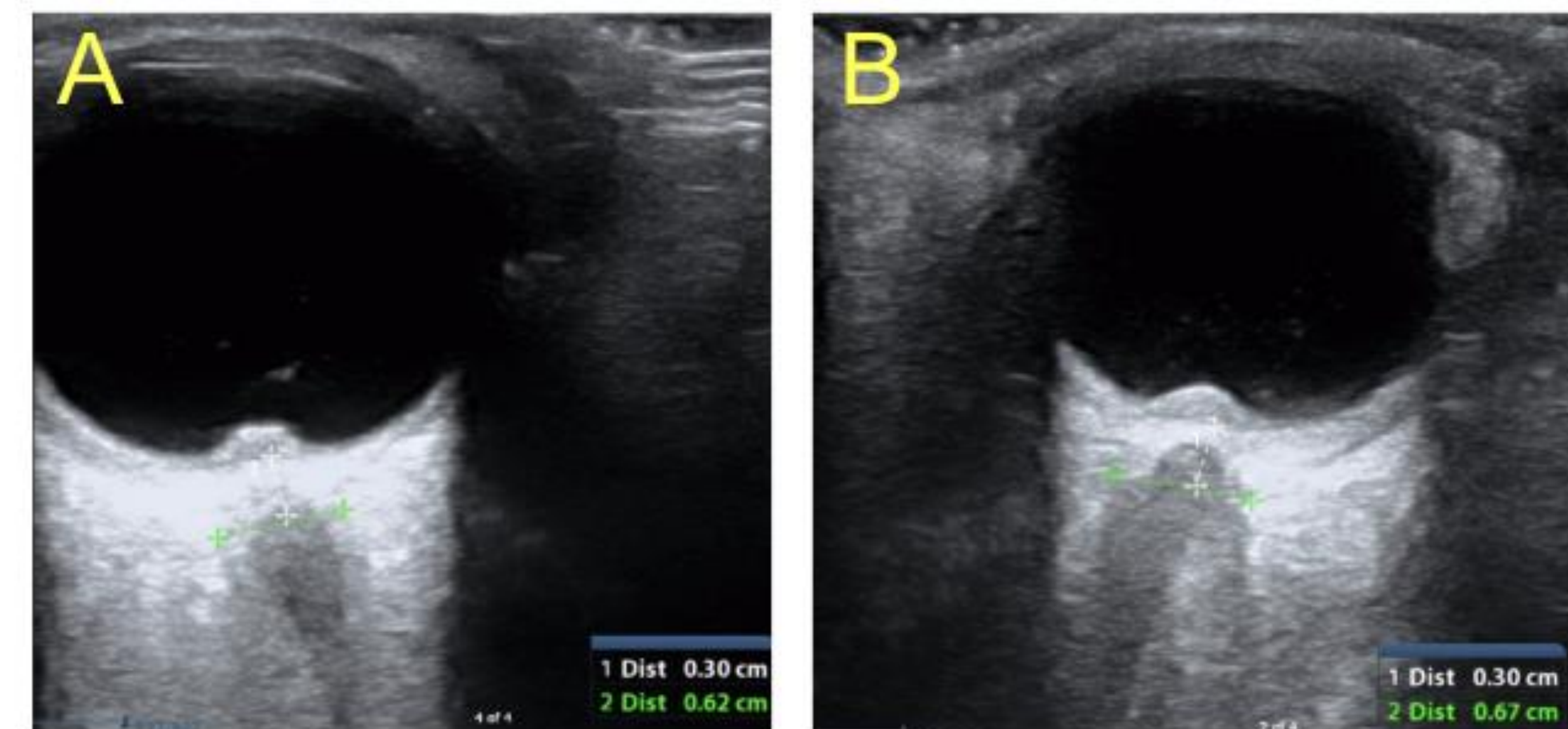
- Intact extraocular eye movements without pain
- Visual acuity changing from 20/25 OD, 20/40 OS to 20/20 OD, 20/25 OS within three days.
- Relative afferent pupillary defect (rAPD) of the left eye.

Workup:

- Ocular ultrasound revealed inflammation of the optic nerve sheath diameters bilaterally (Figure 1)
- Direct fundoscopic exam revealed bilateral optic disc edema (Figure 2)
- Lumbar Puncture: Opening pressure 28 mmH₂O
- MRI Head: inflammatory changes of both optic nerves, no signs of increased pressure.
- Tourtellotte CSF IgG/Albumin: 0.2 (high)
- MRI Spine: hyperintense signals in both the cervical and thoracic cord

Imaging

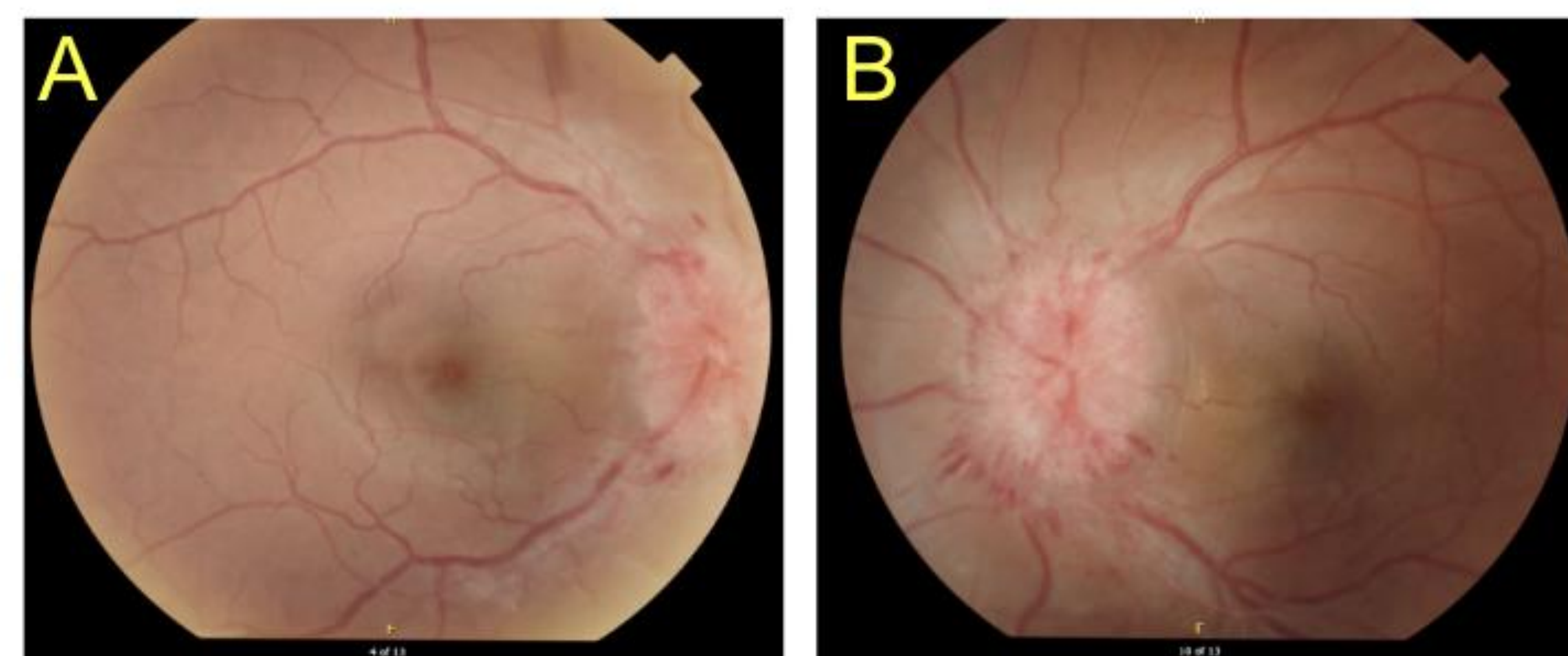
Figure 1



Results of ocular ultrasound performed on March 19th, 2025 show bilateral optic disc edema and inflammation of the optic nerve sheaths.

A. right eye. B. left eye.

Figure 2



Results of retinography examination performed on March 19th, 2025 show bilateral optic disc edema.

A. right eye. B. left eye.

Key Takeaways:

- Optic neuritis is a potential differential diagnosis in cases of optic disc edema with vision loss.
- Optic neuritis vs papilledema needs to be correctly identified early.
- Ocular ultrasound, along with thorough testing, may be a key diagnostic tool in an emergency department setting.

Discussion

Optic disc edema caused by optic neuritis can be difficult to differentiate from true papilledema caused by increased intracranial pressure in the emergency department. If optic neuritis presents in an atypical manner, the two cases can look similar on direct fundoscopy and both can display an enlarged optic nerve sheath diameter on ocular ultrasound (> 0.5cm)⁴. This is where a thorough H&P and testing are necessary.

In addition to the bilateral optic disc edema and inflammation of the optic nerve sheaths the patient displayed blurry vision as one of her first symptoms that later began to resolve, which is more common to see in cases of optic neuritis⁵. A lumbar puncture exhibited an opening pressure of 28 mmH₂O, but this elevated pressure can be attributed to Multiple Sclerosis as the head MRI revealed no signs of increased intracranial pressure⁶. Further test results to reinforce the diagnosis of optic neuritis secondary to MS revealed a Tourtellotte CSF IgG/Albumin level of 0.2 and MRI showing areas of demyelination in the spinal cord.

Despite this atypical case of optic neuritis making ultrasound imaging a nonspecific test, the inflammation of the optic nerve sheath observed is valuable information. Visualizing an enlargement of the optic nerve sheath can help to guide further testing, but can also be diagnostic in more typical cases of optic neuritis where no optic disc edema is present.

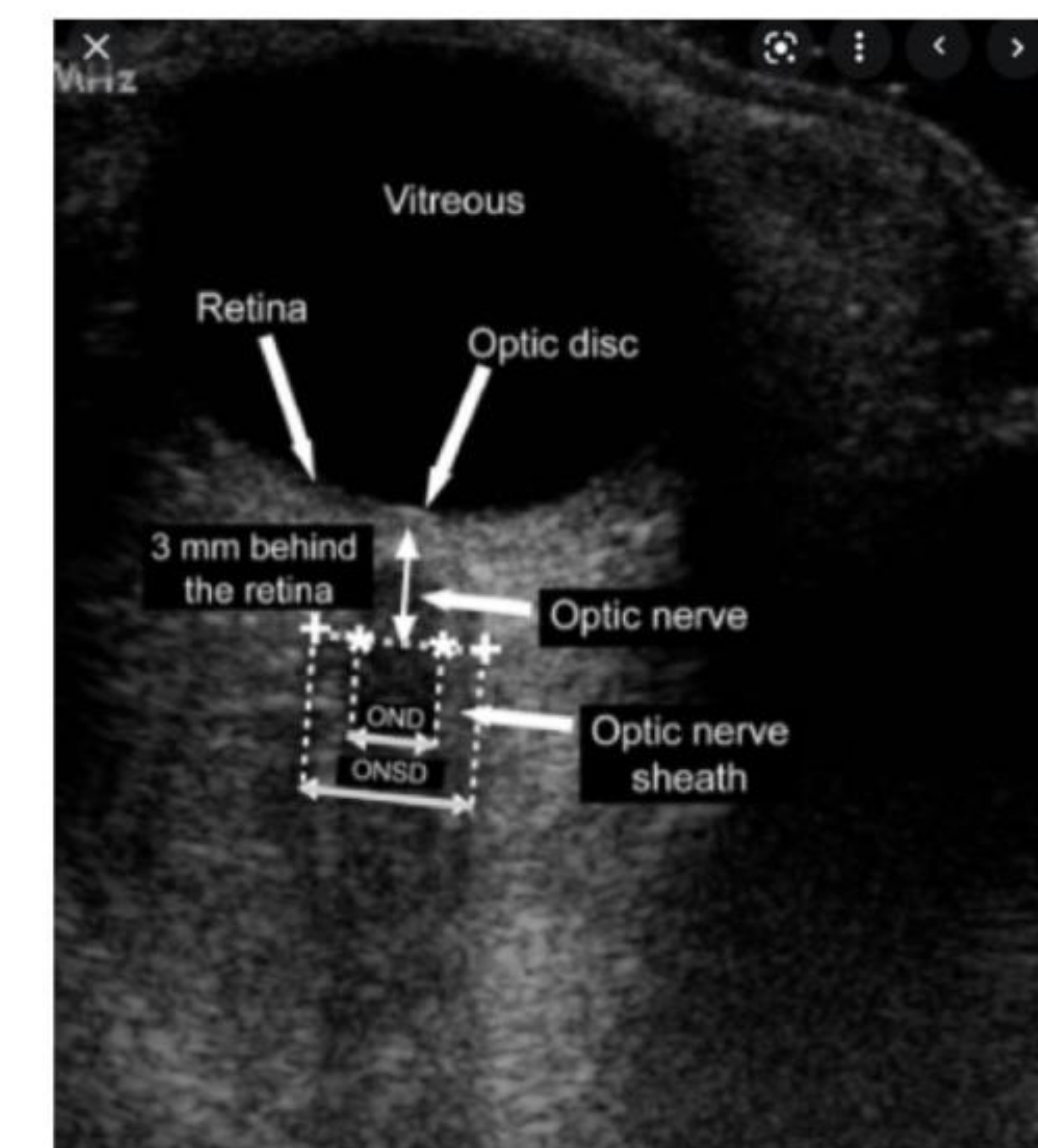


Figure 3

Ocular ultrasound imaging with labeling of key anatomical features³.

References

1. Muro-Fuentes EA, Moss HE. Factors Associated With Increased Emergency Department Utilization in Patients With Acute Optic Neuritis. *J Neuroophthalmol*. 2021 Sep 1;41(3):335-341. doi: 10.1097/WNO.0000000000001294. PMID: 34224527; PMCID: PMC8380632.
2. Wilhelm H, Schäfer M. The Diagnosis and Treatment of Optic Neuritis. *Dtsch Arztebl Int*. 2015 Sep 11;112(37):616-25. quiz 626. doi: 10.3238/arztebl.2015.0616. PMID: 26396053; PMCID: PMC4581115.
3. Cho J. Ocular Ultrasound Abnormalities and Optic Nerve Sheath Diameter in Dogs and Cats. *Vet Clin North Am Small Anim Pract*. 2021 Nov;51(6):1295-1314. doi: 10.1016/j.cvsm.2021.07.010. Epub 2021 Sep 14. PMID: 34535331.
4. Melburger RM, Naldi A, Michelli N, et al. Automatic optic nerve measurement: A new tool to standardize optic nerve assessment in ultrasound B-mode images. *Ultrasound in Medicine & Biology*. 2020;46(6):1533-1544. doi:10.1016/j.ultrasmedbio.2020.01.034.
5. Tran, Maria. "Ultrasound of Optic Nerve Sheath Diameter and Stroke Outcomes - St. John's Riverside Emergency Medicine." *St. John's Riverside Emergency Medicine*, St. John's Riverside Hospital, 26 Apr. 2022. sjrhmededem.org/ultrasound/optic-nerve-sheath-diameter-and-stroke-outcomes/.
6. Chen, John J. "Papilloedema - Eye Disorders." *Merck Manual Consumer Version*, Merck & Co., Inc., June 2024. www.merckmanuals.com/en-ca/home/eye-disorders/optic-nerve-disorders/papilledema#Causes_v799752.
7. Stoutin J, Fan J. Idiopathic Intracranial Hypertension and Multiple Sclerosis Overlap. *Cureus*. 2021 Jul 10;13(7):e16305. doi: 10.7759/cureus.16305. PMID: 34381659; PMCID: PMC8352602.