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A Comparative Study Between Endoscopic Septoplasty With That Of Conventional Septoplasty

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Abstract: ***Background****: nasal blockage is one of the commonest presentation to otolaryngology outpatients department. Deviated nasal septum is one of the commonest cause for the nasal blockage. The deviated septum can be corrected by various procedures amongst which septoplasty is commonly performed. Which can be either conventional type or endoscopic type.*
Aims and Objectives: *The study aims to compare the advantages and disadvantages of endoscopic septoplasty and conventional septoplasty.*
Material & Methods : *The study is performed in department of otolaryngology, Central Referral Hospital & STNM Hospital on 50 patients, 25 patients in each group after taking informed written consent from the patients to participate in our study.* ***Results:*** *we have compared the two procedures over following headings, nasal findings, accessibility of surgical space, amount of blood loss, duration of surgery and various other points.*
Conclusion : *endoscopic septoplasty is a good evolutionary step in the history of septal surgery.*
Keywords: *Conventional Septoplasty, Deviated Nasal Septum (DNS), Endoscopic Septoplasty , Nasal Blockage.*

I. Introduction

Nasal obstruction is one of the most common complaint that Otorhinolaryngologists face in their day to day practice. Deviated Nasal Septum (DNS) is one of the most common cause for the nasal obstruction. Deviated nasal septum (DNS) not only causes breathing difficulties but also causes improper aeration of paranasal sinuses leading to infection of the same. It may also cause headache, drying of mucosa leading to crusting and epistaxis. It may cause blockage of Eustachian tube leading to middle ear diseases. DNS may become symptomatic at any age. Surgeries involving the nasal septum are common in Otolaryngology, both alone and in combination with other procedures. Common ancillary procedures include Inferior turbinoplasty, Endoscopic Sinus Surgery and Rhinoplasty [1]

Majority of these operations are for Deviated Nasal Septum (DNS) which are symptomatic(nasal obstruction, recurrent headache), epistaxis due to septal spur, as a part of septorhinoplasty for cosmetic reasons [2]. Septal deviations are more common in the Caucasians (80%) than the non Caucasians [3]. Surgery is the only option for the obstructive and symptomatic deviated nasal septum.

There are various procedures for correction of the Deviated nasal septum, Surgeries include Sub mucous resection (SMR) of the nasal septum and Septoplasty. The surgical correction has been generally accomplished by the Standard SMR of the septal cartilage without realizing the hazards of this operation. SMR has been avoided because of long term risk of nasal collapse due to loss of support plus contractile force where cartilage was removed[3]. Later septoplasty was proposed as it was thought to be a better surgery compared to sub mucous resection of septum since it had advantages of less resection of the septum and less complications. The surgery preferred for Deviated Nasal Septum (DNS) is septoplasty [3].

With the introduction of endoscope in the field of ENT, Endoscopic septoplasty is a fast developing concept and gaining popularity as it provides a direct targeted approach to the septal anatomical deformity allowing a minimally invasive procedure with limited septal mucosal flap elevation and removal of a small cartilaginous and /or bony deformity. Better visualization and magnification provided by the endoscope helps to increase the precision of the surgical procedure. Endoscopy aids limited but sufficient exposure of the septal pathology and there is no need for disarticulation of ethmoidochondral and vomerochondral junctions. [4].
The application of the Endoscopic techniques for the correction of septal deformities was initially described in 1991 by Stammberger [5].

II. Aims And Objectives

The present study is undertaken to compare the advantages and disadvantages of endoscopic septoplasty over conventional septoplasty regarding

- ❖ Accessibility of surgical space
- ❖ Duration of surgery
- ❖ Post operative stay in hospital
- ❖ Post operative complications.

III. Materials And Methods

The study is a Prospective, comparative, interventional type of clinical trial carried out at department of Otolaryngology, Central Referral Hospital (CRH), Tadong & Sir Tashi Namgyal Memorial Hospital, Gangtok, Sikkim. Due to feasibility constrain, convenient sample size of 50 patients in the age group of 16 years and above who was willing to participate in the study and gave informed written consent was included in the study out of which 25 patients each was included in conventional and endoscopic group respectively. The study was carried for a period of 3 years from 2012 to 2015. simple random sampling technique was applied to the selected patients with age and sex matching done for individuals placed in each group. Institutional ethical clearance was taken prior to start of the study. individuals who were suffering from symptomatic deviated nasal septum (DNS), recurrent epistaxis due to septal spur or a part of endoscopic dacryocystorhinostomy (DCR), septorhinoplasty for cosmetic reason were included. All individuals below 16 years and non consenting or having acute or allergic rhinitis with history of cardiopulmonary disease, diabetese, bleeding disorder or revision surgery of the nose were excluded. The data collected was tabulated and analysed using SPSS version 16.00 where ever possible. Datas where stastical test were not applicable were presented in table and graph forms.

Method

- All the cases included in the study were thoroughly interviewed, examined, investigated and taken up for the surgery.
- Cases were investigated in the following manner

1. Routine haemogram which include Haemoglobin %, Total Leucocyte count, Differential count, absolute eosinophil count, bleeding time, clotting time and urine examination.
2. X- rays of paranasal sinuses- water's view to note the condition of PNS, CT scan of PNS in selected cases
3. Diagnostic nasal endoscopy was done in all the cases.

A correlation was established between clinical features and radiological findings.

After complete preoperative assessment patients were subjected to surgical intervention.

Patients were randomly grouped into two groups A & B of 25 each. Group A underwent conventional septoplasty and group B underwent endoscopic septoplasty.

Preoperative Preparation

Patient were prepared as follows:

- ❖ Xylocaine sensitivity testing was done with 0.1ml of 2% xylocaine injected intradermally on left forearm of patient in supine position.
- ❖ Moustaches and nasal hairs if present were shaved or trimmed properly so that they did not interfere with surgery.
- ❖ Informed written consent of patient was taken after explaining about the surgery, risks associated with it and postoperative care.
- ❖ All the patient selected for the study were prepared for hypotensive general anaesthesia
- ❖ Nasal cavities were packed for about 10 min with ribbon gauze soaked in 4% xylocaine and oxymetazoline.

Instruments

- ➢ Routine septoplasty instruments
- ➢ Headlight
- ➢ 0^0 endoscope
- ➢ T.V monitor, endoscope camera

Position of patient

The patients were placed in supine position with head end of table raised by30^0. conventoional and endoscopic septoplasty was done in the patient of each group using the standard protocol.

Post Operative Management

Patient were put on appropriate antibiotics at least for a week, along with analgesic and decongestants. Nasal packs if present were removed after 48 hours after surgery. Normal saline douching (5-6 times daily) and decongestant nasal drops (3 times daily) were advised for a week.

All the patients were discharged on second post operative day with above mentioned advice. Patients were advised to follow up on 1 week , 2 week and monthly for 6 months.

At each follow up visit, subjective and objective assessment were done. Subjective assessment was done by asking about nasal obstruction, headache, nasal discharge, hyposmia, postnasal discharge. Objective assessment was done by cold spatula test, persistent deformity, discharge in middle meatus. Diagnostic nasal endoscopy was done in all the patients in every post operative visit.
With above findings the outcome of surgery were measured.

Observations and Results

The results of 25 cases of conventional septoplasty and 25 cases of endoscopic septoplasty were assessed under following headings.

1. Patient Particulars
2. Chief complaints
3. Nasal examination finding
4. Surgical results

In our study out of 50 patients the predominant sex was of male which comprised of 40 (80 %) of the study population, Female comprised of just 10 (20%) of the total population. The male to female ratio in our study was 4:1. All the patient included in our study were above 15 years of age, the youngest being of 16 years of age and the eldest being of 50 years of age. The predominant age group in our study was between 16 - 25 years of age comprising 20 (40%) patients followed by the age groups of 26-35 years, 36-45 years and > 45 years comprising 18 (36%), 7(14%) and 5(10%) patients respectively.
37 (74%) were Hindu in which 29 (58%) patients belong to Nepali community and out of 9 (18%) Buddhist 3 (6%) were of Bhutia and 4 (8%) were of lepcha community. 35(70%) patients were resident of East Sikkim with a small contribution of the study patients from different part of the country like West Bengal, Bihar & Assam comprising 5(10%) of the study population.

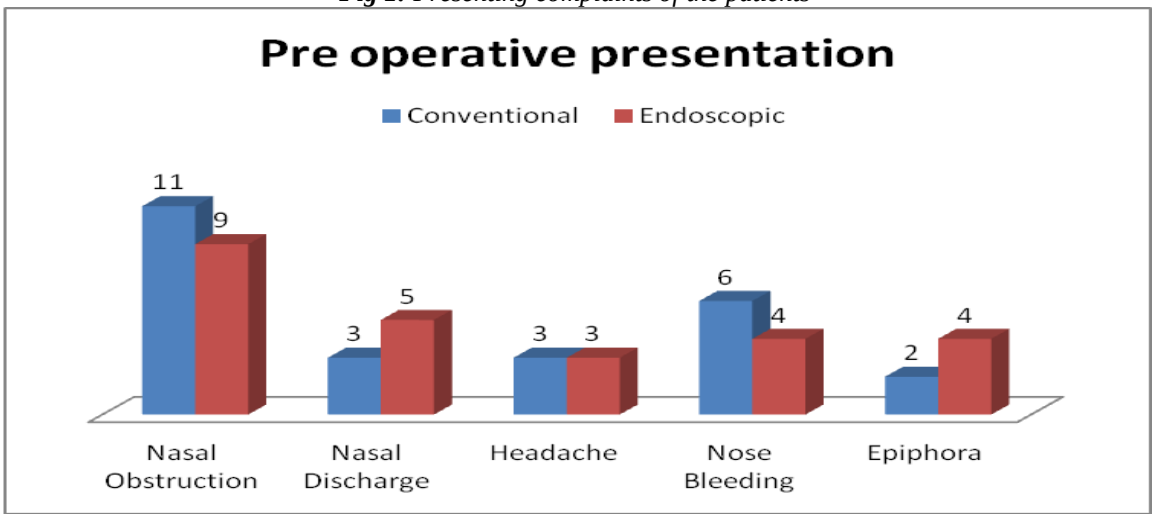
20(40%) of the study population were unemployed and included Students & Housewife's, 13(26%) patients were from Farmers and Business backgrounds. 10(20%) patients were government officials and 7(14%) patients belonged to a group of Drivers, Tailors and Peons. When we consider the literacy status of the patient included in our study then we found that 12 (24%) patient were graduate and above , 15 (30%) patient have studied upto class 12th, 16 (32%) with education upto class 10th and 7 (14%) with no formal education of any kind.

Table -1 : Baseline characteristics of the population studied

Socio – Demographic Variables	***Total studied Population*** *(N=50)*	***Percentage (%)***
1. GENDER		
(a) Male	40	***80***
(b) Female	10	***20***
2. AGE GROUP (yrs)		
(a) 16-25 yrs	20	***40***
(b) 26-35 yrs	18	***36***
(c) 36-45 yrs	07	***14***
(d) ≥ 46 yrs	05	***10***
3. RELIGION		
(a) Hindu	37	***74***
(b) Muslim	04	***08***
(c) Buddhist	09	***18***
4. COMMUNITY		
(a) Nepali	29	***58***
(b) Bhutia	03	***06***
(c) Lepcha	04	***08***
(d) Others	14	***28***
5. OCCUPATION		
(a) Unemployed	20	***40***
(b) Business & farmers	13	***26***
(c) Skilled	7	***14***
(d) Professional	10	***20***
6. Residence		
(a) East Sikkim	35	***70***

(b) North Sikkim	03	***06***
(c) South Sikkim	07	***14***
(d) Outside Sikkim	05	***10***
7. LITERACY STATUS		
(a) Illiterate	07	***14***
(b) Upto Class 10	16	***32***
(c) Upto Class 12	15	***30***
(d) Graduate & above	12	***24***
8. HOSPITAL OF PRESENTATION		
(a) CRH	34	***68***
(b) STNM Hospital	16	***32***

Fig 1: *Presenting complaints of the patients*



In our study, 20 (40%) of the patients presented with nasal obstruction, of which 11 (22%) were in the conventional group and rest 9 (18%) were in the endoscopic group. The next common symptoms was epistaxis which was present in 10 patients, 60 % of which were in the conventional group and rest 40% were in endoscopic group. The next common symptom in order was nasal discharge both anterior and posterior nasal discharge which was present in 8 patients of which 3 were in conventional group and rest 5 were in endoscopic group. headache and epiphora constitute 6 (12%) each.

The nasal finding of the patients included in our study has been tabulated as follows, The external nose examination was normal for any pathology like deviation, saddling, hump, swelling, scar or ulcers in 43 (86%) of the patients with 7 (14%) patients having deformity like deviation of external nose to right or left with fracture of nasal bone. Cold Spatula test done on all patients revealed B/L nasal blockage in 9 (18%) patients, Nasal blockage to right in 13 (26%) patients and Nasal blockage to left only in 5 (10%) patients with no blockage in 23 (46%) patients.

Cottles test showed improved aeration in 10 (20%) patients with no improvement in 40 (80%) patients. On anterior rhinoscopy 32 (64%) patients had C- shaped DNS, with 6 (12%) patients having S shaped DNS, 7(14%) patients with septal spur and 5(10%) patients with caudal septal deviation. Other findings on anterior rhinoscopy included, 6(12%) patients with inferior turbinate hypertrophy and 6 (12%) patients with NLD blockage with 5 patients having fracture nasal bone on palpation. On performing Diagnostic Nasal Endoscopy in 28 (56%) patients 1st pass was difficult, in 5 (10%) patients all the 3 pass was not possible because of deviation of nasal septum and other pathologies like septal spur and inferior turbinate hypertrophy.

43 (86%) of the patients were posted for surgery because of symptomatic DNS and rest of the patients were posted for some other procedures, the various procedures done in the study populations are Septoplasty in 78% , Endo DCR with septoplasty in 12% and septorhinoplasty in 10% of the patients.

During the intra operative period the patients were assessed for various parameters

Table -2 : *Nasal findings of the population studied*

Nasal finding & Procedure done	***Total studied Population*** *(N=50)*	***Percentage (%)***
1. EXTERNAL NOSE		
(a) No Deformity	43	***86.00***
(b) Deformity	07	***14.00***
2. COLD SPATULA TEST		
(a) Equal Fogging	23	***46.00***
(b) Reduced Fogging (RT)	13	***26.00***
(c) Reduced Fogging (LT)	05	***10.00***
(d) Reduced Fogging (B/L)	09	***18.00***
3. COTTLE'S TEST		
(a) No Improvement (Airation)	40	***80.00***
(b) Improvement (Airation)	10	***20.00***
4. ***ANTERIOR RHINOSCOPY***		
(a) C Shaped DNS	32	***64.00***
(b) S Shaped DNS	06	***12.00***
(c) Septal Spur	07	***14.00***
(d) Caudal Septal Deviation	05	***10.00***
5. ANT. RHINOSCOPY (OTHER FINDING)		
(a) NLD Blockage	06	***12.00***
(b) # Nasal Bone	05	***10.00***
(c) Inf. Turbinate Hypertrophy	06	***12.00***
(d) No Abnormality	33	***66.00***
6. DIAGNOSTIC NASAL ENDOSCOPY		
(a) All 3 Pass Possible	17	***34.00***
(b) Difficult 1st Pass	28	***56.00***
(c) Difficult All 3 Pass	05	***10.00***
7. INDICATION FOR SURGERY		
(a) Symptomatic DNS	43	***86.00***
(b) As part of other procedure	07	***14.00***
8. SURGICAL PROCEDURE DONE		
(a) Septoplasty	39	***78.00***
(b) Endo DCR with Septoplasty	06	***12.00***
(c) Septorhinoplasty	05	***10.00***

Accessibility of surgical space was one of the parameter compared in both the group where we found that access to the surgical space was good in all the cases undergoing endoscopic septoplasty and with fair access to all the surgical corners in 5 (10%) patients and with poor access to surgical space in 20 (40%) of the patient in conventional group. This measurement was surgeons subjective observation on the basis of visibility of site of operation.

Table - III : *Comparison of accessibility of the surgical space in both the group*

Visibility of surgical space	***Surgical Group***		***Total***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***	
Poor Visibility	20 (40)	00 (00)	***20 (40)***
Good Visibility	00 (00)	25 (50)	***25 (50)***

Fair Visibility	05 (10)	00 (00)	***05 (10)***
Total	**25 (50)**	**25 (50)**	***50 (100)***

All the patients included in the study were operated under hypotensive general anaesthesia so as to maintain equality, the amount of saline used during the operation was calculated pre operatively and after the amount of blood loss was calculated by measuring the net collection in the suction apparatus, and subtracting the saline used, here we found that in 20 (40%) patients of the conventional group the amount of blood loss was in between 10 - 30 ml and the average being 16 ml per patients. during the endoscopic procedure the amount of blood loss of 10 -30 ml was seen in only 17 (34%) patients.

Table- IV : *Comparison of amount of blood loss in both the group*

Amount of Blood Loss	***Surgical Group***		***Total***	***x^2, df, p***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***		
< 10 ml	5 (10)	8 (16)	***13 (26)***	x^2= .936, *df*=1, *p*= 0.333
10 - 30 ml	20 (40)	17 (34)	***37 (74)***	
Total	**25 (50)**	**25 (50)**	***50 (100)***	

** p value <0.05 is considered as significant*

The exact duration of surgery starting from infiltration of local anaesthesia over the septum and up to the administration of the nasal packing was noted in both the groups. The result is shown below

Table V: *Comparison of duration of surgery in both the groups*

Duration of Surgery	***Surgical Group***		***Total***	***x^2, df, p***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***		
< 1 Hour	10 (20)	17 (34)	***27 (54)***	x^2= 4.906, *df*=2, *p*= 0.086
1 Hour	06 (12)	05 (10	***11 (22)***	
> 1 Hour	09 (18)	03 (06)	***12 (24)***	
Total	**25 (50)**	**25 (50)**	***50 (100)***	

** p value <0.05 is considered as significant*

Immediately after completion of the surgery the administration of pack was based upon the amount of haemorrhage following surgery, which was assessed and to pack or not to pack was decided and the result is as below

Table -VI : *Comparison of requirement of nasal packing and type of pack in both the group*

Nasal packing type and requirement	***Surgical Group***		***Total***	***x^2, df, p***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***		
No Packing	05 (10)	07 (14)	***12 (24)***	x^2= 3.533,

Merocel Packing	18 (36)	12 (24)	***30 (60)***	*df*=2, *p*= 0.171
Nasal Splint	02 (04)	06 (12)	***08 (16)***	
Total	**25 (50)**	**25 (50)**	***50 (100)***	

** *p value <0.05 is considered as significant*

The complications which occurred during the intra operative period ranging from haemorrhage to mucosal tear were noted and were recorded.

Table - VII: *Comparison of intra operative complication in both the group*

Intra operative Complication	***Surgical Group***		***Total***	***x^2, df, p***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***		
No complication	05 (10)	14 (28)	***19 (38)***	x^2= 6.955, *df*=2, *p*= 0.031*
Unilateral Mucosal Tear	12 (24)	06 (12)	***18 (36)***	
B/L Mucosal tear	08 (16)	05 (10)	***13 (26)***	
Total	**25 (50)**	**25 (50)**	***50 (100)***	

** p value <0.05 is considered as significant*

Following operation the patient were shifted to post operative ward for 24 hours of observation and the decision to discharge the patient were taken then after based upon the general condition of the patient and immediate post operative complications**.**

Table - VIII : *Comparison of Post-Operative stay in hospital in both the group*

Post Operative Stay	***Surgical Group***		***Total***	***x^2, df, p***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***		
< 48 Hours	05 (10)	06 (12)	***11 (22)***	x^2= 4.017, *df*=2, *p*= 0.134
48 - 72 Hours	11 (22)	16 (32)	***27 (54)***	
> 72 Hours	09 (18)	03 (06)	***12 (24)***	
Total	**25 (50)**	**25 (50)**	***50 (100)***	

** p value <0.05 is considered as significant*

The various complications which occurred during the immediate post operative period, 1 week, 2 weeks and 4 weeks after follow up were assessed and recorded.

Table - IX : *Comparison of immediate post operative complication in both the group*

Immediate Post Operative Complication	***Surgical Group***		***Total***	***x^2, df, p***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***		

No Complication	05 (10)	06 (12)	***11 (22)***	
Nasal Discharge	03 (06)	06 (06)	***09 (18)***	x^2= 6.491, *df*=4, *p*= 0.165
Swelling of Face	03 (06)	02 (04)	***05 (10)***	
Pain/ Headache	09 (18)	11 (22)	***20 (40)***	
Watering of Eyes	05 (10)	00 (00)	***05 (10)***	
Total	**25 (50)**	**25 (50)**	***50 (100)***	

** p value <0.05 is considered as significant*

Table- X :*Comparison of complication after 1 week of follow up in both the group*

Complication after 1 Week of Follow up	***Surgical Group***		***Total***	***x^2, df, p***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***		
No Complication	07 (14)	13 (26)	***20 (40)***	
Nasal Blockage	01 (02)	04 (08)	***05 (10)***	
Synechiae/ Septal Perforation	(4+2) (12)	2+0(04)	***08 (16)***	x^2= 10.600, *df*=4, *p*= 0.031*
Crusting/ Infection	05 (10)	00 (00)	***05 (10)***	
Pain/ Headache	06 (12)	06 (12)	***12 (24)***	
Total	**25 (50)**	**25 (50)**	***50 (100)***	

** p value <0.05 is considered as significant*

Table- XI : *Comparison of complication after 2 week of follow up in both the group*

Complication after 2 Week of Follow up	***Surgical Group***		***Total***	***x^2, df, p***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***		
No Abnormality Detected	15 (30)	19 (38)	***34 (68)***	
Nasal Blockage	02 (04)	03 (06)	***05 (10)***	x^2= 2.943, *df*=2, *p*= 0.230
Synechiae/ Septal Perforation	(6+2) (16)	3(06)	***11 (22)***	
Total	**25 (50)**	**25 (50)**	***50 (100)***	

** p value <0.05 is considered as significant*

Table - XII : *Comparison of complication after 4 week of follow up in both the group*

Complication after 4 Week of Follow up	***Surgical Group***		***Total***	***x^2, df, p***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***		
No Abnormality Detected	18 (36)	22 (44)	***40 (80)***	x^2= 5.600, *df*=2,
Nasal Blockage	02 (04)	03 (06)	***05 (10)***	

Synechiae/ Septal Perforation	(3+2) (10)	00 (00)	***05 (10)***	*p*= 0.061
Total	**25 (50)**	**25 (50)**	***50 (100)***	

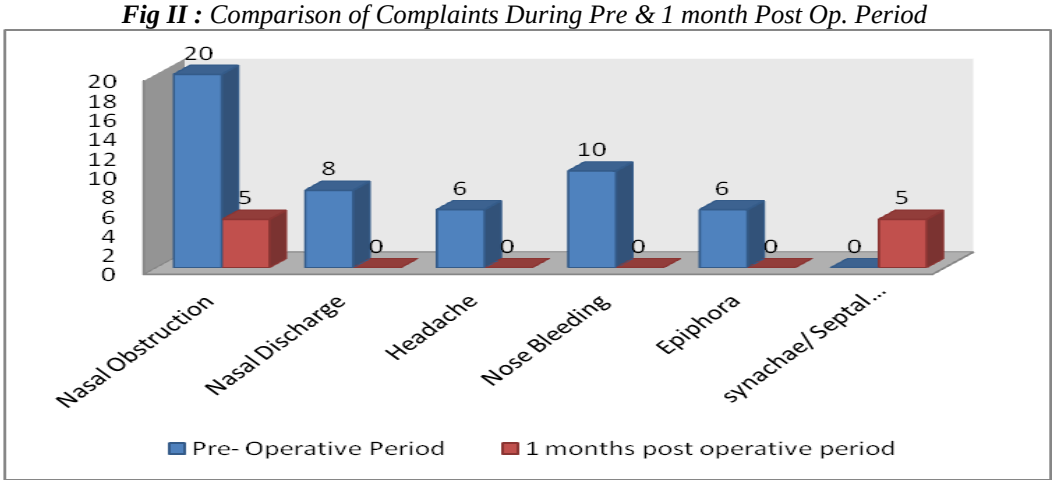
** p value <0.05 is considered as significant*

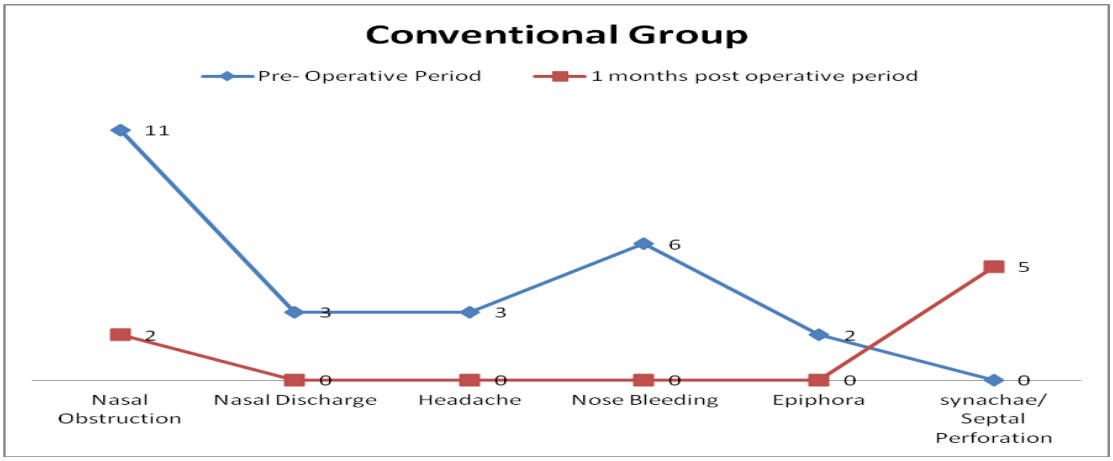
All the patients were advised for regular follow up and during the last follow-up i.e. after 4 weeks after the operation the patients were again interviewed regarding the relief of their symptoms and were advised to grade the result of the surgery as Very Good, Good, Satisfactory and No Improvement [6]

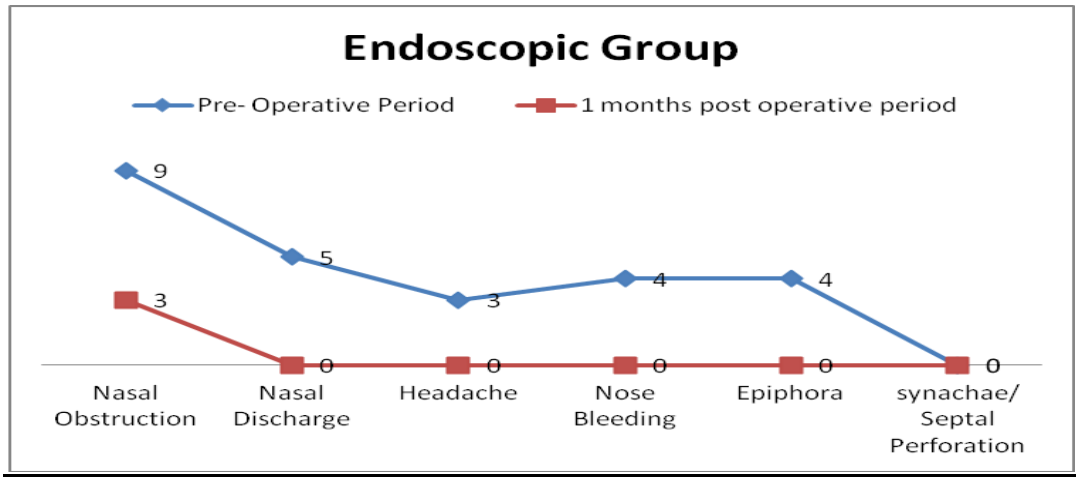
Table XIII: *Patients Subjective Feeling during the follow up*

Subjective feeling after 1 months of follow up	***Surgical Group***		***Total***
	Conventional A=25 (%)	***Endoscopic B=25 (%)***	
Very Good	16 (32)	21 (42)	***37 (74)***
Good	02 (04)	01 (02)	***03 (06)***
Satisfactory	04 (08)	02 (04)	***06 (12)***
No Improvement	03 (06)	01 (02)	***04 (08)***
Total	**25 (50)**	**25 (50)**	***50 (100)***

Fig II : *Comparison of Complaints During Pre & 1 month Post Op. Period*







IV. Discussion

The present study was conducted from November 2011 to November 2014 on 50 adults with nasal complains having deviated nasal septum who attended the outpatient of department of Otorhinolaryngology of CRH and STNM hospital, Gangtok, Sikkim.

The results of 25 cases of conventional septoplasty and 25 cases of endoscopic septoplasty were assessed under the following headings.

1. Preoperative evaluation
- History
- Clinical Examination
- Investigation

2. Operative evaluation
- Procedure performed
- Accessibility of surgical space
- Duration of surgery
- Amount of intra-operative blood loss
- Intra-operative complications

3. Post operative evaluation
- Functional results - symptomatic relief
- Post operative complications
- Patient satisfaction

Age distribution

Some of the earliest work was undertaken by Hayton (1948), who used the Killian's operation and ended up with external deformities in significant number of children indicating that, septal surgery performed during childhood carries with it the external deformities directly due to surgery and an additional problem of interference with subsequent growth of the nose.. This view has been challenged by Cottle (1957), Jennes (1964) and Huizing (1979). Amongst the adults, the age does not have any influence on the septal surgery.

Gulati et al (2009) performed a comparative study of endoscopic and conventional septoplasty on 50 patients having symptomatic DNS, 25 patient in each group to assess the merits and demerits of endoscopic septoplasty. In his study all the patients were in the age group of 18 -40 years, maximum were of young age (up to 25 years); 64 % in conventional septoplasty group and 72% in endoscopic group [4].

Basavaraj et al (2011) did a study on 151 patients to compare the result of septoplasty with or without nasal packing, in their study 126 (83.4%) patients were in the age group of 10 - 30 years and only 26.6% of patients were above 30 years. [7]

Jain et al (2011) did a comparative study on 100 patients and found that most commonly affected subjects belonged to 2nd and 3rd decade of life in both the sexes with 37% and 36% respectively in both the age group. [8]

In our study comparing the Conventional septoplasty with that of endoscopic septoplasty we included 25 patients in both the group and found that the most common age group affected was between 16- 35 years which accounted for 76% of the study population amongst this 40 % belonged to age group of 16-25 years. and rest 36% belonged to age group of 26-35 years, which was consistent with the study performed by Gulati et al , Basavaraj et al and Jain et al. No patients in our study were children, thus the risk of nasal deformity during the follow up were excluded [4,7,8] .

Sex Distribution

As per the available literature neither the incidence of symptomatic deviated nasal septum nor the outcome of surgery have any difference in male and female. Mohammad IA, Nabl-ur Rahman (2003) conducted a descriptive study on 200 patients to assess the complications of septoplasty and sub mucous resection of septum in which 162 (81%) patients were male and 38 (19%) patients were females with a ratio of 4.26:1 [9]. In many other studies male patients were more common than female patients.[9] This can be attributed to more exposure to trauma in males or random assignment of patients.

In our study of 50 patients predominant sex was of male which comprised of 40(80%) of the study population, female comprised just 10 (20%) of the total population. The male to female ratio in our study was 4:1 which was consistent with the available literature.

Occupation

In our study 20 (40%) of the study population were unemployed and included students predominantly and 13(26%) were farmers and business man followed by 10(20%) government officials and 14% belonged to group of drivers, tailors and peons. The students and farmers are more prone to trauma so the high incidence can be explained.

Symptomatology

The principal symptoms of deviated nasal septum are nasal obstruction, nasal discharge, headache, sometimes post nasal discharge and rarely hyposmia and epistaxis.

The nasal obstruction is the commonest symptom and usually found on the side of deviation and sometimes opposite side also due to hypertrophied turbinates. It is more so at night, exposure to cold or when patient have upper respiratory tract infection due to mucosal congestion. the nasal discharge, usually mucoid or sometimes purulent if infected is the next common symptom complained by patients with deviated nasal septum. Majority of the times headache is due to sinusitis but sometimes it might be due to pressure effects of deviated nasal septum. The nature of headache sometimes indicates the type of sinus involved. Post nasal discharge is the next common symptom complained to rhinologist by patients with deviated nasal septum. Hyposmia is usually not complained unless enquired and is due to inability of the air current to reach olfactory epithelium, which could be due to septal deviation or mucosal edema around the middle turbinate.

A study conducted by Dipak Ranjan Nayak, R Balakrishnan, K Deepak Murthy (1998) on 60 patients. 47 patients (78.3%) had complaints of nasal obstruction. Headache was present in 46 (76.66%), rhinorrhoea in 27(45%), post nasal discharge was present in 35(58.33%) and hyposmia in 5(8.33%) patients [10] . In another study conducted by Arunchalum PS, Kitcher E, Gray J (2001) showed that nasal obstruction was complained by 74% patients, facial pain by 72% patients and catarrh in 64% patients. [11]

Jain L, Jain M, Chouhan AN (2011) in their comparative study on conventional and endoscopic septoplasty done on 50 cases found that the most prevalent complaint in the patients of deviated nasal septum among the study subjects was nasal obstruction(74%), Sneezing(15%), post nasal drip(8%), epiphora(7%), hyposmia(3%), bleeding(3%) and snoring(3%). [8]

In our study 20(40%) of the patients presented with nasal obstruction, of which 11(22%) were in the conventional group and rest 9(18%) were in the endoscopic group. The next common symptoms observed was epistaxis which was present in 10(20%), 60% of this were in conventional group and rest 40% were in endoscopic group. The next common symptom in order of frequency was nasal discharge both anterior and posterior nasal discharge which was present in 8 patients of which 3 were in conventional and rest 5 were in endoscopic group, headache and epiphora was present in 6 patients each.

The most common complaint in our study was nasal obstruction which is similar to the available literature of DNS and the previous studies, however we found that epistaxis was the second most common complaint with which patients presented to us and it constituted 20% of the cases this could be explained by high incidence of septal spur and trauma to the nasal framework which was seen in 14% and 10% respectively.

Nasal Findings

All the patients included in our study underwent anterior rhinoscopy and diagnostic nasal endoscopy.

In a prospective study of the efficacy of the endoscopic aided septoturbinoplasty on 480 patients by Nayak DR et al (2002) , anterior deviation of the septum was seen in 427 patients and posterior deviation was seen in 154 patients. Spur was seen in 176 patients and hypertrophied inferior turbinate were seen in 372 patients.[12].

A retrospective study done by Nishi Gupta (2005) to review the endoscopic septoplasty patients for surgical indication, intra operative finding & post operative complications. most of these cases were those posted for endoscopic DCR and limited septoplasty was done to gain an access to the lacrimal sac area. A total of 48 patients underwent endoscopic septoplasty out of which 20(48%) were performed in conjugation of Endoscopic DCR. In 8 cases (16%) endoscopic septoplasty was performed alone as a primary procedure. 4 deviations were broadly based deflections(12%) , whereas 10 of septal deformities were septal spurs(20%) & in 4 (8%) of cases more than 1 type of septal deformities were encountered [13].

A retrospective study done by Sufian Nawaiseh & Nemer Al- Khtoum (2010) on 60 patients to review for surgical indications, intra operative technique, findings and post operative complication. Nasal septal deviations were in the following order, 29(48%) of the deviations were broadly based deflections, whereas 23(38.3%) of the septal deformities were spurs. In 8(13.3%) patients more than 1 type of septal deformity was encountered. [14]In our study anterior rhinoscopy was followed by diagnostic nasal endoscopy in all the cases, deviation of nasal septum was seen in 86% of the cases of which C- shaped deviation was seen in 32(64%) of the patients followed by S- shaped deviation in 6(12%) of the patients, caudal septal deviation was seen in 5(10%) patients and septal spur was seen in 7(14%) of the cases. amongst the other finding inferior turbinate hypertrophy was seen in 6(12%) cases, NLD Blockage seen in 6(12%) of cases and Fracture nasal bone in 5910%) of the cases. 14% of the septoplasty performed was a limited septoplasty as an approach for lacrimal sac while performing Endo DCR. 5 (10%) of septoplasty was performed for the patients who presented with fracture of nasal bone with fracture of septal cartilage. while doing diagnostic nasal endoscopy all the 3 pass was possible in 17(34%) of the cases with difficult all pass in 5 cases. In 28(56%) of cases first pass was possible with difficulty performing second and third pass due to high upper deviation and inferior turbinate hypertrophy.

Type of Operative Intervention

Surgical intervention is the mainstay of the treatment in the correction of deviated nasal septum, described as septoplasty.

Fjermedal O, Saunte C, Pedersen J (1988) made a study on 478 patients to compare nasal septal operations, septoplasty and sub mucous resection of the septum and found that septoplasty was associated with lesser complications and more satisfactory results compared to sub mucous resection of septum.[15]

Sindwani R, Wright ED (2003) evaluated the role of endoscopic septoplasty in the treatment of atypical facial pain and the results showed 7 out of 13 (54%) were completely cured, 5(38.5%) were significantly improved and the conclusion was that endoscopic septoplasty was a useful approach for dealing with some deviated nasal septum with facial pain. [16]

Hwang PH, Mc Laughlin RB, Lanza DC, Kennedy DW(1999) told that "Endoscopic Septoplasty is an attractive alternative to traditional headlight approach to septoplasty". The advantages of endoscopic septoplasty are the ability to reduce the morbidity and postoperative swelling in isolated septal deviations by limiting the dissection to the area of deviation, improved visualisation, improved surgical transition between septoplasty and sinus surgery.[17]

In our study septoplasty was done in all 50 cases, In the conventional group along with septoplasty, Endo DCR was done in 2 cases, reduction of fracture nasal bone was done in 4 cases and in 1 case inferior turbinate cautery was done. In endoscopic septoplasty group, along with septoplasty, Endo DCR in 4 cases and 1 case underwent reduction of fracture nasal bone.

All the 50 cases were done under hypotensive general anaesthesia so that the blood loss was not much variable in both the group, so that comparison was even.

Intra operative evaluation

Mao-Chang Su et al (2004) in their study on Endoscopic septoplasty in conjugation with endoscopic sinus surgery said that there are several advantages of endoscopic septoplasty over traditional septoplasty or SMR when they are performed concomitantly with endoscopic sinus surgery. septoplasty should be done under direct vision, and the endoscope can provide adequate illumination. The endoscope also provide better magnification, so that the correction of septal deformities can be made more accurately. Moreover whole procedure of endoscopic septoplasty can be accomplished with endoscopic surgery equipment without additional instrumentation. On the contrary traditional septoplasty and SMR require the use of additional instruments in addition to endoscopic ones. [18]

Gulati et al (2009) in their study of comparative evaluation of endoscopic with conventional septoplasty stated that the endoscopic approach to septoplasty provides several advantages over the standard headlight technique. it facilitates accurate identification of the pathology due to better illumination, improved accessibility to remote areas and magnification. It allow better understanding of the lateral wall pathology associated with the septal deformity. it allow limited incision and elevation of the flaps not compromising with adequate exposure of the pathological site. It facilitates realignment by limited and precise resection of the pathological areas and/or by precise repair, by strategically placed wedge resection/ shaving of the cartilage. it effectively relives the contact areas and thus the contact headache by allowing intra operative assessment. Endoscopic septoplasty is associated with significant reduction in patients morbidity in both peroperative and post operative period(with pack and after pack removal) due to limited extent of flap dissection, not using Killian nasal speculum which by pressure can cause peroperative discomfort, limited manipulation and resection of septal framework thus obviating the need for a tight pack and requiring packing for a lesser duration.[4]

Ranjan G Aiyer, Rahul Gupta & Jayman Raval (2009) in their study stated that successful septoplasty involves accurate assessment of septal pathology and sound technique to avoid persistent symptoms and new complications. A conventionally performed septoplasty usually involves the elevation of mucoperichondrial flap

in its whole length on one side followed by deviation correction. compared with standard septoplasty, endoscopic technique provides several important advantages. This are as follows-

1. Better visualization under direct light with endoscope
2. Less invasive, only deviated part mucoperiosteum/ mucoperichondrium elevated.
3. Posterior septal spur correction is better which is difficult to reach/ missed by conventional method.
4. A reduced amount of blood loss
5. Improves access to other endoscopic nasal surgeries.
6. Minimal tissue handling results in less postoperative edema and pain.
7. No complications like septal perforation and septal hematoma.
8. Packing is usually not required
9. Day care surgery.
10. Early return to work.
11. Less expensive.
12. Uneventful postoperative period.
13. Excellent teaching tool for postgraduate and undergraduate students through recording and display. [19]

Sufian Nawaisch & Nemer Al-Khtoum (2010) in their study stated that the rationale for developing endoscopic technique from a traditional "headlight" approach comes from the fact that during common nasal procedures, the surgeons view is obscured due to the narrowing caused by septal spur or septal deviations. Endoscope enables the surgeon to localize the spurs and remove them under direct visualization by performing an incision precisely over the spur, thus minimizing surgical trauma. [14]

According to Brennan et al (1973) the ideal objective in septal surgery is permanent correction of deviation with avoidance of any complication. four basic principles are consistent with this objective: good exposure; safe elevation of flaps; resection of only a limited, necessary amount of septum; and elimination of aetiological dynamic forces. Of these four principles, the first three are best achieved by an endoscopic approach to the septum. [20].

Prepageran N & Lingham OR (2010) in their study on endoscopic septoplasty : the open book method, stated the disadvantage of traditional septoplasty. they said that the traditional approach to septoplasty involves head light illumination, visualization through a nasal speculum and surgical instrument that are different from standard endoscopic sinus procedures. This can be sub optimal when treating a narrow nose, posterior deviations, requiring frequent changing from headlight to endoscope. Furthermore, impaired visualization could predispose to nasal mucosa trauma and unnecessary bleeding.. endoscopic septoplasty is an attractive alternative to traditional headlight approach. [21]

In our study, we found that visualisation of surgical space was good in all the 25(100%) cases included in the endoscopic group when compared with the conventional septoplasty group where the visibility of surgical space was poor in 20 cases and 5 cases had fair visibility. the fair visibility can be explained due to caudal septal deviation which was easily visible. when we compared the amount of blood loss in both the conventional and endoscopic group we found that the blood loss less than 10 ml was seen in 5 (10%) of cases of conventional group compared to endoscopic group in which 8(16%) patient had blood loss less than 10 ml. The blood loss of 10 -30 ml was more in conventional group and was seen in 20(80%) of the cases compared to endoscopic group. Thus the blood loss in endoscopic septoplasty was less compared to conventional septoplasty which is similar to the available literature. The comparison of duration of surgery in both the group also showed the result favouring the endoscopic technique, as the surgery was quick and took less than 1 hour in 17 compared to 10 patients in conventional group. The procedure took more than 1 hour in only 3 patients compared to 9 patients in conventional group. However the result was not statistically significant but matched with the available literature. when we compared the requirement of nasal packing between the two groups there was no statistical significance between the two group.

In the intra operative period all the patients in both the group were assessed for any haemorrhage of mucosal tear. in our study we did not find any patient with severe nasal bleeding, however the mucosal tear was seen in large number of patients ranging from unilateral to bilateral tear. unilateral tear was seen in 12(48%) of patient of conventional group compared to 6(12%) of patient in endoscopic group, bilateral mucosal tear was detected in 8(32%) of patient if conventional group compared to 5(20%) in endoscopic group. tear of mucosa was not seen in 14(46%) patients in endoscopic group compared to just 20% of patient in conventional group. The result was consistent with the previous studies and is statistically significant with p value less than 0.05.

Post operative evaluation

Park DH, Kim TM, Han DG, Ahu KY(1988) conducted a study to compare the endoscopic assisted correction of deviated nose to classical septorhinoplasty on 44 patients of which 16 patients underwent endoscopic assisted septoplasty and 28 patients underwent classical method. The patients satisfaction was 87.5% and 71.4% and complications were 0% and 14.3% in endoscopic assisted correction of deviated nose and classical septorhinoplasty respectively [22].

Kamami YV, Pandraud L, Bougara A (2000) studied the laser- assisted outpatient septoplasty in 703 patients and the conclusion was laser assisted septoplasty requires 5 minutes for surgery and useful in chronic nasal obstruction with anterior deviation of septum. advantages were, less invasiveness, decreased morbidity and faster return to work. [23]

Gupta M, Motwani G (2005) did a comparative study of endoscopic aided septoplasty with traditional septoplasty in posterior nasal septal deviations on 50 patients to compare the results in terms of symptomatic improvement, endoscopic finding and complications, if any and found that majority had high deviation, 48% had bony deviation in both the groups, majority of patients were discharged within 48 hours of surgery which included 80% and 96% of patients in conventional and endoscopic group, 5 patients of conventional group required longer stay due to lip edema and bleeding. Symptomatic improvement was mainly observed in nasal obstruction 21(84%) and 24(96%) of the patients in conventional and endoscopic group, respectively [24].

Gulati et al (2009) in their comparative study on 50 patients found that there was statistically significant difference between two groups regarding all the complaints. After one week of surgery , 2 patients of conventional group presented with septal haematoma which was drained and packing was done. None of the patients in endoscopic group was found to have such complaints. comparison in relief of symptoms at the end of 8 weeks did not show statistically significant difference between two groups. On follow up examination at 8 weeks, residual deformity was found to be present in 5(20%) patients of conventional group, whereas it was present in 2(8%) patients of endoscopic group. In conventional group, 9(36%) patients developed Synechiae whereas in endoscopic group only 2(8%) patients developed Synechiae . it was statistically significant difference. [4]

In our study the patients were examined on immediate post operative period, 1 week, 2 week and 4 week after the surgery. During each visits, the patients were assessed subjectively and objectively. the following were the results noted on their follow up.

In the immediate post operative period the patient were enquired of certain complications, we noted that headache was the most common complication in the immediate post operative period and it was present in 9(36%) and 11(44%) of patients, followed by watering of eyes which was present in 5(20%) and 0 %, nasal discharge in 3(12%) and 6(24%) and swelling of face in 3(12%) and 2(8%) of patients in conventional and endoscopic septoplasty in the same order. the result was not statistically significant

When we compared the post operative stay in both the group then we found that 5(20%) and 6(24%) of the patients in both the group had post operative stay less than 48 hours, majority of the patients had post operative stay more than 48 hours in both the groups which was not similar to the previous study however the number of patients staying for more than 72 hours was more in the conventional group compared to the endoscopic group which was similar to the result of previous study.

All the patients who had undergone surgery in both the groups were asked to follow up after 1 week, 2 week and 4 week after they were discharged from the hospital, and during the follow up period all the patients were subjectively and objectively assessed for and complaints. The comparison of the complications after 1 week of follow up in both the group showed that majority of patients in both the group were asymptomatic after 1 week of follow up however the percentage of asymptomatic patients were more in the endoscopic group, amongst the complication which was present in rest of the cases we found that majority of patients in both the group presented with headache and the figure was same in both the group, post operative infection/crusting was seen in 5(20%)patients of the conventional group with no effected patients in the endoscopic group, development of Synechiae was more in patient of conventional group and septal perforation was seen in 2 cases which were in conventional group. the comparison of results of complication after 1 week of follow up was statistically significant and the p value was less than 0.05 in our study.

When we compared the results of complication after 2 weeks of follow up we found that Synechiae/ septal perforation was seen in 6/2 patients in conventional group compared to 3 patient with Synechiae in endoscopic group, with no significant difference in nasal blockage, majority of patients were asymptomatic in both the group. after 4 weeks of follow up the percentage of patients with Synechiae was decreased in both the group following synechialysis however there was no change in the results of nasal blockage after 4 weeks of follow up. The result was not statistically significant.

Gupta M, Motwani G (2005) in their study in order to assess the results of septoplasty postoperatively used nasal specific questionnaire as in various previous studies. The study showed more number of patients being relieved of presenting complaints in endoscopic group with the result being very good in 96% of patients in endoscopic group compared to 80% in conventional group. The result was satisfactory in 1 patient in conventional group and no improvement in 2 patient of conventional group. [24]

In our study we found that majority of the patients in the endoscopic group as compared to conventional group gave very good response and with 4 and 2 patient giving satisfactory result and 3 and 1 patients giving result of no satisfaction in conventional and endoscopic group respectively.

When we compared the relief of symptom in the preoperative period and after 4 weeks of follow up in both the conventional and endoscopic group we found that relief of nasal obstruction was seen in 81.8% of patients in conventional group compared to66.6% of patient in endoscopic group, relief of nasal discharge, headache nose bleeding and epiphora in 100% in both the group. However the development of Synechiae and septal perforation was common in conventional group .

V. Summary

Septal surgery is the commonly performed operation in otorhinolaryngology practice**.** This study was conducted to compare the advantages and disadvantages of endoscopic septoplasty to conventional septoplasty.

This is a randomised controlled trial of 50 patients with symptomatic DNS alone or with other nasal abnormalities in the age group of 16 - 50 years into grouped into two. The average age of the patients was 29 years. There were 40 males and 10 females in the current study. In this study 37 patients were Hindu of which 29 were from Nepali community, Buddhist constituted 9 patients who belonged to Bhutia and Lepcha community, 14 patients belonged to other community.

24% of the study population were graduate and above and 14% were illiterate. Majority of the study population were unemployed.

In our study, 20 (40%) of the patients presented with nasal obstruction, of which 11 (22%) were in the conventional group and rest 9 (18%) were in the endoscopic group. The next common symptoms was epistaxis which was present in 10 patients, 60 % of which were in the conventional group and rest 40% were in endoscopic group. The next common symptom in descending order was nasal discharge both anterior and posterior, which was present in 8 patients of which 3 were in conventional group and rest 5 were in endoscopic group. Headache and epiphora were seen in 6 (12%) patients in each group. Although hyposmia is mentioned as one of the common symptom of DNS it was not seen in any of the patients in the study.

The nasal finding of the patients included in our study showed 32 (64%) patients had C- shaped DNS, with 6 (12%) patients having S shaped DNS, 7(14%) patients with septal spur and 5(10%) patients with caudal septal deviation. Other findings on anterior rhinoscopy included, 6(12%) patients with inferior turbinate hypertrophy and 6 (12%) patients with NLD blockage. On performing Diagnostic Nasal Endoscopy in 28 (56%) patients 1st pass was difficult, in 5 (10%) patients all the 3 pass was not possible because of deviation of nasal septum and other pathologies like septal spur and inferior turbinate hypertrophy.

Nasal valve area was the key area for success of septal surgery in relieving the nasal obstruction. Endoscopic septoplasty helped in release of adhesions or correction of nasal valve area, high and posterior deviations of the nasal septum. It also helped in case of isolated spur with limited incisions and prevented unnecessary mucosal tear.

Incision used for conventional septoplasty was Freer's hemitransfixation incision where as for endoscopic septoplasty, an incomplete transfixation or incision along the floor was used.

In conventional septoplasty group, Endo DCR was done in 2 cases and reduction of fracture nasal bone was done in 4 cases. While in endoscopic group Endo DCR in 4 Cases and 1 case underwent reduction of fracture nasal bone.

Both in conventional and endoscopic group, merocel pack and Nasal splint with soframycin ointment was used to pack the nasal cavities post operatively for minimum of 24 hours. In cases of functional endoscopic sinus surgery pack was kept for minimum of 48 hours. Antibiotics along with oral and nasal decongestants and analgesics were prescribed at least for 1 week with alkaline nasal douching.

The benefit from nasal obstruction was seen in 81.8% of patients in conventional group compared to 66.6% of patients in endoscopic group, relief of nasal discharge, headache, nose bleeding and epiphora was seen in 100% of cases in both the group. However the development of Synechiae and septal perforation was common in conventional group.

The commonest complications seen during the intra operative period was unilateral mucosal tear which was most common in conventional group compared to the endoscopic group, bilateral mucosal tear was again common in the conventional group, on subsequent follow up synechiae and septal perforation was common in conventional group.

Synechiae was successfully treated by releasing them under local anaesthesia and packing the nasal cavities by ribbon gauge for 24 hours.

VI. Conclusion

Endoscopic septoplasty is a major event and good evolutionary step in the history of septal surgery.

Its role is special in dealing with posterior deviations, high deviated nasal septum, isolated spur, septal surgery in children and in revision surgery.

Anterior deviation, caudal dislocation and anterior nasal spine require conventional septoplasty, but even then it requires large incision, poor illumination and often creation of tunnels on both the sides.

In endoscopic septoplasty the disarticulation of the vomero-chondral junction and ethmochondral junction is often not needed and precise shaving of the septal cartilage and proper placement of wedge resection is all that required in most of the surgeries.

At the same time the nasal endoscope aids in better identification and treatment of pathology of the lateral nasal wall either in relation to septal deviation or independent of it.

The combined approach using both conventional and endoscopic methods can be made use of , if the pathology involves both anterior and posterior parts of the septum. The use of powered endoscopic instrument is in its infancy but might become very useful in future.

The best functional and anatomical results are conquered when the entire deformity of the nasal septum is corrected without compromising the resilience and stability of the cartilaginous septum, which cannot be obtained by conventional septoplasty. In addition to the above, the endoscopic septoplasty helps in documentation and is a efficient teaching tool.

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