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Transient Glaucoma after an Epidural Steroid Injection: A Case Report

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ABSTRACT

Background: Steroids are recognized as a beneficial treatment for various medical conditions, yet clinically relevant side effects of steroids are common and problematic, ranging from a minor case of acne to a potentially life-threatening Addisonian crisis. In anesthetic medicine, the use of epidural steroid injections (ESIs) for chronic low back pain and other radicular pain-related conditions has become standard practice in interventional pain management.

Case Report: We report the case of a patient who experienced sudden bilateral blurred vision after receiving an ESI and required urgent ophthalmic interventions and follow-up care. The main clinical findings from this case showed that the patient had high intraocular pressure (IOP) that caused unexpected short-term vision loss. The symptom resolved after 3½ months without ophthalmic treatment.

Conclusion: Clinicians should inform patients about the possibility of visual complications associated with pain procedures involving steroids. Among the high-risk groups with predisposing factors, such as uncontrolled hypertension and diabetes mellitus, routine eye tests that include measuring IOP prior to ESI should be recommended as a preventive measure. Alternative pain management therapies should be considered if possible. Comprehensive planning of patient care will also ensure safety and prevent unwanted outcomes, particularly with high-risk patients receiving steroids for pain procedures.

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INTRODUCTION

Chronic low back pain (CLBP) is a challenging condition that affects a significant percentage of the adult population worldwide every year and contributes to disability and social isolation. Invasive procedures such as facet joint injections are used to treat CLBP when alternative pain management therapy fails.

The use of epidural steroid injections (ESIs) for CLBP and other radicular pain-related conditions has become standard practice in interventional pain management. The efficacy of ESIs, however, remains controversial, as the cost effectiveness and realistic expectations of pain relief are difficult to quantify.[1] According to Chon and Moon, evidence regarding the safety of ESI administration and its positive effects is lacking, although the procedure has a low incidence of complications.[2]

Delivering corticosteroids into the epidural space in theory reduces pain because of the antiinflammatory and immune-modulating properties of steroids.[3] Because they inhibit prostaglandin synthesis, block phospholipase A2, and stabilize inflammatory cell membranes, corticosteroids have a significant antiinflammatory effect.[4]

However, clinically relevant side effects of steroids, especially systemic steroid administration, are common and problematic, ranging from a minor case of acne to a potentially life-threatening Addisonian crisis. Side effects can occur at a wide range of doses and vary depending on the route of administration. For example, various clinical complications from ESIs have been documented, including dural puncture, nerve damage, infection, and postdural puncture headache.[5]

We report the case of a patient who experienced sudden bilateral blurred vision after receiving an ESI and required urgent ophthalmic interventions and follow-up care.

CASE REPORT

A 59-year-old female presented to the pain clinic with a 10-year history of mechanical CLBP. She had been unable to work for the past 3 years because of her persistent back pain. The patient's medical history was documented as hypertension for 3 years and diet-controlled type 2 diabetes mellitus. She had received pain management therapies for 5 years, including analgesics, physiotherapy, and manipulations that had no positive impact on relieving her CLBP. The patient was subsequently offered ESI, and 2 ESIs administered in a period of 12 months resulted in short-term pain relief. A third ESI was considered because the patient declined lumbar laminectomy. Generally known complications, such as nerve injury and epidural hematoma, were discussed with the patient prior to the third ESI.

During the procedure, the patient was in the prone position, and a combination of methylprednisolone 80 mg (Depo-Medrol) in 4 mL of saline and 2 mL of 0.25% bupivacaine (Marcaine) was injected between L4 and L5 using a fluoroscopically guided technique. Methylprednisolone is commonly administered in translaminar ESIs despite the lack of conclusive evidence regarding its efficacy.[5] The overall risk of complications from this technique is $<$1%; puncture of the fluid sac and intravascular spread are also rare.[6] The patient was discharged home as no apparent complications postprocedure appeared, and a follow-up appointment was made.

Two weeks after receiving the lumbar ESI, she requested an urgent follow-up visit to the pain clinic, recommended by her optician because of intermittent visual disturbances. Episodes of short-term blurring and visual disturbances had begun 2 days after she received the third ESI.

During the assessment in the pain clinic, the patient presented no systemic side effects associated with steroid administration, such as flushing, headache, or nausea. The patient denied having eye pain or dizziness associated with the visual disturbances. No hematoma or inflammation was noted at the epidural injection site. Her pain score had dropped from 8 to 4 on the visual analog scale (0-10), and her leg strength was normal.

She was referred to the ophthalmology department for urgent assessment, and transient glaucoma was diagnosed. Her intraocular pressure (IOP) was 23 mmHg (normal level, 12-14 mmHg), and intermittent bilateral blurred vision was identified. The patient had a normal visual field, open-angle glaucoma, and painless elevation of IOP. She confirmed that she had had no visual disturbances after her previous 2 ESIs or prior to her third ESI. She denied prior visual conditions or problems and was unaware of any visual conditions in her family medical history.

The patient's IOP was measured every 2 weeks for 2 months. Throughout this period, she did not receive active ophthalmic treatment. Her blurred vision lasted approximately 3½ months after her third ESI. According to the patient, improvement occurred slowly during this period, and she took steps to reduce the worsening of her visual condition; she minimized sunlight exposure, regularly used saline eye solution, and avoided application of cosmetic products on her eyes. The patient's IOP returned to a normal level during the third month of testing. No further episodes of blurred vision or other visual symptoms were reported. The patient's baseline IOP prior to the ESI was unknown.

DISCUSSION

The elevation of IOP $>$20 mmHg is known to cause acute glaucoma, blurring vision, and even subjective visual loss with or without nonpositional headache.[7] Steroid-induced transient glaucoma caused by systemic use of steroids is widely reported in the literature, yet raised IOP induced by administration of ESIs is rarely documented. Because the actual pathophysiologic mechanism is unclear, clinical anesthesiologists must be aware of the possibility of acute visual loss in patients, especially among those with predisposing risk factors, such as family history and preexisting ophthalmic conditions, prior to administering ESIs. Accurate assessment and diagnosis are necessary to ensure patient safety and to manage acute vision loss appropriately and promptly when transient glaucoma occurs.

The incidence of ocular side effects is not well documented in the literature, suggesting that ocular side effects are rare or unrecognized in association with ESIs. In a 2010 systematic review by Henschke et al, most studies reported transient adverse effects of ESIs, yet reports of visual complications caused by ESIs are limited.[8] Reported ocular side effects associated with ESIs are retinal hemorrhage, posterior subcapsular cataracts, increased IOP, exophthalmos, glaucoma, damage to the optic nerve, and secondary fungal and viral infection.[9]

Glaucoma commonly causes blindness, and persistently elevated IOP often contributes to this irreversible visual condition. Steroid therapy is a causative factor for acute open-angle glaucoma or transient glaucoma. Acute open-angle glaucoma has different clinical characteristics than primary open-angle glaucoma (POAG), a progressive optic neurop-

athy that results in loss of retinal ganglion cells and atrophy of the optic nerve.

Even though the effects of long-term steroid use on POAG are associated with narrow iridocorneal angles,[10] actual correlations between ESIs and transient glaucoma are rarely reported in the literature. Despite the lack of literature reports, a patient theoretically may experience unintentional systemic steroid absorption by intravascular spread during a procedure despite the use of fluoroscopy that may contribute to acute open-angle glaucoma caused by rapid elevation of IOP.[11] An elevation of IOP is usually painless and occurs because aqueous outflow is blocked by the peripheral iris. The regulation of IOP occurs through balancing the fluid secretion and drainage of aqueous humor via the uveoscleral outflow pathway.[11] Steroid-induced IOP elevation may contribute to increased resistance to aqueous flow within the trabecular meshwork where approximately 90% of aqueous humor is drained from the eye.[12] When the anterior chamber angle is occluded, risk of permanent vision loss from ocular ischemia is possible as the IOP pressure increases rapidly.[13]

Steroid-induced glaucoma was first described in the 1950s with the administration of systemic steroids.[14] Patients in a high steroid responders group, around 5% of the population, are more likely to encounter iatrogenic hypertension or transient glaucoma regardless of the route of steroid administration, yet the symptoms can be relatively limited until the patient notices visual disturbances.[15] Predisposing risk factors among high steroid responders are the following: patients with diagnosed or uncontrolled glaucoma, family history of POAG, type 1 diabetes mellitus, and connective tissue disease such as rheumatoid arthritis.[15] The IOP is usually regulated at the level of 10-20 mmHg, and maintaining this range is necessary for optimal refraction and vision. However, acute increases in IOP among patients with predisposing risk factors may lead to retinal artery occlusion and retinal ischemia, causing acute open-angle glaucoma.[16] According to a 2008 study by Chan et al, patients with preexisting glaucomatous optic neuropathy are more susceptible to a transient increase in IOP, and visual disturbances in the short term did not lead to functional optic nerve changes.[17]

Additional clinical trials are urgently needed to better understand the cost and clinical effectiveness of ESIs. In contrast, the beneficial effect of steroid use, especially among patients with CLBP, is widely reported in the literature. A 2012 metaanalysis by Parr et al shows evidence of short- and long-term pain relief with the use of a local anesthetic and steroids.[18] The role of therapeutic interventions, as well as the clinical significance of pain relief and functional improvement, is still unclear; conflicting studies show that ESI for pain management is mostly knowledge based rather than evidence based.[19]

Although procedural complications related to ESIs are rare, transient visual disturbances caused by ESIs are often associated with worsening glaucoma among patients with high IOP.[20] It is unclear how much and what kinds of steroids should be administered to prevent the side effect of transient glaucoma because of a lack of available evidence. Therefore, further clinical studies examining the relationship between ESIs and adverse effects on visual conditions are urged to improve understanding.

CONCLUSION

Clinical anesthesiologists and interventional pain specialists must perform comprehensive preprocedural assessments, including routine eye tests and IOP measurement, in patients scheduled for an ESI. Identifying causative factors, such as predisposing medical conditions and family history that may contribute to developing transient glaucoma, might better predict and identify patients at risk for steroid-induced ophthalmic complications. Clinicians should inform patients about the potential for visual complications associated with pain procedures involving steroids, and patients with predisposing factors who have received ESIs should have a routine eye examination within 3 weeks as part of their follow-up care. Among high-risk groups, alternative pain management therapies should be considered if possible.

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