Scopolamine Patch Can Be Confusing to the Patient and Anesthesiologist: A Case Report

Mazin A. Y. Elias, M.B., Ch.B., F.R.C.A., M.D.,* Ezzat Abouleish, M.B., Ch.B., M.D.†

SCOPOLAMINE patch has been shown to reduce nausea and vomiting after epidural morphine administration. However, it may produce undesirable side effects of its own that can confuse the clinical signs, and, if not diagnosed properly, can have potentially serious consequences.

**Case Report**

A 38-year-old, American Society of Anesthesiologists physical status 1 woman was scheduled for transabdominal hysterectomy during combined epidural-general anesthesia.

During the initial attempt to insert an epidural catheter at the L3-4 level using an 18 gauge Tuohy needle, dural puncture occurred. A second attempt, at the L2-3 level, was successful, and the epidural catheter was threaded 5 cm into the epidural space. After negative aspiration for blood and cerebrospinal fluid, a test dose of 3 ml of 2% lidocaine with epinephrine 1:200,000 confirmed the correct position of the catheter.

General anesthesia was provided using sodium thiopental/vecuronium and maintained with isoflurane N₂O/O₂ mixture for the rest of the surgical procedure, which was uneventful.

Postoperative analgesia was provided by a fentanyl-bupivacaine mixture (3 μg fentanyl per ml in 0.125% plain bupivacaine) infused epidurally at a rate of 8 ml/h. However, 24 h postoperatively, the patient complained of excessive nausea and vomiting, which was not alleviated with a single dose of 25 mg diphenhydramine. Six hours later, 5 mg parenteral promethazine every 6 h for 12 h (two successive doses; total of 10 mg throughout 12 h) was administered without success in treating the nausea and vomiting. A scopolamine patch (Transderm-Scop, Ciba-Geigy, CA) (0.5 mg) applied behind the right ear at the mastoid region successfully controlled these symptoms. On the third postoperative day, the patient complained of classical postdural puncture headache, which failed to respond to hydration and bed rest. An epidural blood patch was performed by injecting blood through the epidural catheter. However, after injecting 12 ml blood, the patient complained of right leg pain; therefore, no more blood was injected, and the epidural catheter was removed intact.

The headache resolved within 1 h; the patient started taking oral fluids, and the scopolamine patch was removed. Two hours after the procedure, the patient became agitated and confused. Her right pupil was dilated and did not react to light both directly (direct light reflex) and indirectly (consensual light reflex) (i.e., dilated fixed pupil). Detailed ophthalmologic and neurologic examinations were difficult, because the patient was uncooperative, yet was able to move all four limbs. A computed tomography scan was ordered for the head. Pilocarpine (1%) eye drops were instilled into both eyes. The left pupil constricted but the right was unchanged. A provisional diagnosis of pharmacologically induced pupillary dilation was made. Phystostigmine (0.5 mg) was then given intravenously, slowly, in repeated doses, to a total of 1.5 mg. This produced dramatic improvement in the patient’s level of alertness, confirming the diagnosis of a cholinergic central nervous system effect. The computed tomography scan was canceled, and no further therapy was required.

Twelve hours later, the patient was fully alert, and her pupils had returned to normal size. The hypalgesia of the right lower limb disappeared within 24 h. She made an unremarkable recovery and was discharged home on the fifth postoperative day.

**Discussion**

Transdermal scopolamine patch has been proven effective to treat epidural opioid-induced nausea. Epidural blood patch is commonly used since it was first described by Gormley in 1960 for the treatment of postdural puncture headache.

In our case, we elected to inject blood through the epidural catheter, to avoid the possibility of another dural tap, which can lead to worsening of postdural puncture headache.

Pupillary change accompanied by changes in mental status is alarming. The dilated pupil that does not react to light may indicate a serious underlying condition, and the consultation of a neuro-ophthalmologist may be required if the anesthesiologist is unfamiliar with the possible mechanisms or with the pilocarpine diagnostic test. The possible causes of unilateral dilated fixed pupil (not responding/reacting to light both directly and indirectly) are multiple and include lesions in the mid-brain, ciliary ganglion, or short ciliary nerve pathology (including Adies pupil, orbital trauma), lesion of the...
third cranial nerve, and pathology of the iris (i.e., blunt trauma, pharmacologic blockade of ciliary reflex by anticholinergic medications).\textsuperscript{3-7} The clinical picture of a unilateral, dilated pupil with altered mental status is usually considered an ominous sign of central nervous system pathology.\textsuperscript{3-7} Therefore, a computed tomography scan was scheduled. We also performed the bedside pilocarpine eye test.\textsuperscript{7} Locally applied pilocarpine acts directly on the pupillary muscles. If the latter are intact but the supplying nerves or the central controlling mechanism are damaged, the pupil will constrict after 1% pilocarpine eye drops. If the constricting muscles are paralyzed (e.g., due to parasympatholytic drug application), a single pilocarpine eye drop application will not cause the dilated pupil to constrict; repeated administration eventually will.\textsuperscript{8,9} In our patient, failure of the right pupil to respond to a single dose of 1% pilocarpine eye drops excluded intracranial pathology.\textsuperscript{4,5,7} This narrowed the diagnosis to three possibilities: sudden increase in intraocular pressure (i.e., acute glaucoma), traumatic iridoplegia, or pharmacologic parasympatholytic blockade. The first possibility was excluded, because there was no previous history of ophthalmologic disease (though measurement of intraocular pressure is advisable, in our case, this was difficult, because the patient was uncooperative). The second possibility was excluded because there were no signs of orbital trauma, which had to be severe to cause pupillary changes.\textsuperscript{7} This left us with parasympathetic blockade as the most likely etiology.

To confirm that the change in mental status was induced by the central effect of scopolamine, we used phystostigmine in small, repeated doses.\textsuperscript{9} This was a therapeutic and diagnostic test.\textsuperscript{8} Although phystostigmine can reverse the central effects of a number of drugs, the overall picture was consistent with scopolamine-induced pupillary and mental changes.

We suspected the possibility of drug-induced pupillary changes because of the presence of the dilated pupil on the same side of the scopolamine patch.\textsuperscript{5} Ninety percent of cases of scopolamine-induced pupillary changes occur on the same side.\textsuperscript{3} The etiology could be inadvertent transfer of the drug by hand after being in contact with the patch at the time of application or the site thereafter, and the systemic effect due to the absorption of the drug from the vascular conjunctiva.\textsuperscript{3-7} Another possibility we postulate is positioning the patch more anteriorly, thereby allowing access of scopolamine to the internal carotid artery causing the mental symptoms and, through the ophthalmic branch supplying the ciliary muscles of the ipsilateral side, causing pupillary dilatation.\textsuperscript{9} This possibility is favored by the 90% incidence of reported ipsilateral pupillary dilatation and the relatively large size of the scopolamine patch (2.5 cm\textsuperscript{2}). Also, the fact that locally applied scopolamine to the conjunctiva produces ocular effects of considerable duration (few days) and minimal central nervous system effects\textsuperscript{10} contrary to our case, in which the ocular effects lasted less than 24 h and the central nervous system effects were significant.

This case report is not to deter anesthesiologists from using a scopolamine patch, but to alert them of two possible simultaneously occurring complications—namely, alteration in the level of consciousness and anisocoria.

In conclusion, we report a case where a fixed dilated pupil and altered mental status were induced by a scopolamine patch applied to the mastoid region. Two simple bedside diagnostic tests, pilocarpine eye drops and phystostigmine antagonism, not only helped in the diagnosis and treatment of the case, but also obviated the use of unnecessary expensive investigations and procedures, with their own complications.

The authors thank Richard Urso, M.D., Consultant Ophthalmologist, for valuable evaluation of the case management.

**References**