A Case of Isolated Complete Oculomotor Nerve Palsy Following Endoscopic Sinus Surgery

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ABSTRACT

Orbital complications after endoscopic sinus surgery (ESS), such as optic nerve or medial rectus injuries, are well known, but isolated complete oculomotor nerve palsy has never been reported. In this case, a 31-year-old male was transferred to our hospital after ESS. Physical examination showed complete left oculomotor nerve palsy, with a bony defect on the sellar floor, which had not fully recovered after more than 1 year. We hypothesized that blunt trauma could be the main cause of the oculomotor palsy. Surgeons performing ESS must keep in mind the possibility of oculomotor palsy due to blunt trauma, especially when operating around the sphenoid and posterior ethmoid sinus.

KEY WORDS : Endoscopic Sinus Surgery · Orbital Complication · Oculomotor Nerve Palsy.

INTRODUCTION

Endoscopic sinus surgery (ESS) is well-established as the mainstay of surgical treatment for refractory chronic rhinosinusitis (CRS). Outcomes of ESS have improved due to advances in endoscopic systems, surgical techniques, and instruments.[1)] However, ESS still carries a potential risk of injury to adjacent structures such as the orbital contents and skull base.[1)] These complications may present as CSF leakage, orbital hematoma, optic nerve, or extraocular muscle injury[2)] and are the leading cause of litigations in otorhinolaryngology.[3)] However, oculomotor nerve palsy is extremely rare after ESS, and isolated oculomotor nerve palsies after ESS without orbital injury have never been reported. We report an unusual case of isolated complete oculomotor palsy after ESS along with a discussion of the potential mechanisms.

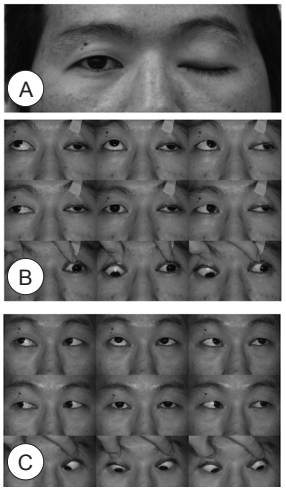

Fig. 1. (A) The patient suffered from left complete ptosis. (B) Composite photograph of eye movements 1 day post-operatively. We observed exotropia with ptosis in primary position (center middle panel) and significant limitation of movement of the left eye except the left lateral gaze. (C) Composite photograph of eye movement 1 year after surgery. Ptosis was completely resolved while some limitation in upward and downward gaze of left eye movement remained.

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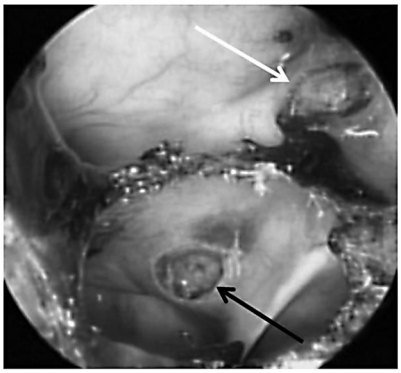

Fig. 2. A nasal endoscopic view demonstrated a bony defect at the left sellar floor (black arrow) and the optic canal (white arrow) without evidence of cerebrospinal fluid leakage.

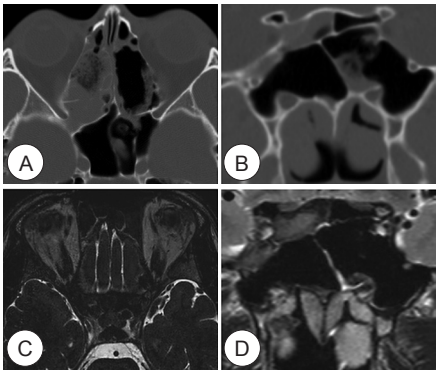

Fig. 3. CT and MRI were performed 1day after surgery. Axial (A) and coronal (B) CT scan showed hemorrhagic opacity, but there was no bony defect. T2 VISTA MRI (C) and T2 coronal MRI (D) demonstrated no abnormal finding at oculomotor nerve pathway, orbital contents and adjacent soft tissues.

CASE REPORT

A 31-year-old male was referred to our hospital one day after bilateral ESS for CRS with nasal polyps from private clinic. The patient underwent ESS under local anesthesia and felt severe headache and complained of left orbital pain, left ptosis, and diplopia immediately after sphenoidotomy (Fig. 1A).

The left pupil was dilated to 7 mm without direct or consensual response to light or accommodation with temporal deviation of the eye. Extraocular movements were impaired in all directions except for abduction, with complete ptosis of the eyelid (Fig. 1B). Visual acuity was 20/20 in both eyes. Anterior segment of eye ball and fundus examinations were normal.

In direct endoscopic visualization, there was bony defect at the sellar floor in the sphenoid sinus and optic canal in Onodi cells. However, there was no evidence of cerebrospinal fluid (CSF) leakage (Fig. 2). There was no evidence of direct injury to the orbit, any other site of the skull base, or the brain stem on computed tomography (CT) and magnetic resonance imaging (MRI) (Fig. 3).

The patient received intravenous injections of dexamethasone (15 mg per day for 1 week) for treatment of his symptoms. Three months postoperatively, the left ptosis had completely recovered and pupillary reactivity had improved. Extraocular movements were recovered almost completely, except for an upward gaze in the left eye. At 1 year post-operatively, however, the patient still complained of diplopia. On opthalmologic examination, he had nor mal balance in all directions of gaze except for the superior direction. He had left hypotropia of 8 prism diopters in upgaze and slight limitation of upgaze and downgaze, with abnormal adducting movement on attempted upgaze in the left eye (Fig. 1C). His left pupil was mildly dilated with slightly reduced reactivity.

DISCUSSION

ESS is currently the treatment of choice of for medically intractable sinusitis. Its use has extended to various disease of the sinuses, orbit, and skull base.[4] The growing popularity and refinement of ESS techniques and advancements in instruments allow for constant and clear surgical views, minimal intraoperative bleeding, and reduced surgical time and complications. However, complications associated with ESS are still a concern and demand attention from otorhinolaryngologists. Opthalmic injuries during ESS can involve the optic nerve, orbital vessels, extraoccular muscles, and the nasolacrimal system. However, oculomotor nerve palsy after ESS is extremely rare. There has only been one case report describing partial oculomotor nerve palsy following penetrating injury to the lamina papyracea.[5] In that case, there was an offending bone fragment impinging on the medial rectus and optic nerve, and after removal of the bone chip, the patient gradually and fully recovered from oculomotor palsy. However, the present case is the first report of complete oculomotor nerve palsy after ESS without direct orbital or nerve injury.

In this case, we performed both CT and MRI for evaluation of potential causes of nerve palsy and extent of injury, because CT may fail to detect midbrain damage and oculomotor nerve root avulsion, MRI should be performed.[6] We found no evidence of neurovascular injury, bony disruption of the lamina papyracea, or brain stem abnormalities. We hypothesize that the mechanism of oculomotor nerve palsy in this case was focal stretching or contusion in the parasellar segment of the oculomotor nerve by blunt trauma that occurred while performing sphenoidotomy by force, although this is extremely unlikely because the oculomotor nerve pathway is quite distant from the sellar floor.

We administered high dose systemic steroids for prevention of perineural swelling and symptom reduction, but the treatment was not successful.

If, there is no traumatic injury which needed surgery, systemic steroid treatment is recommended for reducing swelling and symptom. Furthermore, physician should check operation site frequently whether there develop additional complication like infection or not.

It is difficult to predict the prognosis of patients with oculomotor palsy after ESS because there are no data available. However, we can predict the prognosis based on cases of traumatic oculomotor palsy, because the present case resulted from traumatic injury which is typically very poor. Tokuno et al.[7] noted that none of the 10 patients with oculomotor nerve palsy experienced complete recovery during follow-up periods of 3 months to 18 months. In another study, Memom et al. found that only 1 of 12 patients had fully recovered 6 months to 3 years after trauma.[8] In general, the patients in previous studies had experienced more rapid and complete recovery from ptosis rather than from extraocular muscle movements.[7-10] Similarly, in this report, the patient's ptosis was completely recovered 3 months post-operatively, while the motility of his extraocular muscles remained limited and the patient complained of diplopia until 1 year post-operatively.

CONCLUSION

The importance of preventing severe orbital and skull base complications cannot be overemphasized when performing ESS. Blunt trauma to the skull base may cause CSF leakage, which can be repaired without permanent deficit. However, permanent deficits could be sustained after oculomotor nerve palsy due to trauma to the skull base as in our case. Surgeons performing ESS must keep in mind the possibility of oculomotor palsy due to blunt trauma to the skull base, and must perform the whole procedure with great care, especially when operating close to the sphenoid and posterior ethmoid sinus.

저자역할 (Author Contributions)

최나연, 조현진, 박경아, 최나연은 본 연구에서 모든 자료에 접근할 수 있으며 자료의 완전성과 자료 분석의 정확성에 책임을 지고 있습니다. **연구기획** : 최나연, 홍상덕. **자료 해석 및 분석** : 최나연, 조현진, 박경아, 홍상덕. **논문초안** : 최나연. **논문수정** : 최나연, 조현진, 박경아, 홍상덕. **연구 총괄** : 홍상덕.

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