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# Power-assisted instruments in trans-nasal endoscopic management of choanal adenoid in the adult patients with persistent nasal symptoms

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**Abstract**— *Objective:* The purpose of this study is to assess the effect of trans-nasal endoscopic management of choanal adenoid in management of the adult patient with persistent nasal symptoms. *Patients and methods:* This study conducted on 40 patients with bilateral nasal obstruction not responding to medical treatment of the nasal symptoms. The youngest patient's age was 18 years and the oldest was 43years (mean22.9± 7.4). Diagnosis preoperative was based on a careful history, examination including nasal endoscopy to confirm the diagnosis. Phoniatrics evaluation included (APA) and, Nasometery and examination including nasal endoscopy to confirm the diagnosis. A transnasal endoscopic powered adenoidectomy using a microdebrider in all patients to remove the choanal adenoids. *Results:*A high statically significant difference between the nasal symptoms pre and post-operative follow up. Our patients had different degrees of improvement in the three follow up post-operative as regards the degree of nasal obstruction, Nasal discharge, Snoring, Chronic cough, Degree of crustations, and Degree of intranasal adhesions, and nasal bleeding. *Conclusion:* Our results revealed that the microdebrider is one of the best tools in removing chonal adenoid completely and relief most of nasal symptoms.

**Keywords**: ChonalAdenoid, Transnasaladenoidectomy, Choanaladenoid in adult, Microdebrider, Nasal symptoms, Nasometery, Closed nasality.

## INTRODUCTION:

Adenoid may be a lymphatic tissue at the rear of the nose or on the posterosuperior wall of the nasopharynx. Adenoid is that the part of the Waldeyers Ring. It appears to possess a very important role within the development of an (immunological memory) in children [1].

Adenoid hypertrophy occurs physiologically in children between the age of 6-10 years, then atrophy at the age of 16 years [2]. Adenoid hypertrophy is rare in adults, while examination of the nasopharynx by indirect posterior rhinoscopy is insufficient, many cases of enlarged adenoid within the adult are misdiagnosed and accordingly maltreated. The presence of lymphoid hyperplasia within the nasopharynx, is related to chronic inflammation. Regressed adenoidal tissue may re-proliferate in response to infections and irritants [3].

A good type of methods available to perform adenoidectomy. Routes for visualization and access to the adenoid is also trans-oral, Trans-nasal, or a mixture. A combined approach of conventional and endoscopic adenoidectomy allows the most bulk of the mass to be removed by adenoid curette and also the remaining part under trans-nasal endoscopic control, using power shaver, suction cautery or sinus surgery forceps [3,4].

The aim of this study is to assess the effect of trans-nasal endoscopic management of choanal adenoid within the management of the adult patient with persistent nasal symptoms.

**PATIENT AND METHOD:**

This was a prospective study conducted on 40 Egyptian Arabic patients during the period between March 2018 through May 2019 at the Department of Otorhinolaryngology in Minia University hospital, Egypt. The participants included 9 males and 31 females. The youngest age was 18 years, and the oldest was 43years (mean22.9 ± 7.4). They were selected from both urban and rural areas of the El Minia and governorates of Egypt. Informed consent was taken from each patient after the explanation of the procedure to them. Approval of the University Ethics in Research Committee was taken.

I- Preoperative: We selected adult patients with bilateral nasal obstruction not responding to medical treatment of the nasal symptoms. Diagnosis preoperative was based on a careful history, examination including nasal endoscopy to confirm the diagnosis. Phoniatrics evaluation included (Auditory Perceptual Analysis(APA) and Nasometery) and examination, including nasal endoscopy to confirm the diagnosis.

1-Patients subjected to full history taking with special emphasis on contact with diseased relatives, the duration of their main complaint, other nasal symptoms, history of (previous medications, previous head and neck operations, and common causes of immunodeficiency such as human immunodeficiency virus, long term steroid therapy, diabetes mellitus (DM), or history of immunosuppressive therapy).

2-Complete otorhinolaryngeal examination was done for all patients, including endoscopic nasal examination, to assess each nasal fossae and nasopharynx.

3-Evaluation Nasal symptoms:

a- nasal obstruction: Nasal obstruction was analyzed according to VAS (Visual Analogue Score) system by asking the patients to score the nasal obstruction symptoms from 1-10 and was categorized as follows Imad et al. [5]. No improvement: VAS (1-3), Partial improvement: VAS (4-7), and Complete improvement: VAS (8-10).

b-Extent of intranasal crustations: Extent of intra-nasal crustations was analyzed according to endoscopic scoring of Lund and Kennedy [6] as follow: Grade 0: Grade 1(Absence of crustations), Grade 2 (Mild crustations, partially filling the nasal cavity) and Grade 3 (Severe crustations: filling the nasal cavity).

c-Degree of tissue Healing and adhesions formation (Synechiae): Tissue healing was also assessed according to endoscopic scoring of Lund and Kennedy[6], as follows: Good healing: Rapid mucosal re-epithelization, minimal crustations, no nasal synechiae, patient feel the relief of nasal symptoms.Moderate healing: Mucosal re-epithelization, mild to moderate crustations, with nasal synechiae, the patient feels the relief of nasal symptoms. Poor healing: Delayed mucosal re-epithelization, severe crustations, and nasal synechiae, persistent inflammations, and infection, and the patient don’t feel a relief of his/her nasal symptoms.

4- Phoniatrics evaluation: A pretest was done before management to evaluate all the patients using the assessment protocol of asses that is applied in the phoniatric unit, Ain-Shams University, that includes subjective as well as quasi-objective measures of evaluation *Kotby et al.,* [6].

A- Auditory Perceptual Assessment (APA) of the patient's speech: This is a subjective evaluation of speech and voice by the well-trained expert 3 phoniatricians through listening to the patient in a free conversation, counting from 1 to 10 and a recorded speech sample as Quran Holy. The evaluation

included type and degree of closed nasality. All these elements were graded along a 5-point scale in which 0 = normal and 4 = severe affection[7].

b- The Nasometer: II (Model 6400; Kay Elemetric Corporation, Lincoln Park, N.J., USA) was used for the analysis of speech samples. The system components of the Nasometer II included a host PC with a Santa Cruz sound card and Nasometer II corresponding software. This system was connected to a headset containing two directional microphones with a sound separator plate. The examiner placed the headset so that the separator plate was tightly fitted between the upper lip and nose. All participants were asked to perform four speech subtests. These subtests were based on the MacKay-Kummer SNAP Test-R [8]. The test was modified to apply to the Arabic language, especially to the Egyptian dialect (the Egyptian Arabic SNAP test is available from the corresponding author upon request). Below, these speech tasks are described in more detail. It included (Oral + /a/ syllables pa, pa, pa), (Oral + /i/ syllables pi, pi, pi), (Nasal + /a/ syllables ma, ma, ma),( Nasal + /i/ syllables mi, mi, mi) and Sustained /a/, /i/, /m/.

II- Operative: All patients enrolled in this study received standardized premedication and anesthesia. Intraoperative, the operative time started when removal of tissue began was evaluated. Blood loss and precise surgical removal of adenoid tissue were estimated as well.

Operative techniques were as follows: under general anesthesia, all patients were intubated with an endotracheal tube. The nasal cavity was decongested with topical solution 1% xylometazoline to facilitate the nasal passage during the procedure. A 0-degree sinoscope was passed trans-nasally. A shaver blade (microdebrider) was introduced through the nose into the nasopharynx under telescopic visualization, the same as done in choanal atresia procedure. Tissue was removed at the site of the oscillating blade only, and the blade is kept under vision all the time using the telescope. The procedure started in the region of the choanae, progressing inferiorly and posteriorly. Careful tissue removal was carried out with the protection of important nearby structures like eustachian, torus tubaris, and posterior pharyngeal wall. A surgical patty was then applied to choana to control bleeding. In the end, the postnasal space was examined to guarantee the patency of posterior choanae and sufficient hemostasis. Other procedures like turbinoplasty, septoplasty or FESS done in some patients having associated rhinological findings beside enlarged choanal adenoid(Figure 1,2,3-4)

III-Postoperative Follow up

In each visit, we assess the following parameters: APA, Nasometery, and nasal obstruction, Extent of intranasal crustations, Degree of tissue Healing, and adhesions formation (Synechiae).

In all patients, Follow up was carried-out two weeks, and one month and three months postoperatively to assess the previous parameters.

Statistical analysis: The Statistical Program SPSS for Windows version 19 was used for data entry and analysis. Graphics were done by Excel Microsoft office 2013. Quantitative data were presented by mean and standard deviation, while qualitative data were presented by frequency distribution. We used the Chi-Square test to compare two or more proportions. The student t-test was used to compare two means. For all tests probability (P) was considered significant if $\leq 0.05$.

## RESULTS:

The study was done on 40 patients, 31 (77.5%) were females and 9 (22.5%) were males. Patients were in the age range of 18-43 years (mean 22.9±7.4). (Table 1-2).The study was done on 40 patients, 13 (32.5%) patients were had only had choanal adenoidectomy and 27 (67.5%) were had choanal adenoidectomy with other procedures (table-3).The operative time of trans-nasal endoscopic adenoidectomy about 15.25 minutes (mean 19.5 ± 3.4) usingmicrodebrider with bipolar diathermy. Thebloodlossintrans-nasal endoscopic adenoidectomy ranged from 35-65 ml (mean 49.8 ±9.6) using microdebrider with bipolar diathermy .

In the present study, A high statically significant difference between the nasal symptoms pre and post-operative follow up. Our patients had different degrees of improvent in the three follow up post-operative ( 2 weeks, 1 months, 3 months) as regard theDegree of nasalobstruction(Table-4 & Fig. 5),Nasal discharge(Table-5 & Fig. 6),Snoring(Table-6 & Fig. 7),Chronic cough(Table-7 & Fig.8),Degree ofcrustations(Table-8 & Fig. 9),and Degree of intranasaladhesions(Table-9 & Fig. 10)and nasal bleeding(Table-10 & Fig. 11).

The results obtained from the 40 pre and post postoperative follow up revealed a statistical highly significant differences were obtained between the study group as regard the Nasometery (Table -11)andauditory perceptual assessment (APA) (Table -12),

## DISCUSSION:

The current study sheds a spot of sunshine on the role of choanal adenoid in nasal obstruction in adults and therefore the best method in surgical endoscopic management. A spread of adenoidectomy techniques are present Ron et al.,[9]. The standard way of adenoidectomy was well described by many authors [10]. High care is very important to confirm that adjacent structures, like the palate, posterior choana, and post pharyngeal wall don't seem to be damaged especially just in case of giant adenoid hypertrophy. a big obstructive symptoms appear when the nasopharynx is full of 50% of adenoid tissue [11]. Most Surgeons do adenoidectomy by curettage method. The most complication of the curette technique include, less precise removal of adenoid tissues, bleeding could also be increased, and velopharyngeal insufficiency. Excessive removal of adenoid tissue by curettage method may end in damage to the muscles, the posterior choana, eustachian tubes, or other structures. As a result, many complications could be a results of aggressive adenoidectomy as velopharyngeal insufficiency and persistence of adenoid symptoms [12].

Suction coagulation diathermy is one in every of the methods that are tested and considerable benefits regarding the precise removal of adenoid tissue [13].

Shrinking or removing the adenoid with heat requires a big amount of thermal energy (heat). With large adenoids, this will take significantly longer and therefore the adenoids may only be reduced, not completely removed. If the adenoid isn't completely, they'll still be a source of infection, or regrowth and cause airway obstruction.

The study sample showed that females were more presented with choanal adenoid than males with a mean age of twenty-two.9 years old. Also, choanal adenoid was the sole reason behind nasal obstruction in 32.5% of the study sample while there was associated pathology in 67.5% that further worsen nasal obstruction (deviated septum and turbinate hypertrophy). Our study revealed that rather than nasal obstruction either by choanal adenoid only or choanal adenoid related to other nasal pathology; only three patients suffer from chronic Rhinosinusitis 7.5%, so choanal adenoid wasn't a crucial reason behind infection of the nose and paranasal sinuses.

We used X-radiation and nasal endoscopy for evaluation of every patient, these tools were sufficient in confirming the diagnosis and that we used endoscopy alone for postoperative evaluation of results. Also use of microdebrider was the simplest tool in surgical excision of choanal adenoid through the Transnasal approach, microdebrider was a pleasant tool for Turbinoplasty especially of the posterior end of the inferior turbinate. Its use with endoscope enables good visualization of the lesion, less bleeding intraoperatively, and total removal of the adenoid. The present results showed that after 2 weeks post-operative, marvelous cure of cough with variable improvement in other symptoms (nasal obstruction, nasal discharge, and snoring) these symptoms didn't improve completely thanks to postoperative nasal crustation, and edema of the nasal mucosa. After one month postoperative, more improvement of nasal symptoms as nasal mucosa starts to heal and no adhesion or bleeding, but crustation has still occurred in 85% of cases but it's mild. After three months of postoperative, all nasal symptoms improved without nasal adhesion, crustation, or bleeding.

Main presenting complaints of patients with choanal adenoid within the current study as follows, bilateral nasal obstruction and mouth breathing 40 patients, nasal discharge and recurrent nasal infections 34 patients, significant snoring 35 patients, chronic cough 5 patients, while in Khafagy et al, [14], bilateral nasal obstruction and mouth breathing 60 patients, nasal discharge and recurrent nasal infections 30 patients, significant snoring 28 patients, chronic cough 6 patients. In our study, we used the nasometry as an objective measurement of the advance of nasal obstruction of the patients. And results show a marked increase within the nasal resonance of vowel and consonants postoperative. Associated rhinological findings in our study as follows, hypertrophied turbinates 13 patients, septal deviation 11 patients, rhinosinusitis 3 patients and 13 Patients without associated rhinological findings, while in Yasser Khafagy et al,[14], The study was done on 64 patients hypertrophied turbinates 34 patients, septal deviation or spur 16 patients, nasal purulence 20 patients, rhinosinusitis 10 patients.

Our study was done on 40 patients, 13 (32.5%) were only choanal adenoidectomy and 27 (67.5%) were choanal adenoidectomy with other procedures. These other procedures choanal adenoidectomy with turbinoplasty 13 patients (32.5%), choanal adenoidectomy with turbinoplasty and septoplasty 11 patients (27.5%), choanal adenoidectomy with turbinoplasty , septoplasty, and FESS 3 patients (7.5%) while in Khafagy et al,[14], The study was done on 64 patients, 28 were only choanal adenoidectomy and 36 were choanal adenoidectomy with other procedures. These other procedures choanal adenoidectomy with turbinoplasty 20 patients, choanal adenoidectomy with turbinoplasty and septoplasty 14 patients, choanal adenoidectomy with septoplasty 2 patients.

In this study, it had been obvious that blood loss is far less by using transnasal endoscopic adenoidectomy. This can be associated with direct visualization which allows direct identification and treatment of the source of bleeding. The reduction of blood loss reduces the chance of hemorrhage. If the packing time to manage is added -5 min- then it'll give almost the identical result [15].

This can be clearly as a results of better field visualization by a right away vision while in conventional methods it needed multiple tries to get rid of adenoid tissue adequately without remnants which are time-consuming. The using of powered assessed instrumentation is decreasing the cutting time as well[16] the utilization of transnasal endoscopic adenoidectomy has many advantages like better vision, accurate adenoid tissue removal mainly within the choanal adenoid of our study, the bleeding is controlled directly and therefore the duration of surgery is a smaller amount. But still, it's some drawbacks like bleeding might make telescopic visualization difficult. The foremost important prerequisite for doing such a way is vigilant and well-trained surgeons [17].

**CONCLUSION:**

This study showed that choanal adenoid is a very important entity in Otorhinolaryngology that require further research work to research why it present till this age, and predisposing factors for its presence, and therefore the common associated nasal pathology with it. Our results revealed that the microdebrider is one among the simplest tools in removing this lesion completely, and that we encourage others to research other surgical procedures within the treatment. This study sample is little and that we need this work to be done on an oversized scale of patients and in multicenter.

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Ethics deceleration: Ethics approval and consent to participate

Centenary Hospital Institutional Ethical Committee permission was obtained, and written informed consent was obtained from the patient.

Consent for publication: Written consent was obtained from the patient including the consent to publish clinical images without revealing identity.

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Tables:

Table 1 .Distribution of sex among cases

| | Number | Percentage |
|---|---|---|
| Sex: | | |
| Females | 31 | 77.5% |
| Males | 9 | 22.5% |

Tables (2): Age range, mean and standard deviation:

| | range | Mean | SD |
|---|---|---|---|
| Age | 18-43 years | 22.9 | 7.4 |

Table (3): types of surgical procedures with trans-nasal endoscopic adenoidectomy) usingmicrodebrider with bipolar diathermy.

| Surgical procedures | No. of patient/% |
|---|---|
| choanal adenoidectomy only | 13 (32.5%) |
| choanal adenoidectomy with turbinoplay | 27 (67.5%) |
| choanal adenoidectomy with turbinoplasty and septoplasty | 13(32.5% |
| choanal adenoidectomy with turbinoplasty , septoplasty | 11 (27.5%) |
| choanal adenoidectomy with turbinoplasty , septoplasty with FESS | 3(7.5%) |

Table 4. Comparison of the Nasal obstruction scores among the patient pre and post-operative

| | | Preoperative | Postoperative | | | P value |
|---|---|---|---|---|---|---|
| | | | 2 weeks | 1 month | 3 months | |
| Nasal obstruction | *No* | 0(0%) | 0(0%) | 0(0%) | 40(100%) | *<0.001** |
| | *Mild* | 0(0%) | 13(32.5) | 40(100%) | 0(0%) | |
| | *Moderate* | 13(32.5%) | 27(67.5) | 0(0%) | 0(0%) | |
| | *Severe* | 27(67.5%) | 0(0%) | 0(0%) | 0(0%) | |
| P value (between each 2 times) | | | | | | |
| *Preoperative* | | | *<0.001** | *<0.001** | *<0.001** | |
| *2 weeks* | | | | *<0.001** | *<0.001** | |
| *1 month* | | | | | *<0.001** | |

- *Friedman test for comparison between the 4 times*
- *Wilcoxon test for comparison between each two times*
- **: Significant difference at P value < 0.05*

Table 5. Comparison of the Nasal discharge scores among the patient pre and post-operative

| | | Preoperative | Postoperative | | | P value |
|---|---|---|---|---|---|---|
| | | | 2 weeks | 1 month | 3 months | |
| Nasal discharge | *No* | 6(15%) | 6(15%) | 25(62.5%) | 40(100%) | *<0.001** |
| | *Mild* | 5(12.5%) | 34(85%) | 15(37.5%) | 0(0%) | |
| | *Moderate* | 29(72.5%) | 0(0%) | 0(0%) | 0(0%) | |
| P value (between each 2 times) | | | | | | |
| *Preoperative* | | | *<0.001** | *<0.001** | *<0.001** | |
| *2 weeks* | | | | *<0.001** | *<0.001** | |
| *1 month* | | | | | *<0.001** | |

- *Friedman test for comparison between the 4 times*
- *Wilcoxon test for comparison between each two times*
- **: Significant difference at P value < 0.05*

Table 6. Comparison of the Snoring scores among the patient pre and post-operative

| | | Preoperative | Postoperative | | | P value |
|---|---|---|---|---|---|---|
| | | | 2 weeks | 1 month | 3 months | |
| Snoring | *No* | 5(12.5%) | 5(12.5%) | 18(45%) | 40(100%) | *<0.001** |
| | *Yes* | 35(87.5%) | 35(87.5%) | 22(55%) | 0(0%) | |
| P value (between each 2 times) | | | | | | |
| *Preoperative* | | | 1 | *<0.001** | *<0.001** | |
| *2 weeks* | | | | *<0.001** | *<0.001** | |
| *1 month* | | | | | *<0.001** | |

- *Friedman test for comparison between the 4 times*
- *Wilcoxon test for comparison between each two times*
- **: Significant difference at P value < 0.05*

Table7. Comparison of the chronic cough scores among the patient pre and post-operative

| | | Preoperative | Postoperative | | | P value |
|---|---|---|---|---|---|---|
| | | | 2 weeks | 1 month | 3 months | |
| Chronic cough | *No* | 35(87.5%) | 35(87.5%) | 38(95%) | 40(100%) | *<0.001** |
| | *Yes* | 5(12.5%) | 5(12.5%) | 2(5%) | 0(0%) | |
| P value (between each 2 times) | | | | | | |
| *Preoperative* | | | 1 | *<0.001** | *<0.001** | |
| *2 weeks* | | | | *<0.001** | *<0.001** | |
| *1 month* | | | | | *0.001** | |

- *Friedman test for comparison between the 4 times*

Table 8 . Comparison of the nasal Crustationsscores among the patient pre and post-operative

| | | Postoperative | | | P value |
|---|---|---|---|---|---|
| | | 2 weeks | 1 month | 3 months | |
| Crustations | *No* | 0(0%) | 6(15%) | 40(100%) | *<0.001** |
| | *Mild* | 6(15%) | 34(85%) | 0(0%) | |
| | *Moderate* | 34(85%) | 0(0%) | 0(0%) | |
| P value (between each 2 times) | | | | | |
| *2 weeks* | | | *<0.001** | *<0.001** | |
| *1 month* | | | | *<0.001** | |

- *Friedman test for comparison between the 3 times*
- *Wilcoxon test for comparison between each two times*
- **: Significant difference at P value < 0.05*

Table 9 . Comparison of the Synechiascores among the patient pre and post-operative

| | | Postoperative | | | P value |
|---|---|---|---|---|---|
| | | 2 weeks | 1 month | 3 months | |
| Synechia | *No* | 40(100%) | 40(100%) | 40(100%) | 1 |
| | *Yes* | 0(0%) | 0(0%) | 0(0%) | |
| P value (between each 2 times) | | | | | |
| *Preoperative* | | | 1 | *<0.001** | |
| *2 weeks* | | | | *<0.001** | |

- *Friedman test for comparison between the 3 times*
- *Wilcoxon test for comparison between each two times*
- *Significant difference at P value < 0.05*

Table 10 . Comparison of theNasal Bleedingscores among the patient pre and post-operative

| | | Postoperative | | | P value |
|---|---|---|---|---|---|
| | | 2 weeks | 1 month | 3 months | |
| Bleeding (secondary) | *No* | 38(95%) | 40(100%) | 40(100%) | *0.135* |
| | *Yes* | 2(5%) | 0(0%) | 0(0%) | |
| P value (between each 2 times) | | | | | |
| *2 weeks* | | | *0.157* | *0.157* | |
| *1 month* | | | | 1 | |

- *Friedman test for comparison between the 3 times*
- *Wilcoxon test for comparison between each two times*
- **: Significant difference at P value < 0.05*

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Table 11. Comparison of of the nasalance scores among the patient pee and post operative

| nasometery | | Preoperative | Postoperative | | | P value |
|---|---|---|---|---|---|---|
| | | | 2 weeks | 1 month | 3 months | |
| Oral + /a/ syllables pa, pa, pa | | 30± 14 | 25± 66 | 21± 33 | 15±22 | <0.001* |
| Oral + /i/ syllables pi, pi, pi... | | 50± 16 | 42± 30 | 34± 44 | 28± 11 | <0.001* |
| Nasal + /a/ syllables ma, ma, ma... | | 31± 65 | 44± 12 | 51± 56 | 68± 14 | <0.001* |
| Nasal + /i/ syllables mi, mi, mi... | | 39± 11 | 48± 27 | 66± 30 | 82± 17 | <0.001* |
| Sustained sounds | Sustained /a/ | 52± 15 | 42± 66 | 33± 15 | 22± 15 | <0.001* |
| | Sustained /i/ | 49± 11 | 40± 3 | 31± 17 | 21± 10 | <0.001* |
| | Sustained /m/ | 50± 12 | 65± 4 | 70± 22 | 95± 40 | <0.001* |
| P value (between each 2 times) | | | | | | |
| *Preoperative* | | 1 | *<0.001** | *<0.001** | | |
| *2 weeks* | | | *<0.001** | *<0.001** | | |
| *1 month* | | | | *<0.001** | | |

Table (12): Comparison between preoperative and postoperative state as regard to APA.

| | | Preoperative | Postoperative | | | P value |
|---|---|---|---|---|---|---|
| | | | 2 weeks | 1 month | 3 months | |
| Closed Nasality | *No* | 6(15%) | 6(15%) | 25(62.5%) | 40(100%) | *<0.001** |
| | *Mild* | 5(12.5%) | 34(85%) | 15(37.5%) | 0(0%) | |
| | *Moderate* | 29(72.5%) | 0(0%) | 0(0%) | 0(0%) | |
| P value (between each 2 times) | | | | | | |
| *Preoperative* | | | *<0.001** | *<0.001** | *<0.001** | |
| *2 weeks* | | | | *<0.001** | *<0.001** | |
| *1 month* | | | | | *<0.001** | |

Figures:

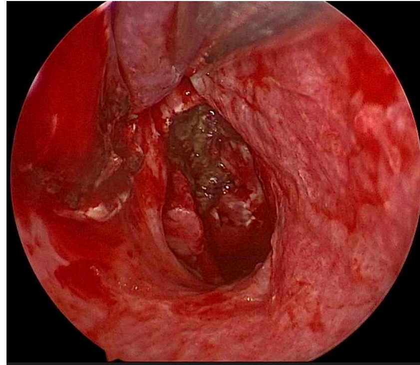


**Figure (1): Endoscopic removal of choanal adenoid with microdebrider and bipolar diathermy**

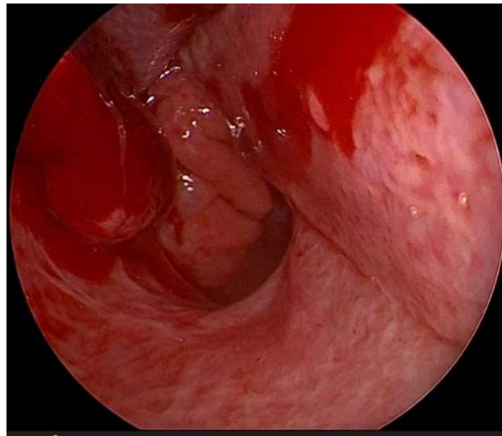


**Figure (2): Grade 3 choanal obstruction**

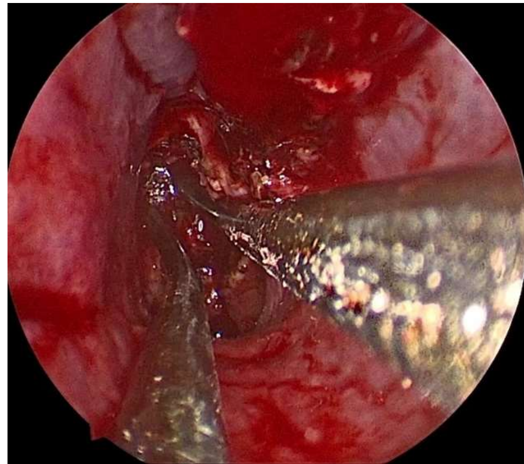


**Figure (3): Use of bipolar diathermy in removal of choanal adenoid**

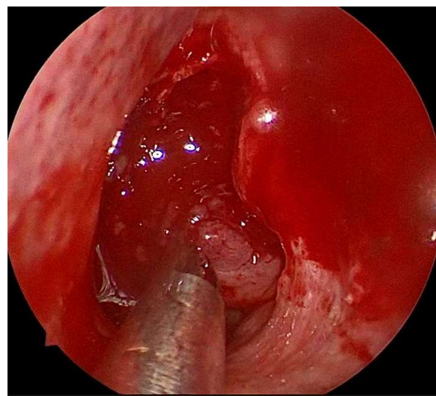
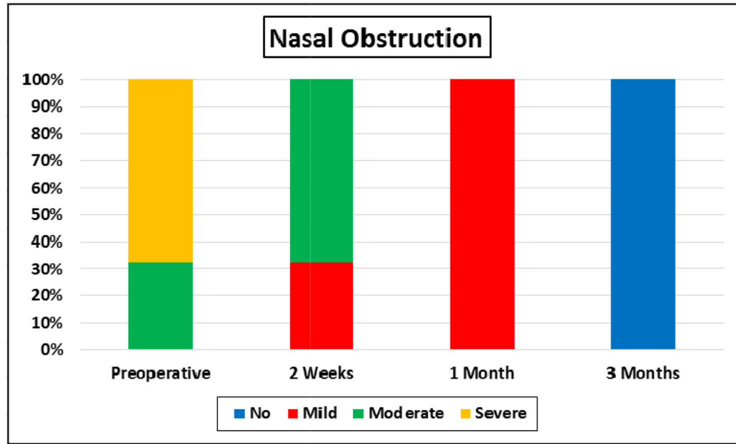


**Figure (4): Use of microdebrider in removal of choanal adenoid**




Figure(5): Comparison of the Nasal obstruction scores among the patient pre and post-operative.

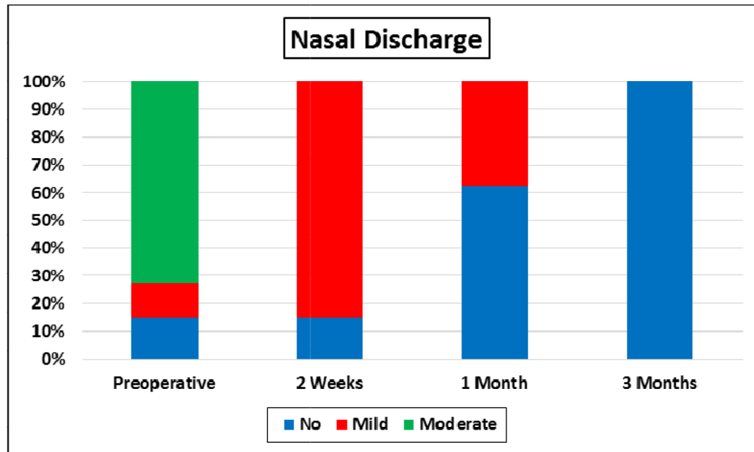



Figure (6): Comparison of the Nasal discharge scores among the patient pre and post-operative

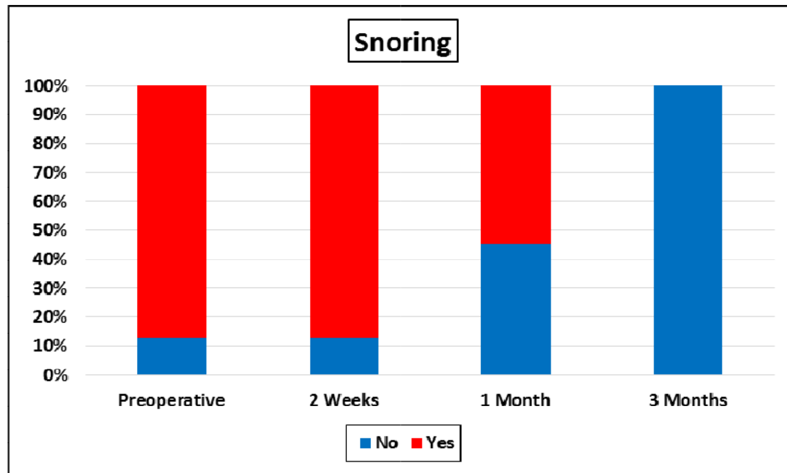



Table 7. Comparison of the Snoring scores among the patient pre and post-operative

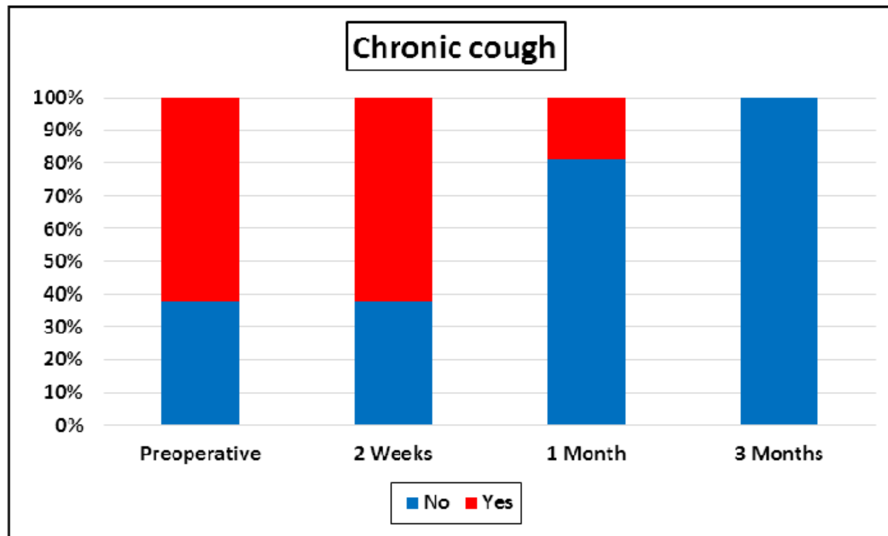



Table8. Comparison of the chronic cough scores among the patient pre and post-operative

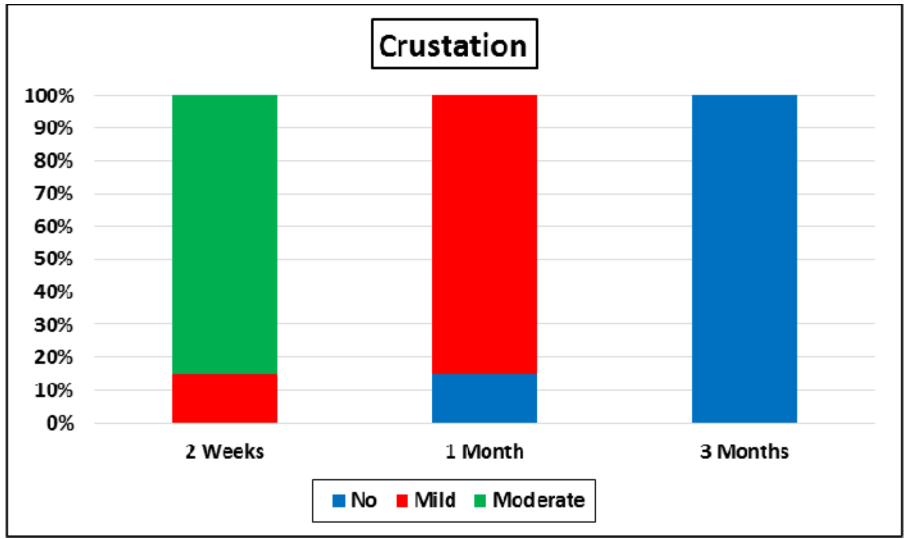



Figure (9): Comparison of the nasal Crustationsscores among the patient pre and post-operative.

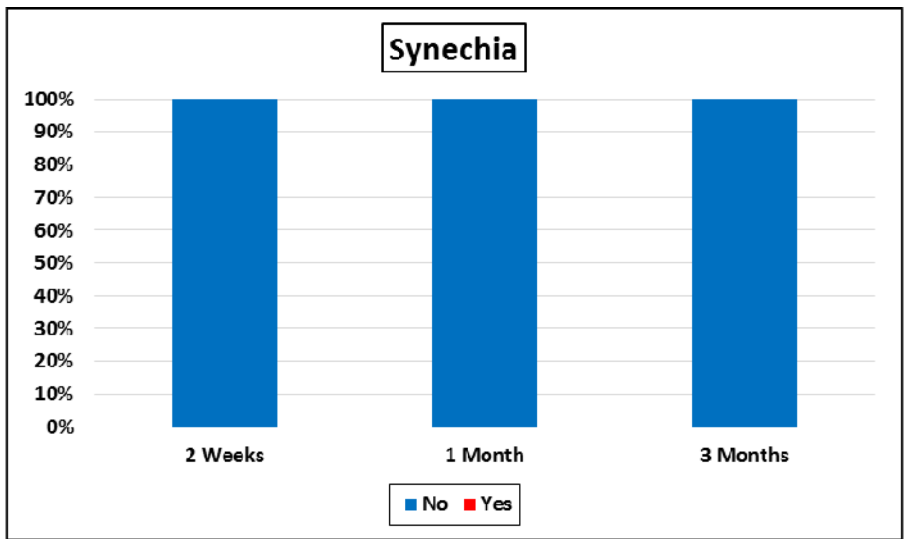



Figure (10): Comparison of the Synechiascores among the patient pre and post-operative

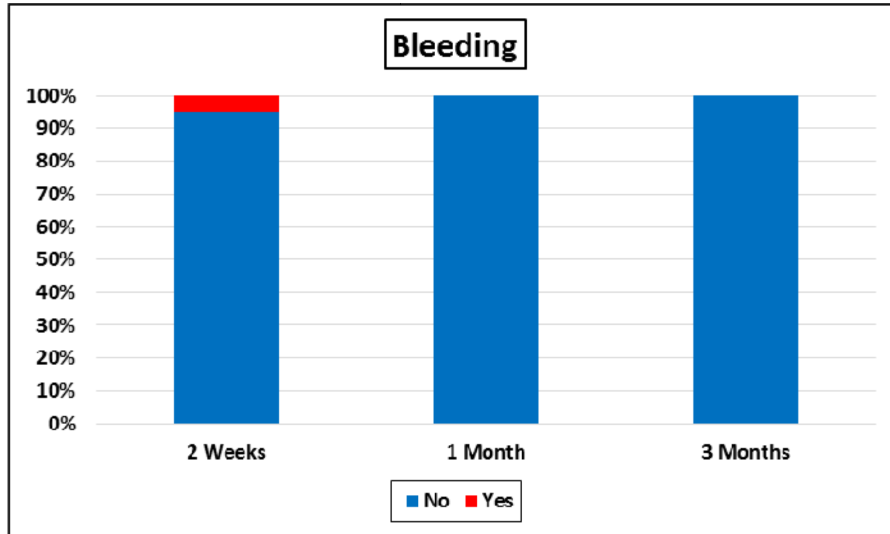



Figure (11): Comparison of theNasal Bleedingscores among the patient pre and post-operative