



Outcomes of rhinoplasty in relation to variable factors: as prospective audit

Khalid M. Bofares

Otorhinolaryngology Department, Omar Al-moukhtar University, Elbyda, Libya

Email: bofaresstat2012@yahoo.com

Back ground and objectives: *Rhinoplasty is considered as a one of the most difficult facial plastic surgeries. Although, there are multiple factors which may affect the results of this pattern of nasal surgery, but still the outcomes of this procedure cannot be predicted because in addition to the objective measurable factors there are also non-measurable subjective factors which may extend up to the psychological status of the patient and his/her cosmetic satisfaction, these last factors can be of more significant role as compared to the other objective factors.*

For this reason, this study was conducted prospectively to confirm the effect of different factors on results of this surgery.

Patients and methods: *35 patients aged 18-39 years of different types of external nasal deformities, namely crooked nose , deviated nose , and humped deformed nose, with and without DNS , presented to us at period in between September 2005 to April 2012 who operated by rhinoplasty as closed technique . The outcomes of the surgery were studied in relation to different demographic , anatomical , pathological as well as surgical factors, namely 1) patients age , 2) sex, 3) race, 4) familial nasal disfigurement background ,5) type of clinical presentation , 6) cause of the deformity ,7) type of DNS if present, 8) associated local pathology rather than DNS, 9) recurrent or first attempt of surgery , 10) associated oro-facial disfigurements , and 11) surgical technique which was performed . Patients postoperatively were followed and assessed for outcomes of the surgery.*

Results: *80% of patients who underwent the rhinoplasty procedure got acceptable results with high patient's satisfaction. On the other hand 20% of the patients had residual external deformities and they are subsequently not satisfied with obtained results.*

Conclusion: *Generally speaking, the rhinoplasty is a difficult surgical procedure, its outcomes are very difficult to be suggested, because these outcomes can be subjective rather than objective form, and the satisfaction of the patient is considered as one of the most important factors which affect these outcomes.*

Keywords: *Rhinoplasty, septo-rhinoplasty, external nasal deformities reconstruction.*

INTRODUCTION

Although there are many and variable forms of the rhinoplasty definitions, most of these definitions are

concerning with the description of this procedure from the anatomical, structural as well as surgical correction point of views. These patterns of the definitions have a narrow and limited consideration with this procedure, because the main goal of this surgery is to relief the cosmetic complain

of the patient, and makes the patient satisfied as much as possible with the final results i.e. sometimes by the performance of all typical steps of the surgical reconstruction in the most recommended manner but still the outcomes of the surgery will not be either partially or completely acceptable by the patient. Thus this means that in addition to the surgical technique itself there are a lot of accompanied factors which may play a significant role in the determination of the results of this procedure.⁽¹⁻¹⁰⁾

The age of the patient is considered as an important factor which has been confirmed to affect strongly the outcomes of rhinoplasty. Socially speaking, it was found that the performance of this surgery at young age groups (<12 years) may come with more acceptable results as compared to older ages, this can be explained by the fact that the younger patients still they are not yet worry about their cosmetic appearance in comparison to the adults who are more careful regarding this aspect. On the other hand, pathologically speaking, the patients of ages younger than adolescents are still in the growth period and the nasal skeleton need to be progressively remodeled, in addition to this, there is over activity of fibroblasts on top of high level of secreted growth hormone which will result in more fibrosis tendency at the site of surgery, therefore those young ages become more susceptible for recurrence of the deformity after surgery as compared to older ages.⁽²⁶⁻²⁹⁾

The other demographic factor which also can be considered as a significant factor in the determination of the rhinoplasty outcomes is the sex. Although from the anatomical point of view there are a lot of nasal skeletal structural variations in between males and females which are very necessary and obligatory needed to be respected and probably assessed before any rhinoplasty, in addition, from the social aspect point of view usually females are more complaining regarding their cosmetic presentation as compared to the males. Thus in spite of adequate surgical procedure, the females postoperatively may have persistent complain and they will show insufficient satisfaction.⁽³⁰⁻³²⁾

The race also was proved to be another affecting factor on the decision to proceed for this procedure as well as on the patient's agreement regarding the cosmetic status of the nose after surgery. I.e. naturally speaking, the external structural parameters of the nose are varying from the Negro, to the Caucasian, to the Mongolian races. For instance in frontal views external assessment profiles the nose appearing more sized, with obvious flattening among Negro and Mongolian people as compared to Caucasian race; in addition the naso-alar groove will be seen shallower among Negro and Mongolian races as compared to the Caucasian race where it is more prominent. This actually will affect the findings at the basal views profiles too. On the other hand, in the beside views profiles the fronto-nasal angle at Negro and

Mongolian races is less than 120 as compared to Caucasian race which 120 or more, this is mainly due to the over boozing of the fore head among the first two races as compared to Caucasian race. Also because of the high flattening of the nose as general and at the tip particular among the Negro race the naso-libial angle will appear less than 95 as compared to the Mongolian race where is usually from 95 to 100, and the Caucasian race where is often more than 100. All previously mentioned natural variation in relation to the race must be concerned before the decision of the surgery (34, and 40).

On the other hand, the familial background of patient may also play a significant role on the outcomes of this procedure i.e. from the genetic point of view, there are certain families have a characteristic contour of their external nasal appearance, therefore as general these genetic- familial landmarks of the face may make the process of external nasal reconstruction more difficult if the surgeon act to maintain these typical facial characters.^(11-15,38,48,53)

The exact complain of patient must be taken as another significant factor for proper decision making and subsequent improved postoperative patient's satisfaction. I.e. the type and degree of external nasal deformity correction must be decided according to the desire and request of patient. This was found to be much help in the achievement of maximum level of postoperative patient's satisfaction.⁽¹⁶⁻²⁴⁾

From the other view, the social status of patient is playing an important role in drawing of the suggested picture of this surgery outcomes. This is confined to two main aspects, the patient's marital status and type of job. Usually the single patients are more caring about any minor disfigurements at their oro-facial region particularly the nose as compared to the married patients. Thus that group of patients becomes postoperatively finer in the assessment of their noses after the surgery. The patient's job may reflect his\her complains too. Those patients who have works depending mainly upon their cosmetic appearance will be presented with much complain and may ask for frequent sessions of cosmetic surgical interventions including the rhinoplasty. That group of patients usually will not be satisfied completely after the procedure and they always ask for further changes.⁽³⁵⁾

In addition to the previously mentioned factors, there are certain highly important surgically applicable anatomical factors which can be considered as practical tricks for the performance of the rhinoplasty in more successful manner. One of these factors is the basal view profile of nose through which the surgeon needs to look for two significant anatomical landmarks, the pyramid of the nose as well as the position of the collumella which constitute one of key points for rhinoplasty. I.e. the deformed nose

Outcomes of rhinoplasty in relation to variable factors: as prospective audit

of patient presented with deformed nasal pyramid or collumellar deviation will not be corrected probably unless these two structures are interfered. In fact these two landmarks determine the status of tip of nose.^(25-29,30-41)

In accordance the other factor is a frontal view profile of nose which will present another key point for preoperative evaluation in rhinoplasty. This is concerning with the position of light reflex line on the dorsum of nose. I.e. whether this line is straight, or it is deviated, or it is angulated to ward one side. Thus to achieve good results of rhinoplasty, the surgeon must work to make this line as straight as much as possible.⁽¹⁻¹⁵⁾

Also beside view profile is considered as another necessary profile for preoperative evaluation of exterior of nose. This is important to confirm whether the patient has humped nose or no. if the hump is recognized therefore it must be removed in order to obtain the highest degree of patient's satisfaction. The other very significant practical trick is the eye brow- alar line; this line is needed to be assessed via the angular view profile. This line must be corrected during the surgery and made as uniformed as much as possible as a key point toward the reconstruction of deviated or crooked nose.⁽¹⁻²⁰⁾

On the other hand, the nasal septum status constitutes the other determining factor for postoperative results of rhinoplasty. There is well-known concept in the rhinology says that: the nose goes as the septum goes. It was proofed that among many cases of crooked and deviated nose, there was associated deviated nasal septum which is commonly related to cartilaginous part of nasal septum therefore just by septoplasty; the external nasal morphology will be recovered. For this reason it becomes very necessary to assess the nasal septum before any decision for rhinoplasty.⁽³³⁾

The contour of nasal tip strongly affects the outcomes of rhinoplasty. As it is said: the nose goes as the septum goes, this concept can be extended to add: the nose appears as the tip appears. If there are tip related deformities, the tipoplasty must be performed to obtain the maximum degree of correction.^(1-20,42-50)

From practical point of view, as it is observed clinically, if the external nasal deformity was coarse and obvious to the patient him\herself and to the people surrounding the patient thus the postoperative patient's satisfaction regarding the results of surgery is suspected to be high even if the reconstruction was not completely performed because the patient and the patient's relatives will note a clear difference in between the preoperative and postoperative situations regarding external nasal appearance.⁽³⁵⁾

In addition the size of nose acts as a considerable factor in determination of rhinoplasty outcomes. I.e. whenever the nose size is big this technically will facilitate the performance of variable surgical interventions whether in form of augmentation or de-augmentation or tipoplasty as well as this will give the chance to the surgeon to conduct multiple osteotomies in spite of limited number of osteotomies which are necessary to mobilize the different portions of external nasal skeleton and subsequently will be helpful for sufficient reconstruction.⁽⁴²⁻⁵⁰⁾

In accordance the surgical technique definitively constitutes an important factor which affects directly the outcomes of this surgery. The main trick in this aspect is the osteotomy. In fact the multiple osteotomies mainly as lateral and horizontal osteotomies are found to play a significant role in the reconstruction of the external skeleton of nose by the mobilization of its different parts. This will facilitate the correction of the eye brow- alar line in most optimum contour, and as it is mentioned before the eye-brow alar line is presenting the most important key point for rhinoplasty surgical technique.^(1-25,42-50)

For this reason this study was hypothesized to evaluate and postulate prospectively the effect of all previously discussed factors on the outcomes of rhinoplasty.

PATIENTS AND METHODS

35 patients aged 18-39 years of different types of external nasal deformities, namely crooked nose, deviated nose, and humped deformed nose, with and without DNS, presented at ENT department – Althowra central teaching hospital at period in between September 2005 to April 2012 for cosmetic correction who operated by rhinoplasty as closed technique. The outcomes of the surgery were studied in relation to different demographic, anatomical, pathological as well as surgical factors, namely 1) patients age, 2) sex, 3) race, 4) familial nasal disfigurement background, 5) type of clinical presentation, 6) cause of the deformity, 7) type of DNS if present, 8) associated local pathology rather than DNS, 9) recurrent or first attempt of surgery, 10) associated oro-facial disfigurements, and 11) surgical technique which was performed. Patients postoperatively were followed for three to six months and assessed for outcomes of the surgery. The outcomes of surgery which were elucidated at this study mainly presented by the degree of postoperative patient's satisfaction as well as the appearance of possibly suggested postoperative external nasal deformities either in form of persistence of same original deformity or development of the new progressed deformity. An informed consent was taken from the patients involved in the research prior to their participation.

Data were expressed by using descriptive analysis as means ±, standard error of mean (s.e.m) and percentages. Test of significance was carried out; using chi-square test and two-way analysis of variance - A probability less than 0.05 was considered as significant, the degree of significance was determined by using level of standard deviation test. Student — t — test was used for dependent sample, as well as contingency coefficient was calculated as measurement of association between nominal variables.

RESULTS

As shown in Table I, 92% of young patients (18-25 years) was not satisfied with their postoperative results and as can be noted from Table II, among the non-satisfied group, 64% they were presented with newly appeared external nasal deformity in form of hump deformity in 43% of them and remaining 21% had been presented with supra-tip depression deformity. Table III illustrated that, the non-acceptance status of surgery results was significantly more among female patients (13%) as compared to the males (7%). On the other hand all patients who unsatisfied with the results of surgery were single and planned for the marriage, this factor was considered as one of most important indicators for them to ask for surgery. As postulated in Table IV, all patients

who accepted the postoperative results were underwent for septoplasty in addition to rhinoplasty to correct their deviated septum. Regarding the importance of patient's preoperative complain, Table V shown that, 67% of patients were satisfied with the obtained postoperative results, those patients who proved to be underwent for reconstruction of their external nasal deformities which were exactly defined and pointed by patients themselves. As it is demonstrated at Table VI, the patients who operated by multiple osteotomies in form of lateral as well as horizontal osteotomies show significantly more acceptable postoperative results as compared to those who were operated by solitary lateral osteotomy. On the other hand and from the surgical technique point of view too, as noted from Table VII, the largest number of postoperative satisfied patients were significantly presented with preoperative coarse and clearly recognized external nasal deformity with big sized nose as compared to the other unsatisfied group among which most of patients were presented preoperatively with minimal and difficult to be determined external nasal deformities with small sized nose. In accordance as observed at Table VIII, the patients who interfered by correction of the nasal pyramid as well as the collamella showed a significant postoperative satisfaction as compared to the group among which these two anatomical parts were not touched.

Table I. Outcomes of rhinoplasty in relation to patients' age.

Postoperative results	Age				
	18-25years N=23		26-39years N=12		
	NO.	%	NO.	%	
a) Satisfied	2	8	9	75	
b) Non-satisfied	Partial	21	92	3	25
	Complete	0	0	0	0
Total	23	100	12	100	

Table II. Type of postoperative external nasal deformity among non-satisfied group.

Type of nasal deformity	Hump	Supra-tip depression deformity		
		Crooked nose	Deviated nose	
Newly appeared (%)	43	21	0	0
Persistent of original deformity (%)	17	0	9	0

Outcomes of rhinoplasty in relation to variable factors: as prospective audit

Table III. Outcomes of rhinoplasty in relation to patients' sex.

Postoperative results	Sex				
	Male N= 13		Females N= 22		
	NO.	%	NO.	%	
c) Satisfied	11	87	0	0	
d) Non-satisfied	Partial	2	13	22	100
	Complete	0	0	0	0
Total	13	100	22	100	

Table IV. Outcomes of rhinoplasty in correlation with nasal septum correction.

Outcomes of surgery	Type of procedure				Total	
	Combined Septo-rhinoplasty N=11		Solitary rhinoplasty N=24		N=35	
	NO.	%	NO.	%	NO.	%
Satisfied	11	100	0	0	11	100
Non- satisfied	0	0	24	100	24	100

Table V. Outcomes of rhinoplasty in relation to the performance of external nasal deformity reconstruction according to patients' request.

Outcomes of surgery	External nasal deformity reconstruction according to patient's request			
	NO.	%	NO.	%
a) Satisfied	10	67	1	5
b) Non-satisfied	5	33	19	95
Total	15	100	20	100

Table VI. Outcomes of rhinoplasty in relation to the number of performed osteotomies.

Outcomes of surgery	Number of osteotomies			
	Multiple N= 15		Solitary lateral osteotomy N= 20	
	NO.	%	NO.	%
a) Satisfied	9	60	2	10
b) Non-satisfied	6	40	18	90

Table VII. Outcomes of rhinoplasty in relation to the degree of external nasal deformity and size of nos.

Outcomes of surgery	Degree of nasal deformity						Size of nose					
	Clear		Non-clear		Total		Big		Small		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Satisfied (n=11)	7	63	4	37	11	100	9	82	2	18	11	100
Non- satisfied (n=24)	5	21	19	79	24	100	3	12	21	88	24	100

Table VIII. Outcomes of rhinoplasty in relation to the correction of nasal pyramid as well as the collamella.

Outcomes of surgery	Proper correction of nasal pyramid						Proper correction of collamella					
	Done		Not done		Total		Done		Not done		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Satisfied (n=11)	9	82	2	18	11	100	9	82	2	18	11	100
Non- satisfied (n=24)	11	46	13	54	24	100	11	46	13	54	24	100

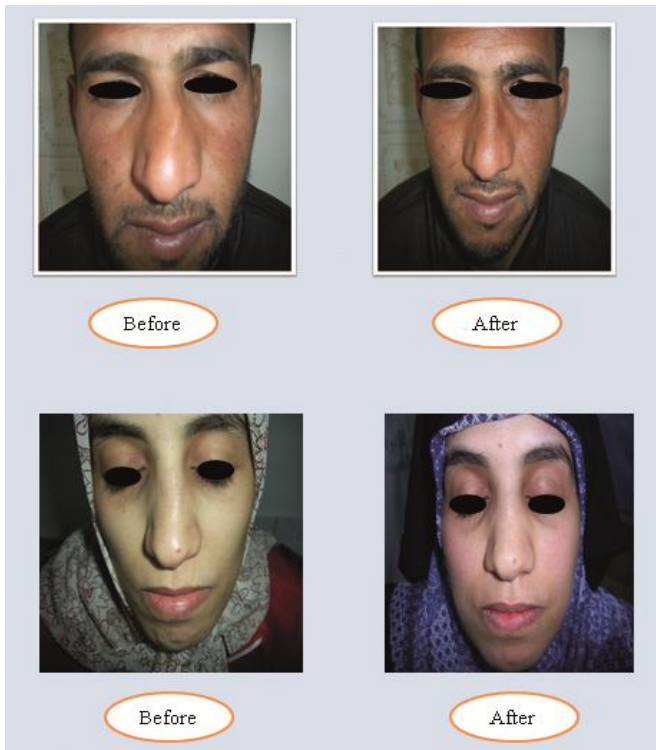


Fig I. it demonstrates the importance of the line of light reflex on dorsum of nose as well as the importance of eye brow – nasal tip line for rhinoplasty procedure outcomes. By the reconstruction of these two lines in most optimum manner the highest degree of post-operative patient's satisfaction will be achieved.

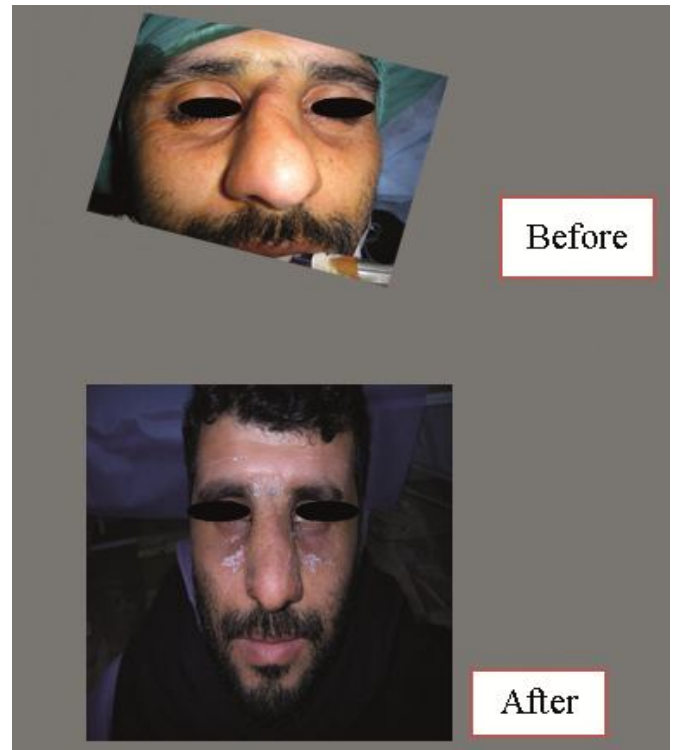


Fig II. It shows the significance of the pre-operative degree of the external nasal deformity on outcomes of rhinoplasty procedure. The most obvious and clear pre-operative external nasal deformity will create a significant improvement in post-operative patient's satisfaction, because simply the patient's surrounding population will note a wide difference in between pre-operative and post-operative patient's facial morphological appearance.

Outcomes of rhinoplasty in relation to variable factors: as prospective audit

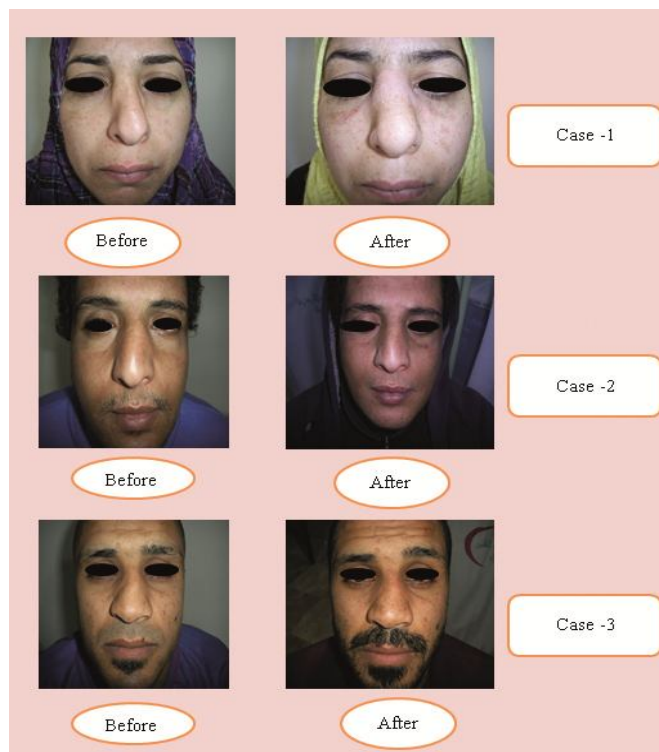


Fig III. It postulates the importance of the number of performed osteotomies as a technical factor in rhinoplasty procedure. In case-1, just lateral osteotomy was performed. Among case-2, both lateral and horizontal osteotomies were performed. While in case-3, three osteotomies were performed, lateral, horizontal as well as medial osteotomy.

DISCUSSION

As it was demonstrated in this presenting study, the rhinoplasty can be considered as one of difficult surgical procedures in rhinology. This is because of the presence of multifactorial effects which will define the outcomes of this procedure. On the other hand, this difficulty in performance of this procedure will make the rhinologists more careful from legal point of view.⁽¹⁻²⁵⁾

This study confirmed that the demographic factors play a significant role in determination of outcomes of this procedure. It was noted that the young age groups and female sexes had been associated with higher incidence of postoperative failure as compared to older ages and males consecutively. This can be explained by two facts: a) anatomically as well as physiologically speaking, the younger age groups are still in developing stage and under the effect of growth hormone, therefore they are susceptible for frequent skeletal changes including the nose up to the age of adolescence. On the other hand, the females also are affected by continuous hormonal changes

which may have effect on fibroblastic activity and enhancement of further fibrosis, thus this will act as contributing factor for recurrence of the deformity, in addition, there are certain anatomical oro-facial measurements among the females which need to be maintained and respected during performance of rhinoplasty as naso-labial angle, concavity of the dorsum of nose, and thinning of nasal tip. and b) psycho-socially speaking, usually the young ages who are not married yet, as well as females can be considered as more careful group of people regarding their cosmetic status as general and for facial appearance particular including the nose, for this reason those people cannot easily accept the results of surgery and this was proved at this presenting study.⁽²⁶⁻³⁰⁾

In addition, it was noted that the outcomes of surgery significantly improved by the interference with the nasal septum. This can be explained by well-established concept that the nasal septum by its two parts, cartilaginous as well as bony part plays a very important role in the determination of the external contour of nose, and as it is said that (the nose goes as septum goes). In fact from our experience we observed that the deformed noses which are mainly due to traumas during childhood usually associated with deviated nasal septum, and the complete reconstruction of these external deformities will not be achieved unless the septoplasty is performed, this actually comes in agreement with many other studies. Also it was noted that the septoplasty will help in facilitation of rhinoplasty by separation of nasal septum from dorsum of nose, this will give a proper access for conduction of medial osteotomies in most optimum and sufficient manner.⁽³³⁾

In accordance, and technically speaking, the patient's nose size has also a significant role in postulation of post-rhinoplasty patients' satisfaction. It was elucidated that the post-operative patients' satisfaction is significantly improved among patients with larger size of nose. This can be technically discussed by the fact that the larger sized nose will provide a sufficient surgical access for creation of required osteotomies as compared to small nose with limited access which makes the bony skeleton of nasal exterior more brittle and thus it becomes difficult to be interfered by multiple osteotomies and this was supported by a group of related studies.⁽³¹⁻⁵⁵⁾ In addition it was found that the number of performed osteotomies carries an important effect on outcomes of rhinoplasty. As shown in the results of this presenting study, the creation of multiple osteotomies in form of lateral, horizontal as well as medial osteotomies will significantly improve the postoperative patients' satisfaction as compared to the patients among who a solitary lateral osteotomy was done. This simply can be explained by the increase of nasal external bony skeleton mobilization after multiple osteotomies as compared to solitary lateral osteotomy.⁽³¹⁻⁵⁵⁾

In the same manner, and from the technical point of view, it was concluded that the contour of nasal pyramid and collumella plays a significant role in the determination of outcomes of rhinoplasty, i.e. these two anatomical indicators must be assessed probably via the basal view profile pre-operatively as well as intra-operatively just to confirm how much these two landmarks need to be reconstructed. In fact it was noted that by achievement of maximum correction of these two structures the post-operative patients' satisfaction will be improved significantly. Thus in agreement with many other studies, the correction of nasal pyramid and collumella can be considered as one of important key points for improvement of post-rhinoplasty results.^(1-16,31-55)

On the other hand, it was postulated at this presenting study that the degree of pre-operative nasal deformity can be considered as another effective factor on post-operative patients' satisfaction. As shown from results of this study that the patients who presented pre-operatively with coarse deformity will be more significantly satisfied after the surgery as compared to those who presented pre-operatively with minor and limited deformity. This can be simply explained by a fact that there will be a wide difference between pre-operative status and post-operative situation noted among those patients with pre-operative coarse deformity. This difference will be recognized by patient himself as well as relatives and friends of the patient. Therefore this will increase the level of post-operative patients' satisfaction.^(14,23,27,35,42)

The exact patient's complain and request can be considered as another significant factor in determination of outcomes of rhinoplasty. I.e. it was confirmed from this presenting study that the performance of rhinoplasty according to patient's request will improve significantly the post-operative patient's satisfaction, because in this circumstance the reconstruction will be done to correct exactly what making the patient discomfort and worry. This actually was in agreement with many confirming studies.⁽³⁵⁾

As shown from our experience via this presenting study that the outcomes of rhinoplasty are not affected by the objective, measurable and technical factors only, but the other subjective related factors as patient's demography, familial background, and psycho-social status are playing a very important role in elucidation of post-operative suggested results after rhinoplasty. As it is mentioned the post-operative patient's satisfaction can be considered as the most achievable target and outcome of this procedure. Although sometimes it will become very difficult to reach to the need of the patient, but as a recommendation on top of our experience that by covering of almost of previously discussed factors this subsequently will elevate the degree of post-operative patient's satisfaction. It is not necessary to obtain the patient's satisfaction from the first session surgery, at

some cases more than one session may be required to get full patient satisfaction.

Finally from our experience we noted that there are three key points for improvement of outcomes of rhinoplasty which can be considered as secrets of this procedure, 1) the appearance of the line of light reflex on the dorsum of nose, it must appear as straight as much as possible after the reconstruction. 2) The eye brow- nasal tip line contour, this line must be corrected to its normal contour by creation of multiple osteotomies. And 3) the pyramid of the nose, it must be achieved as symmetrical as much as possible. Although for rhinoplasty technique, there are other additional technical steps may be required as augmentation, de-augmentation and tipoplasty, but generally speaking we concluded from this study to that the previously mentioned factors can be considered as the main skeleton and corner stone for higher successful rate after rhinoplasty.^(24,30,31,33,42,49,50,53)

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Outcomes of rhinoplasty in relation to variable factors: as prospective audit

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