

Comparative Evaluation of Septoplasty versus Septoplasty with Functional Endoscopic Sinus Surgery (FESS) in 50 Cases of Chronic Maxillary Sinusitis

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ABSTRACT

Introduction: Chronic sinusitis with nasal septal deviation is a common condition encountered in ENT practise. Deviated nasal septum leads to altered airflow dynamics in nasal cavity and sinuses causing hypertrophy of mucosa. It leads to osteo-meatal complex obstruction, impaired mucociliary clearance and sinusitis.

Aim: To compare the outcome of septoplasty alone and septoplasty with FESS in patients of chronic maxillary sinusitis with septal deviation.

Materials and Methods: Fifty patients of chronic maxillary sinusitis with Deviated Nasal Septum (DNS) were included in the study. They were randomly divided into two groups of 25 each. First group (Group A) underwent septoplasty alone while the second group (Group B) underwent septoplasty with FESS. The results were analysed to find out the efficiency of each procedure when done independently and concomitantly.

Results: Mean age in group A was 29.68 years while mean age of group B was 28.96 years. In group A, 19 (76%) were males while in group B, 16 (64%) were males. Nasal obstruction and post nasal drip were present in all patients at 12 weeks follow-up, in Group B patients who underwent FESS and Septoplasty only 7 patients out of 25 had nasal obstruction giving 72% improvement while 3 out of 25 patients showed post nasal discharge showing an improvement of 88%. In Group A, 11 out of 25 patients still

had nasal obstruction giving only 56% improvement whereas 11 out of 25 had post nasal discharge showing 56% relief. On statistical analysis the results were statistically significant.

Conclusion: Though both groups reported improvement in symptoms as compared to pre-operative state, it was more in Group B which underwent FESS with septoplasty rather than in Group A which underwent septoplasty alone. In deviated nasal septum with features of chronic rhinosinusitis, septoplasty alone is inadequate; therefore FESS must be concomitantly done with septoplasty.

Key Words: Deviated nasal septum, Chronic maxillary sinusitis, Functional endoscopic sinus surgery, Mucociliary clearance, Osteo-meatal complex

INTRODUCTION

Chronic rhinosinusitis is one of the most common problems encountered in routine otorhinolaryngological practice. Regional anatomic abnormalities and pathologies in the vicinity of OMC are frequently associated with the development of chronic sinus disease. [1] The severity of septal deviation, its location, shape and complexity-all influence air flow dynamics in the nasal cavity. Thus, in binasal cavities of subjects with nasal septal deviation, a difference may occur in the amount of air

flow and resistance. [2] In response to the difference in air flow dynamics between nasal cavities in nasal septum deviation, a compensatory hypertrophy of nasal mucosa on the side of nose opposite the major septal deviation is often found. [3]

In addition to the compensatory hypertrophy, an impaired mucociliary clearance, higher incidence of OMC obstruction and increased incidence of sinusitis had been reported in subjects with nasal septum deviation. [4] Sinusitis had been reported to be more severe in concave side than on convex side. [5]

The term sinusitis refers to a group of disorders characterised by inflammation of mucosa of paranasal sinuses. Chronic sinusitis is defined as sinus infection that has persisted for longer than 3 months. Major symptoms of chronic rhinosinusitis are facial pain/pressure, nasal obstruction, nasal discharge, hyposmia/ anosmia and purulent discharge in the nasal cavity on examination. Minor symptoms are headache, halitosis, fatigue, dental pain, cough and ear pain. The sinus most commonly involved is maxillary followed by ethmoid, frontal and sphenoid respectively. Diagnosis of chronic and recurrent maxillary sinusitis may be made clinically upon rhinoscopy by detecting pus in the middle meatus, either anteriorly or posteriorly. Radiographs should be obtained to confirm the diagnosis which, often, demonstrates an opaque sinus and thickened mucous membrane [6] but coronal CT scan has become investigation of choice for chronic sinusitis as it simulates endoscopist's view of sinonasal cavity. [7]

As regional anatomical abnormalities and pathologies in the vicinity of ostiomeatal complex (OMC) are frequently associated in the development of chronic sinus disease, Messerklinger identified a range of normal anatomical variants that can interfere with the mucociliary drainage of the OMC including an enlarged middle turbinate, agger nasi cells, ethmoid bulla variation, Heller cells, spurs and deviated nasal septum. [8]

The present study was planned to compare the septoplasty alone vis a vis septoplasty with FESS in patients of chronic maxillary sinusitis with septal deviation.

MATERIAL AND METHODS

The present study was conducted in the Department of Otorhinolaryngology, Government Medical College/ Rajindra Hospital, Patiala after approval from the Institutional Ethical Committee. 50 cases of either sex in the age group of 18-50 years suffering from chronic maxillary sinusitis with septal deviation were included in the study both from urban and rural population irrespective of socioeconomic status. The patients were randomly divided into two groups of 25 patients each. Patients in Group A underwent septoplasty alone while patients in Group B underwent septoplasty and FESS

Patients of maxillary sinusitis with History of nasal obstruction, postnasal drip, History of nasal discharge, History of Headache, Significant deviated nasal septum were included in the study. Patients having nasal polyp, Nasal mass, Previous nasal or sinus surgery, Any bleeding disorder, Diabetes mellitus, Hypertension were excluded from study. Patients having involvement of frontal, ethmoid or sphenoid sinuses on computed tomographic scan were also excluded from study.

All the patients selected were evaluated based on history, general physical examination as well as complete ear, nose and throat examination.

Detailed examination including anterior rhinoscopy, Diagnostic nasal endoscopy, throat and ear examination was done. All the patients were given two weeks of medical treatment in the form of broad spectrum antibiotics, antihistaminics, and local decongestants. The patients showing no improvement were subjected to X-ray paranasal sinuses (Water's view) and cases with hazy sinuses were subjected to CT scan of Nose and PNS. Patients having involvement of only maxillary sinuses were taken up for study. Routine blood and urine

tests were done in all the patients. The patients were admitted in the ward a day prior to surgery and kept fasting after midnight. Written informed consent was taken and xylocaine sensitivity was done.

In Group A patients septoplasty alone was done under either local anaesthesia or general anaesthesia whereas in Group B patients Septoplasty with FESS was done. Analgesics, antihistaminics and broad spectrum antibiotics intravenously and/ or oral antibiotics were given to all the patients. Patients were discharged on the second or third day of surgery after pack removal.

The follow up was done at 4th week, 8th week, 12th week and 24 weeks intervals. The patients were assessed symptomatically and condition was graded depending upon the relief of the symptoms and episodes of sinusitis i.e. complete improvement, partial improvement, no change and deterioration.^[9] At 24th week of followup, CT scan of PNS (coronal view) was also done.

Postoperative gradation of improvement in symptoms at 24th week follow up was done in both groups. The results of group A compared with group B statistically by using Fisher's/ Chi-square test by calculating the p value and postoperative sequelae were recorded.

RESULTS

The age of the patients was in the range of 18-50 years in both groups. Mean age in group A was 29.68 years while mean age of group B was 28.96 years. In group A, 19 (76%) were males while in group B, 16 (64%) were males. In both groups 36% had duration of symptoms within 1 to 2 years and duration of disease varied from six months to more than four years. Nasal obstruction and post nasal drip were present in all patients. Nasal discharge and headache were the other common symptoms in both the groups.(Table I)

On Anterior Rhinoscopy deviated nasal septum was found in all 50 (100%)

patients and other significant findings were discharge in middle meatus and hypertrophy of inferior turbinate. The Diagnostic nasal endoscopy showed deviated nasal septum in all the patients while 18 (72%) in group A while 19 (76%) in group B patients had mucopurulent discharge in posterior choana and 74% patients had discharge in middle meatus.

CT Scan of Nose and Paranasal sinuses (coronal view) was done in all patients. All patients were having marked nasal septal deviation in both groups. OMC obstruction was the most common finding in 47(94%) cases. Mucosal hypertrophy was the next most common finding in 36 (72%) cases. Medialized uncinate process was found in 10 (20%) and hypertrophied uncinate process in 3 (6%) cases (Table III).

In group A, patients were treated by septoplasty alone while functional Endoscopic sinus surgery plus septoplasty was done in group B. Post-operative assessment by diagnostic nasal endoscopy showed 15 out of 25 patients had midline septum and 10 patients showed residual septal deviation in Group A patients and four patients had discharge in nasal cavity. In Group B, all the 25 patients had midline septum with patent middle meatus antrostomy. However at 24 weeks, 2 patients had discharge in the nasal cavity.

Postoperative improvement of symptoms by subjective assessment in group A, out of 25 patients with nasal obstruction 14 patients had complete improvement, 11 patients had no improvement in PND. After 12 weeks follow-up in Group B, 18 patients had complete improvement in nasal obstruction and 3 patients had no improvement in PND.

TABLE I SYMPTOMATOLOGY (n=50)

Symptoms	Group A		Group B		Total	
	No.	%	No.	%	No.	%
Nasal obstruction	25	100	25	100	50	100
Post nasal drip	25	100	25	100	50	100
Nasal discharge	20	80	20	80	40	80
Headache	16	64	17	68	33	66

TABLE II CT SCAN - NOSE & PNS FINDINGS (n=50)

CT Findings	Group A			Group B			Total	
	Unilateral No.(%)	Bilateral No. (%)	Total No.(%)	Unilateral No.(%)	Bilateral No.(%)	Total No.(%)	No.	%
Mucosal hypertrophy	10(40)	6(24)	16(64)	7(28)	13(52)	20(80)	36	72
OMC obstruction	13(52)	10(40)	23(92)	10(40)	14(56)	24(96)	47	94
Polyp	2(8)	1(4)	3(12)	3(12)	2(8)	5(20)	8	16
Deviated nasal septum	-	-	25 (100)	-	-	25(100)	50	50(100)
Concha Bullosa	2(8)	2(8)	4(16)	2	2	4(16)	8	16
Enlarged bulla ethmoidalis	2(8)	2(8)	4(16)	3(12)	1(4)	4 (16)	8	16
Medialized uncinat process	2(8)	2(8)	4(16)	4(16)	2(8)	6(24)	10	20
Hypertrophied uncinat process	1(4)	0(0)	1(4)	2(8)	0(0)	2(8)	3	6

POSTOPERATIVE ASSESSMENT BY CT SCAN OF GROUP A AND GROUP B

TABLE III CT SCAN- NOSE & PNS FINDING (n=50)

CT Findings	Group A			Group B		
	Unilateral No.(%)	Bilateral No.(%)	Total No. (%)	Unilateral No.(%)	Bilateral No.(%)	Total No. (%)
Mucosal hypertrophy	2 (8%)	2 (8%)	4 (16%)	1 (4%)	0(0%)	1 (4%)
OMC obstruction	2(8%)	3 (12%)	5 (20%)	0 (0%)	0 (0%)	0 (0%)
Polyps	2 (8%)	1 (4%)	3 (12%)	0 (0%)	0 (0%)	0 (0%)
Deviated nasal septum	10 (40%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Concha bullosa	2 (8%)	2 (8%)	4 (16%)	0 (0%)	0 (0%)	0 (0%)
Bulla ethmoidalis	2 (4%)	2 (4%)	4 (8%)	0 (0%)	0 (0%)	0 (0%)
Medialized uncinat process	2(8)	2(8)	4(16)	0(0)	0(0)	0(0)
Hypertrophied uncinat process	1(4)	0(0)	1(4)	2(0)	0(0)	2(0)

TABLE IV STATISTICAL ANALYSIS OF GROUP A AND GROUP B

Nasal Obstruction							
	Complete improvement	Partial improvement	No improvement	Total	Chi-square	P value	Significance
Group A	14	2	9	25	6.24	<0.05	Sig.
Group B	18	5	2	25			

Post Nasal Drip							
Group A	12	2	11	25	6.72	<0.05	Sig.
Group B	17	5	3	25			

Nasal Discharge							
Group A	9	2	9	20	6.15	<0.05	Sig.
Group B	15	3	2	20			

Headache							
Group A	5	3	8	16	6.46	<0.05	Sig.
Group B	12	3	2	17			

DISCUSSION

Chronic sinusitis is one of the commonest medical problems in ENT practice and maxillary sinus is the commonest to be involved. Chronic rhinosinusitis is thought to be a disease secondary to obstruction caused by anatomic anomalies and reactive mucosal engorgement. The goal of treating sinus disease with surgery has evolved from removing all diseased sinus mucosa to specific exenteration of the tissue causing obstruction. Once ventilation is restored, it is postulated that the mucosa may regain near normal appearance and function. [10]

Ostiomeatal complex (OMC) is considered to play a role in the initiation of the disease. Anatomic variations can lead to obstruction of OMC, which can be enhanced by inflammation and result in compromised mucociliary clearance. This results in chronic or recurrent rhinosinusitis. [11]

The most frequent OMC anatomic variations are the Septal deviation which is one of the causes of the nasal obstruction and also may affect the nasal mucociliary clearance negatively. [12]

Various etiologies have been implicated including bacterial and viral infection, sinus outflow obstruction, allergy, Helicobacter pylori, decreased levels of trace elements and functional disorders of leukocytes. [13] Nasal septal deviation has been implicated in the pathogenesis of chronic rhinosinusitis by means of sinus outflow obstruction or interference in the mucociliary activity. The outcome of procedures of combined septoplasty and FESS done instead of doing it separately showed better results with fewer

postoperative complications. [14,15] So, the present study was conducted in Department of Otorhinolaryngology, Government Medical College/Rajindra Hospital, Patiala to compare the results of septoplasty alone and septoplasty with FESS in patients of chronic maxillary sinusitis with septal deviation. Fifty patients of chronic maxillary sinusitis with septal deviation, 25 each in group A and B were taken into study.

In present study, age of the patients was in range of 18-50 years in group A and in group B it was 18-46 years. Mean age in group A was 29.68 years while of group B was 28.96 years. There were 35 (70%) males and 15 (30%) females in the present study showing males predominance over females. These findings are similar to findings of (Bayiz et al, 2005) and Aderito (2005). [15,16]

The high incidence in these age groups was mostly due to more exposure to noxious agents causing sinus infection. Males are predominant over females; this is probably to the fact that males are more mobile as compared to females, due to which they are more exposed to pollutants.

Besides the clinical and radiological findings the duration of symptoms is very important for diagnosis. Benninger (2003) suggested inflammation of the mucosa of the nose and paranasal sinuses of at least 12 consecutive weeks. [17] In the present study most of the patients (36%) suffered from the disease duration 1-2 years. The range of duration of symptoms was 6 months to 4 years.

In our study, common symptoms were nasal obstruction and postnasal drip (100% each). Next in frequency were nasal discharge (80%) and headache (66%).

Bhattacharyya (2005) studied the symptoms and disease severity differences between nasal septal deviation and chronic rhinosinusitis in 155 patients and concluded that these patients have higher severity scores for the nasal symptoms in which nasal obstruction and nasal discharge were most severe one. [18]

Vincent & Gendeh (2010), observed in their study the association of DNS with chronic sinusitis in functional endoscopic sinus surgery patients, the commonest symptom was nasal obstruction (90.1%) and other symptoms were post nasal drip and headache. [19]

In the present study, anterior rhinoscopy showed deviated nasal septum (100%), nasal discharge (54%) and hypertrophy of inferior turbinate (34%) in total patients (50). On posterior rhinoscopy, post nasal discharge was found in 74% cases and on examination of oropharynx, congestion of posterior pharyngeal wall was seen in (38%). Sinha (1993) reported presence of mucus or mucopus in middle meatus in 76% in his series of 42 patients. Prabhakar et al (1992) in their study of 75 patients of chronic maxillary sinusitis found nasal discharge in 69%, septal deviation in 51%, inferior turbinate hypertrophy in 52% and congestion of posterior pharyngeal wall in 29%. [20]

The plain radiography examination used in sinonasal imaging consists of X-ray PNS (Water's view). While the utility of plain radiographs in evaluating sinonasal pathology is limited, it is still used frequently for the evaluation of routine maxillary sinusitis.

In the present study the patients were subjected to X-ray PNS (Water's view) and the following inference was made:-

In group A, 52% showed maxillary haziness, 40% mucoperiosteal thickening and air fluid level in 8%.

In group B, 56% showed maxillary haziness, 40% mucoperiosteal thickening and air fluid level in 4%.

Aalokken et al (2003) in their study found that specificity of plain film examination is high but sensitivity is low except for the maxillary sinus in which sensitivity is 80%. Thus for maxillary sinusitis plain film examination is reasonably accurate. [21]

CT scan was done in all patients (50). In the present study, most common finding was deviated nasal septum 100%.

Other findings in descending order were OMC obstruction (94%), mucosal hypertrophy (72%) and maxillary polyps (16%) and concha bullosa (16%) and enlarged bulla ethmoidalis (16%). Uncinate process was found medialized in 20% and hypertrophied in 6%.

Bayiz et al (2005) studied 26 patient and done CT scan in all cases and found marked septal deviation in all patients (100%). The deviations impinged on OMC and or lateral nasal wall causing objective obstruction on nasal endoscopy. Mucosal hypertrophy of maxillary sinuses were seen on CT scan. [22]

Diagnostic nasal endoscopy was performed in all patients of group B and it confirmed the presence of DNS in all patients 25(100%), narrow OMC in 13(52%), concha bullosa in 4(16%) and bulla ethmoidalis in 4 (16%) patients. Uncinate process was found medialized in 6 (24%) and hypertrophied in 2 (8%).

In present study, septoplasty alone was done in 25 patients of group A and septoplasty plus FESS on 25 patients in group B. The patients improved symptomatically as evident by subjective assessment decided by questionnaire based on patient's improvement status in line with study done by Terris & Davidson (1994). The results were determined in terms of complete improvement (CI), partial improvement (PI), no improvement (NI) and deterioration (DT). Patients in CI and PI were taken as overall improved patients.

In group A, patients with septoplasty alone, postoperative symptomatic improvement in the symptoms at 24 weeks – 64% success in nasal obstruction; 56% in post nasal drip; 55% in nasal discharge and 50% in headache. Post operative assessment by CT scan PNS (coronal view) at 24 weeks revealed that 16% of the patients had persistent mucosal hypertrophy and 10 patients showed residual septal deviations which was touching the middle turbinate. It had little effect on OMC obstruction and had no effect on maxillary polyps, concha

bullosa, bulla ethmoidalis and uncinata process.

In group B, where septoplasty with FESS was done, post-operative symptomatic improvement at 24 weeks were found as -92% success in nasal obstruction; 88% in post nasal drip; 94.7% in nasal discharge and 88.23% in headache. The result was statistically analyzed by Chi-Square test and was found $P < 0.05$. This was significant. Post operative assessment by CT Scan PNS (Coronal view) at 24 weeks had shown that only 1(4%) patient had persistent mucosal hypertrophy in maxillary sinus and no obstruction in OMC region and there was no maxillary polyp.

No major complication was there in group A & group B.

In this study, comparison of subjective and objective results of both the groups was statistically significant. Septoplasty plus FESS in treatment of chronic maxillary sinusitis with septal deviation revealed excellent results subjectively and objectively.

Aderito et al (2005) reported that the correction of the deviated septum associated with sinus surgery may also help to minimize postoperative sinusitis caused by scar formation between the middle turbinate and the lateral nasal wall. [15]

Jonathan et al (2005) observed septoplasty and functional endoscopic sinus surgery may be safely and effectively performed in combination without a significantly increased risk of complications when compared to either procedure performed individually. [23]

According to study of Bruce and Rakesh (2010), FESS is currently the most effective treatment for chronic sinusitis refractory to medical therapy, with symptomatic improvements reported by approximately 90% of patients. In addition to meticulous and careful surgical technique, the management of postsurgical patient is instrumental to optimizing success following FESS. [24]

Vincent and Gendeh (2010) reported a higher incidence of DNS in chronic

rhinosinusitis and it was significantly associated with OMC disease, and found there was an apparent relationship between concha bullosa and DNS. [25]

In our study, patients of DNS with chronic maxillary sinusitis with minimal mucosal hypertrophy who had undergone septoplasty alone, results were satisfactory but not upto the mark. Septoplasty alone had little effect on patients presenting with blocked OMC. However, it had no effect on patients with maxillary polypi. On the other hand, the septoplasty along with FESS has given excellent results in conditions like chronic maxillary sinusitis with DNS associated with other conditions like, concha bullosa and blocked OMC.

It has been observed that FESS needs experience and the residual septal deviation which has been seen in the post operative cases of group A were due to lack of preoperative diagnostic nasal endoscopy which is very important to achieve excellent results.

CONCLUSION

It is not sufficient to perform septoplasty alone in cases of deviated nasal septum with maxillary sinus disease (limited disease), but FESS must be combined with septoplasty in these cases of deviated nasal septum with maxillary sinusitis and osteomeatal complex pathology.

REFERENCES

1. Elahi MM, Frenkiel S, Fageeh N. Paraseptal structural changes and chronic sinus disease in relation to the deviated septum. *J Otolaryngol* 1997; 26: 236-40.
2. Cole P, Chaban R, Naito K, Oprysk D. The obstructive nasal septum: effect of simulated deviations on nasal airflow resistance. *Arch Otolaryngol Head Neck Surg* 1988; 114: 410-2.
3. Illum P. Septoplasty and compensatory inferior turbinate hypertrophy: long term results after randomized turbinoplasty. *Eur Arch Otorhinolaryngol* 1997; 1: 89-92.
4. Ginzel A, Illum P. Nasal mucociliary clearance in patients with septal deviation. *Rhinology*. 1980; 18: 177-181.
5. Suzuki H, Yamaguchi T, Furukawa M. Rhinologic computed tomographic evaluation in patients with cleft lip and palate. *Arch Otolaryngol Head Neck Surg* 1999; 125: 1000-4.
6. Eichel BS. Surgical management of chronic paranasal sinusitis. *Laryngoscope* 1973; 83: 1195-1203.
7. Yousem DM. Imaging of sinonasal inflammatory disease. *Radiology* 1993; 188: 303-14.
8. Chakares DW. Computed tomography of the ethmoid sinuses. *Otolaryngol Clin North Am* 1985; 18: 29-42.
9. Terris MH, Davidson TM. Review of published results for endoscopic surgery. *Ear Nose J* 1994; 73: 574-80.
10. Ganjian E, Gannon PJ, Fliegelman LJ et al. Nasal obstruction: An alternative to ostiomeatal complex dysfunction in sinus disease. *Laryngoscope*. 1999, 109: 1848-1851
11. Ginzel A, Illum P. Nasal mucociliary clearance in patients with septal deviation. *Rhinology*. 1980; 18: 177-181.
12. April MM, Zinreich SJ, Baroody FM et al: Coronal CT scan abnormalities in children with chronic sinusitis. *Laryngoscope* 1993, 103: 985-990.
13. Inceer AO, Yetgin S, Onerci M. Evaluation of leukocyte chemotactic function in patients with chronic sinusitis. *Rhinology* 1995; 33: 141-3.
14. Jonathan H. Lee, David A. Sherris, Eric J. Moore. Combined Open Septorhinoplasty and Functional Endoscopic Sinus Surgery. *Otorhinolaryngology*. 2005; 133 (3): 436-440
15. Aderito DE Sousa F, Livia Inciarte F, Howard Levine: Powered Endoscopic nasal septal surgery. *Acta Med Port* 2005; 18: 249-256.
16. Bayiz U, Dursun E, Islam A, Korkmaz H, Arslan N, Ceylan K et al. Is septoplasty alone adequate for the treatment of chronic rhinosinusitis with septal deviation? *Am J Rhinol* 2005; 19(6): 612-6.
17. Benninger MS. Adult chronic rhinosinusitis: definitions, diagnosis, epidemiology and pathophysiology. *Otolaryngol Head Neck Surg* 2003; 129: 1-32.
18. Bhattacharyya N. Symptom and disease severity differences between nasal septal deviation and chronic rhinosinusitis. *Otolaryngol Head Neck Surg* 2005; 133: 173-7.

19. Vincent TES, GendehBS : The association of Concha Bullosa and deviated nasal septum with chronic Rhinosinusitis in functional Endoscopic sinus surgery patients. *Med J. Malaysia* 2010; Vol. 65(2): 108-111.
20. Prabhakar S, Mehra YN, Talwar P, Mann SBS, Mehta SK. Fungal infections in maxillary sinusitis. *Indian J Otolaryngol Head Neck Surg* 1992; 1(2): 57-7.
21. Aalokken TM, Hagtvedt T, Dalen I, Kolben S. Conventional sinus Radiography compared with CT in diagnosis of acute sinusitis. *DentoMaxillo facial Radiology* 2003; 32:60-62.
22. Bayiz U, Dursun E, Islam A, Korkmaz H, Arslan N, Ceylan K et al. Is septoplasty alone adequate for the treatment of chronic rhinosinusitis with septal deviation? *Am J Rhinol* 2005; 19(6): 612-6.
23. Jonathan H. Lee, David A. Sherris, Eric J. Moore. Combined Open Septorhinoplasty and Functional Endoscopic Sinus Surgery. *Otorhinolaryngology*.2005;133 (3):436-440
24. Bruce K. Tan, Rakesh K. Chandra. Postoperative Prevention and Treatment of Complications After Sinus Surgery. *Otolaryngologic Clinics of North America* 2010; 43(4).
25. Vincent TES, GendehBS: The association of Concha Bullosa and deviated nasal septum with chronic Rhinosinusitis in functional Endoscopic sinus surgery patients. *Med J. Malaysia* 2010; Vol. 65(2): 108-111.

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