Changes in Canon Cosmetic Standards after Rhinoplasty and Its Association with Patients Satisfaction Level

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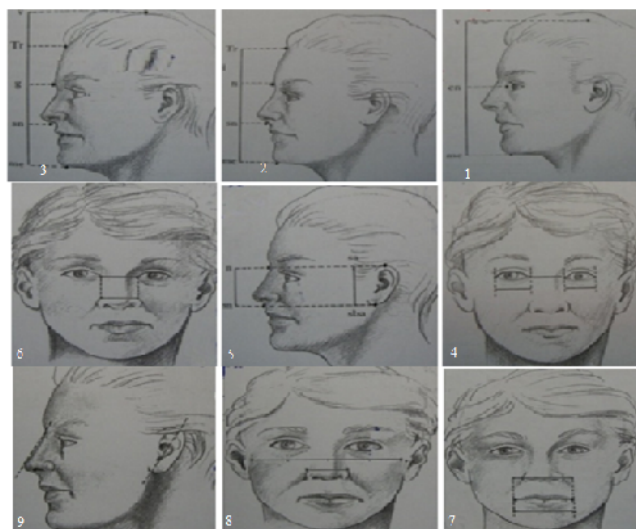2. Department of Plastic Surgery, Zahedan University of Medical Siences, Zahedan, Iran

Article information	Abstract
	Background: Rhinoplasty is one of the most common plastic surgeries. Although patient satisfaction is still the main prerequisite for success, but this method of determining the outcome of surgery is qualitative. A quantitative method is required to compare the results of rhinoplasty surgery results. **Materials and Methods**: In this pilot study, Canon cosmetics standards were measured in 15 patients undergoing rhinoplasty before and after the surgery. The changes in these standards were presented quantitatively. In addition, the patients' satisfaction from the surgery was examined through questionnaires. Data were analyzed using statistical SPSS-11 software, dependent t-test and Pearson correlation coefficient. **Results**: 15 patients were examined in a 6-month period; all patients were female and their average age was 23. The results showed that rhinoplasty makes changes in 5 out of 9 standards of Canon. The lowest patient satisfaction score was 17 and the highest was 24. The average satisfaction score was 22/3, score reduction was shown after rhinoplasty in all Canon standards except for standard 7 and 8 (p <0/05). There was no statistically significant relationship between changes in Canon standards before and after rhinoplasty surgery and patient satisfaction. **Conclusion**: The results showed that even if Canon standards change after the surgery, patients' satisfaction depends on other factors rather than the mathematical calculation of changes in face component. In other words, although symmetry is desirable, it is not equivalent to beauty.

Introduction

Beauty is easy to detect; yet difficult to define and explain [1]. There is evidence that nose plastic surgery has been performed in India and ancient Egypt in 600 BC. Indian surgeons have been known to use forehead flap. The advent of modern rhinoplasty was after 1887. Rees from New York performed a simple surgery to correct deformity of the nasal tip exactly 4 years after reconstruction of whole nose including bone and cartilage skeleton [1].

Rhinoplasty results mainly depend on the degree of patient satisfaction after surgery and a subjective perception. Different centers use different methods in design and performing rhinoplasty, which on the one hand involves stitching various components of nose cartilage, and on the other hand, the use of cartilage autograft. Comparison of the results of surgery performed in different centers need quantitative methods. There are reports on the examination of validity of some of these methods which are mainly based on the questionnaires completed by patients [2,3]. Obviously, rhinoplasty has profound effects on the relationship between face components and Canon standard is one of the methods able to analyze the relationship between face components (Fig. 1).

Figure 1. Canon cosmetic standard

In these standards, face is divided and defined based on its different components. In standards 1 to 3 of Canon,

face is divided into 3, 4 and 5 parts in the vertical plan and according to Canon standard, these various components of face must be equal to each other. Based on standard 4, in a standard face, the length of nose and ears should be equivalent. In standards 5, 6 and 8, width of a standard nose is defined. Width of nose has been compared with the gap between internal canthus of eye, eyes width and width of whole face. In standard 7, slope of ear and nose of patient have been compared. These standards change after the cosmetic surgeries [4].

Lund et al investigated the role of objective methods for determining the quality of the surgeries. He believes that while the importance of patient's judgment about the quality of surgery is inviolable, the role of objective methods is getting more notable day by day. Changing the qualitative findings to quantitative findings, objective methods can provide an opportunity to compare the surgery results of different centers [5].

Chatrah et al investigated the patients with facial disorders before and after the surgery based on anthropomorphic studies. Although these studies were not the criteria to make decision on surgical technique, there was no significant correlation between changes in the cephalometric profile of the patient and aesthetic results of the surgery [3]. In a study, cephalometric standards were used as a method to evaluate surgical results. In this study, the changes in level of projection and rotation of nose were evaluated based on cephalometric standards [6]. Other studies also compared the surgery results based on information obtained from patients after surgery with changes in nose appearance [7-9]. The present paper investigated the quantitative changes in dimensions of Canon standards resulting from rhinoplasty and then examined the relationship between these changes and the degree of patient satisfaction after surgery.

Materials and Methods

The present research was conducted as a pilot cross-sectional study in 15-Khordad Hospital within a 6-month period. The study population included female patients requesting cosmetic rhinoplasty who referred to the clinic. Male patients and those who had a history of previous cosmetic surgery as well as the patients lip and palate cleft and those who had a history of trauma of head and face were excluded. Since the study was conducted as pilot study, we selected sample size 15 patients. After the initial interview, the necessary explanations were given to the patients on surgery, possible outcomes, possible complications and objectives of the study and they were asked to sign the research consent form, if they agree and they were assured that the results of research will be presented as a whole and their ID will remain completely confidential.

Given the reasonably insistence of patients on observing the Islamic dress code during the photography which hides the ears while taking pictures, it was not possible to examine standards 9 and 4. We know that in these two standards, the slope of ear and nose of patient are compared (study limitation). In addition, rhinoplasty does

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not cause any change in the Canon standards No. 6 and 1. Finally, examinations were performed on total five out of 9 Canon standards.

We have used two tools in the present study. Photography of patients was performed observing the defined principles of photographic technique and thus, it had the same specifications in all patients before and after surgery. Our second tool was questionnaire in which pre-planned questions were asked from patients regarding the surgical results. To determine content validity Patient Satisfaction Questionnaire, the important components influencing patient satisfaction were identified based on valid references and comment of three experienced plastic surgeons, and was agreed. Reliability of the questionnaire was measured through test-retest method (within two weeks after surgery) (r=0/80). Cronbach's alpha for the reliability of the questionnaire was (0/87).

Surgery was performed with general anesthesia and endotracheal tube and hypotension induction and it was conducted as closed surgery in all patients. At the end of surgery, mesh impregnated with antibiotics was placed inside the nostrils. In order to reduce after surgery edema in all patients during the perioperative period, 8 mg daily dose of dexamethasone was used for 48 hours and then tapering off in a period of 5 days to complete withdrawal were used. All patients were hospitalized one night. The mesh was taken out of nose within 48 hours after discharge and immediately a week after that, the splint was removed and the adhesive splint continued. There was no complication after surgery except for slight hematoma of lower lid.

Further visits were performed at weekly intervals to 6 weeks and then monthly. At final visit and at the third month, the patients were asked to complete the questionnaire. Canon landmarks (life size) on photography were measured by millimeters before and after surgery. The calculated values were fractional and included before and after the surgery and finally, the difference was written as decimal point of one thousandth as reduction or increase. Then, data were analyzed using statistical SPSS-11 software, dependent t-test and Pearson correlation coefficient.

Results

All patients were female and the youngest was 19 and the oldest was 35 years old. None of the patients were Asian. The average surgical duration was 2/5 hours. Hospitalization duration in all patients was 24 hours. There was no bleeding problem after surgery in any and all patients referred to the clinic based on pre-schedule up to 6 weeks after surgery in order to visit and change nasal adhesive. The average degree of patient satisfaction from surgery was score 22/3. The score was 17 in a patient, who required revision. Table 1 summarizes the changes in 5 Canon standards after surgery.

Table 2 shows the comparison of the scores of Canon standards 2, 3, 5, 7 and 8. As shown in the above Table, dependent t-test indicates a statistically significant difference between the mean of above scores in standards

2, 5 and 8 before and after surgery. The average Canon score in the standard No. 5 has increased after surgery, but it decreases after surgery in the standard No. 2 and 8. Also, there is no statistically significant correlation between changes in Canon standards after rhinoplasty surgery and patients' satisfaction level.

Table 1. The changes in five Canon standards after rhinoplasty surgery

Canon No.	Timinig of measurment	Mean±SD	p-Value
2	Before	0.31±0.04	0.001
	After	0.30±0.04	
3	Before	0.24±0.06	0.84
	After	0.23±0.06	
5	Before	0.87±0.06	0.01
	After	0.91±0.07	
7	Before	1.38±0.15	0.31
	After	1.41±0.17	
8	Before	0.26±0.04	0.04
	After	0.24±0.03	

Table 2. Comparison of scores obtained from the standards 2, 3, 5, 7 and 8

Patient No	Canon No.2	Canon No.3	Canon No.5	Canon No.7	Canon No.8
1	-0.013	0.026	0.178	0.031	-0.04
2	-0.005	0.003	0.072	0.010	-0.021
3	-0.18	0.012	0.052	0.010	-0.018
4	-0.006	-0.005	0.027	0.04	-0.008
5	0.006	-0.005	0.024	-0.05	0.006
6	0.006	0.005	0.072	0.010	-0.021
7	0.006	-0.012	-0.025	0.03	-0.000
8	0.017	-0.005	0.027	0.04	-0.006
9	0.005	-0.009	0.026	0.04	-0.007
10	0.010	-0.009	0.027	-0.04	-0.006
11	0.012	-0.005	0.072	0.010	-0.010
12	0.029	-0.011	-0.082	-0.04	0.021
13	0.009	-0.008	0.052	0.01	-0.018
14	-0.013	0.026	0.0178	0.031	-0.040
15	-0.005	0.003	0.072	0.010	-0.021

Discussion

The current study indicates that although rhinoplasty causes changes in Canon standards, these changes are not significantly related to the patients' level of satisfaction from the surgery. Nose is the most prominent symbol in face and has a very important role from aesthetic aspects. The efforts to define and describe the standards for beauty of face date back to the time of artists such as Da Vinci [6,8,9]. In recent years, Farakas established some revisions in Canon indices [10]. Evaluation of the success rate of rhinoplasty surgery in creating a more beautiful face is of inherent problems of this surgery. Although patient's judgment was and is one of the important standards, different methods have been applied to define objective standards in relation to assessment of quality of surgery. Success in providing objective standards of assaying the quality of surgery will make us to act more confidently regarding preoperative planning.

Lund believes that an objective method of assessing the results of cosmetic surgery should be simple, accessible, repeatable and valid and it should be standardized for implementation [7]. In a study based on cephalometric

studies, Werther et al examined the status of nasal tip and projection of the nose before and after surgery. In this study, 46 septorhinoplasty patients were evaluated in two stages by performing lateral cephalograms before and after surgery regarding nasal tip status and amount of projection [6]. Applying cephalometric standards to determine the specifications of a beautiful face is a well-known method with inherent limitations. Cephalometric is able to evaluate bone landmarks, but it has no application for the status of soft tissue, which is a decisive factor in beauty and nose shape in many cases. In the mentioned study, neither the aesthetic result of surgery has been studied nor is the degree of effect of cephalometric changes in the quality of surgery presented. In the present study, the evaluation criteria are soft tissue patients and changes in soft tissues after the surgery. On the other hand, nose has been examined from various aspects in our study. That is, the length and width of the nose have been measured and compared with other components. Finally, our study includes assaying surgical quality based on the patient's personal judgment, which is still considered a valuable criterion.

In another study, Petroff et al regarded anthropomorphic evaluations as the criterion for assessment of nasal tip status and projection of nose [7]. Other specifications such as nasal root position, nose length, as well as nose width and bone and cartilage arch status are not judged in this study. All the factors listed above which Petroff has not examined are effective in determining the final status of surgery and the cosmetic results of surgery. Also, in this study the satisfaction level of patients from surgery has not been considered. The assessment of patients' photography before and after surgery which was performed in our method, provides the most information on the various parts of nose. In addition, the comprehensive perception which is obtained by comparing the nose with other parts of the nose also provides a possibility to create a comprehensive impression of the overall results of surgery. Thus, the main difference between our study and the mentioned study is that it provides more comprehensive information on the changes in the nose after surgery. In another study, Byrd evaluated three important cosmetic standards of nose (nasal length, nose projection and nasal root position) in patients. This study was performed on photographic images and in the first stage, these three standards were defined in 90 beautiful faces and at the second stage, the same standards were analyzed in 120 patients after rhinoplasty.

In fact, Canon standards in this study are analyzed based on the information obtained from the first part of the study. An important point in this study is that the criterion for selecting individuals as examples of beautiful faces can change by cultural and racial factors. In fact, the beautiful face is not still defined in Iran race and culture and if this is so local standards can be used instead of Canon standards that are defined in Caucasian race. Photography is a rapid and economic method for recording the specifications of patient's face and the changes after surgery and if it is done standardly, it can be

quite helpful for clinical analysis and comparison of various centers. There are three noteworthy points regarding the use of predetermined standards to define beauty. Beauty standards were determined by Canon and Farakas presented the amendment regarding the Caucasian race. Contrary to Farakas, several studies have been conducted on different races and existence of racial differences regarding the above standards has been demonstrated. The proper solution can be so that if the beautiful face is defined in Iranian women, the above mentioned standards can be also explained in Iranian race. The face in which symmetry is considered will not always look beautiful. There are numerous cases where although the face lines are not symmetrical and in accordance with Canon standards, the face totally looks beautiful because of enough projection in middle and lower 1/3 of face. Aesthetic standards are strongly influenced by cultural and economic factors, and especially can be dramatically transformed over time. In this study, standard 2 and 3 of Canon were significantly changed after surgery. In fact, examination of the scores obtained in standards 1 to 5 shows that the figures obtained after surgery always inclined to decrease. One of cosmetic purposes of rhinoplasty in a large percentage of patients is to reduce the nose in dimensions. Performing osteotomy with the aim of making nose smaller, which is one of the main pillars of cosmetic rhinoplasty surgery, will change standard 5 of Canon.

Our study showed that even in those patients that Canon standards change in postoperative period, these significant differences have no relationship with satisfaction of patients from surgery and in fact, this emphasizes the fact that although asymmetry is not desirable, symmetry does not mean beauty. The possible reasons for lack of correlation between changes in Canon standards and satisfaction of rhinoplasty patient are as follows. 1-The number of cases examined in this study is low, 2-The need to define beautiful face in Iranian women is an undeniable necessity and introduction regarding cosmetic surgeries in our patients, 3-Limitations of the study, the patients' reasonable insistence to comply with Islamic veil makes it impossible to assess 2 out of 9 standards, 4-Racial differences can be possibly effective.

Acknowledgements

References

1. Rees TD, LaTrenta G. Aesthetic and plastic surgery. 2nd ed. Philadelphia: W.B Saunders; 1994: 870-879.
2. Pawar SS, Garcia GJ, Kimbell JS and Rhee JS. Objective measures in aesthetic and functional nasal surgery: Perspectives on nasal form and function. Facial Plast Surg 2010; 26(4): 320-327.
3. Chatrath P, De Cordova J, Nouraei SA, et al. Objective assessment of facial asymmetry in rhinoplasty patients. Arch Facial Plast Surg 2007; 9(3): 184-187.
4. Farkas LG, Katic MJ, Hreczko TA, et al. Anthropometric proportions in the upper lip, lower lip,chin area of the lower face in young white adults. Am J Orthod 1984; 86(1): 52-60.
5. Lund VJ. Objective assessment of nasal obstruction. Otolaryngol Clin North Am 1989; 22(2): 279-290.
6. Werther JR, Freeman JP. Changes in nasal tip projection and rotation after septorhinoplasty. J Oral Maxillofac Surg 1998; 56(6): 728-32.
7. Petroff MA, McCollough EG, Hom D and Anderson JR. Nasal tip projection: Quantitative changes following rhinoplasty. Arch Otolaryngol Head Neck Surg 1991; 117(7): 783-788.
8. Farkas LG, Eiben OG, Sivkov S, et al. Anthropometric measurements of the facial framework in adulthood: Age-related changes in eight age categories in 600 healthy white North Americans of European ancestry from 16 to 90 years of age. J Craniofac Surg 2004; 15(2): 288-98.
9. Farkas LG, Hreczko TA, Kolar JC and Munro IR. Vertical and horizontal proportions of the face in young adult North American Caucasians: Revision of neoclassical canons. Plast Reconstr Surg 1985; 75(3): 328-38.
10. Bozkir MG, Karakas P, Oguz O. Vertical and horizontal neoclassical facial canons in Turkish young adults. Surg Radiol Anat 2004; 26(3): 212-9.
11. Farkas LG, Hreczko TM, Katic MJ and Forrest CR. Proportion indices in the craniofacial regions of 284 healthy North American white children between 1 and 5 years of age. J Craniofac Surg 2003; 14(1): 13-28.
12. Farkas LG, Posnick JC, Hreczko TM. Growth patterns of the face: A morphometric study. Cleft Palate Craniofac J 1992; 29(4): 308-15.
13. Farkas LG, Forrest CR, Litsas L. Revision of noclassical facial canons in young adult Afro-Americans. Aesthetic Plast Surg 2000; 24(3): 179-84.
14. Le TT, Farkas LG, Ngim RC, et al. Proportionality in Asian and North American Caucasian faces using neoclassical facial canons as criteria. Aesthetic Plast Surg 2002; 26(1): 64-9.
15. Wang D, Qian G, Zhang M and Farkas LG. Differences in horizontal, neoclassical facial canons in Chinese (Han) and North American Caucasian populations. Aesthetic Plast Surg 1997; 21(4): 265-9.
16. Kramer MF, Rasp G, Kastenbauer E. Health-Related Quality of Life in rhino surgery. Am J Otolaryngol 2003; 24(2): 97-105.