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# Nontraumatic oculomotor nerve palsy following endoscopic sinus surgery

Wasan F. Almarzouq, Salma S. Alsharhan

## Abstract:

The proximity of the paranasal sinuses to the orbit and its contents increases the chances of injuries during endoscopic sinus surgery (ESS). We present an extremely rare case of transient oculomotor nerve palsy with no direct injury following ESS, which has never been reported in the literature. The proper clinical approach and medical management are also discussed in this case report.

## Keywords:

Endoscopic sinus surgery, oculomotor nerve palsy, orbital complications, third nerve injury

## Introduction

Chronic rhinosinusitis is an inflammatory disease usually managed through endoscopic sinus surgery (ESS), a limited traditional sinus procedure with low patient morbidity. However, orbital complications some of which can be devastating, resulting in permanent damage, such as retroorbital hematoma, blindness, and extraocular muscle insult are reported in 0.01%–2.25%,<sup>[1-6]</sup> Furthermore, despite being a highly uncommon complication following sinus surgery, oculomotor nerve paralysis (ONP), as a sequelae of ESS has been reported as a result of inadvertent trauma.<sup>[1]</sup> In our case, we experienced a <24 h ONP post-ESS for nasal polyposis without direct nerve injury of a kind that has never been reported.

## Case Report

A 48-year-old Saudi male underwent bilateral revision ESS for symptomatic sinonasal polyposis under general anesthesia. At the beginning of the surgery, 2 mL xylocaine with 1:100,000 adrenaline

was injected into the uncinat process, head, and axilla of the middle turbinate, as well as the sphenopalatine artery. We used an anterior-to-posterior approach during this ESS, at the end of which—and after achieving hemostasis – a Merocel pack was placed in the ethmoid cavity.

In the recovery room, immediately post-ESS, the patient complained of horizontal diplopia. Therefore, there was an urgent ophthalmology consultation, and the examination indicated left ONP. There was limited eye movement in adduction, supraduction, and infraduction, along with ptosis. However, on examination, the anterior segment and media were normal, as were the fundus, the optic disc, and the macula no relative afferent pupillary defects were found, as shown in Table 1, and after the nasal packs were removed, a nasal endoscopic examination was performed and the ethmoid cavity was suctioned. The patient was started on medical management, which included intravenous dexamethasone at 8 mg every 8 h.

For further evaluation, radiological imaging was requested, and a computed tomography (CT) scan showed an intact left eye lamina papyracea with no detectable pathology to cause the compression or

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Department of  
Otorhinolaryngology,  
College of Medicine, Imam  
Abdulrahman Bin Faisal  
University, Dammam,  
Saudi Arabia

### Address for correspondence:

Dr. Wasan F. Almarzouq,  
Department of  
Otorhinolaryngology,  
College of Medicine,  
Imam Abdulrahman Bin  
Faisal University, P. O.  
Box 6470, Dammam  
34211, Saudi Arabia.  
E-mail: w-almarzouq@  
hotmail.com

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pressure effect on the orbital content [Figure 1]. The patient's left eye gradually recovered, as shown in Figure 2a taken 3 h post-ESS, which revealed complete recovery of the left third cranial nerve postsurgery in comparison to the eye in Figure 2b at 24 h post-ESS.

### Discussion

The ethmoid sinuses are separated from the orbit by a thin bony wall, called the lamina papyracea, therefore, ophthalmological complications following sinus surgery are common. The oculomotor nerve enters the intraconal space through the superior orbital fissure, where it splits into superior and inferior divisions. The former enters the superior rectus muscle, but the latter divides into three branches to supply the medial, inferior recti, and inferior oblique muscles.<sup>[7]</sup>

The most devastating yet rare complication of ESS is vision loss as a result of optic nerve damage.<sup>[1-6]</sup> In addition, lacrimal duct and extraocular muscle injury can be caused by inadvertent penetration of the medial orbital wall.<sup>[1,6]</sup> Moreover, orbital bleeding, followed by hematoma collection resulting from direct injury to the orbital vessels and ethmoidal arteries, can lead to permanent blindness if not managed.<sup>[1,7]</sup> Thus, it is worth mentioning that ONP following ESS without direct trauma has not been previously reported.

This patient's transient blindness and rapid recovery from ONP is rare. One possible hypothesis is that the ONP was caused by a local contusion of the oculomotor nerve as a result of blunt trauma, which could have occurred while the ethmoid sinus was being operated on. However, the surgery was uneventful, and the CT images showed a preserved lamina and bony borders surrounding the ethmoid sinuses. It is likely that in this case the ischemic nerve insult was caused by the entrapment of herniated tissue or the pressure effect of the nasal packs within the nasal cavity, and sphenopalatine or unciniate process injection with the extravasation of local anesthetic into the orbit resulting in ophthalmoplegia, transient mydriasis, and even blindness. Whereas ONP post-ESS is extremely uncommon, it remains a significant complication. Rapid self-limiting recovery, as occurred in this case, indicates that conservative, nonsurgical management should be considered as a first choice when there is no fat, muscle, or nerve entrapment. Rhinologists should always consider the possibility of cranial nerve injury resulting from direct trauma while performing an ESS. Therefore, meticulous tissue handling, especially while working near the lamina, sphenoid, and posterior ethmoid sinuses, is crucial.<sup>[8]</sup>

In fact, orbital imaging is important to assess the site and extent of injury when post-ESS orbital complications occur. As an immediate intervention, nasal packs should



Figure 1: Showing coronal computed tomography postendoscopic sinus surgery with intact lamina papyracea



Figure 2: (a) Ptosis of left eye 3 hours postendoscopic sinus surgery (ESS). (b) twenty-four hour post-ESS with full recovery of left eye ptosis

Table 1: Left eye examination as per time intervals

Postoperation intervals/eye	Examination in the recovery room	After 3 hours	After 24 hours
Pupil size in response light (mm)	Right eye: 2 Left eye: 7	Right eye: 2 Left eye: 4	Right eye: 2 Left eye: 2
Ptosis information (mm)	MRD1 Right eye: 4–5 Left eye: –2	MRD1 Right eye: 4–5 Left eye: 2	MRD1 Right eye: 4–5 Left eye: 3–4

MRD=Marginal reflex disease

be removed and intravenous steroids started to decrease edema and intraorbital pressure. However, the ideal time to interfere surgically and repair ocular motility dysfunction through ophthalmology is unknown, even though the reduction of the high intraorbital pressure and release of incarcerated orbital contents or removal of harmful bony chips in the case of an orbital fracture may minimize postoperative adhesion and fibrosis.<sup>[9]</sup> In the absence of all of the above, a conservative approach may be considered, as indicated in the reported patient.

## Conclusion

ONP following ESS is an uncommon but serious complication, from which our patient had complete and spontaneous recovery, which confirms that initial medical management may be appropriate in the absence of significant functional damage, such as orbital content, muscle, or fat entrapment, or an orbital fracture. Moreover, a cautious preoperative evaluation should include imaging and a proper understanding of anatomy, and careful intraoperative tissue handling in comparison to the eye in Figure 2b at 24 h post-ESS, is crucial to a safe ESS performance.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and

due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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