Subjective and Objective Assessment of Rhinoplasty Outcome

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ABSTRACT

Background: Rhinoplasty is a glamorous surgical procedure for achieving a well functioning and aesthetically nose appearance, since the majority of its outcome were largely defined by subjective assessment of patient satisfaction, recent works are attempting to correlate this assessment with more objective methods.

Objectives: To evaluate the outcome of open and closed rhinoplasty, through the measuring of the objective computerized facial indexes achievement together with the degree of subjective patients' satisfaction.

Methods: A retrospective study of 200 patients enrolled for aesthetic rhinoplasty or septorhinpolasty, the evaluation of the results of the operations were measured and analysed by subjective method via Rhinoplasty Outcome Evaluation "ROE" questionnaire assessment, and the objective method by the application of the standard anthropometric measurement (nasal tip projection, nasolabial, nasofrontal, and nasofacial, and deviation angles), preoperatively and 6 months after the operation.

Results: The average score of "ROE' for open rhinoplasty was (81.70%), and that for closed approach was (74.38%), and the average score of the anthropometrics facial indexes for open rhinoplasty was (76.25%), and for closed approach was (68.35%). The overall results of both modalities assessed by 'ROE" were significant as the p value was 0.0001, and the total correction rate of the all anthropometrics' indexes separately looks almost comparable in both modalities, but for tip projection in open and closed approach was (80.95%), and (65.21%) and for C-shaped nasal deviation was (80%), and (57.14%), respectively.

Conclusions: The study revealed the outcome of rhinoplasty was statically significant, and the subjective patient's satisfaction and objective anthropometric facial indexes measurement in both surgical modalities were almost comparable, with the arithmetic mean (correction rate) was higher in those with open than those with closed approach especially in tip deformity and C-shaped crooked nose.

Keywords: Open rhinoplasty, Closed rhinoplasty, Nose.

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The nose is the central and the most prominent structure of the face, attractive faces have certain proportions and relations in common, the nose has a great importance in the facial harmony and such parameters are important in the analysis of patients candidates for rhinoplasty in order to obtain a more accurate diagnosis and better surgical planning, and regardless of the technique used, the main goal of rhinoplasty is to seek as a result an aesthetically balanced nose with a respiratory function suitable for olfactory and phonics[1].

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Nasal surgery can be traced back to ancient as The Ebers Papyrus[2] from Egypt (dating from 3599 BCE) included a discussion of nasal reconstruction secondary to rhinoectomy for punishment, then Roe[3] in 1887 performed the first cosmetic rhinoplasty used internal approach to improve nasal aesthetics secondary to a pug nose deformity, and Joseph[4] in 1898 presents his original work, systematizing the classic technique of rhinoplasty, and therefore he was considered the father of modern rhinoplasty, while Rethi[5] in 1921 was the first introduced the columellar incision for open rhinoplasty.

Rhinoplasty has become one of the main cosmetic surgeries performed by ENT and plastic surgeons (both for cosmetic as

aesthetic rhinoplasty and non-cosmetic i.e. functional as septorhinoplasty), in those cosmetic only procedures, the physician must assess the reason for which the patient wishes to be submitted to the procedure, often times, the reason involves the need to please other people, social or professional ambition, and such analysis is very important because patient satisfaction is the key factor for surgical success, many studies were performed aiming to validate a reliable questionnaire to be applied to patient submitted to aesthetic surgery and measure the patient satisfaction[6].

Alsarraf R[7] was the first author who offer an evaluation tool for several facial aesthetic procedures including rhinoplasty with reliability, internal consistency, and validity of method. Then with expanding need to improve the facial aesthetics, the clinical application of the anthropometric measurement became of great significance in facial plastic surgery[8] as "rhinoplasty", when formulating the treatment plan, there were many methods used for facial analysis using a standard anatomical landmarks measurement, one of them was through the application of software tool design to analyze the facial anthropometric parameters[9].

One of the most confusing dilemmas confronting the rhinoplasty is the choice of open (external) versus the closed (endonasal) approach, the indications for both modalities are basically the same, although some surgeons reserve the open procedure for cases of the noses that considered more complex, while the enthusiasts now use this technique to treat all kind of nasal deformities[4].

Aims: To evaluate and analyze the results of open and closed rhinoplasty, considering the patient chief complaint, physical examination, and the type of surgical procedure used through the measuring of the objective computerized facial indexes achievement and the degree of subjective patient's satisfaction.

Methods

A retrospective descriptive study of 200 patients of both sexes admitted for aesthetic rhinoplasty or septorhinpolasty at Al-Yarmouk Teaching Hospital, and private Hospital, in period from 2010 to 2015, in whom the parameters in relation to the initial patient complaint and the physical examination were evaluated for the surgical indication, and the type of the surgical technique (closed or open) to be selected.

The exclusion criteria were: patients younger than 18 years, those with psychological or systemic diseases as malignant or chronic granulmatous disorders of the nose and paranasal sinuses, other nasal or facial deformities, revision rhinoplasty.

Evaluation the results of the operations were measured and analysed by subjective and objective methods of assessment, preoperatively and 6 months after the operations, the study was conducted according to the rules of Helsinki declaration in 1975.

The subjective assessment by "The Rhinoplasty Outcome Evaluation" (ROE) questionnaire which was designed by Alsarraf[7] that evaluate the pre and post operative functional and aesthetic components of patient satisfaction as in the following the chart:

1) How much do you like the appearance of your nose?

Absolutely no (0), A little (1), More or less (2), Very much (3) Absolutely yes (4)

2) How much can you breathe through your nose?

Absolutely no (0), A little (1), More or less (2), Very much (3) Absolutely yes (4)

3) How much do you think your friends and those close to you like your nose?

Absolutely no (0), A little (1), More or less (2), Very much (3) Absolutely yes (4)

4) Do you think the appearance of your nose limits your social or professional activities?

Always (0), Frequently (1), Sometime (2), Rarely (3) Never (4)

5) How confident are you that your nose has the best possible appearance?

Absolutely no (0), A little (1), More or less (2), Very much (3) Absolutely yes (4)

6) Would you like to surgically change the appearance or function of the nose?

Certainly yes (0), Very likely yes (1), Possibly yes (2), Probably no (3), Certainly no (4)

The questions were answered within a scale of scores between zero and 4, then the sum of the all responses from each question was divided by 24 and multiplied by 100 and from that obtained the final a value which varied between zero to 100 (zero represents minimum satisfaction and 100 the maximum one), and the results were classified into 4 division as follows; from zero to less than 25 was tagged as poor, 25 to less than 50 (acceptable), from 50 to less than 75 (good), and from 75 to 100 was tagged as an excellent.

The objective assessment of the aesthetic indexes was performed through the application of the standard anthropometric measurement using computerized Adobe Photoshop software 7.1, in which the normal values of the angles were measured and calculated through three standard photos (frontal, lateral and basal nasal views) which captured by the same photographer (before, and after the operation), in order to a certain a uniform size of the photography.

These parameters (indexes) were[10] "Nasal projection; according to Goode's method, defined as the length of alar point to the nasal tip line divided by the length of the nasion to the nasal tip line, its normal value is 0.55 to 0.60, the nasolabial angle is formed by subnasale to the labrale superius line intercepting with columellar point to the subnasale line, with normal range is within 90°-100° for men and 100°-110° for women.

The nasofacial angle is made by nasion to the nasal tip line and glabella to the pogonion line, the ideal angle is 36°, although the range from 30°- 40° is an acceptable value, the nasofrontal angle is formed by nasion to the glabella line intersecting with nasion to the nasal tip line, the normal range is within 115°-130°, and the external nasal deviation (crooked nose): was based on the following; the light reflex measurement tool through computer analysis which represents as a straight line from the nasion to the pogonion in a non-deviant (normal) nose, but in case of linear type of external nasal deviation of both the bony and cartilaginous components this line makes an angle (deviation angle) with another line from the nasion to the nasal tip, and was classified as follows; 0° deviation as normal, while "0°-10° was considered as mild deviation, 10°-20° as moderate, and 20°-30° as severe deviation", while in cases of type C-shaped (curved) nasal deviation, the angle was measured by drawing a line from the nasion to the most prominent point of convexity and a second line from this point to the nasal tip, then the angle was calculated and the results were classified into 170-180 as excellent,160-170 as good, and if the angle less than 160 it considered as a poor value".

The study was approved by the ethical and the scientific committee, as well as the detailed information, and written consents were taken, also the hospital registration numbers of all participated patients were recorded, and both types of the operations had being performed under general anaesthesia by one of the senior specialized surgeon.

The surgical technique:

In closed method: The incision was intercartilaginous, the bilateral septal mucoperichondrial flaps dissection, with or without septoplasty when necessary, then by extra mucosal approach separation the upper lateral cartilages from the septum, dehumping of the septum and nasal bones, lateral and central osteotomies done. Tip plasty was difficult to control and limited to cephalic lower lateral cartilage partial excision and blind approximation of the crural domes by transfixing suturing, alar wedge resection was done whenever needed, packs and nasal slab applied at the end of the surgery.

In open method: Inverted V incision, colomellar dissection was done to the tip through marginal incision, lower lateral alar

cartilage dissection done upwards to the junction of upper and lower alar cartilages, then nasal dorsum skin dissection and periosteal separation of the nasal bones done, the next step is bilateral dissection of the nasal septum at the sub perichondrial plane to expose the septum fully, upper lateral flaps folding, spreader grafts suturing can be done, dehumping of the nasal hump can be controlled under direct vision, lateral and central osteotomies done, control of tip plasty done by resection, suturing and strut procedure as indicated, wound closure by 5.0 PDS suture, alar wedge resection done whenever indicated, pack and slab ensured at the end of the surgery,

Statistical analysis: Data were analyzed using SPSS version 22. Data were presented as mean, standard deviation, range (minimum and maximum), numbers, and percentages, paired t-test for the difference between two dependent means (pre compared to postoperative) with P values less than or equal 0.05 were considered as significant.

Results

Among 200 patients, there were 126 females (63%), and 74 males (37%), with mean age of 24.69 ± 7.538 years, regard the type of the surgical procedures; there was 123 open rhinoplasty (61.5%), and 77 closed rhinoplasty (38.5%).

In open technique; there was 82 aesthetic rhinoplasty (66.66%), and 41 septorhinoplasty (33.33%), while in closed technique; there was 61 aesthetic rhinoplasty (79.22%), and 16 septorhinoplasty (20.77%).

In the current study, for the purpose of analysis the deformities was classified into two groups for open and closed rhinoplasty according to the demographic distribution of lesions, as follows; in the tip deformity mean that the lesion involved the tip either alone was tagged “tip only” or involved with other parts of the nose was tagged “tip + others”, while if the deformity affect other parts of the nose apart from the tip was tagged as “non tip“ which divided into three groups; linear shaped, C-shaped, and “others” deformities.

Initially the frequency of the surgical procedures was evaluated according to the patient chief complaint, as follows; in open rhinoplasty; there was 84 operations (68.29%) for tip deformity that included; 53 for “tip only” (63.09%), and 31 “for tip + others” (36.91%), while for “non tip” rhinoplasty there were 39 operations (31.7%) that included 14 operations (38.97%) for linear shaped, 20 for C-shaped (51.82%), and 5 operations for “others” (12.82) deformities, while in closed technique; there was 23 operations (29.87%) for tip deformity which include; 8 for “tip only” (34.78%), and 15 for “ tip + others” (65.21%), while for “non tip” rhinolpasty there were 54 operations (70.13%) that included; 16 for linear shaped (29.47%), 7 for C-shaped (12.96%), and 31 operations for “others” (57.4%) deformities.

The assessment of the degree for subjective patient satisfaction separately was analyzed for open and closed rhinoplasty according to the “Rhinoplasty Outcome Evaluation (ROE)” as follows: the postoperative value in open rhinoplasty, the average degree of patient satisfaction was (81.70%), and those for closed technique was (74.38%), and the average ROE score in both types of rhinoplasty was shown in table 1.

The average degree of subjective patient satisfaction by ROE was analysed according to the patient`s chief complaint as the following; in open rhinoplasty, for tip deformity was (82.18%) which include (82.65%) for “tip only”, and (81.71%) for “tip + others”, while for “non tip” deformity was (81.23%) that included; (81.79%) for linear shaped, (80.37%) for C-shaped, and (81.53%) for “others” deformities.

In case of closed rhinoplasty, the result of ROE was as the following; for “tip deformity” was (73.84%) which included; (72.47%) for “tip only”, and (75.21%) for “tip + others”, while for “non tip” was (74.36%) that included (74.52%) for linear, (73.71%)

for C- shaped, and (74.86) for "others" deformities.

The results of the objective assessment of the surgical outcome for both types of rhinoplasty were analyzed by the application of the anthropometric angles before and after the operations as shown in table 2 and anthropometric measurement relationship to the linear type of the external nasal deformities was shown in table 3, and for C-shaped, and "others" deformities was shown in table 4.

Table 1: * ROE score in both types of rhinoplasty

Average ROE score in opened and closed rhinoplasty		
ROE score	Open rhinoplasty	Closed rhinoplasty
Preoperative	19.95±7.41	24.16±6.09
Postoperative	81.70±7.31	74.38±9.14
P value	0.0001#	0.0001#

*ROE= Rhinoplasty Outcome Evaluation

Significant paired t-test for two dependent means at 0.05 level

Table 2: The measurement of anthropometric nasal angles indexes among the patients sample.

Indexes/rhinoplasty Time	Above the normal limit	Within the normal limit	Below the normal limit	Total correction rate
Nasal tip projection				
Open				
Preoperative	49	0	35	80.95%
Postoperative	10	68	6	
Closed				
Preoperative	16	0	7	65.21%
Postoperative	6	15	2	
Nasolabial angle				
Open				
Preoperative	81	2	42	70.37
Postoperative	24	87	12	
Closed				
Preoperative	48	0	29	68.83%
Postoperative	19	53	5	
Nasofacial angle				
Open				
Preoperative	77	0	46	72.35%
Postoperative	23	89	11	
Closed				
Preoperative	51	0	26	67.53%
Postoperative	18	57	7	
Nasofrontal angle				
Open				
Preoperative	79	0	44	71.54%
Postoperative	25	88	10	
Closed				
Preoperative	50	0	27	67.35
Postoperative	19	52	6	

Table 3: The measurement of anthropometric indexes of linear deformities among patients sample.

Linear external nasal deviation	Normal	Mild	Moderate	Severe	Total correction rate
Open Preoperative Postoperative	0 11	0 3	4 0	10 0	78.57%
Closed Preoperative Postoperative	0 12	1 4	5 0	10 0	75%

Table 4: The measurement of anthropometric indexes of C-shaped, and others deformities among patients sample.

Anthropometric indexes		Excellent	Good	Poor	Total correction rate
C- shaped external nasal deviation	Open Preoperative Postoperative	0 16	0 4	20 0	80%
	Closed Preoperative Postoperative	0 4	0 3	7 0	57.14%
"others"	Open Preoperative Postoperative	0 4	0 1	5 0	80%
	Closed Preoperative Postoperative	0 24	0 7	31 0	77.41%

The mean surgical time was analyzed, as the following; in aesthetic open rhinoplasty was 45-75 minutes, and in closed type was 35-45 minutes, while those for septorhinoplasty; the mean surgical time in open rhinoplasty was 60-90 minutes, and in closed type was 50-60 minutes.

The columnar incision scar visibility in open rhinoplasty at talking distance was analyzed as the following; barely visible at talking distance was found in (72,671%) of the patients within the 3 months, (27.329%) within 6 months.

The subsidence of the postoperative nasal oedema was analyzed as the following; in case of open rhinoplaty it subsided in (24.029%) of the patients within 3 months, and in (75.871%) within 6 months, while in closed procedure in (83.738%) of the patients subsided within 3 months, and in (16.262%) within 6 months. As for the other sequelae and complications, they had not been studied.

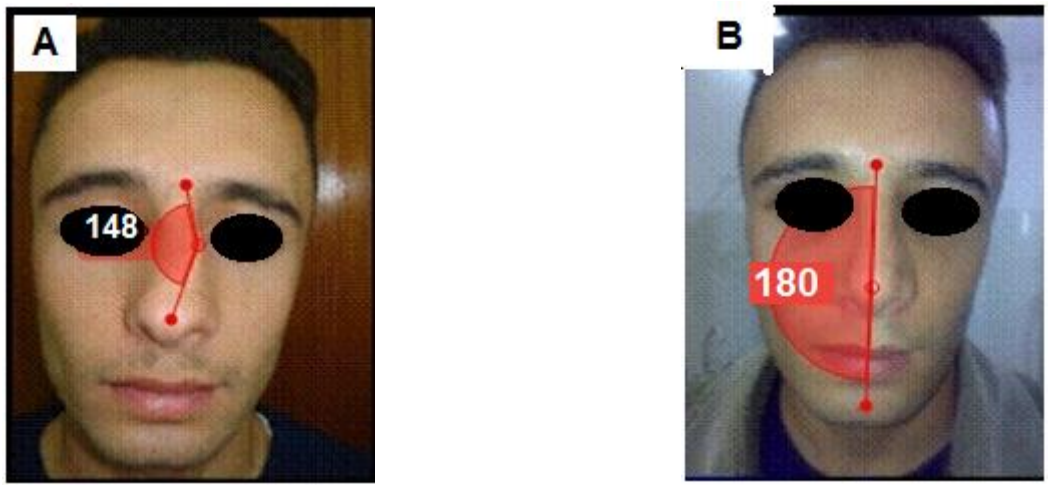

Figure 1: Preoperative(A) and post surgical (B) profile of C-shaped crooked nose.

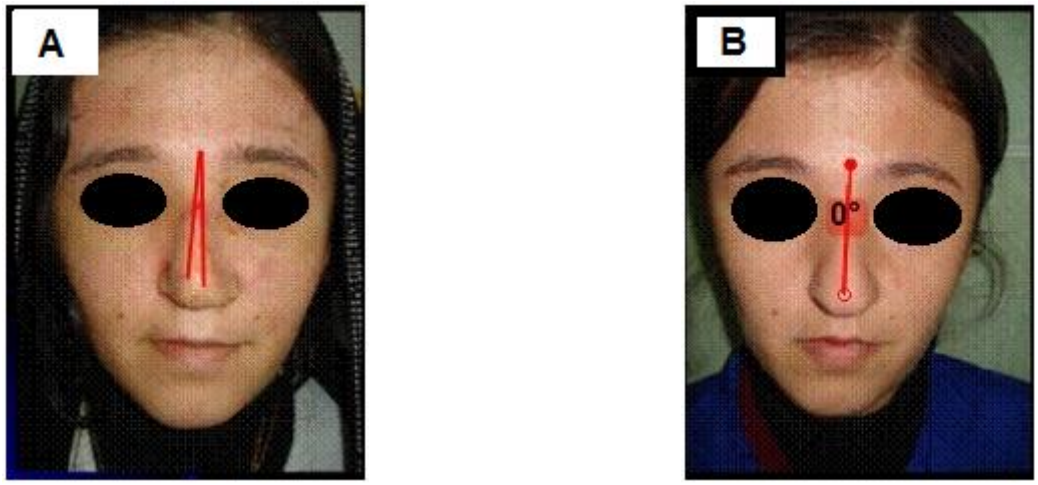

Figure 2: Preoperative (A) and post surgical (B) profile of linear shaped crooked nose.

Figure 3: Preoperative (A, C, E) and postoperative (B, D, F) surgical profile of closed approach (frontal, nasal basal, lateral views).

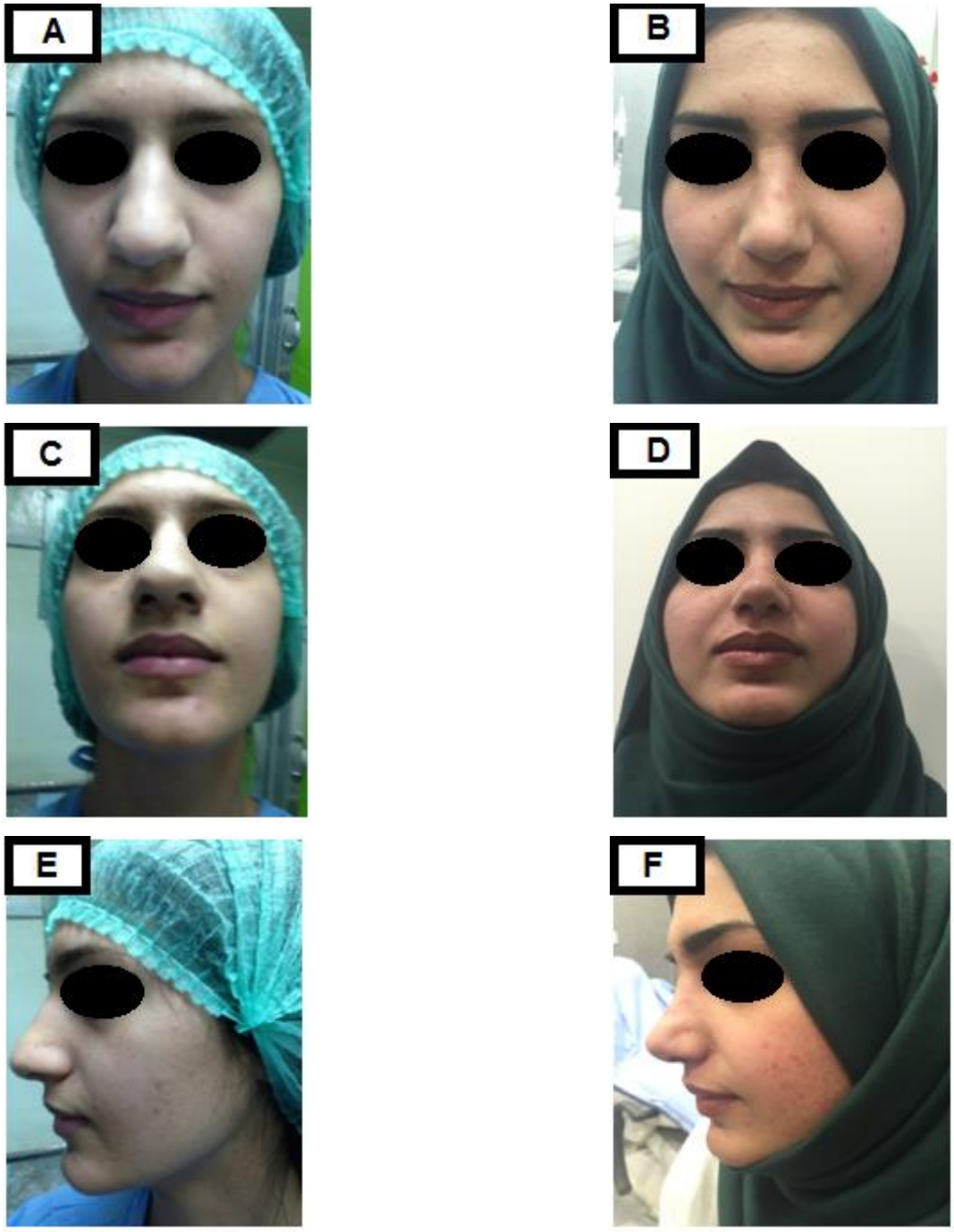

Figure 4: Preoperative (A, C, E) and postoperative (B, D, F) surgical profile of open approach (frontal, nasal basal, lateral views).

Discussion

It had been suggested that the visual impact on the perception of beauty increases significantly toward the midline, and the main objectives to achieve the aesthetic and well-functioning nose, those resulted in a harmonious relationship where no facial feature steals the attention of others, as they enhances the beauty of the whole face, so the use of the anthropometric measurement and aesthetic

standards, together with surgeon judgment, and patients satisfaction is very useful in this evaluation[8].

The conflict between the open and closed modalities of rhinoplasty is very common and had been the matter of extensive studies by many authors[11].

In the current study the there were 126 females (63%), and 74 males (37%), with mean age of 24.69 (± 7.538) years, this young ages female predominance was agreed by other studies[9,12], this probably due to those the young females were more concerned about their body concept and awareness for their physical appearance (beauty), with special appreciation of facial attractiveness specially in the nose.

The type of the surgical procedures used in the current study revealed there was predominance of 123 open rhinoplasty (61.5%), this agreed with what mention with the opinion of other studies that revealed the open rhinoplasty had became unquestionably popular in the last two decades, due to ease of diagnosis and technical advantages that access both in view of the structures as in the teaching of rhinoplasty[13].

In the current study, the frequency of the type of the rhinoplasty regard to the chief patient complaint was analyzed and found the open rhinoplasty was mainly indicated for tip deformity (68.29%), while for closed rhinoplasty was (70.13%) for "non tip" deformities, the indication of the type selection of surgical procedure was depended upon the chief patient complaint, physical examination and the surgeon preference, as several authors[14-16] recommended the open technique to be selected for tip plasty, also Ashrfgat Islam and Aamir Yousuf[17] in their study reported that "closed rhinoplasty approach an adequately handle most of the common straightforward nasal deformities as high dorsal hump, however in more complex nasal deformities, as wide nasal bridge and broad nasal tip, severely twisted nose, the wide exposure provided by the open approach allows for precise evaluation of the deformities and improves the surgical control over the corrective maneuvers employed".

There are many factors that can influence the satisfaction of patients whom underwent rhinoplasty such as their culture characteristics, life style, sex, their level of expectations, so, it is essential for surgeon to understand the complaint of the patient and have an insight about his expectations[18].

The majority of results in rhinoplasty were subjective in nature and they were largely defined by the view of patient satisfaction, therefore several studies are beginning to attempt to evaluate the surgical outcomes in more objective ways for qualitative improvement of the quality of life of the patients regarding their beauty, that's why it is important to measure the outcomes of their surgical procedures and to establish validated instruments[6].

In the current study the surgical outcome of both types of rhinoplasty were assessed preoperatively and postoperatively by both a subjective method that evaluated the patient satisfaction through the "Rhinoplasty Evaluation Outcome (ROE)" questionnaire, and the objective method through the measurement of a computerized anthropometric facial indexes.

ROE questionnaire by Al Sarraf is one of validated, useful method that assess both the appearance and the function of the nose, and is considered as an applicable tool for evaluation of the surgical outcome of different techniques.

The average patient satisfaction by "ROE" assessment was excellent in open rhinoplasty as (81.70%), and with postoperative score of 61.75 points gain, and was good in closed rhinoplasty as (74.38%), and with postoperative score of 50.22 points gain, based on the numerical scale, the arithmetic mean was higher in open rhinoplasty than those for closed technique, and p values for both modalities was 0.0001 that meant there was a

significant improvement in the surgical outcome for both modalities.

In the current study the "ROE" questionnaire assessment in relation to the patient chief complaint was analyzed, and the results were as the following; in open rhinoplasty, as for tip deformity was (82.18%), while for "non tip" deformity was (81.23%), and for closed rhinoplasty for "tip deformity" was (73.84%), and for " non tip" was (74.36%), depend on numerical bases; in open rhinoplasty, those initial complaint involved both nasal tip and "non tip" deformities resulted in a higher level of patient satisfaction if compared to closed technique, also it was found that in closed rhinoplasty in whom their initial complaint involved nasal tip resulted in slightly minimum level of patients satisfaction if when compared to that of "non tip" deformity, these observations were agreed with studies[14-17] that advocated the treatment of nasal tip is best accomplished by open approach. However, other studies defended and described an excellent results in the nasal tip deformity can be achieved by closed approach[11,19].

The degree of patient satisfaction for linear and C-shaped external nasal deviation revealed, the postoperative "ROE" score was detected higher in open rhinoplasty (81.79%) and (80.37%), than those in closed rhinoplasty (74.52%) and (73.71%), respectively, and these result were almost comparable with the results that obtained by Wael SM et al study[8] especially in C-shaped septal deviation as their the approach for the management of the crooked nose includes wide exposure through external septorhinoplasty, and Shafqat Islam and Aamir Yousuf[17] study concluded the open approach gives better functional results and corrects most of the deformities of the external nose along with any severity of septal deviation better than the closed approach.

In the current study the assessment of the open and closed rhinoplasty outcome was performed through the measurement of anthropometric facial indexes, and the total correction rates in both modalities of surgery were assessed for all these indexes separately, and the results revealed almost comparable rates in all these indexes in both modalities, although they was a considerable higher level in open approach than closed approach especially in tip projection as (80.95%) and (65.21%) respectively, and in C-shaped deviation angle as (80%) and (57.14%) respectively which meant the open approach was better in addressing these deformities than closed technique, and this was agreed aforementioned studies[8,10,14-17], and as well as Ozkul and Ozkul[20] study were used to induce a facial harmony index, revealed an objective improvement in those patients.

Also, the overall anthropometric scores obtained were pretty much comparable with those assessed by " ROE " questionnaire, as the following; in open rhinoplasty the average sore that assessed with objective method was (76.25%), and was (81.70%) with subjective method, while in case of closed rhinoplasty the result was (68.35%), and was (74.38%) respectively, however, in some cases with those whom the postoperative objective anthropometric indexes correction rate had not been kept up within its normal limit, but with a very good improvement expressed as an excellent patient satisfaction, and the explanation for this was probably due to their preoperative nasal deformities was very severe so the postoperative normal values obtained for these indexes were very hard to be achieved, and as well as the improvement that gained were almost near to the normal limits (the preoperative values were so far from their normal or ideal limit, but after rhinoplasty these values were close to it even they were still out of their normal limit).

The surgical time both in aesthetic and septorhinoplasty in the current study revealed, was longer in the open than in the closed rhinoplasty, and this was probably due to its surgical characteristics, and also the subsidence of postoperative edema was seen to be longer in open rhinoplasty as in Grau A observation[21], while the transcolumelar scar in open rhinoplasty was

acceptable and barely seen at talking distance, these finding were agreed with other studies[22,23].

Therefore the decision for the surgeon to select the type of surgical procedures as (closed or open) rhinoplasty would based on the chief patient complaint, the type of the nasal deformity, and the surgeon preference combined with both subjective and objective elements.

In conclusions; The study revealed the outcome of both modalities of rhinoplasty was statically significant, and the subjective patient satisfaction and the objective anthropometric facial indexes measurement were almost comparable in both surgical modalities with the arithmetic mean was higher in those with open than those with closed approach for the tip and C-shaped crooked nose, and this confirm the importance of both subjective and objective assessment for identification the proper candidate for rhinoplasty.

Conflicts of interest: None.

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