



# Nasal tip ptosis and some of its causes in patients who referred for rhinoplasty

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## ABSTRACT

**Introduction:** Nasal tip ptosis or droopy nose tip is a fairly common nasal deformity. Given the importance of correcting nose tip in rhinoplasty and the need to diagnose the causes of tip ptosis.

**Aims:** The current study was performed aimed to investigate the frequency of the causes of this deformity in rhinoplasty candidates.

**Methods:** In this cross-sectional study, 257 patients (205 women and 52 men; mean age:  $26.6 \pm 1.7$  years old) who came to Amirmomenin Teaching Hospital of Rasht for rhinoplasty in 2011-2012 were selected by simple sampling method. The contributing factors that led to tip ptosis were diagnosed and recorded based on the results of preoperative and the intraoperative clinical observations.

**Results:** In this study, 44% (113 patients) of the patients had tip ptosis. Statistically, no significant difference was observed between the incidence of tip ptosis in men and women ( $p=0.504$ ). The prevalence of tip ptosis among patients older than 40 years old was significantly greater ( $p=0.039$ ). Based on the results of preoperative and intraoperative observations, long caudal septum was the most important cause of tip ptosis. The most common coordination between the causes of tip ptosis in preoperative and intraoperative observations was the thick skin of nose lobules.

**Conclusion:** It seems that nasal tip ptosis is common in our rhinoplasty subjects, and there is only a partial correlation between the mentioned causes of tip ptosis in preoperative and intraoperative assessments, hence more consideration is required for a precise diagnosis of tip ptosis.

**Keywords:** rhinoplasty, tip ptosis, causality

## INTRODUCTION

All humans have a natural sense of beauty, and new findings show that this concept relates to race and culture in which they live (1). Nose is located in the middle third of the face. Since the nose is in the midline, it is considered as the most apparent aesthetic element which can impress on the other face parts specially the harmony of chin, lips and eyebrows (2). Rhinoplasty is an aesthetic surgery with high importance because of the central position of the nose in the face (3). The central position of nose effects on the overall beauty of a face, therefore it is not surprising that many people go to the otolaryngologists for changing their nose shapes by rhinoplasty in order to have an ideal face. After many years of performing rhinoplasty (late 1800s), this surgery still remains as one of the most challenging surgeries in rhinology and aesthetic surgery fields. The surgeon should not only maintain the performance and supportive mechanisms of the nose, but also should maintain a combination of aesthetic harmony between the parts of the face. Meantime, the abilities of the rhinoplastic surgeon are very important because he should pay attention to the harmony of shape and the function of nose at the same time (4). Over the decades, according to the change in philosophy of rhinoplasty as well as the tip suture techniques, previous methods of correcting nose tip which are usually based on the removal or destruction of the nasal cartilage had been replaced by the techniques that focus on keeping the cartilages of the nose and mechanisms of nasal support (5). Generally, tip projection and tip rotation are two forms of nasal tip deformities (6). Tip rotation (7) determines the position of the nose tip changes cranio-caudally (top-down) and it is apparent in nasolabial angle. Tip ptosis or droopy nose tip is apparent in a too long nose and the acute nasolabial angle. It is a fairly common and multifactorial deformity which its prevalence is estimated 72% in some studies. This deformity

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can also lead to the collapse of the nose so that the air flow is restricted to narrow nose blades (8). Structural defects of nose tip can also damage the delicate structure of the nasal valve. Nasal valve is the narrowest part of nasal airway, hence it regulates the airflow and resistance in response to variable inspiratory flow. The lack of structural support of the tip can obviously reduce the cross section of nasal valve which itself leads to continuous or intermittent nasal airway obstruction. Treatment of airway obstruction usually needs tip surgery to improve the skeletal support mechanisms (9). Rhinoplasty in ptotic noses requires understanding the pathogenesis of nasal tip ptosis, the dynamic forces and the scar power and construction of the tip. The surgeon should also specify the internal and external factors that cause tip ptosis. A different number of tip ptosis etiologies are studied in medical papers, however the studies on the importance of each etiology are not sufficient. According to all the mentioned discussions, correcting nasal tip rotation is the most common and important objective in rhinoplasty surgeries. Given the importance of nose tip correction in rhinoplasty and the necessity of defining and determining ptosis etiologies for correcting this deformity, the current study is done for determining the prevalence of its causes in rhinoplasty candidates in a teaching hospital of Gilan University of Medical Sciences.

## METHOD AND MATERIALS

In this cross-sectional study, 257 people (including 72% prevalence ( $P=72\%$ ) tip ptosis,  $\alpha=0.05$  and  $d=0.055$ , who came to the Amirmomenin teaching hospital of (Rasht, Guilan province, North of Iran) for rhinoplasty in 2011- 2012 were selected by the convenience non-probability sampling. Regards to the minimum required sample size, sampling was continued until the completion of the calculated samples. The required information was collected by the data entry form that contained general information of the patients, causes of tip ptosis, prevalence of tension nose and columellar show. In each case, the specialist diagnosed and recorded the etiologies of tip ptosis based on the results of preoperative physical exams and intraoperative observations. The nasolabial angle less than 95 degrees in females and 90 in males (2) was the criteria for diagnosing tip ptosis. Before the surgery, otolaryngologist measured the nasolabial angle by using the photographs of patients and through the physical examinations. The overgrowth of quadrangular cartilage which led to the long nose dorsome and the anterior or lower displacements of nasal tip cartilages were referred as a tension nose (14). In this study, columellar show also referred to a condition in which columella located so that more than 4 mm of the nostrils was visible in lateral view. Data were analyzed by using SPSS 17 statistical software and through the preparation and distribution of standard deviation and frequency tables and chi-square tests, Independent Sample t Test and Mann-Whitney tests, and Kolmogorov-Smirnov test was used for determining the standard values of variables. The p-value in this study was considered less than or equal to 0.05. The required studies to determine the level of coordination between etiologies of tip ptosis in preoperative or intraoperative assessments studies were done by the measure of agreement, and Kappa values were obtained for each causes.

## RESULTS

Among 257 patients who underwent rhinoplasty, 79.8% (i.e. 205 cases) were female, and the mean age of the patients was  $26.6 \pm 7.1$  years old (median: 25, range: 17-54 years old). Majority of the patients aged 30 years old or less, and only 6.2% of them aged more than 40 years old. The prevalence of tip ptosis in this group of patients was 44% (113 patients). Statistically, no significant difference was observed in the incidence of tip ptosis between men and women ( $p=0.504$ ) (Table 1). Although the prevalence of rhinoplasty candidates in the age group older than 40 years was small ( $n=16$ ), the prevalence of tip ptosis among patients older than 40 years was significantly higher than that in younger patients ( $p=0.039$ ) (Table 2). The averages of nasolabial angle in women with and without tip ptosis were  $84.5 \pm 4.1$  and  $100.7 \pm 7$  degrees, respectively. And in men with and without tip ptosis were  $80.8 \pm 4.9$  and  $99.1 \pm 8.1$  degrees, respectively. Twenty-one (2.8%) of the participants in the study had tension nose. The prevalence of tension nose was significantly greater in men than that in women ( $p=0.007$ ) (Table 2). There was no significant correlation between the prevalence of tension nose and age ( $p=0.779$ ) (Table 2). None of the patients who had tension nose suffering from tip ptosis. Columellar show was seen in 25.1% (56 out of the 223 patients). No significant correlation was seen between the prevalence of columellar show and sex and age (Tables 1 and 2). The prevalence of tip ptosis in patients with or without columellar show was 33.9 and 45.5, respectively ( $p=0.129$ ). In preoperative assessments the most common causes of tip ptosis were diagnosed as long caudal septum (59.3%), lower lateral cartilage (LLC) asymmetry (how this can produce tip ptosis) (31.9%) and high anterior septal angle (1.30%), and in the intraoperative assessments, long caudal septum (72.6%), medial hypertrophy or long-Alai LLC (Lower lateral cartilage) (48.7%), asymmetric LLC (36.3%), and high anterior

**Table 1:** Frequency Distribution of Abnormalities in the Nasal Tip in Patients under Rhinoplasty Surgery in terms of Age Groups

Variable	Age Group (year)		Total %(N)	P-Value
	≤ 40	> 40		
Tip ptosis	42.3(102)	68.8(11)	44(113)	0.039
Tension nose	8.3(20)	6.3(1)	8.2(21)	0.772
Columellar show	26.1(54)	12.5(2)	25.1(56)	0.227

**Table 2:** Frequency Distribution of Abnormalities in the Nasal Tip in Patients under Rhinoplasty Surgery in terms of Sex

Variable	Sex%(N)		Total%(N)	P-Value
	Male	Female		
Tip ptosis	48.1(25)	42.9(88)	44(113)	0.504
Tension nose	17.3(9)	5.9(12)	8.2(21)	0.007
Columellar show	17.1(7)	26.9(49)	25.1(56)	0.189

**Table 3:** Frequency Distribution of Nasal Tip Ptosis Etiology in Patients Undergoing Rhinoplasty in terms of Assessing Time

Etiology	Preoperative Results		Total%(N)	P-Value	Postoperative Results%(N)		Total%(N)	P-Value
	% (N)				% (N)			
	Female	Male			Female	Male		
Long caudal septum	56.8(50)	68(17)	59.3(67)	0.239	68.2(60)	88(22)	72.6(82)	0.050
ANS (1) hypertrophy	13.6(12)	4(1)	11.5(13)	0.377	15.9(14)	4(1)	13.3(15)	0.211
Depressor septi muscle hyperplasia	3.4(3)	0	2.7(3)	0.476	5.7(5)	0	4.4(5)	0.223
ANS hypertrophy	10.2(9)	4(1)	8.8(10)	0.583	15.9(14)	4(1)	13.3(15)	0.121
Medial hypertrophy or long-Alai LLC3	20.5(18)	24(6)	21.2(24)	0.347	46.6(41)	56(14)	48.7(55)	0.406
LLC (3) medial processed Alai	5.7(5)	0	4.4(5)	0.087	36.4(32)	32(8)	35.4(40)	0.602
thick skin of the nose lobules	12.5(11)	20(5)	14.2(16)	0.401	14.8(13)	24(6)	16.8(19)	0.276
high anterior septal angle	27.3(24)	40(10)	30.1(34)	0.239	33(29)	48(12)	36.3(41)	0.167
LLCs asymmetry	33(29)	28(7)	31.9(36)	0.861	38.6(34)	28(7)	36.3(41)	0.517
Bifid lobule	29.5(26)	28(7)	29.2(33)	0.982	30.7(27)	28(7)	30.1(34)	0.830

septal angle (36.3%) were accounted as the most common causes of tip ptosis (**Table 3**). Based on the preoperative Assessment, the prevalence of the long upper lateral cartilage or hypertrophic scroll zone and based on the results of intraoperative Assessment, the prevalence of long casual septum and long ULC or hypertrophic scroll zone in men was significantly frequent more than that in women (**Table 3**). In preoperative and intraoperative Assessment, no statistically significant difference was seen in the prevalence of other causes of tip ptosis in men and women (**Table 3**). Aberrant tip defining point was seen more than other causes of tip ptosis (including long membranous septum, the disproportion of their medial and lateral positions); therefore, it can be a main causes of tip ptosis according to it high level of prevalence (66.4%). The prevalence of aberrant TDP in men with tip ptosis was significantly higher than that in women (88% vs 60.2%;  $p=0.009$ ). According to the estimates and Kappa values, the highest rates of correlation in preoperative and intraoperative results of tip ptosis etiologies were with this ranking: the thick skin of the nose lobules (1000), high anterior septal angle (0.977), bifid lobule (0.977), soft tissue hypertrophy of the anterior nasal spine (0.939), the asymmetric LLCs (0.910), long ULC or hypertrophic scroll zone (0.865), hypertrophy or LLC long medial Alai (0.816), long caudal septum (0.789), Processes or tags of medial ala of LLC, (0.798), muscle hyperplasia of septicemia depressor muscle (0.792), and ANS hypertrophy (0.353).

## DISCUSSION AND CONCLUSION

Rhinoplasty is one of the most common types of surgeries in otolaryngology (10). Maintaining the position of the nose tip after rhinoplasty depends on reviving the supportive mechanisms of weakened or surgically distorted nose tip (2). Tip is a fairly common in rhinoplasty cases, which a number of causes are attributed to it. The findings of this study showed a high prevalence of tip ptosis (44%) in our rhinoplasty cases. Although in some studies, such as Foda's study, higher prevalence of tip ptosis has been reported (72%), this difference is justified because of the racial differences and the younger samples of our study. It should be mentioned that increasing age can be one of the major causes of tip ptosis which is ignored in this study because of the young samples. Of the eleven common causes of tip ptosis Those were assessed in preoperative and intraoperative evaluations, the most frequent was long caudal septum, and the least

important was hyperplasia of septal depressor muscle. Few studies have focused on the causes of tip ptosis, and also, with regard to the different classifications, comparing the results with each other that is practically impossible. In Foda's study (11). The main causes of tip ptosis was divided into four categories of spinning down of alar cartilage (85%), excess spreading of scroll of LLC (73%), long anterior septal angle (65%) and thick skin of nose lobules (56%). However in that study and the other studies by Zuliani (8), Sajjadian and Guyuron (12), we can interpret the phrases such as "down orientation of LLC" to an umbrella term of aberrant TDP. In Sajjadian and Guyuron study (12), the causes of tip ptosis was similar. But the prevalence of each cause was not considered. There are many studies in the role of septal depressor muscle in causing tip ptosis and the ways of treatments (such as using botulinum toxin A). but in this study it was found that septal depressor muscle had the least role in tip ptosis. In the current study, the majority of subjects (about 80%) were young women. According to Romo et al. (13) aging nose can occur with tip ptosis, and it was obvious in the current study because the prevalence of tip ptosis in minority of older than 40-year-old patients was significantly higher than that in the younger patients. Although no relationship was found between gender and the incidence of tip ptosis. There was an accordance in the results of preoperative and intraoperative studies for some etiologies of tip ptosis. The most accordance was about the thick skin of nose lobules, and the lowest was about the coordination of the ANS hypertrophy. It should be mentioned that we cannot rely on some of the preoperative assessments for diagnosing the causes of tip ptosis, and it needs more experiences and considerations. In preoperative and intraoperative studies, statistically no significant difference was found in the prevalence of causes of tip ptosis between males and females, so that based on the results of the preoperative study, the incidence of upper lateral cartilage or hypertrophy of scroll zone, and based on the results of the intraoperative study, just the prevalence of long caudal septum and long ULC or hypertrophic scroll zone in men was significantly greater than women. Aberrant TDP was the most important cause of tip ptosis which had high incidence (66.4%) in patients with tip ptosis. Also, the prevalence of aberrant TDP tip ptosis in men was significantly higher than that in women. The effect of gravity (given that humans are in upright/sitting position rather than lying down in most of the time), the effect of septal depressor muscle on LLC, as well as degenerative effect and reduction of the elasticity and strength of LLC cartilages in aging and genetic issues can be accounted as the pathophysiology of aberrant TDP.

## CONCLUSION

In summary based on the findings of our study, the prevalence of tip ptosis among rhinoplasty candidates is high, and long caudal septum and the aberrant TDP are the most important causes of tip ptosis. Given the high prevalence of tip ptosis, it seems that this deformity leads to the high percentage of dissatisfied patients and compels them to undergo rhinoplasty. Therefore, considering the different causes and correcting tip ptosis by using surgical techniques can be helpful.

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