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Original Research Article

RADIOLOGICAL EVALUATION OF LACRIMAL APPARATUS INJURY AFTER FUNCTIONAL ENDOSCOPIC SINUS SURGERY AT TERTIARY CARE CENTRE: A PROSPECTIVE STUDY

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ABSTRACT

Background: Functional Endoscopic Sinus Surgery (FESS) is a set of minimally invasive surgical techniques which allow direct visual examination and opening of the sinuses. The aim of this study to determine the incidence of nasolacrimal duct injury after functional endoscopic sinus surgery radiologically, using computed tomography. **Materials and Methods:** A hospital based single-center, prospective, observational study, conducted in Department of Otorhinolaryngology at SKGMC Sikar, Rajasthan, India during one-year period. The diagnosis of CRS was made in accordance with history and objective findings. Routine laboratory investigations, nasal endoscopy, radiological assessment (X-ray of the paranasal sinuses Water's view and sometimes lateral view including nasopharynx) and CT Scan PNS were done whenever required. **Result:** During study period 50 patients satisfying study criteria were considered for present study. Presence of the lacrimal bone dehiscence and no passage of the contrast material into the inferior meatus were noted as the signs of injury to the lacrimal canal on active transport dacryocystography. Bony dehiscence was detected in 54% of the operated sides but 20% of the nonoperated sides. No passage of the contrast material into the inferior meatus was observed in 16% of the operated sides. There were no cases of epiphora postoperatively. The lacrimal drainage system injury was more frequently observed on the left sides operated (30%). **Conclusion:** We conclude that lacrimal drainage system injury might occur in various extents during functional endoscopic sinus surgery. However, it does not necessarily result in postoperative epiphora.

INTRODUCTION

Functional endoscopic sinus surgery (FESS) is frequently carried out for the treatment of medically resistant chronic sinus disease.[1] Radiological evaluation, in particular computed tomography (CT), in combination with nasal endoscopy is routinely performed to assess the underlying cause, extent and response of sinus disease to medical therapy.[2-4]

FESS is the gold standard for treatment of chronic rhinosinusitis (CRS), with or without nasal polyposis and allergic fungal sinusitis refractory to optimal medical treatment.[5] FESS confers the advantage of being minimally invasive and allows for sinus air cells and sinus ostia to be opened under direct visualization.[6-8] The primary goal of FESS is to return the mucociliary drainage of the sinuses to normal function. FESS is a complex procedure, due to the sinuses' location near the cranium and orbit as well as its propensity for bleeding, this is a delicate procedure that requires skill and precision.[9]

The ophthalmic complications of FESS have been known for many years. The intimate anatomical relationship between the paranasal sinuses and the orbit places the various ocular structures at risk of injury during FESS. Blindness can result from an orbital hemorrhage or injury to the optic nerve, epiphora from injury of the nasolacrimal duct system and diplopia from damage to the extraocular muscles or disruption of the orbital fascial planes. The risk of injury to the ocular structures has been associated with the surgeon's experience, the extent and severity of sinonasal disease, history of previous sinus surgery, intraoperative visualization and the presence of anatomical variations.10 The aim of this study to determine the incidence of nasolacrimal duct injury

after functional endoscopic sinus surgery radiologically, using computed tomography.

MATERIALS AND METHODS

A hospital based single-center, prospective, observational study, conducted in Department of Otorhinolaryngology at Shree Kalyan Government Medical College, Sikar, Rajasthan, India during one-year period.

Inclusion criteria

Patients 18-60 years, either gender, with CRS with or without polyps and patients with mucoceles posted and operated for FESS.

Exclusion criteria

Patients with diagnosed benign and malignant tumours. Patients with pathologies like lesions of the pituitary, orbit, intracranial complications of sinusitis. Patients with gross septal deviation, patients with bleeding diathesis and other general conditions like diabetes and hypertension.

All the patients were subjected to detailed history of wide spectrum of presenting symptoms viz. facial pain, headache, nasal discharge, nasal obstruction and nasal mass. A thorough ENT examination with special emphasis on anterior and posterior rhinoscopy and elicit sinus tenderness was done. The diagnosis of CRS was made in accordance with history and objective findings. Routine laboratory investigations, nasal endoscopy, radiological assessment (X-ray of the paranasal sinuses Water's view and sometimes lateral view including nasopharynx) and CT Scan PNS were done whenever required.

All patients underwent Functional Endoscopic Sinus Surgery, in supine position with head elevated to 30 degree and slightly turned to right, under General anaesthesia. The 'Messerklinger Technique' of FESS was followed in all the patients, this is an anterior to posterior approach. the surgical procedure consists of septoplasty, polypectomy uncinectomy, anterior ethmoidectomy, middle meatal antrostomy, posterior ethmoidectomy, partial middle turbinectomy. The surgery was performed by two senior surgeons. (experienced more than 5 years). After the surgery the middle meatus was packed with removable gauze packing for 7days. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version.

RESULTS

During study period 50 patients satisfying study criteria were considered for present study. Majority of patients were from 19-30 years age group (46%) followed by 31-40 years age group (28%). Male patients (64%) were more as compared to female (36%) [Table 1].

Presence of the lacrimal bone dehiscence and no passage of the contrast material into the inferior meatus were noted as the signs of injury to the lacrimal canal on active transport dacryocystography. Bony dehiscence was detected in 54% of the operated sides but 20% of the nonoperated sides. No passage of the contrast material into the inferior meatus was observed in 16% of the operated sides. There were no cases of epiphora postoperatively. The lacrimal drainage system injury was more frequently observed on the left sides operated (30%) [Table 2].

In present study we noted few minor complications as synechiae requiring treatment (4 %), periorbital emphysema (2%) and epistaxis requiring packing (2%), all were managed conservatively and successfully [Table 3].

Table 1: Age and gender distribution

Characteristics	No. of cases (N=50)	Percentage
	Age (yrs)	
19-30	23	46%
31-40	14	28%
41-50	8	16%
51-60	5	10%
	Gender	
Male	32	64%
Female	18	36%

Table 2: Radiographic evaluation of lacrimal duct system after FESS

Radiographic evaluation	No. of cases (N=50)	Percentage
Bone dehiscence operated side	27	54%
Bone dehiscence non-operated side	10	20%
Right involvement	10	20%
Left involvement	15	30%
Bilateral	2	4%
Passage of contrast medium in operated side	42	84%
No passage of contrast medium in operated side	8	16%

Table 3: Complications

Complications	No. of cases (N=50)	Percentage
Adhesions requiring treatment	2	4%
Periorbital emphysema	1	2%
Epistaxis requiring packing	1	2%

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DISCUSSION

FESS can be a difficult technique to master, with a learning curve that has to be overcome to consistently perform safe and efficient surgery.[11,12] Compared with conventional surgery, FESS offers the advantages of quicker postoperative recovery time, lack of an external excision and improved intraoperative visualization. With the addition of powered cutting instruments, also known as microdebriders, hummers or microshavers, the operative time for removing diseased tissue has been greatly reduced and effectiveness increased.[13]

Our results consisted with H. Halis Unlu et al,[14] found presence of the lacrimal bone dehiscence and no passage of the contrast material into the inferior meatus were noted as the signs of injury to the lacrimal canal on active transport dacryocystography. Bony dehiscence was detected in 53.2% of the operated sides but 20% of the nonoperated sides. No passage of the contrast material into the inferior meatus was observed in 14.9% of the operated sides. There were no cases of epiphora postoperatively. The lacrimal drainage system injury was more frequently observed on the left sides operated.

G B Singh et al,[15] found that the prevalence of nasolacrimal duct injury dehiscence was 1.16 per cent, with a similar incidence of 1.16 per cent for nasolacrimal duct injury post-operatively. However, no cases of symptomatic nasolacrimal duct injury were recorded, which was conflicted with our results. Major factors influencing the occurrence of complications are extension of the disease pathology and anatomical variations of the paranasal sinuses. Scott et al,[16] in their study on 315 patients documented a complication rate of 2.5% (epistaxis, infection and swallowed nasal pack) also reported possible additional complications includes pain, vasovagal attack and swallowed nasal pack which terminated the procedures. The National Sinonasal Audit of 3128 patients reported a total adverse event rate of 6.6 %, most of which was related to minor bleeding. 0.4 % had major complications, 0.2 % were orbital complications. Five patients had a peri-orbital haematoma and 2 had peri- orbital emphysema. None had a reduction in visual acuity or extra-ocular movements. 0.06 % had a CSF leak, which were addressed intraoperatively and a further two returned to theatre because of major post-operative hemorrhage.

Suzuki et al,[17] found an overall incidence of surgical complications after FESS at 0.5%, with the corresponding rates for cerebrospinal fluid leak 0.09%, orbital injury 0.09%, and hemorrhage requiring surgery 0.1%. James G. Krings et al,[18] conducted a retrospective cohort analysis of 78,944 primary FESS cases, 288 major complications were identified representing a complication rate of 0.36% (95% CI 0.32%–0.40%). The major complication rate following revision cases (n = 19; 0.46%) and primary cases (n = 288; 0.36%) was similar (OR=1.26; 95% CI 0.79–2.00).

From its introduction, the concepts of endoscopic sinus surgery continue to evolve because of increased understanding of the anatomy, improved endoscopes and video equipment, newer instrumentation, and improved technology. Pre- operative imaging of the patient to understand the extent of the disease and anatomical variations, thorough knowledge of anatomy, identification of key landmarks, preservation of normal sinus mucosa, meticulous intra operative tissue handling, periodic saline irrigation, proper hemostasis and using technologically advanced instruments are the major factors, which can definitely reduce the occurrence of complications and improve the patient outcome.19 The use of FESS allows for a much less invasive and traumatic procedure, resulting in shorter surgery and healing times, less postoperative discomfort, and fewer surgical complications.

CONCLUSION

We conclude that lacrimal drainage system injury might occur in various extents during functional endoscopic sinus surgery. However, it does not necessarily result in postoperative epiphora. Performing the middle meatal antrostomy in posteroinferior direction, and uncinectomy with backbiting forceps or a shaver might help in reducing the lacrimal injury. Active transport dacryocystography can be adopted as an alternative diagnostic tool in detection of the lacrimal injury.

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