

Functional Endoscopic Sinus Surgery: Experience with Fifty Patients Suffering From Chronic Rhinosinusitis, A descriptive study

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Abstract:

Background: Chronic rhinosinusitis (CRS) can be considered as one of the most frequent problems that can be faced in the practice of otolaryngology. The cornerstone of accurate diagnosis and treatment of chronic rhinosinusitis is a thorough history and complete physical examination, including nasal endoscopy supported by CT examination.

Objectives: To identify the commonest age group affected by CRS, the symptoms and signs of CRS, to compare the findings of CT scans with endoscopic and operative findings and to reveal the most common operative steps performed in functional endoscopic sinus surgery (FESS).

Patients and method: A cross sectional descriptive study conducted in Al-Yarmouk Teaching Hospital enrolled 50 patients presented with medically resistant CRS. Data collected from the patients using a questionnaire formula and all of them were subjected to endoscopic examination. CT scan of the nose and paranasal sinuses in coronal view was arranged for all of them. All the patients subjected to endoscopic sinus surgery.

Results: The commonest age group affected by CRS was in those between 21-30 years (40%), the mean age was 30.4 years with male to female ratio 1.27:1. The commonest chief complaint was nasal obstruction (46%). The commonest endoscopic finding was septal deviation (86%). The commonest CT finding was inferior turbinate hypertrophy (72%). Uncinectomy and middle meatal antrostomy were the commonest surgical procedures performed (94%).

Conclusions: The commonest age group affected by CRS is 21-30 years. Males are more affected by CRS than females. Nasal obstruction is the commonest symptoms suffered by the patients. Septal deviation is the commonest endoscopic finding. Hypertrophy of the inferior turbinate is the commonest CT finding. Uncinectomy and middle meatal antrostomy are the commonest surgical procedures done.

Key words: Chronic rhinosinusitis, CT, Endoscopic sinus surgery, paranasal sinuses.

Introduction:

Although Hirschmann conducted the first endoscopic examination of the nose with modified cystoscope in 1901^[1] the modern era of endoscopic sinus surgery (ESS) evolved with the development of Hopkins rods in the 1950s. Messerklinger pioneered the study of endoscopic anatomy and pathophysiology of the paranasal sinuses, publishing his experience with ESS in 1978^[2]. He highlighted the role of the ostiomeatal complex (OMC) in the pathophysiology of rhinosinusitis and directed attention to it during surgery. His resident, Stammberger, was instrumental in popularizing this technique outside Germany and Austria^[3]. Kennedy is credited with the introduction of ESS to the United States in 1985^[4].

One of most important Messerklinger's observations is that the secretions of various sinuses do not reach their respective ostia randomly but by definite pathways which seem to be genetically determined. Even when these pathways may be pathologically impeded or blocked; their direction is not significantly altered^[5]. Secretions are always directed to the natural ostium even when one or more accessory ostia are present. A surgically created inferior meatal antrostomy may allow drainage of a fluid sump and provide ventilation but it will not actively aid outward transport^[6].

The concept of such a limited disease producing extensive changes is central to our understanding and appropriate treatment of chronic or recurrent rhinosinusitis. The key region is that part of the lateral nasal wall that encloses the sinus ostia and their adjacent mucosa, which is referred to as the

ostiomeatal complex^[6]. Specific therapy towards this area of obstruction may allow resolution of even massive mucosal pathology in the dependant sinuses without direct intervention upon^[7].

CRS is a relative indication for surgery. It is indicated in patients in whom maximal medical therapy has failed. Endoscopic evaluation is mandatory before the surgery. The telescope is held lightly in the left hand using the thumb and first two fingers and is introduced under direct vision^[8]. An organized nasal endoscopy can be accomplished in three passes that will facilitate a thorough and detailed examination^{[9][10]}.

Aims of the study:

The objectives of the study were to discover the commonest age group affected the symptoms and signs of CRS, to compare the finding of CT scans with the endoscopic and operative findings and to delineate the commonest operative procedure steps requested in ESS.

Patients and Method:

The current study was conducted from October 2010 to October 2011 in Al – Yarmouk Teaching Hospital. All patients with symptoms and signs of sinonasal origin were referred for evaluation and assessment to investigate the possibility of inclusion in the study.

Eligibility for the study:

- Age eligible for the study: Over 10 years.
- Genders eligible for the study: Both
- Accepts healthy volunteers: No.

Inclusion Criteria:

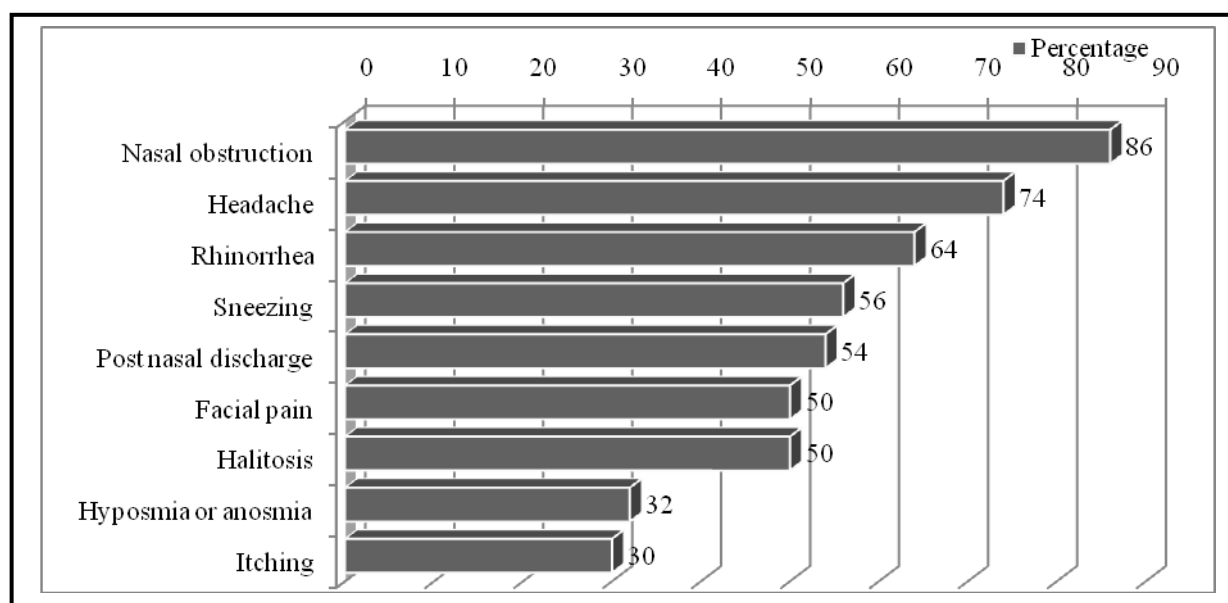
Patients visiting the outpatient clinic of Al-Yarmouk Teaching Hospital of Otolaryngology every Tuesday, any patients suffering from symptoms and signs of chronic rhinosinusitis, failure of appropriate medical treatment to relieve their sufferings, patients with past sinonasal surgeries were accepted and agreement of the patient to do all the necessary steps of diagnosis and the required investigation after proper explanation. Ethical explanation and written approval were fulfilled for every patient.

Exclusion Criteria:

Patients did not receive the appropriate medical treatment, unfit patients for general anesthesia and patients with second (non-sinonasal) cause of headache were excluded from the study.

Seventy six patients found to have CRS. However, only 50 patients were fulfilled the above criteria and were included in the current study, the patients were classified into groups according to their ages. A questionnaire formula was prepared for data collection concentrating on comprehensive history. Clinical findings were recorded after thorough otolaryngological examination. Routine CT scan for the nose and paranasal sinuses in coronal view was arranged for all patients, other views were individualized accordingly. The findings during endoscopic examination and the steps performed during surgery were recorded.

Diagnostic endoscopy performed under local anaesthesia in a routine way. Preparation for anaesthesia and FESS was done as the usual way. The surgical steps were tailored according to endoscopic examination, CT findings, and intra-operative judgments.

Figure 1: The occurrence of preoperative symptom**Results:**

The mean age of the patients was 30.4 ± 9.52 years. The commonest age group affected was between 21 – 30 years (40%) while the least group affected was between 51 – 60 years (2%). Male patients were 28 (56%) while females were 22 (44%). Male to female ratio as 1.27:1. Table 1 shows the chief complaint of the patients with nasal obstruction as the commonest (46%).

Table 1: The chief complaints

Chief complain	No. of patients	%
Nasal obstruction	23	46
Headache	15	30
Rhinorrhea	4	8
Facial pain	4	8
Post nasal drip	2	4
Hyposmia	1	2
Sneezing	1	2
Total	50	100

The duration of symptoms in (56%) of patients was between 1 - 2 years as shown in table 2.

Table 2: The duration of complaints

Duration	No. of patients	%
<1 year	7	14
1 – <2 years	28	56
2 – <5 years	13	26
=> 5 years	2	4

Figure 1 shows the frequency of nasal symptoms and the most prevalent symptom was nasal obstruction seen in 43 patients (86%).

Septal deformity was the commonest finding on anterior rhinoscopy which was found in (86%) of patients as shown in table 3.

Table 3: The clinical findings on anterior rhinoscopy

Clinical findings	No. of patients	%
Septal deformity	43	86
Hypertrophied turbinates	36	72
Congested mucosa	31	62
Pale mucosa	17	34
Polyps	17	34
No abnormal findings	7	14
Mucopus in the nasal cavity	8	16

Septal deformity was also the commonest endoscopic finding (88%) of patients as shown in table 4.

Table 4: The endoscopic findings

Endoscopic findings	No. of patients	%
Septal deformity	44	88
Inferior turbinate hypertrophy	36	72
Polyps in the middle meatus	27	54
Abnormalities in maxillary ostium	Total 15	30
Small	7	
Just dip	5	
Multiple ostia	3	
Middle turbinate hypertrophy	12	24
Enlarged bulla	11	22
Mucopus in the middle meatus	8	16
Inferior meatal antrostomy	6	12

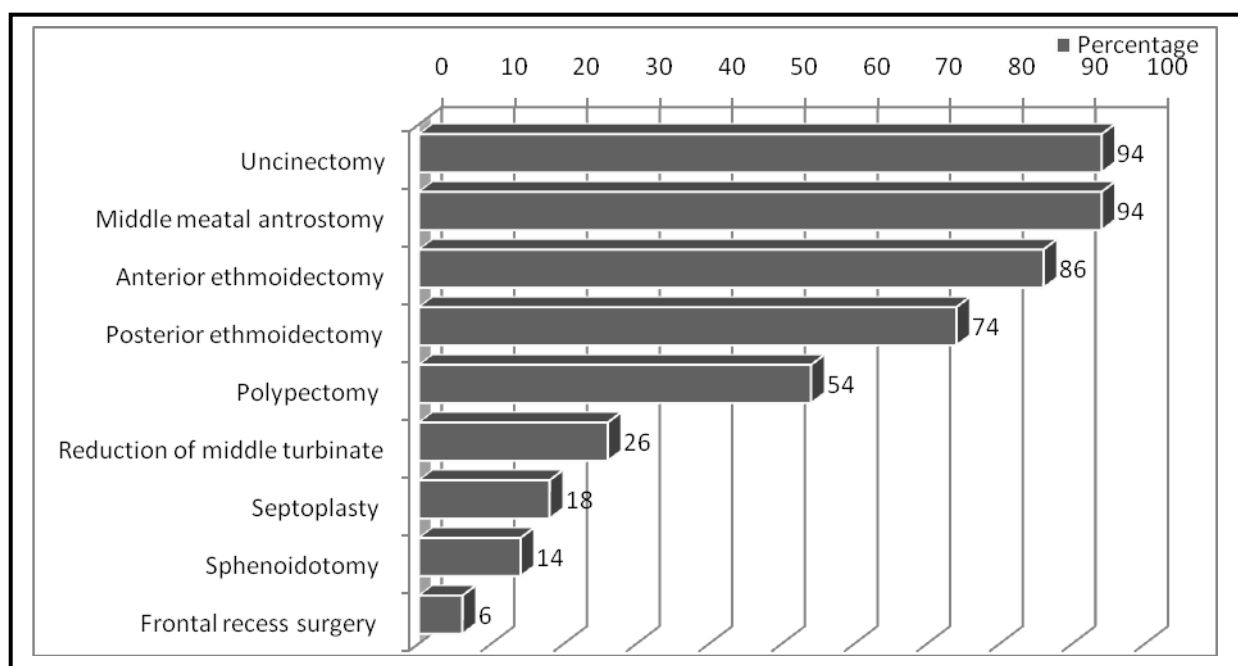
Inferior turbinate hypertrophy was the most frequent CT scan finding (72%) as shown in table 5.

Table 5: CT scan findings

CT finding	No. of patients	%
Inferior turbinate hypertrophy	36	72
Mucosal thickening	Total 32	64
Maxillary sinus	23	46
Ethmoidal sinus	20	40
Sphenoid sinus	9	18
Frontal sinus	6	12
Blockage of ostiomeatal complex	29	58
Enlarged bulla	28	56
Concha bullosa	13	26
Onodi cells	4	8
Fluid level	4	8
Frontal recess polyp	3	6
Haller's cells	3	6

Uncinectomy was the predominant surgical step as it was performed in (94%) of patients, while frontal recess surgery was the least one as it was done in (6%) of patients.

Figure 2: Types of surgical steps



Discussion:

The mean age of our patients was 30.4 years and the standard deviation was ± 9.52 years.

Nearly comparable results were found by Nair et al (2011), they revealed that the mean age of patients affected by CRS was 34.8 years in view of the fact that their study also included only the Asian race and nearly the same no. of patents^[11].

James and Hilda (2005) studied the pathophysiologic classification of CRS and revealed that the average age of patients was 45.1 year^[12].

Another study by Knut et al (2006) revealed that the mean age of their patients was 43 years^[13]. Differences from the results of the current study were probably explained by the strict criteria according to which they excluded the patients from the study (these criteria included any patient with heavy allergy, polypous sinusitis or pansinusitis, pregnancy, previous acupuncture treatment, previous surgery for chronic sinusitis, or recent medication use that could influence the results of the study) together with the influence of the racial factors and the ecological conditions that cannot be overlooked under which the study was carried out.

The commonest age group affected by CRS in the current study was 21–30 years group (40%). Nearly similar results were reported by others. Golam et al (2011) in his experience of 60 cases with ESS^[14] and Kanu et al (2008) in his study about the management of sinonasal diseases^[15] all reported that the commonest age group affected were 21 – 40 years.

Gender distribution in the current study revealed that males were (56%) while females were (44%), with male to female ratio of 1.27:1.

Stanojkovic (2010) found nearly parallel results and he stated that (42.5%) of his patients were females^[16]. James and Hilda (2005) reported that male were (27%) and females were (73%)^[12]. Differences from our results probably explained by fact that their study involved different races and the Asian race represented only by (3%) of the studied group. Knut et al (2006) revealed that females were (51%) and males were (49%) of the studied patients^[13]. Differences from the results of the current study were probably explained again by the strict criteria of exclusion and the influence of the racial and ecological factors.

In the current study nasal obstruction was the predominant chief complaint (46%). Golam et al (2011)^[14] and Kanu et al (2008)^[15] reported that nasal obstruction was also the chief complaints in their patients but with higher percentages, (70%) and (78.3%) respectively. Differences from our results were probably explained by that their patients had anatomical variations which will influence the results.

Most of our patients suffered from their symptoms along 1-2 years (56%). Up to the knowledge of the authors of the current study no comparable studies

investigate this point of view. More than three quarters of the patients in the current study were complaining from nasal obstruction (86%). Netkovski and Sirgovska (2006) in their study reported that nasal obstruction was complained of in (93%), post nasal drip (86.2%) and headache (65%)^[17]. in a study by Bunzen et al (2006) nasal obstruction was found in (100%), nasal discharge (91.6%) and headache (87.5%)^[18]. in another study by Engin et al (2003) nasal obstruction was found in (85.4%), headache (75.4%) and post nasal drip (69.2%)^[19]. in a further study by Valerie and Mackay (1994) nasal obstruction was found in (70%), headache (38%), anterior and posterior nasal discharge was found in (72%)^[20]. in a study by Stammberger and Posawetz (1990) nasal obstruction was found in (82%), nasal discharge (64%) and headache was found in (48%)^[21].

As seen, all the studies revealed that nasal obstruction was more prevalent in all patients with some sort of variation probably explained on the bases that these studies were done in different parts of the world with differences in the weathers, probably the difference of the season during which the study was conducted and the racial variations which might influence its effects on the patency of the nose as the shape and size of the turbinates, the prevalence of intrinsic and extrinsic rhinitis and any hereditary problems.

The causes of nasal obstruction are multiple and probably explained by the facts that most of the patients had septal deviation, the increased association of inferior turbinate hypertrophy and the occurrence of nasal polyposis in some patients or due to turbulence of the nasal air flow predisposed by the presence of septal spurs with enlarged middle turbinates. In the current study anterior rhinoscopy revealed no abnormal finding in (14%) of the patients. While nasal endoscopy was higher through documenting the nasal findings (100%). It allows thorough evaluation of intranasal anatomy and identification of pathology that is impossible to see using standard techniques of anterior rhinoscopy and headlight examination. Septa deformity was the most common finding during endoscopic examination of the nasal cavity (88%).

Kanu et al (2008) stated that the most common finding were middle meatus polyps which were founds in (48.3%), followed by mucopus in the middle meatus in (33.3%) and septal deviation in (16.6%) of his patients^[15]. Engin et al (2003) reported that septal deviation as the commonest finding during endoscopy which was seen in (53.1%) followed by enlarged middle turbinate in (32.3%) and enlarged bula in (26.2%)^[19]. in another study done by Kamel (1989) blocked maxillary ostium was reported in (32.91%), purulent discharge in the middle meatus in (27.21%) and enlarged bulla in (19.62%)^[22].

In the current study the most common finding on coronal CT was inferior turbinate hypertrophy (72%).

Tezer et al (2006) reported mucosal thickening as the most common CT finding among the three hundreds ninety nine patients that were included in their study, the thickening involved the maxillary sinus in (48.85%), ethmoidal sinus in (43.60%), frontal sinus in (27.56%) and sphenoid sinus in (18.8%). Also they reported inferior turbinate hypertrophy in (41.35%), ostiomeatal complex disease in (38.09%), concha bullosa in (31.07%) and Haller's cells in (12.78%)^[23]. Engin et al (2003) concluded that concha bullosa as the commonest CT finding which was found in (32.3%), while bulla ethmoidalis found in (26.2%), and Haller's cells in (10%)^[19]. While in a study performed by Berenholz et al (2000), the commonest CT finding was septal deviation which was found in (65%) of patients, less commonly was the mucosal thickening seen in (43%) of patients, while inferior turbinate hypertrophy was found in (40%) of patients and concha bullosa in (20%) of them^[24].

Coronal CT scans have dramatically improved the imaging of the nasal cavity and paranasal sinuses. Subtle variations or anomalies of paranasal bony anatomic structures and mucosal abnormalities can easily be detected with coronal plane CT imaging. CT scan in coronal view performed to all patients to confirm the diagnosis, see the extent of the disease, and to identify the bony details which will greatly influence the surgical planning.

The commonest surgical steps performed in the current study were uncinectomy and middle meatal antrostomy (94%) for each. All patients who needed sphenoidotomy and frontal recess surgery presented with duration of symptoms more than 2 years. This probably reflect the fact that early endoscopic examination and CT evaluation of patients suspected to have CRS may discover the disease in its early occurrence and may reduce the surgical interference needed which will probably improves the outcome of management. Septoplasty was needed in 9 patients (18%), it was performed in four patients prior to endoscopic surgery because of severe septal

deviation that interferes with the surgical field, while in five patients septoplasty performed after endoscopic intervention to enhance the nasal patency.

Nair et al (2010) in their study, uncinectomy was done to all the patients (100%), clearance of disease from the ostiomeatal complex (82.7%), anterior ethmoidectomy (48.2%), frontal recess surgery (42%) posterior ethmoidectomy (30.9%), while the least common were sphenoidotomy (27.2%) and septoplasty (19.8%)^[25]. Golam et al (2011) performed uncinectomy, middle meatus antrostomy and anterior ethmoidectomy to all their patients (100%) while posterior ethmoidectomy was done in (75%) of the patients^[14]. A study done by Luke et al (2011) revealed that the commonest surgical steps done for their patient were maxillary antrostomy and ethmoidectomy^[26].

The combination of endoscopic examination and CT scan are the main tools in the diagnosis and treatment of chronic rhinosinusitis. Despite the fact that clinically dominating symptoms may result from a diseased paranasal sinuses and nasal pathology, in most cases, the underlying causes are not to be found in the affected sinuses themselves but in the clefts of the lateral wall of the nose from which the disease usually spread to the paranasal sinuses to cause chronic rhinosinusitis. The current study revealed that sinus changes seen 36 times (32 mucosal thickenings plus 4 fluid levels), while double that number seen as abnormalities in the lateral wall of the nose, 73 times (29 blocked complexes, 28 enlarged bullae, 13 concha bullosa and 3 frontal recess polyps).

Conclusions:

The commonest age group affected by CRS is 21-30 years. Males are more affected by CRS than females. Nasal obstruction is the commonest symptoms suffered by the patients. Septal deviation is the commonest endoscopic finding. Hypertrophy of the inferior turbinate is the commonest CT finding. And uncinectomy and middle meatal antrostomy are the commonest surgical procedures done.

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