



## ENDOSCOPIC SINUS SURGERY; ORBITAL COMPLICATIONS: A CASE SERIES

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**ABSTRACT... Background:** Endoscopic sinus surgery has become a preferred modality for management of various nasal and sinus disorders. Orbital complications, though rare, are reported amongst patients undergoing ESS. **Study Design:** Case series. **Methods:** A retrospective review was undertaken of four cases of orbital complications during endoscopic sinus surgery. **Results:** Two patients suffered from periorbital haematoma and subconjunctival haemorrhage. One patient developed subcutaneous emphysema and numbness of lower eyelid and cheek. One patient got oedema of lower eyelid. **Conclusion:** Ophthalmic complications occurring during ESS should be timely and properly addressed. By having sound knowledge of anatomy of nose, paranasal sinuses and orbit and detailed preoperative assessment, chances of orbital complications can be lessened.

**Key words:** Endoscopic Sinus Surgery, Orbital haematoma, Lamina Papyracea.

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### INTRODUCTION

Endoscopic sinus surgery (ESS) is an unquestionable advancement in the surgical management of chronic infectious sinusitis and has a growing role in the management of many sinus, orbit, and skull base diseases.<sup>1</sup> However this new modality entails risk of orbital and ocular complications because of the intimate relation between the paranasal sinuses and the orbit. These complications can be as trivial as ecchymosis, pain and subconjunctival haemorrhage. But devastating complications like cerebrospinal fluid leak (rhinorrhea), damage to optic nerve and extraocular muscles and even loss of vision is also reported.<sup>2</sup> By meticulous preoperative assessment and careful surgical technique, these complications can be circumvented. Here we present a series of four cases that developed ocular complications during ESS, but these were promptly diagnosed and appropriately managed.

### CASE REPORTS

#### Case 1

A 28 year old male patient was diagnosed a case of Deflected Nasal Septum to the right

side, reduced nasal patency and left maxillary sinusitis. He underwent endoscopic septoplasty, left middle turbinoplasty and left middle meatus antrostomy. Approximately one hour after surgery, he developed left peri orbital haematoma extending over the cheek. His thorough ocular examination by ophthalmologist revealed subconjunctival haemorrhage and mild chemosis. However there were Snellen visual acuity of 6/6, normally reacting pupil, normal ocular motility and intraocular pressure within normal range. Peri orbital swelling worsened in next 24 hours causing complete closure of eye lids (Figure-1). Patient was observed closely and his vision, pupillary reactions and intra ocular pressure were periodically checked. Conservative medical management was begun with elevation of the head of the bed and iced compresses. He was advised to abstain from sneezing and coughing. After 5-7 days, peri orbital swelling started resolving. Repeat evaluation 3 weeks after surgery showed no residual ophthalmic problems.



**Figure-1. Peri orbital haematoma, chemosis and subconjunctival haemorrhage**

### Case 2

A 43 years old male patient underwent bilateral endoscopic middle meatus antrostomies, bilateral partial inferior turbinectomies and middle turbinoplasty on right side. While performing uncinectomy, a breach of approximately 5 mm size in the left lamina papyracea was noticed and orbital fat was visible protruding through this defect into the nasal cavity. Remaining part of the surgery was performed with utmost care. Few hours after surgery, he developed left peri orbital subcutaneous emphysema and palpable crepitus. There was no complaint of diplopia or reduced vision. Complete ocular examination was performed by an ophthalmologist. His visual acuity, ocular movements and pupillary reactions were normal. Conservative management was instituted and patient was followed closely. This peri orbital swelling gradually subsided over a period of two weeks. Subsequent ocular examination revealed numbness left lower eye lid, cheek and left side of upper lip. Rest of the examination was normal. Severity of numbness decreased over 2 months time.

### Case 3

A 31 year old male, after undergoing clinical examination and relevant radiological investigations, was diagnosed a case of massive hypertrophy of left inferior turbinate with S shaped deflected nasal septum, opaque left maxillary sinus and significant enlargement of right middle

turbinate. By endoscopic sinus surgery, his bilateral middle and inferior turbinoplasty and left middle meatus antrostomy was performed. After uncinectomy a defect was noted in lamina papyracea. Post operatively, patient developed left lower eyelid haematoma and subconjunctival haemorrhage (Figure-2). Ophthalmological examination revealed normal visual acuity, pupillary reactions and intra ocular pressure. Conservative management was begun by elevating head end of bed, cold compresses and topical mild steroid and artificial tear eye drops. The swelling gradually reduced over a period of three weeks.



**Figure-2. Haematoma of lower eyelid and subconjunctival haemorrhage.**

### Case 4

A 23 year old male underwent bilateral middle meatus antrostomies for chronic maxillary sinusitis. Post operatively he developed oedema and subcutaneous emphysema of right lower eye lid. Ocular examination showed normal visual acuity and ocular motility. He was managed conservatively and after one week his eyelid oedema and emphysema subsided.

### DISCUSSION

The introduction of endoscopic sinus surgery (ESS) in 1985 has modified the way surgery is performed on the paranasal sinuses. Surgeons prefer this modality for the treatment of chronic rhinosinusitis (CRS), sinonasal tumors, cerebrospinal fluid (CSF) leaks, encephaloceles,

orbital endocrinopathy, nasolacrimal duct obstruction, epistaxis and other pathologies in the nose and sinuses.<sup>3</sup> In 1994, a revolutionary powered cutting instrument, termed the “hammer” or “microdebrider,” was introduced which further increased popularity and usage of ESS.<sup>4</sup> Unfortunately ESS is not devoid of its complications. As per a recent survey conducted on 62,823 endoscopic sinus surgery cases in the US, the overall major complication rate was 1%, of which orbital injury was observed in 0.07%.<sup>5</sup> Orbital injury is a well-recognized complication of endoscopic sinus surgery. Reported orbital complications include periorbital ecchymosis, proptosis, retro bulbar hemorrhage, nasolacrimal duct injury, damage to the medial rectus (MR) muscle, central retinal artery occlusion and injury to the optic nerve.<sup>2</sup> The newer powered devices used for endoscopic sinus surgery have a greater potential to damage extraocular muscles when accidentally misdirected and may cause permanent strabismus and troublesome diplopia.<sup>2,6</sup>

These mechanised systems extract tissue very rapidly and provide no tactile feedback to the surgeon about the type of tissue being removed.<sup>7</sup> It is extremely important that the surgeon be well schooled in radiologic and endoscopic nasal, sinus and orbital anatomy. The medial orbital wall is composed of four bones: ethmoid (lamina papyracea), maxillary, lacrimal and sphenoid bones. The lamina papyracea constitutes the thinnest portion of the medial orbital wall and it separates the contents of the medial orbit, in particular the medial rectus muscle, from the ethmoid air cells. The lamina papyracea, especially at the extremes of age, is extremely thin and may be incomplete in some patients; such a thin or incomplete wall presents an almost imperceptible boundary during sinus surgery.<sup>7</sup> The risk of breach is probably also greater when there are anatomical variants in the sinuses.

Orbital haemorrhage manifests as peri orbital ecchymosis and subconjunctival haemorrhage, as reported in our case no 1 and 3. However if not timely observed and adequately managed, it

can cause proptosis, firm orbit and compressive optic neuropathy leading to blindness.<sup>8</sup> Orbital haematoma results from damage to either orbital veins or arteries. Venous orbital haematoma results when veins that supply the lamina papyracea, periorbita, and/or orbital fat are traumatized and bleed into the orbit. The other kind of orbital haematoma occurs when anterior or rarely the posterior ethmoidal artery is traumatized.<sup>9</sup> It retracts into the orbit and continues bleeding. As little as 5 mL of blood accumulation in the orbit or periorbital space can raise intraorbital pressure to dangerous levels.<sup>3</sup>

So whenever breach of lamina papyracea and inadvertent orbital entry is suspected, the surgeon or his assistant must uncover the patient’s eye and observe any movement of eyeball, proptosis, firmness of globe, periorbital swelling and dilation of pupil. In surgery, the key to preventing orbital injury is identifying the lamina papyracea, which is present just superior to the maxillary antrostomy.<sup>10</sup> Surgery without detailed knowledge of anatomical structures and their visualization during procedure is fraught with hazard and increases the risk of orbital complication. The useful way to identify any opening in the lamina papyracea is to use simultaneous endoscopic exam and eye palpation, the so-called bulb press test.<sup>11</sup>

Another useful test is “fat float” test. Fat floats in water, tissue sinks—as a way to identify orbital fat, which endoscopically appears yellow and greasy.<sup>3</sup> The test identifies fat when the result is positive. If negative, the tissue present can be nerve or muscle, not just disease. As noted, time is of the essence when dealing with increased intraorbital pressure, more so with an acute arterial hematoma. The reversal of critical pressure is the key to success. When suspected, intra ocular pressure should be immediately checked with a portable tonometer like Tonopen or Pekin’s tonometer or at least digital tonometry should be done. Ocular massage should be started as a first step. If the eye is persistently hard and tense or pressure continues to be elevated, a lateral canthotomy preferably with cantholysis should

be performed. An incision into the eyelid skin crease(s) and evacuation of haematoma from the orbital fat can also be tried.<sup>7</sup> If above methods fail, a medial decompression taking down the lamina papyracea externally or endoscopically should be considered.<sup>3</sup> A transcaruncular orbitotomy can be used to identify ethmoid artery bleeding and complete a medial wall decompression.<sup>12</sup> Ophthalmologist consultation should be requested to check vision and assist in further treatment.

Opening of the lamina papyracea, even a slight crack or dehiscence, may allow outside air to get into the orbital tissues causing subcutaneous emphysema as noted in case no 2. Air accumulates usually as a result of vigorous straining such as occurs during awakening from anesthesia, sneezing and vomiting. Eye exam reveals a characteristic “crunchy” crepitus which usually resolves in 7-10 days.<sup>13</sup> Facial numbness was also observed in case no 2. It is caused by injury to the infraorbital nerve and it can be avoided by taking care while performing surgery in midline superior maxillary sinus.<sup>3</sup> Blindness though not reported by any of our patients, is a dreaded complication of ESS. It results either because of ignored or improperly managed fast growing orbital haemorrhage, direct injury to optic nerve or damage to vascular supply of optic nerve. Damage to ocular muscles particularly medial rectus muscle is high when middle to posterior portion of lamina papyracea is breached because medial rectus muscle is in contact with lamina here. Chances of damage to medial rectus are high when using microdebrider.<sup>14</sup> Cerebrospinal fluid leak or rhinorrhea can occur during instrumentation, including probes, suction, microdebriders, drills with diamond or cutting burrs, suction cautery, and curettes. Chances of rhinorrhea are high when disease is extensive or revision surgery is being performed.<sup>15,16</sup>

## CONCLUSION

All surgeons performing endoscopic sinus surgery should be well conversant with the anatomy of nose, sinuses and orbit. Good preoperative work up with the aid of radiological

investigations is a prerequisite for a successful surgical outcome. Frequent orbital checks must be performed during surgery. The surgeon doing ESS must be able to perform canthotomy and cantholysis procedures and must not spend time in waiting for ophthalmologist, in cases of orbital haematoma and a proper postoperative eye examination should be performed in the recovery room.

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