

# Orbital Injury in Endoscopic Sinus Surgery for Sinonasal Inflammatory Disorders: Juntendo's Ten-Year Experience

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## Abstract

Orbital injury and complications are commonly encountered in endoscopic sinus surgery (ESS) despite advances in techniques and instrumentation. For the recent 10 years, we summarized the experience of the rhinology unit of our department regarding orbital injury and complications of ESS for sinonasal inflammatory disorders. One thousand seventy-three patients (1869 sides) from January 1, 2003 to December 31, 2012 undergoing ESS for sinonasal inflammatory diseases were enrolled in the present study. The age of the patients ranged from 8 to 81 years, mean age 49 years. Orbital injury and complications were observed in 13 patients (13 sides), which corresponded to 0.7% of the operated sides and 1.2% of the patients. Eight patients showed herniation of orbital fat alone through the injury of the lamina papyracea. The protruding orbital fat was snipped and cut using forceps in 2 patients. Removal of exposed orbital fat using powered instruments was performed in 3 patients, two of whom transiently showed periorbital edema postoperatively. No permanent complications were observed. Meticulous preoperative and perioperative planning is critical to prevent orbital complications. Especially, exposure of the periorbit and herniation of orbital fat after lamina injury with powered instrumentation dramatically increases the potential for more severe complications.

## Keywords

Orbital Injury, Orbital Complications, Endoscopic Sinus Surgery, Orbital Fat

## 1. Introduction

Endoscopic sinus surgery (ESS) has been widely accepted as a primary surgical

modality for the treatment of inflammation, trauma, benign tumor, and fibro-osseous lesions [1]-[8]. However, complications in ESS are still encountered despite advances in techniques and instrumentation. It is critical to reduce major complications such as cerebrospinal fluid leak, intracranial injury, ocular injury, nasolacrimal duct injury, and massive bleeding requiring blood transfusion to reduce the risk of permanent injury, while a variety of minor complications of ESS include epistaxis, synechia, periorbital emphysema, hyposmia, antrostomy closure, etc. [9] [10]. The most common complications are known to be related to the ocular organ, which vary widely in severity and include orbital hematoma, subcutaneous or periorbital emphysema, diplopia and blindness, as well as postoperative hemorrhage [10].

For the 10 years from 2003 to 2012, we summarized the experience of the rhinology unit of our department regarding orbital injury and complications of ESS for sinonasal inflammatory disorders.

## 2. Materials and Methods

One thousand seventy-three patients (1869 sides) from January 1, 2003 to December 31, 2012 undergoing ESS for sinonasal diseases such as acute or chronic rhinosinusitis, and paranasal sinus mucocoeles were enrolled in the present study. The age of the patients ranged from 8 to 81 years, mean age 49 years. ESS in all cases was performed under general anesthesia. The ESS procedures in acute or chronic rhinosinusitis and paranasal sinus mucocoeles were performed according to our previous reports [1]-[8]. Since most of the CRS cases with nasal polyps associated with asthma showed extensive sinonasal disease with multiple polyps, which protruded from the olfactory cleft and middle meatus, we usually performed extended ESS. Extended ESS implies the elimination of polyps using a microdebrider, resection of the lower half of both the superior and middle turbinates, and maximal enlargement of each paranasal sinus ostium. This study was approved by the ethics committee of the Juntendo University Faculty of Medicine.

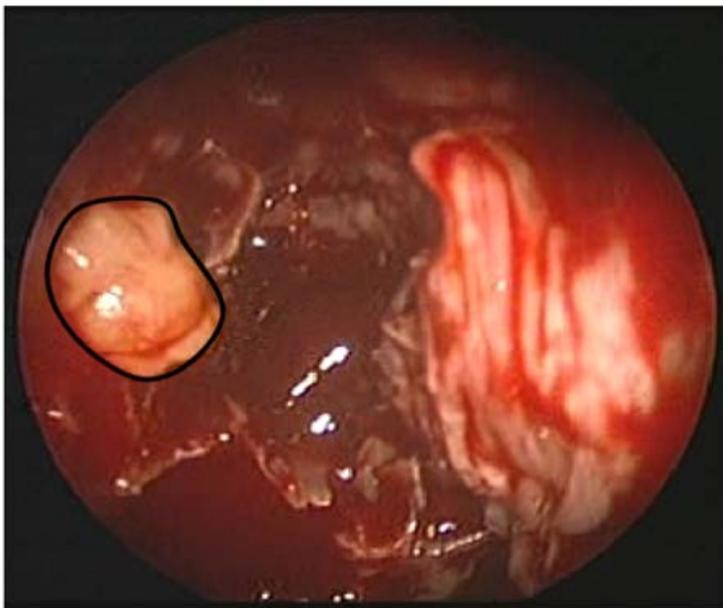
## 3. Results

Orbital injury and complications were observed in 13 patients (13 sides), which corresponded to 0.7% of the operated sides and 1.2% of the patients. All injuries and complications were brought about by injury of the lamina papyracea. Eight patients showed herniation of orbital fat alone through the injury of the lamina papyracea, where the presence of fat in the surgical field was confirmed by gentle ballottement of the eye (**Figure 1**). In another 2 patients, the protruded orbital fat, which was mistaken as nasal polyps, was snipped and cut using forceps (**Figure 2**). However, prompt recognition of the exposure of fat enabled us to prevent postoperative ocular symptoms and signs. Removal of the exposed orbital fat using powered instruments was done in 3 patients (**Figure 3**), two of whom showed periorbital edema postoperatively (**Figure 4**). However, no per-

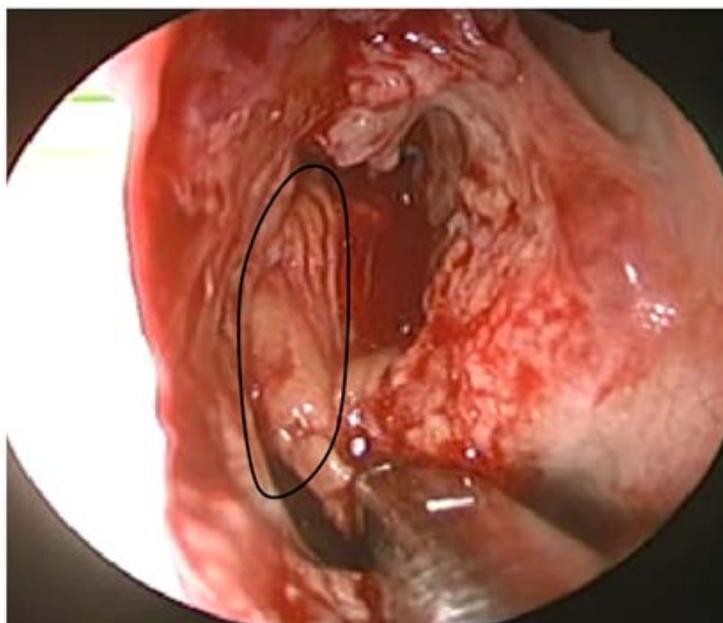
manent complications remained.

#### 4. Discussion

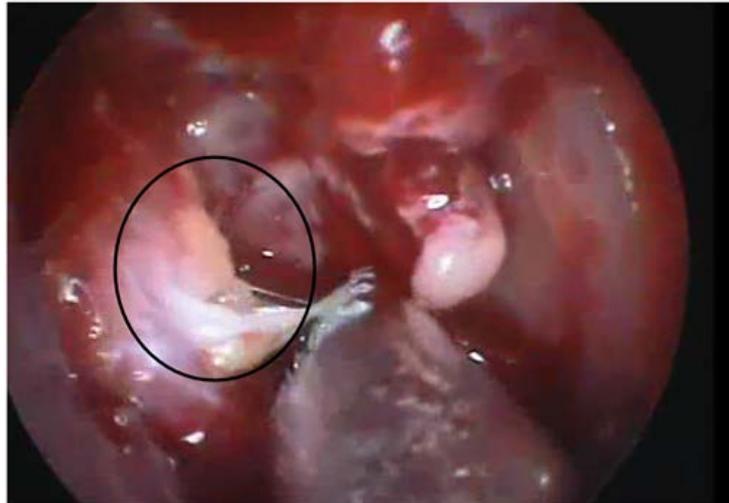
ESS has the potential to cause orbital injury due to close proximity of the surgical site. Violation of the orbital medial wall can induce herniation of orbital fat, hemorrhage, extraocular muscle injury, ocular motility dysfunction, optic nerve injury, periorbital hematoma, or periorbital emphysema. In this series of our



**Figure 1.** Herniation of orbital fat (a circle mark) in the right ethmoid sinus.



**Figure 2.** Snipping of the protruding orbital fat (a circle mark) using forceps in the right ethmoid sinus.



**Figure 3.** Removal of exposed orbital fat using powered instruments.



**Figure 4.** Postoperative picture showing left periorbital edema.

experience from the past 10 years, we experienced 13 patients (1.2%) with ocular injury. However, postoperative complications were observed in only 2 patients (0.2%), which was well comparable with that found in previous reports [11] [12] [13]. No major orbital complications such as blindness, double vision, ptosis, etc. were encountered in our series.

Meticulous preoperative and perioperative planning is crucial to prevent orbital complications. Preoperative review of the patient-specific anatomy should identify the location of the anterior and posterior ethmoid arteries, medial orbital slope and dehiscence, and atelectasis of the uncinated process using endoscope and radiological images. The appropriate surgical technique may also minimize the risk of ocular injury. Since blind insertion of a sickle knife into the infundibulum is associated with an inherent risk to the orbit, the uncinated process may be safely removed in a retrograde fashion with backbiting forceps [14].

It should be emphasized that exposure of the periorbit and herniation of the orbital fat after lamina injury with powered instrumentation dramatically increases the potential for a more severe complications. As the present study, orbital injury using conventional instrumentation may result in silent signs or minor complications. On the other hand, diplopia and blindness resulting from extraocular muscle injuries and/or orbital hemorrhage using powered instrumentation have been reported [14] [15]. Furthermore, subarachnoid hemorrhage has been reported as a complication of ESS using powered instruments [16]. Thus, the suction effect from powered dissection can draw in adjacent tissue and produce dramatic postoperative sequelae in a fraction of a second.

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