



# Psychological profiles in patients undergoing orthognathic surgery or rhinoplasty: a preoperative and preliminary comparison

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## Abstract

**Objective** The aim of this study was to assess, identify, and compare the personality traits and psychosocial status of two groups of patients undergoing orthognathic surgery and rhinoseptoplasty respectively.

**Study design** This prospective study recruited patients referred for orthognathic surgery and for rhinoseptoplasty. The research protocol included the administrations of questionnaires to the patients during their last visit before surgery, including the Minnesota Multiphasic Personality Inventory (MMPI-2), the Myers–Briggs Type Indicator (MBTI), the tree drawing test (or Baum test), and the BC Scale.

**Results** As for MMPI-2, the highest (pathological) percentages were encountered in Hypochondriasis and Psychasthenia scales within the Orthognathic Surgery Group, whereas in the rhinoseptoplasty group, the highest scores were obtained in the Hypochondriasis, Psychasthenia, Psychopathic Deviate, and Schizophrenia scales.

**Conclusions** It would be important to assess some characteristics of the patients' mental health and emotional state prior to surgery, including depression, anxiety, panic, and aggression. The overview of these factors may give an insight into the psychological and emotional capacity of the patients undergoing orthognathic and rhinoseptoplasty surgery.

**Keywords** Orthognathic surgery · Rhinoplasty · Surgery first · Psychology · Quality of life

## Introduction

The face reflects emotional changes and influences the individual's appearance and acceptability in the society [1–25]. By improving the appearance of a person, facial surgery, such as orthognathic surgery or rhinoplasty, can improve the mental, emotional, and psychosocial functioning and well-being of that patient in the long term, by boosting self-confidence and self-esteem and even improving the professional life of the patient [11].

However, the mental health status of the individual may affect the probability of seeking cosmetic surgery. Furthermore, the presence of psychological problems could complicate the treatment process and affect patient outcome and satisfaction [1–52].

The information about the psychosocial effect of orthognathic surgery on patients may allow surgeons to appropriately inform patients on their expectations from surgery. [1–14]

Therefore, patients' reasons behind seeking surgery, their expectations, and their ability to adapt after operation should be evaluated on an individual basis by understanding their psychological status regarding the deformities [1–25], as it is believed that the presence of some psychological and personality characteristics could predict the likelihood of future requests of cosmetic surgery and its poor outcome [11].

Following a first study about the assessment of psychodynamic features associated with orthognathic surgery, both in traditional surgery and in “surgery first” treatment [26], we tried to deepen the topic in order to understand the preoperative psychological status and personality traits of patients undergoing orthognathic surgery in comparison with patients undergoing rhinoseptoplasty.

Therefore, the aim of this study was to assess, identify, and compare the personality traits and psychosocial status of two groups of patients undergoing orthognathic surgery and rhinoseptoplasty respectively.

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## Materials and methods

This prospective study recruited patients referred for orthognathic surgery and for rhinoseptoplasty (with both functional and esthetic motivations) between January 2016 and December 2017. Patients with cleft lip or palate, with syndromes affecting the craniofacial anatomy, and with posttraumatic dentofacial deformities were excluded from the study.

Patients were consecutively included in the study if they fulfilled the following inclusion criteria: 1) age > 18 years; 2) willingness to participate in the study; and 3) ability to complete the series of questionnaires.

Data regarding gender, age, and motivation for surgery were collected for all the included patients.

The research protocol included the administrations of tests and questionnaires to the patients during their routine last visit before surgery (about 10–20 days before surgery). The test and questionnaires included the Minnesota Multiphasic Personality Inventory (MMPI-2), the Myers–Briggs Type Indicator (MBTI), the tree drawing test (or Baum test), and the BC Scale.

The research protocol was described to patients and a written informed consent was obtained before participating in the study. Participation in this study was voluntary.

The Minnesota Multiphasic Personality Inventory (MMPI) [20–22] is a self-report personality inventory consisting of 550 items that describe feelings or actions that the person is asked to agree with or disagree with. The MMPI includes 10 clinical subscales, which are a result of answering certain questions on the test in a specific manner: (1) The Hypochondriasis (Hs) scale measures a person's perception and preoccupation with their health and health issues. (2) The Depression (D) scale measures a person's depressive symptoms level. (3) The Hysteria (Hy) scale measures the emotionality of a person. (4) The Psychopathic Deviate (Pd) scale measures general social maladjustment and the absence of strongly pleasant experiences. [5] The Masculinity/Femininity (Mf) scale measures a stereotype of a person and how they compare. [6] The Paranoia (Pa) scale primarily measures interpersonal sensitivity, moral self-righteousness, and suspiciousness. (7) The Psychasthenia (Pt) scale measures a person's inability to resist specific actions or thoughts, regardless of their maladaptive nature. [8] The Schizophrenia (Sc) scale measures a person's unusual/odd cognitive, perceptual, and emotional experiences. [9] The Hypomania (Ma) scale measures a person's energy. [10] The Social Introversion (Si) scale measures the social introversion and extroversion of a person. Moreover, the MMPI contains four validity scales designed to measure a person's test-taking attitude and approach to the test: [1] the Cannot say (CNS) scale is the number of items answered "I cannot say either way" and is high in general neurotic patients. [2] The Lie (L) scale is intended to identify individuals who are attempting to place themselves in a good light. [3] The

Frequency (F) scale is intended to detect unusual or atypical ways of answering the test items, like if a person were to randomly fill out the test. [4] The Correction (K) scale is intended to identify psychopathologies in people who would otherwise have profiles within the normal range. These scales are standardized to ensure that the averages are around 50 points, with scores more than 70 points considered high.

The Myers–Briggs Type Indicator (MBTI) [16–18] denotes a self-disclosure of personality trait. It is used to describe how individuals interact with their environment through the identification of four preference pairs that are combined into 16 psychological types to reach the type of personality. It uses Jung's psychological principles of how individuals perceive information, both consciously and unconsciously. Based on this, individuals have four basic "mental attitudes" and "mental functions." The four MBTI dimensions are extraversion–introversion (E–I), sensing–intuition (S–N), thinking–feeling (T–F), and judging–perception (J–P). Introvert and extrovert (EI) types are the first preference pair. Introverted types focus their thoughts around their inner world experiences and carefully process and reflect on the data they collect.

Extroverted types are able to quickly express and outwardly describe the "big picture." They enjoy interacting and are energized by other people. Sensors and intuitives (IN) are the next preference type. Sensors prefer to process information by piecing together facts. Their questions revolve around choosing the precise answer, whereas intuitives are more abstract, often describing their findings in vague, general terms. Thinkers and Feelers (TF) are the preference pair associated with how individuals make decisions or judgments. Although thinker types prefer to weigh the evidence in an objective fashion, feeler types value the opinions of others and may lean on others to resolve complicated situations. Judging and Perceiving (JP) is the preference pair that addresses the way individuals structure their lives. Judging types want to organize their lives and get tasks done by organizing detailed procedures. Perceiver types are described as being more curious and prefer to delay decision-making until they have all the information. Taken altogether, the mental attitudes and functions combine to generate 16 MBTI personality types. All possible permutations of preferences for the four dichotomies above yield 16 different combinations or MBTI personality types. Four-letter acronym usually is used to assign each personality type, as they are resumed in Table 1.

**Table 1** The 16 different combinations of the four dichotomies, corresponding to 16 MBTI personality types

ESTJ	ISTJ	ENTJ	INTJ
ESTP	ISTP	ENTP	INTP
ESFJ	ISFJ	ENFJ	INFJ
ESFP	ISFP	ENFP	INFP

*E* extraversion, *I* introversion, *S* sensing, *N* intuition, *T* thinking, *F* feeling, *J* judging, *P* perceiving

The tree drawing test (or Baum test) [19] is a projective psychological examination and a supplementary psychodiagnostic tool, often used for assessing personality in the developmental age. Its easiness of administration makes it a useful tool to express self-image and emotional states with relatively little resistance. Thus, the examination provides significant information to the examiner without as much stress as with other projective psychological examinations, such as the Rorschach test. All patients were requested to draw a tree on an A4-sized white paper sheet with a pencil. Instructions were as follows: “Draw a tree, as you like.” No limits of time were given. The tree drawn was evaluated qualitatively and quantitatively, including the following: area of the tree, position of the tree in the paper, height and width of trunk and foliage, global impression (energy, control, richness in elements (Aoki’s method). The qualitative analysis of trunks, crowns, and branches included also the characterization of the shape (single or double lines for trunk and branches; open or closed crown). Heights and widths were obtained directly in millimeter units. Trunk’s tilt was obtained in degrees by means of a goniometer [19].

The Body Cathexis Scale (BCS) [13] is a five-point Likert scale described in 1953, and it consists of 40 questions. In the scale, 1 indicates “extremely satisfied” and 5 indicates “extremely dissatisfied.” The BCS includes a list of 54 body parts and their functions, which are listed in reversed alphabetical order, and it is comprised of two test sheets. When completing the BCS-1 test sheet, the patient shows their satisfaction level of particular elements of their body (from 1—very dissatisfied to 5—very satisfied). In the BCS-2 test sheet, the patient shows the level of subjective meaning of these bodily features (from 1—unimportant to 5—very important). Furthermore, the test enables body image analysis on the basis of Franzoi’s concept, according to which

the body may be viewed from two points: 1) physical appearance—how it is presented to others (BCS\_Parts), or 2) way of functioning—how the body is functioning (BCS\_Functions). On the whole, the body image of every patient was described by eight indicators, and each of them was calculated as an arithmetic mean of its components’ assessments; four of the indicators showed the level of satisfaction with different bodily aspects, and the other four were associated with the significance of these aspects.

IRB approval was obtained. We followed Helsinki Declaration guidelines.

## Results

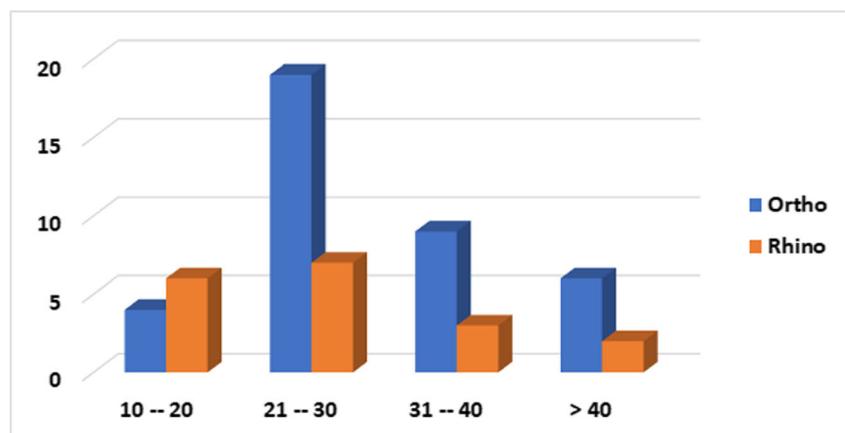
Between January 2016 and December 2017, 56 patients (15 males, 41 females) that underwent orthognathic surgery or rhinoseptoplasty met the inclusion criteria of this study, completed the questionnaires, and were included in the study population. On the whole, 38 patients (67.9%) underwent orthognathic surgery, whereas rhinoseptoplasty was performed in 18 patients (32.1%). Mean age was 28 years (standard deviation, 8.78; range, 18–57). Most patients were included in the 20–29 years decade, as shown in Fig. 1.

Therefore, 46.43% of the patients referred an exclusively functional motivation for surgery and 44.64% of the study population referred both functional and esthetic motivation. The remaining 8.93% was not sure about his/her motivation. Table 2 resumes motivation of patients according to the orthognathic/rhinoseptoplasty subcategories.

As for the MMPI-2 questionnaire, less than 30% of the patients produced clinically significant mean elevations (with scores higher than normality) in all clinical scales (Fig. 2).

The scales with higher scores were Hs (Hypochondriasis), Pt (Psychasthenia), and Sc (Schizophrenia) scales. In particular, the highest percentages were encountered in Hs and Pt

**Fig. 1** Study population according to decades of age (Orthognathic Surgery Group and Rhinoseptoplasty group)



**Table 2** Motivation of patients of the study population

Group	Functional reasons	Functional and esthetic reasons	Do not know/unsure
Orthognathic surgery	23	14	1
Rhinoseptoplasty	3	11	4

scales within the Orthognathic Surgery Group, whereas in the Rhinoseptoplasty group, the highest scores were obtained in the Hs, Pt, Pd (Psychopathic Deviate), and Sc (Schizophrenia) scales. In almost all the scales, scores were proportionally higher within the rhinoseptoplasty patients, with the only exception being represented by the Social Introversion scale. The Pd (Psychopathic Deviate) scale presents the highest difference between the two subgroups. High (pathological) scores in Hypochondriasis Scale suggest an excessive concern about the own health and body that persist even after repeated reassurances. High values in Psychopathic Deviate Scale may denote poor relationships within the family of origin, and disinterest for most social and moral standards of conduct. High scores in Psychasthenia Scale may suggest doubts in own abilities as well as a block of decisions. These subjects present traits characterized by anxiety, irrational fears, feelings of anguish, obsessive ideas, and a partial emotional detachment from personal conflicts. High values in Schizophrenia scale point out difficulties of concentration and lack of impulse control. As shown in Fig. 2, Rhinoseptoplasty patients presented higher values of Hs, Pt, Pd (Psychopathic Deviate), and Sc (Schizophrenia) scales than orthognathic patients.

Finally, on the other hand, orthognathic surgery patients presented higher values just in the Social Introversion scale, thus suggesting difficulties in social situations with anxiety and feelings of insecurity.

As for MBTI results, Table 3 shows the different percentages of the four dichotomies within the whole study

**Table 3** MBTI results in the whole study population

Dichotomies		
E, extraversion/I, introversion	E	65.71%
	I	34.29%
S, sensing/N, intuition	S	85.71%
	N	14.29%
T, thinking/F, feeling	T	65.71%
	F	34.29%
J, judging/P, perceiving	J	48.57%
	P	51.43%

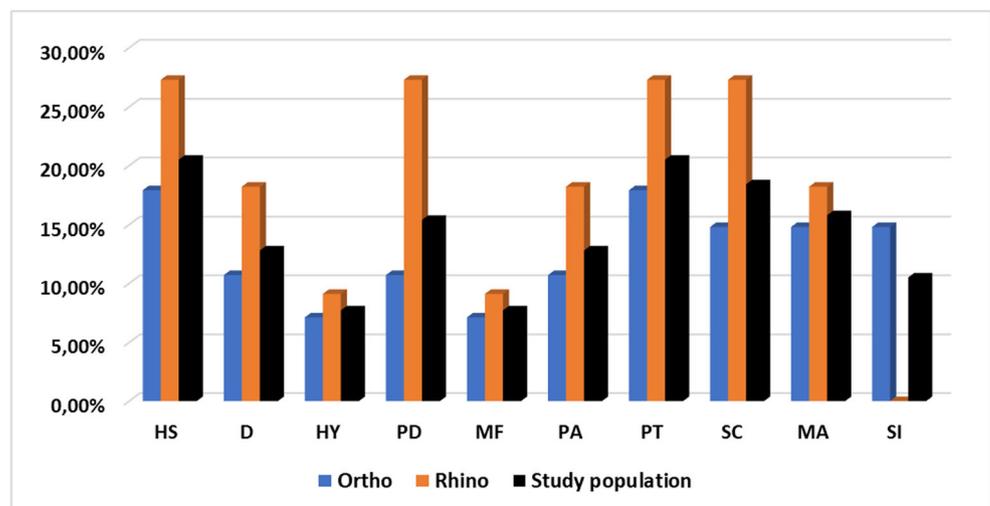
population, whereas Fig. 3 points out the percentages of the dichotomies according to the treatment groups.

Therefore, the results of MBTI tests show that in both orthognathic and rhinoseptoplasty groups, most patients are extrovert, prefer feeling to intuition as a way of perceiving, and rely more on thought, rather than on feeling, as a method of judgment (i.e., they prefer the logical and impersonal process to reach conclusions rather than a process based on logic but more subjective and personal). Instead, as for the fourth preference (J/P), a difference between the two groups can be observed: rhinoseptoplasty patients presented higher values of perceiving (P) (thus suggesting that they have an attitude based on perception as a way to deal with the external environment), whereas orthognathic surgery patients referred higher scores in judging (J) (they prefer the judgment).

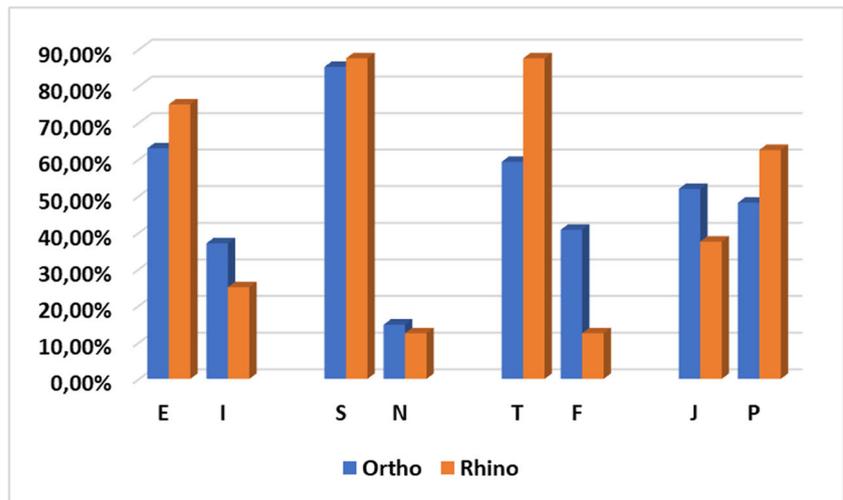
As for the MBTI personality types, Figs. 4 and 5 allow to highlight that the ESTJ profile was the most frequent personality type in both groups.

ESTJ subjects are usually extrovert; they tend to focus on the present and on how much concrete can be achieved with the senses. They are skilled, practical, and realistic; they like to organize and manage activities. They base their decisions on

**Fig. 2** MMPI-2 questionnaire results in the whole study population and according to subgroups (Hs, Hypochondriasis scale; D, Depression scale; Hy, Hysteria scale; Pd, Psychopathic Deviate scale; Mf, Masculinity/Femininity scale; Pa, Paranoia scale; Pt, Psychasthenia scale; Sc, Schizophrenia scale; Ma, Hypomania scale; Si, Social Introversion scale)



**Fig. 3** MBTI results percentages of the dichotomies according to the treatment groups (E, extraversion; I, introversion; S, sensing; I, intuition; T, thinking; F, feeling; J, judging; P, perception)



the logic and on the objective analysis of the causes and effect. They tend to face life in a planned and organized way.

The tree drawing test results are presented in Table 4.

The results of the tree drawing tree show that there is a tendency to draw quite little trees. The dimensions of the tree symbolize the extrovert or introvert character of the subject. As for the used side of the paper, there is a tendency in both groups to draw trees in the left part. Therefore, little trees in the left side of the paper denote a low self-esteem, introversion, inferiority complexes, dependency, need for help, depression, anxiety, concern for the past, and passivity.

The foliage of the drawn trees is more wide than high: flattened foliage stands for an inferiority complex. Furthermore, the drawn low and narrow trunks, in association with a flattened foliage, are suggestive for feelings of oppression and closure in themselves.

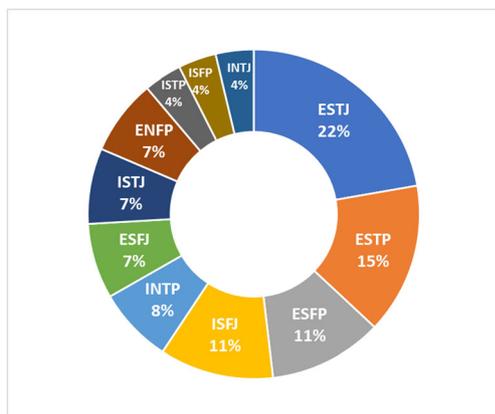
The characteristics of trees drawn by rhinoseptoplasty patients suggest that these subjects present traits of anxiety, depression, and less pronounced passivity compared with patients with malocclusion, but more self-esteem.

Finally, the BC-Scale results show that in both groups, about half of the patients are satisfied with their body image, having a BCS score higher than 3.6 (51.85% of the orthognathic group, 54.55% of the rhinoseptoplasty group), whereas the remaining patients are quite or really not satisfied with their image. Figure 6 depicts the results according to the study groups.

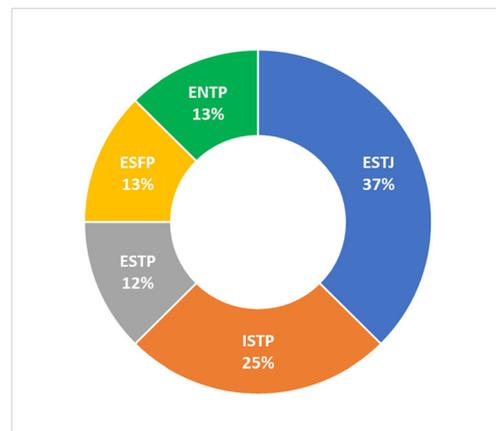
As shown in Fig. 6, the most critical category ( $2 < BCS < 3$ ) that suggests a significant disturb of the body image involves the 3.70% of orthognathic patients and the 9.09% of the rhinoseptoplasty patients.

### Discussion

The understanding of psychological profiles in patients undergoing orthognathic surgery or rhinoplasty is crucial for an appropriate and correct management of such patients. In fact, it seems to be extremely important to identify the personality



**Fig. 4** MBTI personality types percentages within the orthognathic surgery group



**Fig. 5** MBTI personality types percentages within the rhinoseptoplasty group

**Table 4** Tree drawing test results

	Orthognathic surgery group mean value	Rhinoseptoplasty group mean value	Whole study population mean value
Total area (cm <sup>2</sup> )	90,02	135,30	102,96
Left area (cm <sup>2</sup> )	59,04	83,14	65,93
Right area (cm <sup>2</sup> )	30,98	52,11	37,03
Height of foliage (mm)	84,96	94,50	87,69
Height of trunk (mm)	68,52	84,00	72,94
Width of foliage (mm)	106,04	119,65	109,93
Width of trunk (mm)	21,97	26,75	23,33
Psychological energy	1,96	2,60	2,14
Control	1,68	0,60	1,37
Richness in elements	1,60	1,90	1,68

type, the realistic or unrealistic expectations, and the perception of the own body image of the future patients. A thorough knowledge could help surgeons to obtain a really informed consent, to obtain a full understanding of the possible results by the patients, and even to avoid surgery in selected patients [1–10, 22, 25].

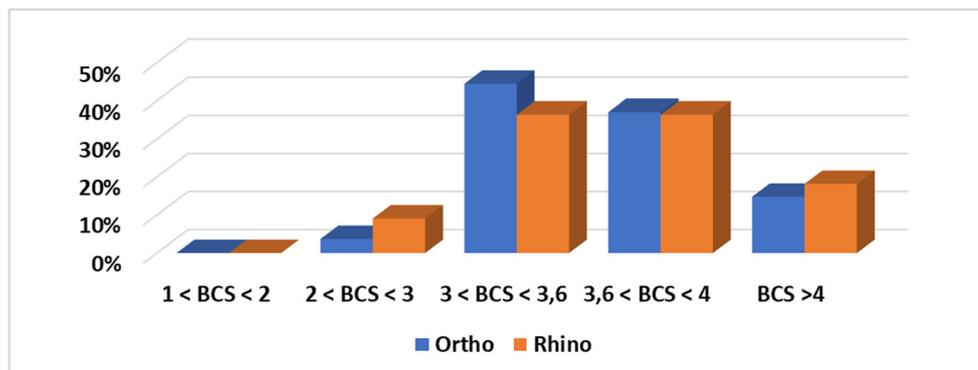
In fact, patients undergoing orthognathic surgery are a special type of patients with dentofacial deformities that can influence their self-esteem and personal relationships owing to difficulty in establishing effective ties with society. Ridicules given by people around them are likely to bring psychologic trauma, lack of trust, stubbornness, suspicions, fear, paranoia, emotional instability, and humiliation to these patients. Jaw deformity and dissatisfaction with dental appearance had a strong predictive effect on self-esteem [25].

It is possible that some peculiar personality traits do predict dissatisfaction with facial appearance. Therefore, such patients might be identified and advised against the operation, and screened out of the process before they begin treatment, in which case, the screening procedure for orthognathic treatment would be successful [24, 25].

This study could be considered a preliminary research because of the low numerosity of the study population and the absence of a control group of subjects that are not undergoing surgery for a further administration of the questionnaires. Of

course, the allocation of the patients to the “orthognathic surgery” and “rhinoseptoplasty” groups that was based on clinical reasons could represent a bias for the study. However, this study, in spite of its preliminary condition, brings new insights on the assessment of personality of orthognathic surgery and rhinoseptoplasty patients. In the literature, few studies have assessed not only the psychological and personality features of such patients.

The results of the present study show that patients undergoing rhinoseptoplasty present excessive concerns for their health and for their body that are not supported by an organic basis, are pre-sentimentally anxious, present difficulties of concentration, and may manifest irrational fears. They are extrovert individuals; they tend to focus on the present and on how much concrete it can achieve with the senses; they tend to base the decisions on the logic and face life in a planned and organized way. Even the tree drawing test results highlight that most rhinoseptoplasty patients present anxiety-depressive traits, insecurity, addiction, concern for the past, and difficulties in relationships. Half of such patients are dissatisfied with their body images. Our results seem to confirm data from the literature that reported the prevalence of narcissistic trait, dependent and obsessive–compulsive disorders in such patients [11, 12].

**Fig. 6** BC-Scale results according to the study groups

Instead, patients undergoing orthognathic surgery usually present anxious traits, excessive concern for their body and for their health not supported by an organic basis, tend to be insecure and inhibited, and present relationship difficulties. They are extroverted; they tend to focus on the present; they face life in a planned way. The tree drawing test results highlight that most rhinoseptoplasty patients present anxiety-depressive traits, insecurity, addiction, concern for the past and difficulties in relationships. About half of such patients are dissatisfied with their body images.

Therefore, some peculiar differences could be observed between the two types of patients, although great similarities were confirmed as for personality and character.

In practice, facial surgeons are advised to explore the distress and dysfunction of patients with maxillofacial defects [23, 25], and to consult a psychiatrist when patients have significant distortion of body image or moderate to severe behavioral impairment. The assessment of a patient's emotional state before and after operation is essential as postoperative satisfaction and rehabilitation are helped by psychological well-being [3].

## Conclusion

In our opinion, it would be crucial to assess some characteristics of the patients' mental health and emotional state prior to surgery, including depression, anxiety, panic, and aggression. The overview of these factors may give an insight into the psychological and emotional capacity of the patients undergoing orthognathic surgery. At the same time, the knowledge of the patients' expectations is fundamental too, in order to obtain a sincere communication between the surgeon and the patient, allowing the patient to fully understand the challenges and difficulties he or she has to face and to have a realistic idea about what to expect from orthognathic surgery.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** IRB approval obtained.

**Informed consent** Informed consent obtained.

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