# Postoperative Mydriasis After an Interventional Spine Pain Procedure: Causes, Differential Diagnosis, and Workup

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## Background

- Postoperative visual disturbances occur in 0.013% to 1% of cases [1]
  - Causes include:
    1. Medication effects
    2. Ocular injury
    3. Neurologic dysfunction
    4. Life-threatening conditions
- Scopolamine → anticholinergic agent
  - Used to prevent PONV
  - Blocks acetylcholine, a key neurotransmitter in parasympathetic system
- Previous cases have been reported (Table 1)
  - To our knowledge this is the first case reported following an interventional pain procedure

## Case Description

- 61-year-old female presented with vertebrogenic low back pain with Modic changes at L5 and S1
- Scopolamine patch placed behind left ear for PONV prevention for interventional procedure
- Basivertebral nerve ablation completed with no complications
- Postoperative day 2: developed unilateral left-sided mydriasis
  - Left pupil 2-3 mm larger, non-reactive to light, blurred vision
- Stroke workup and brain MRI were unremarkable
- No arterial narrowing or occlusion
- Third cranial nerve palsy initially suspected
- Diagnosis: scopolamine-induced mydriasis
- Symptoms improved 6 days after patch removal (Fig. 2)

**Table 1: Table of Similar Cases**

| Author | Procedure | Scopolamine Patch Location | Onset | Symptoms | Diagnostic Workup | Initial Evaluation Results | Final Outcome |
|---|---|---|---|---|---|---|---|
| Lee, et al.[3] | Surgery to correct enophthalmos and a smaller right eye aperture with cranial bond grafting | Behind right ear | Intraoperative | Right unilateral mydriasis, pupil dilated to 8mm, nonreactive to light | The procedure was cancelled as a result of the onset of mydriasis. Inpatient observation | Symptoms improved after patch removal. | The mydriasis resolved in 8 hours without intervention, and the next day the patient was operated on uneventfully. |
| Lee, et al.[3] | Orbital floor fracture repair | Behind left ear | Intraoperative | Left unilateral mydriasis, pupil dilated to 7-8 mm, nonreactive to light | Removal of the titanium plate, CT imaging, and an ophthalmologic exam | CT imaging showed no abnormalities. Ophthalmologic exam showed that the left pupil was reactive. | Symptoms resolved on postoperative day one without. Operated on the following week successfully. |
| Lee, et al.[3] | Cosmetic rhinoplasty | Behind right ear | Postoperative day three | Left unilateral mydriasis | Emergency room and plastic surgery evaluation; scopolamine patch removed. | Physicians determined the mydriasis was a result of contact with scopolamine patch. | Mydriasis resolved a few hours following patch removal without extrenal intervention. |
| Korolyov & Kleiber[2] | Surgical revision due to failed arthrodesis | Behind right ear | Postoperative day one | Right unilateral mydriasis, headache, and dizziness | Neurological and ophthalmological examinations. | Neurologic and opthalmologic exam showed no abnormalities. | All symptoms resolved the next day with no further intervention. |

**Table 2: Postoperative Dilated Pupil Workup**

**Initial Evaluation Findings**

| Differential Diagnosis | Pupillary Light Reflex | Eye Movement | Eyelid Position | Headache | Mental Status | Ophthalmologic Examination |
|---|---|---|---|---|---|---|
| **Serious Conditions Associated with Perioperative Mydriasis*** | Absent or poor | Abnormal | Abnormal, ptosis | Often severe | May be altered | Extraocular movements impaired. Pupil constricts with pilocarpine. |
| **Pharmacologically Induced Mydriasis**** | Absent or poor | Normal | Normal | Mild or absent | Normal | Otherwise normal exam. Pupil does not constrict with pilocarpine. |
| **Benign Neurological Causes***** | Reduced | Normal | Normal | Often inttermittent, localized, or orbital pain. | Normal | Otherwise normal exam. Pupil constricts with pilocarpine. |

*Serious causes of perioperative mydriasis include strokes, intracranial hemorrhages, intracranial tumors, intracranial aneurysms, a third cranial nerve palsy, and central retinal artery occlusion.
** Pharmacologically induced mydriasis is commonly associated with the perioperative use of anticholinergic medications.
***Benign episodic unilateral mydriasis is a common benign neurologic cause of perioperative mydriasis and may be associated with extubation stress or anesthetic fluctuations. Other common benign neurological causes include Adie's tonic pupil and transient parasympathetic neuropraxia.



Fig. 1



Fig. 2

## Discussion

- Postoperative visual disturbances are a rare occurrence after spine surgery in the prone position
- In the case of postoperative visual disturbances:
  1. Rule out urgent neurologic and ophthalmologic etiologies (Table 2)
  2. Review pharmacologic agents used perioperatively
- Surgeries in the prone position already possess risk of visual complications
  - May be best to avoid agents associated with mydriasis
    - Help prevent diagnostic confusion
    - Streamline postoperative evaluation

## References

1. Epstein NE. Perioperative visual loss following prone spinal surgery: A review. Surg Neurol Int. 2016;7(Suppl 13):S347–60.
2. Korolyov AK, Angela. Postoperative Pupil Dilation - Scopolamine Induced Anisocoria. Proceedings of UCLA Health. 2023;27.
3. Lee DT, Jenkins NL, Anastasopulos AJ, Volpe AG, Lee BT, Lalikos JF. Transdermal scopolamine and perioperative anisocoria in craniofacial surgery: a report of 3 patients. J Craniofac Surg. 2013;24(2):470–2.