Original Article

Neuro-ophthalmic complications of functional endoscopic sinus surgery among chronic sinusitis patients

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Objective: To determine the frequency of neuro-ophthalmic complications during functional endoscopic sinus surgery in chronic sinusitis patients.

Methodology: This descriptive case series was conducted at ENT department of Qazi Hussain Ahmed Medical Complex, Nowshera, from February to August 2019. WHO calculator was utilized for the sample size calculation, thus 171 patients with chronic sinusitis were selected using consecutive sampling. Ethical approval was taken from ethical committee and consent forms were taken from all participating patients. Detailed clinical evaluation and endoscopic Rhinoscopy and CT scan were performed by ENT consultant to evaluate the status of sinuses.

Results: Sixty two percent patients were male and 38% patients were female. In this study, 36% patients were in age range of 20-30 years, 30% patients were in age range 31-40 years, 23% patients were in age range 41-50 years and 11% patients were in age range 51-60 years. Mean age was 32±1.26 years. Neuro ophthalmic complications seen were visual loss due to damage to optic nerve in 1% while 0.5% patients had ophthalmoplegia due to oculomotor nerve damage.

Conclusion: Neuro-ophthalmic complications during functional endoscopic sinus surgery in our study were rare. However, some of these lead to permanent disabilities. (Rawal Med J 202;45:669-672).

Keywords: Neuro-ophthalmic complications, endoscopic sinus surgery, chronic sinusitis.

INTRODUCTION

Sinus surgery is one of very common surgical procedure used internationally. In 1985, endoscopic sinus surgery (ESS) was introduced. Now ESS is reported as treatment of choice for management of sinuses, skull/orbit base diseases and chronic infectious sinusitis. ESS also had some disadvantages include injury to other orbital structures and vital cranial structures.[1] Functional endoscopic sinus surgery (FESS), is a minimally invasive surgical procedure in which nasal drainage pathways of paranasal sinuses are enlarged through nasal endoscopes to improve sinus ventilation. Preoperative evaluation of patients undergoing FESS require CT scan with five key points; anatomical variants, sinus opacification, critical variants, opacification of sinus drainage pathways and condition of surrounding soft tissues of the neck, brain and orbits.[2]

Such evaluation of anatomical variants leads to preempt complications and modify surgical approach. FESS leads to major orbital complication rarely, however optic nerve injury is very serious complication of FESS. Frequent location and direction checking can prevent optic nerve injury during FESS.[3] Precise knowledge of surgeons regarding detailed anatomy, experience surgical skills and ability to interpret peripheral central nervous system (PNS) CT scans can be helpful in prevention of endoscopic complications.[4]

Reports from Spain revealed that endoscopic sinus surgery lead to permanent blindness occasionally and irreversible damage to orbital structures.[5] Another similar study conducted at Jinnah Hospital, Lahore, Pakistan reported that only one patients had optic nerve damage and none of patients had morbidity during FESS.[6] Pakistan is one of those countries where majority of surgeons are using external surgical approaches for chronic sinusitis treatment. The reason is fear of FESS complications. However, internationally FESS is used as effective and less invasive treatment of choice. In Pakistan, limited literature is available on similar topics. This study aimed to determine

frequency of neuro-ophthalmic complications during FESS in chronic sinusitis patients.

METHODOLOGY

Present descriptive case series was conducted at ENT department, Qazi Hussain Ahmed Medical Complex, Nowshera, Pakistan. Sample size of 171 patients was calculated using WHO calculator (using prevalence 0.66 confidence interval=1.96, significance 7%, N=175 rounded off to 171) patients were selected with consecutive non probability sampling.[7] Patients of both gender (male and female) and age >14 (ranging from 14 to 60 years) having chronic sinusitis were included in this study. Patients with co morbidities conditions like uncontrolled hypertension and diabetes and those having acute sinusitis were excluded from the study. Ethical approval was taken from ethical committee and informed consent was taken from all participating patients

Selection of patients was done from outpatients. Detailed history and clinical evaluation of sinuses, visual acuity and ocular motility was done. Each patient had endoscopic rhinoscopy, x-ray paranasal sinuses (open mouth view) and CT scan paranasal sinuses axial and coronal views. FESS was performed in standard conditions. Patients were followed after 6 weeks. Detailed clinical evaluation and endoscopic rhinoscopy and CT scan were performed by ENT consultant to evaluate the status of sinuses. During follow up patients were assessed for visual acuity measurement, color vision assessment and ocular motility.

Statistical Analysis: Data were analyzed using SPSS version 24. Frequency and percentages were computed for categorical variables such as gender and neuro-ophthalmic complications of functional endoscopic sinus surgery. Effect modifiers (age and gender) were controlled through stratification. Post stratification fissure exact test was applied and $p<0.05$ were considered significant.

RESULTS

A total of 171 patients underwent FESS in chronic sinusitis. There were 106(62%) male patients while 65(38%) female patients (Table 1). There were 62(36%) patients in age range 20-30 years, 51(30%) patients were in age range 31-40 years, 39(23%) patients were in age range 41-50 years and 19 (11%) patients were in age range 51-60 years. Mean age was 32±1.26.

Table 1. Gender distribution (n=171).

Gender	Frequency	Percentage
Male	106	62%
Female	65	38%
Total	171	100%

Table 2. Neuro ophthalmic complication (n=171).

Complication		Frequency	Percentage
Visual loss	Yes	2	1%
	No	169	99%
Total		171	100%
Ophthalmoplegia	Yes	1	0.5%
	No	170	99.5%
Total		171	100%

Table 3. Stratification of neuro ophthalmic age (n=171).

Complication		20-30 years	31-40 years	41-50 years	51-60 years	Total	p
Ophthal moplegia	Yes	1(0.6%)	0(0%)	0(0%)	0(0%)	1(0.6%)	0.62
	No	61 (35.7%)	51 (29.8%)	39 (22.8%)	19 (11.1%)	170 (99.4%)	
Total		62 (36.3%)	51 (29.8%)	39 (22.8%)	19 (11.1%)	171 (100%)	
Visual Loss	Yes	2(1.2%)	0(0%)	0(0%)	0(0%)	2(1.2%)	0.313
	No	60 35.1%)	51 (29.8%)	39 (22.8%)	19 (11.1%)	169 (98.8%)	
Total		62 (36.3%)	51 (29.8%)	39 (22.8%)	19 (11.1%)	171 (100%)	

Table 4. Stratification of neuro ophthalmic gender (n=171).

Complication		Male	Female	Total	p
Visual loss	Yes	2(1.2%)	0(0%)	2(1.2%)	0.383
	No	104(60.8%)	65(38%)	169(98.8%)	
Total		106(62%)	65(38%)	171(100%)	
Ophthal moplegia	Yes	1(0.6%)	0(0%)	1(0.6%)	0.62
	No	105(61.4%)	65(38%)	170(99.4%)	
Total		106(62%)	65(38%)	171(100%)	

Neuro-ophthalmic complications among 171 patients were analyzed as 2(1%) patients had visual loss due to damage to optic nerve, while 1(0.5%) patients had ophthalmoplegia due to oculomotor nerve (Table 2). Stratification of Neuro ophthalmic complications with regard to age and gender are shown in Table 3 and 4.

DISCUSSION

FESS is one of very effective surgical procedure used internationally for management of sinus related disease. The procedure is reported as very safe treatment option in research evidence based on last few years studies.[8] In present study, complications seen were of optic nerve damage in 1% and oculomotor nerve damage in 0.5% patients. A similar study reported 0.4% major while 30% minor complication after FESS.[5] Another similar study reported that majority of minor complication after performing FESS were orbital in nature, ranging from 3.9 to 20.3%.[9] Major complications found were low (ranged from 0.01 to 2.2%).[11] Maharshak et al reported 1% optic nerve damage leading towards permanent visual loss in patients undergone FESS.[11]

Kitthaweesin and Theerakul encountered two main devastating complications of FESS; ophthalmoplegia and visual acuity loss.[10] Researchers observe both of them as combination occurs very rarely. However, this study reported two cases at clinics >9 cases were reported from other literature (combination of two complications). Authors present distinct clinical and radiographic results. Distinct mechanism of injury leads towards ophthalmic complications associated with FESS.[10]

In this study, neuro ophthalmic complications were analyzed, as 1% patients had visual loss due to damage to optic nerve while 0.5% patients had ophthalmoplegia due to oculomotor nerve damage. Similar findings were observed in other studies as well. A similar study conducted in Thailand reported that 12.72% patients undergone FESS showed visual loss, however 22% patients showed isolated oculomotor and 77.5% showed combined oculomotor with abducent nerve involvement.[12]

Several studies reported findings similar to our study that general anesthesia helped in minimizing intra operative blood loss while controlled hypotension also contributed in blood loss prevention.[13] Studies reported that sphenoethmoidal cells identification is very critical, as 8-14% of general and place optic nerve at high risk.[14] Anatomical variants are strongly connected with lamina papyracea and need to dissect very carefully. A similar study reported that 2 cases of hypoplastic maxillary sinus that were complicated with lamina papyracea resulting in periorbital ecchymosis.[15]

No revision cases were found in our study. However, a similar study reported that surgical land marks are being influenced by extent of mucosal lesion but in revision surgery the scaring affects surgical land marks.[16] Experience of surgeon is not associated with complication rate. But we can predict that surgeons with more experience can perform more difficult cases. However, literature did not support it. Studies reported that same complication rate was seen with experienced and beginner surgeons.

For example process that is more predictable with unexpected complication line nasal polyps (including ethmoidectomies, sphenoidectomy and frontoethomidectomy) had nothing to do with surgeon experience.[17] Extent of disease, extent of surgery, coexisting comorbidities, Lund-Mackay scores, revision surgery, powered surgery and surgeon experience are import risk factors for FESS complications. These factors are needed to cater for prevention of complications.[18] Small sample size and conduction of study at single center limits generalizability of study.

CONCLUSION

A rare percentage of neuro-ophthalimc complications were found during FESS in our study. However, minor amount of these complications leads to permanent disabilities. A serious collaboration among ophthalmologists and sinus surgeons is necessary for better understanding, reporting and final decision regarding management of complications.

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