



Subarachnoid or Intradural Spread of Local Anesthetic Along The Optic Nerve Following An Infraorbital Retrobulbar Block

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Introduction

Subarachnoid or intradural spread of local anesthetic along the optic nerve is a rare complication of retrobulbar blocks. We present a case of central spread of local anesthetic after an infraorbital retrobulbar injection in a 61-year-old man resulting in brainstem anesthesia.

Case Report

A 61-year-old man with a past medical history of heart failure, hypertension, asthma, diabetes mellitus, chronic kidney disease, obstructive sleep apnea and obesity presented to an outpatient eye surgery center for right complex small pupil cataract removal with lens implant.

After 100 mg of propofol sedation, a 25 gauge 1 ¼ inch long Atkinson needle was inserted perpendicular to the skin inferior to the orbit and advanced parallel to the orbital floor until a “pop” was felt. The needle was then advanced an additional 1 cm, then angled upwards 45 degrees and advanced until an additional “pop” was felt indicating entry into the muscle cone⁴. After a negative aspiration for blood or CSF, 5 mL of a 50/50 mix of 0.375% bupivacaine/2% lidocaine was injected under low pressure.

A few minutes later, the patient was fully awake and conversant. The patient’s right eye had some movement in all directions, indicating an inadequate block. He subsequently received two more retrobulbar injections using the same technique without sedation to achieve akinesia of the globe.

Minutes after the third block, the patient became hypoxemic to an SpO₂ of 61%. A jaw thrust increased the patient’s SpO₂ to greater than 90%, but he remained unresponsive to sternal rubs. The patient’s blood pressure and HR remained at baseline, but supportive bag valve mask ventilation was required for hypoventilation.

The patient was not intubated at surgery center because he was breathing spontaneously, SpO₂>92%, was a low aspiration risk, the surgery center did not have airway adjuncts such as video laryngoscope, supraglottic airway or paralytics, and it was near the hospital. EMS was called and patient was taken to ED where he was intubated. He had no additional hypoxemic events besides the initial desaturation due to obstruction.

Workup demonstrated a head CT that showed no acute intracranial abnormalities, along with mild hypokalemia, hyperchloremia, hypercalcemia and hypomagnesemia. The patient was admitted and eventually extubated once he became responsive 4 hours after the blocks took place. He suffered no long-term sequela and was subsequently discharged to his home the next day.

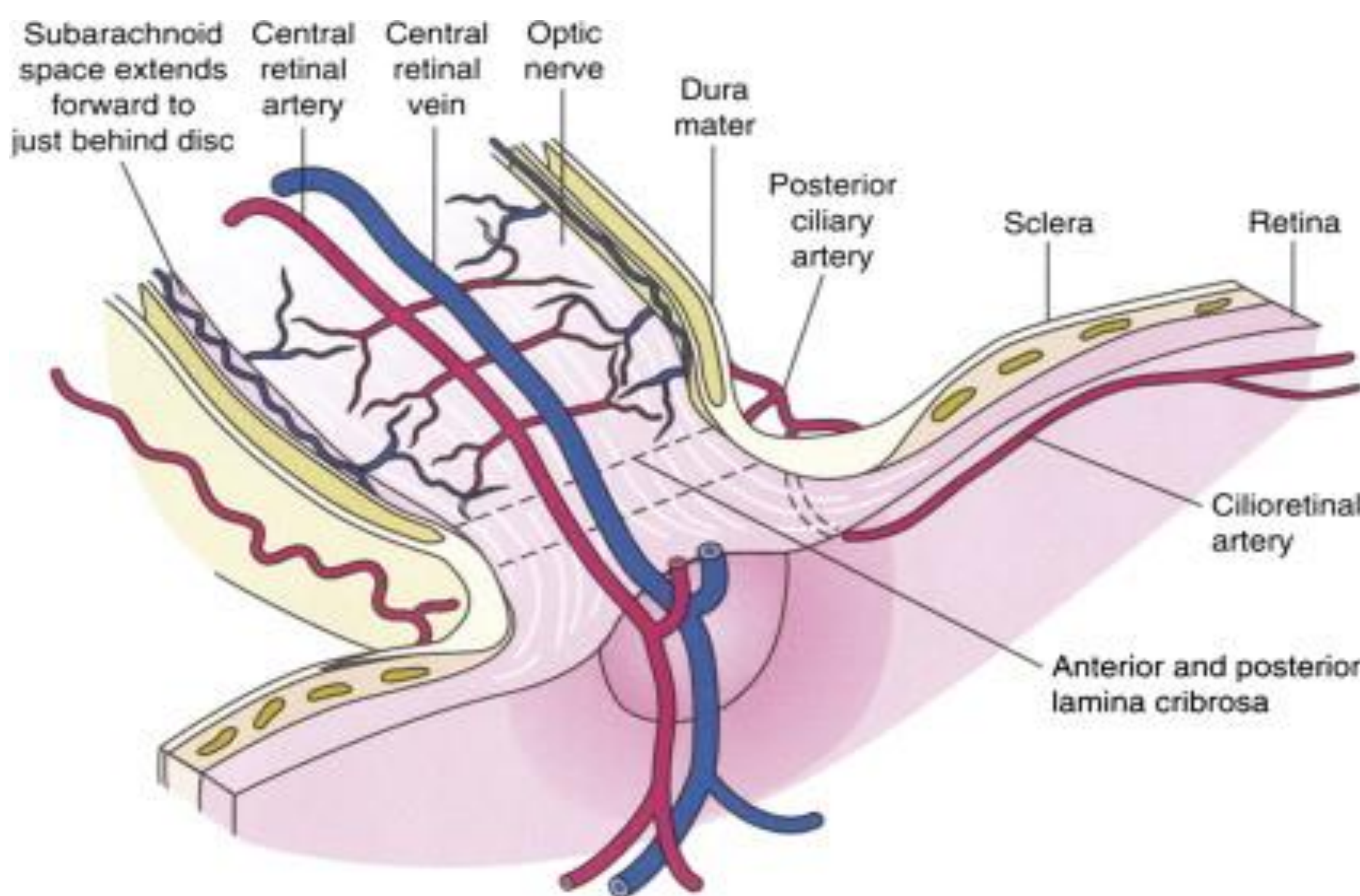


Figure 1. Anatomy of Optic Nerve with Dura and Subarachnoid Space⁵

Discussion

Local anesthetic can track along the optic nerve sheath via intradural or subarachnoid injection causing partial or total progressive brainstem anesthesia with an incidence of 0.04% to 0.8% of cases^{3,4}. Symptoms are wide ranging and include aphasia, confusion, and dysphagia as well as apnea, seizures, loss of consciousness and cardiac arrest^{2,3}. Our patient experienced loss of consciousness and respiratory failure ultimately requiring intubation. Management is supportive and full recovery is expected within a few hours.

Another retrobulbar block complication is the intraarterial injection, which can be differentiated from brainstem anesthesia by an immediate onset of CNS excitation and seizures as opposed to delayed symptoms of brainstem anesthesia. Facilities providing retrobulbar blocks need to weigh the risks and benefits of being able to treat these rare complications with the cost and upkeep of maintaining such airway equipment and a malignant hyperthermia cart. It is not uncommon for ambulatory surgery centers to have limited advanced airway equipment, so early recognition and immediate treatment of this rare complication is crucial.

Risk of complications can be mitigated by using a 25-gauge, 31 mm blunt needle, maintenance of eye in a neutral position, aspirating prior to injection to confirm needle tip is not intravascular, as well as performing “wiggle test” to confirm the needle is not tethered in any vital structures¹. Those administering retrobulbar blocks should be well versed in recognizing and treating the potential rare complications.

References

1. Kostadinov, I., Hostnik, A., Cvenkel, B., & Potočnik, I. (2019). Brainstem Anaesthesia after Retrobulbar Block. *Open medicine (Warsaw, Poland)*, 14, 287–291. <https://doi.org/10.1515/med-2019-0025>
2. Kumar, C M FRCA. Orbital regional anesthesia: Complications and their prevention. *Indian Journal of Ophthalmology* 54(2):p 77-84, Apr–Jun 2006. | DOI: 10.4103/0301-4738.25826
3. Nicoll, J. M., Acharya, P. A., Ahlen, K., Baguneid, S., & Edge, K. R. (1987). Central nervous system complications after 6000 retrobulbar blocks. *Anesthesia and analgesia*, 66(12), 1298–1302.
4. Polania Gutierrez JJ, Riveros Perez E. Retrobulbar Block. [Updated 2022 Oct 23]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK557448/>
5. Sashank Prasad, Steven L. Galetta, Chapter 1 - Anatomy and physiology of the afferent visual system, Editor(s): Christopher Kennard, R. John Leigh, *Handbook of Clinical Neurology*, Elsevier, Volume 102, 2011, Pages 3-19, ISSN 0072-9752, ISBN 9780444529039, <https://doi.org/10.1016/B978-0-444-52903-9.00007-8>. (<https://www.sciencedirect.com/science/article/pii/B9780444529039000078>)