Orbital complications of functional endoscopic sinus surgery at King Hussein Medical Center

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ABSTRACT

Objectives: To evaluate major orbital complications of functional endoscopic sinus surgery (FESS) at King Hussein Medical center.

Methods: A retrospective study conducted at King Hussein Medical Center. The medical records of patients who underwent functional endoscopic sinus surgery (FESS) for the last 5 years (between January 2012 and January 2017) were evaluated for the presence of any operative orbital complication, the results of orbital CT and MRI were obtained for such cases. The Demographic data for the patients included in the study were reviewed in addition to method of surgery and type of orbital complication. Any patient who was lost to follow up was excluded from the study. The collected data were analyzed and compared with other studies conducted worldwide.

Results: Twelve patients out of 565 with a mean age of 42 years were found to have orbital complications. Diplopia occurred in 5 patients as result of involvement of the medial rectus (4 patients) and inferior rectus muscle (one patient). Orbital hemorrhage occurred in 3 patients, orbital cellulitis occurred in two patients and injury to the nasolacrimal drainage system occurred in two patients. Computed Tomography and MRI were able to detect those complications in all patients.

Conclusion: Major orbital complications of functional endoscopic sinus surgery were infrequent at our hospital. Only 12 complications (2.1%) were encountered in the study. The most common complication was involvement of the extraocular muscle particularly the medial rectus. Radio-imaging (MRI and CT) were very sensitive in detecting and defining orbital complication of functional endoscopic sinus surgery.

Key words: Orbital complications, Functional endoscopic sinus surgery.

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Introduction

Functional Endoscopic Sinus Surgery (FESS) is one of the common surgeries performed by otolaryngologist worldwide. Although there is a long list of indications for FESS, inflammatory and infectious sinus disease particularly chronic rhinosinusitis remains the most common indication. The paranasal sinuses are much very closed anatomically to the orbit. Therefore, FESS may result in ophthalmic complication which can be very severe and may be associated with serious morbidity. Orbital involvement in FESS occurs in only 0.5% to 3% of all surgeries but represents 16-50% of all complications. Major complications include; Extra-ocular muscle injury, nasolacrimal duct injury, orbital hematoma, orbital foreign body, optic nerve injury, orbital abscess, orbital cellulitis and globe perforation. This study was conducted to evaluate type and severity of orbital complications of FESS at our hospital.

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Methods
A retrospective study analysis conducted at King Hussein Medical Center. The medical records of patients who underwent FESS for chronic inflammatory rhinosinusitis within the last 5 years (between January 2012 and January 2017) were included in the study and evaluated for the presence of any operative orbital complication; the results of orbital CT and MRI were obtained for these cases. Surgery was conducted under general anesthesia. In all cases microdebrider was used for the removal of the polyp’s, after which middle meatal antrostomy performed, followed by ethmoidectomy. Post operatively, middle meatus was packed for one week. Navigation was used only for revision cases. The surgery is performed by or under supervision of a senior otolaryngologist. The demographic features for the patients included in the study were reviewed in addition to method of surgery and type of orbital complication. Any patient who was lost for follow up was excluded from the study. The collected data was analyzed and compared with previous studies conducted worldwide.

Results
Twelve patients (2.1%), aged between 32 and 55 years (mean 42 years), of patients who underwent FESS had orbital complications. Seven of them were males. The most common symptoms were double vision which occurred in five patients (41.7%); diplopia occurred as a result of medial rectus muscle (MR) entrapment in the medial orbital wall (3 patients), direct injury to the MR (one patient) or inferior rectus muscle (IR) entrapment in the inferior wall. Eye pain also occurred in five patients; three of them had orbital haematoma with elevation of the intra ocular pressure and two patients had orbital cellulitis for which the patients were admitted and treated with intra venous antibiotics. Epiphora occurred in 2 patients which were as a consequence of direct injury to the nasolacrimal duct who were treated later with dacryocystorhinostomy (DCR). All symptoms occurred within 24 hours post operatively. Orbital imaging (CT or MRI) were able to detect all types of orbital complication related to FESS. Symptoms and types of orbital complications related to FESS in addition to the ability of MRI and CT to detect those complications are all summarized in Table I. Post-operative orbital pain was found in five patients; two of them were due to orbital cellulitis. The patients were admitted and responded well to intra venous antibiotics including Vancomycin, Cefazidine (Fortum) and Metronidazole. Three patients had eye pain attributed to elevated IOP which reached 55 mmHg in one patient and between 30 and 40 mmHg in the other two patients. The last two patients responded well to topical medication and oral acetazolamide while the former patient responded to lateral canthotomy and cantholysis after failure of the conventional medications to lower the intra ocular pressure. Two patients (0.35%) experienced epiphora which was successfully managed with dacryocystorhinostomy (DCR).

Table I: Symptoms and types of orbital complications related to FESS

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Type of complication</th>
<th>Number of patients</th>
<th>Ability of CT or MRI to detect the injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent Diplopia</td>
<td>Medial rectus entrapment or injury</td>
<td>4(33.3%)</td>
<td>100%</td>
</tr>
<tr>
<td>Eye pain</td>
<td>Inferior rectus entrapment</td>
<td>1(8.3%)</td>
<td>100%</td>
</tr>
<tr>
<td>Lagrimation</td>
<td>Orbital cellulitis</td>
<td>2(16.7%)</td>
<td>100%</td>
</tr>
<tr>
<td>Lagrimation</td>
<td>Orbital haematoma</td>
<td>3(25.5%)</td>
<td>100%</td>
</tr>
<tr>
<td>Lagrimation</td>
<td>Nasolacrimal duct injury</td>
<td>2(8.3%)</td>
<td>100%</td>
</tr>
</tbody>
</table>

Discussion
Orbital complications in FESS occur in 0.5 to 3% of all procedures. In our study 12 patients (2.1%) who underwent FESS had orbital complications; this percentage did not exceed the frequency which was reported in most previous studies. Those complications can be divided into two groups; major complications which include extra-ocular muscle injury, persistent diplopia, nasolacrimal duct injury, orbital haematoma, optic nerve injury, orbital abscess, orbital cellulitis, cavernous sinus
thrombosis, injuries to the optic nerve, emphysema and perforated globe. Minor ones which include ecchymosis, minimal emphysema, temporary diplopia, edema and granuloma formation\textsuperscript{[6,7]} Complications which may result in permanent visual loss include direct injury to the optic nerve, globe perforation and increased intraocular pressure as a sequence of orbital emphysema or hematoma\textsuperscript{[8]} CT and MRI studies were able to detect 100\% of the post-operative complications. Worldwide diplopia occurs in 15 to 63\% of patients undergoing FESS\textsuperscript{[9]} Most patients who experienced diplopia post operatively was transient. However, in our study five patients reported persistent diplopia. CT and MRI were able to define its etiology; medial rectus entrapment was found in three patients, medial rectus injury in one patient and inferior rectus entrapment in one patient. Medial rectus muscle was the most common muscle affected by FESS, that is because of its closed anatomical relation to lamina papyracea which is a very thin bone that can be easily fractured during the procedure\textsuperscript{[2]} Three of those patients were satisfied with using prism glasses to treat diplopia but the other two patients the surgical options were preferred. Post-operative orbital pain was found in five patients; two of them were due to orbital cellulitis. The pathogenesis involves bacterial spread from infected sinuses infiltrating the orbital subperiosteal space through valveless venous plexuses, direct extensions via the neurovascular foraminae or passage through defected areas of the orbital wall during the procedure especially the medial wall.\textsuperscript{[10]} Both patients were admitted and responded well to intra-venous antibiotics including Vancomycin, Cefazidime (Fortum), and Metronidazole. The remaining three patients who had eye pain reported a score of pain between 7 and 9. The patients were referred to the ophthalmologist who found elevated IOP which was 55 mmHg in one patient but and between 30 and 40 mmHg in the other two patients. The last two patients responded well to topical medication and oral acetazolamide while the former patient responded to lateral canthotomy and cantholysis when topical and systemic medications including mannitol and acetazolamide failed to lower the intra ocular pressure to normal level. It is very important to detect orbital hematoma early before irreversible damage to the optic nerve takes place. Two patients (0.35\%) experienced epiphora; this was comparable to that found internationally which was reported to be between 0.3\% and 1.7\%.\textsuperscript{[12]} Epiphora occurs as a result of direct damage to the nasolacrimal drainage system which lies just anterior to the uncinate process; also the thickness of the lacrimal bone allows its easy penetration with most surgical instruments which increase the risk of nasolacrimal drainage system injury.\textsuperscript{[11,13]} Dacryocystorhinostomy (DCR) is almost invariably required for such cases. In our study, the two patients were successfully managed with DCR.

**Conclusion**

Major orbital complications of functional endoscopic sinus surgery were infrequent at our hospital. Only 12 complications (2.1\%) were encountered. The most common complication was involvement of the extraocular muscle particularly the medial rectus. MRI and CT were able to detect and define orbital complication in all cases. All complications were successfully managed and no serious complication which adversely affected vision was recorded.

**References**