



Patients' Satisfaction after Orthognathic Surgery: A Systematic Review

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Authors' contributions

This work was carried out in collaboration between all authors. Author SS(1) designed the study, wrote the protocol and search strategy, appraised the selected articles. Authors SS(2), MB and ESER gathered data regarding the issue, searched data bases, extracted data and wrote the first draft. Author SS(3) wrote the search strategy, searched the databases, extracted data and appraised selected articles. All authors read and approved the final manuscript.

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ABSTRACT

Objective: The aim of the present study is to review data regarding patients' satisfaction after orthognathic surgery in a systematic approach.

Methods and Materials: Electronic searching was done in Medline, EMBASE and CENTRAL databases. Inclusion criteria were: 1) assessment of patients' satisfaction or quality of life, 2) one-stage orthognathic surgery, 3) follow up period of 8 weeks or more, and English, German, Persian and Arabic articles. Exclusion criteria were: 1) presence of craniofacial syndromes, cleft lip and palate or traumatic injuries, 2) previous facial surgery, 3) psychological problems before surgery.

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Data were extracted and analyzed in three groups: function, appearance and overall satisfaction.
Results: 18 studies met the inclusion criteria. Esthetic and function was improved in majority of patients, however, it was not possible to assess the issue statistically. Overall satisfaction analysis revealed that 88.6% of patients were satisfied, while 2.8% and 8.6% of patients were neutral and dissatisfied, respectively.
Conclusion: Most of the patients were satisfied with the surgical outcome. Satisfaction was seemed to be multifactorial and it was not possible to predict satisfaction prior to the surgery.

Keywords: Patient satisfaction; orthognathic surgery; quality of life; esthetics.

1. INTRODUCTION

During the past decades, orthognathic surgery has become a significant part of maxillofacial surgery which can change function, as well as esthetics. Surgeons usually consider these changes satisfactory and also beneficial for their patients both psychologically and physiologically [1]. In contrast to orthodontic treatment orthognathic surgery may modify patient's face immediately, not gradually and therefore makes adaptation to changes more difficult [2].

Although clinicians consider dental occlusion and cephalometric parameters as the gold standard for determining the success of the surgery, patients may have different criteria for assessing the outcomes. It is possible that clinicians be unsatisfied with the outcome while patients rate it satisfied and vice versa [3]. It is well known that surgeons' skill would not guarantee patients' satisfaction. In fact, some other factors, including communication issues, affect patient perception of the outcome [4]. Patients' dissatisfaction may cause psychological problems, complaints, threatened or actual malpractice suit, and refusal to pay for surgery [5].

Understanding percentage of satisfaction and dissatisfaction after surgery and clarifying its multiple variables would be of great importance in clinical management of patients and helps to decrease dissatisfactions, which can be bothering for both patient and surgeon. Many authors had attempted to evaluate satisfaction of patients after orthognathic surgery and determine variables which may explain dissatisfaction. Satisfaction was reported to be quite high in some articles [5,6], while some authors reported somehow high rates of dissatisfaction [7,8]. The aim of the present study is to gather data from previously conducted studies regarding postsurgical patient satisfaction and report their findings in a systematic approach.

2. MATERIALS AND METHODS

2.1 Search Strategy

An electronic literature survey was carried out through the Medline (Entrez PubMed, <http://www.ncbi.nlm.nih.gov>), EMBASE and CENTRAL databases in order to find articles published from January 1980 up to March 2014. The keywords used to search these bibliographic databases were as follows: "quality of life" (Medical Subject Heading [MeSH]), "patient satisfaction" (MeSH) AND "orthognathic surgery" (MeSH), "Maxillofacial orthognathic surgery" (MeSH).

2.2 Study Selection

The inclusion criteria were: (1) Studies which have assessed patients' satisfaction and quality of life, (2) One-stage orthognathic surgery, (3) Follow-up period of 8 weeks or more, (4) Articles in English, German, Persian, and Arabic languages.

The exclusion criteria were studies that included patients with: (1) Craniofacial syndromes, cleft lip and palate and traumatic injuries in facial skeleton. (2) History of previous surgery in craniofacial region, (3) Psychological problems diagnosed prior to surgery.

2.3 Study Question

1. What is the prevalence of dissatisfaction and satisfaction after orthognathic surgery?
2. Which variables may affect patients' satisfaction and dissatisfaction?

2.4 Data Extraction

Data extraction forms were used for gathering data. The relevant data were extracted from each article by one author and rechecked by the second author. Bibliographic data of articles were eliminated and a number was assigned to each article. Intra-examiner disagreements were

resolved by consensus. Method of evaluation, number of patients, surgery type, follow-up period and results were extracted from studies.

2.5 Data Analysis

Descriptive data from all selected articles were selected and gathered in tables. Function, appearance and overall satisfaction were assessed separately. For quantitative analysis, the total numbers of patients which were satisfied and dissatisfied were extracted from each study and the numbers were summed and overall percentage was calculated.

In some articles the results were classified in 5 groups including "very satisfied", "satisfied", "neutral", "unsatisfied", and "very unsatisfied", while in other articles it was reported in two groups, "satisfied" and "unsatisfied". So that, "very satisfied" and "satisfied", "unsatisfied" and "very unsatisfied" were summed and overall result was reported in 3 groups: "satisfied", "neutral" and "unsatisfied".

In some articles, satisfaction was reported in more than 1 follow-up period. In these articles longest follow-up period was chosen.

3. RESULTS

3.1 Search Result

Electronic search resulted in 364 articles which were retrieved for more detailed and finally 18 articles met the inclusion criteria. Table 1 shows the details of study selection process. Characteristics of selected studies are shown in Table 2.

3.2 Esthetic and Functional Improvement

Eleven studies had addressed esthetic improvement [9-13,16-21], and nine studies

reported functional changes [2,3,8-11,16,18-20]; however, due to heterogeneity in outcome measurement quantitative analysis was not possible.

Kiyak et al. [2] in a 9 months follow-up study observed that occlusion and mastication were improved in 78.6% and 56.1% patients, respectively. TM Joint sounds decreased in 73.7% of patients, while increased in 24.7% and speech was improved in 92% patients compared with early post-surgical phase [2].

Posnick et al. [3] reported that majority of patients (86%) were satisfied with occlusal outcome while 12% were not satisfied. Regarding speech articulation 80% of patients were satisfied. 88% of patients accepted post-surgical level of TMJ dysfunction and facial pain, while acceptance for sensibility in lower lip and chin region was 55% [3].

Al Ahmad et al. [8] assessed TMJ function by Helkimo index and reported that 50% of patients had mild or no functional interferences (D0 to DI) and remaining were in DII category. 76% of satisfied patients and 77% of less satisfied patients had DI or DII dysfunction [8].

Cheng et al. [9] assessed degree of appearance and function improvement via VAS (Visual Analogue Scale) in 139 patients and reported mean VAS of +6,78 (range -10 to +10) for appearance improvement and +7.24 (range -2 to +10) for function improvement. The difference between function and appearance score was statistically significant. Among patients, 90% were satisfied with function and esthetic, 7% with appearance alone, 2% with function alone and 1% with neither [9].

Table 1. Details of study selection process

1	Electronic search
2	Potentially relevant articles were identified and screened for retrieval (n=364)
3	185 articles were not related and were excluded.
4	179 articles were retrieved for more detailed evaluation
5	81 articles were excluded due to presence of craniofacial syndromes, cleft lip and palate or history of traumatic injuries.
6	98 articles were chosen
7	In 44 articles, patients had a history of previous surgery in craniofacial region.
8	54 potentially appropriate studies were included.
9	In 30 studies, the follow-up periods were less than 4 weeks
10	In 5 articles, patients had psychological problems. 2 articles had same sample groups so that, one of them was excluded.
11	18 articles were chosen for quantitative and qualitative synthesis

Table 2. Characteristics of included studies

Author and year	Method of evaluation/	Number of patients	Surgery	Jaw	Follow-up period
Kiyak HA et al. 1982 [2]	Author questionnaire	55	<ul style="list-style-type: none"> • Mandibular advancement • Maxillary intrusion • Combination • Correction of mandibular asymmetry • Mandibular advancement and genioplasty • Maxillary advancement • Mandibular retropositioning 	<ul style="list-style-type: none"> • 35 mandible • 3 maxilla • 16 both jaws • 3 mandible • 4 mandible • 11 maxilla • 2 mandible 	4-9 months
Finlay PM et al. 1995 [1]	1.General health questionnaire 2.Eysenck Personality Inventory 3.Second and Jourard's body cathexis scale 4.author's questionnaire	61	<ul style="list-style-type: none"> • Lefort I • Lefort III • Sagittal osteotomy • vertical sub-sigmoid mandibular osteotomy • genioplasty 	<ul style="list-style-type: none"> • maxilla • maxilla • mandible • mandible • mandible 	3 months, 6 months, 1 year
Cheng LHH et al. 1998 [9]	Author questionnaire	139 (48 M, 91 F)	<ul style="list-style-type: none"> • bimaxillary • single jaw 		1 year
Zhou YH et al. 2001 [10]	Author questionnaire	140	<ul style="list-style-type: none"> • cl III correction • 14 Maxillary advancement • 7 Mandibular set back • 1 Mandibular set back and genioplasty • 57 mandibular set back and maxillary advancement • 15 mandibular set back maxillary advancement and genioplasty 	<ul style="list-style-type: none"> • Maxilla • Mandible • bimaxillary 	6 months, 24 months
Chen B et al. 2002 [5]	1.Author questionnaire 2.Minnesota Multiphasic Personality	73			1 year

Author and year	Method of evaluation/	Number of patients	Surgery	Jaw	Follow-up period
	Inventory 3.Symptom checklist 90				
Maurer P et al. 2002 [11]	Author questionnaire	121 (78 F 43 M)	<ul style="list-style-type: none"> • Sagittal • Lefort 1 • Bimaxillary • Genioplasty • Segmental 	<ul style="list-style-type: none"> • Mandible • Maxilla • Maxilla and mandible 	47 months
Al-Ahmad HT et al. 2008 [8]	Author questionnaire	36			20 months
Posnick JC et al. 2008[3]	Post-surgical patient satisfaction questionnaire	42	<ul style="list-style-type: none"> • Lefort I • Sagittal osteotomy • septoplasty • inferior turbinate reduction 	<ul style="list-style-type: none"> • maxilla • mandible • nose 	6 months
Rocha NS et al. 2008[12]	Author questionnaire	23	<ul style="list-style-type: none"> • Surgicall assisted maxillary expansion 	<ul style="list-style-type: none"> • maxilla 	More than 2 months Average: 12.6 month Max:36months
Turker N et al. 2008 [13]	Author questionnaire	30 F	<ul style="list-style-type: none"> • double jaw • BSSO • Lefort1 • Genioplasty 	<ul style="list-style-type: none"> • 21 bimaxillary surgey • 6 mandible • 4 maxilla • 5 mandible 	1 year
Kim SJ et al. 2009 [14]	1.Author questionnaire 2.Minnesota Multiphasic Personality Inventory 3.Symptom checklist 90 revised	34 24F 10M			6 months
Meade EA et al. 2010 [15]	Post-surgical patient satisfaction questionnaire Author questionnaire	115 patients 117 parents		<ul style="list-style-type: none"> • 32 maxilla • 62 mandible • 43 bimaxillary 	Mean : 4.9 years
Rustemeyer J et al. 2010 [16]	Author questionnaire	37 women 40 men	<ul style="list-style-type: none"> • Bimaxillary osteotomy for CIII correction • BSSO • Lefort I 	<ul style="list-style-type: none"> • Both jaws 	year
Øland J et al.	Author questionnaire	66		<ul style="list-style-type: none"> • 32 maxillary • 9 mandibular 	After completion of

Author and year	Method of evaluation/	Number of patients	Surgery	Jaw	Follow-up period
2011[17]				<ul style="list-style-type: none"> • 25 bimaxillary 	postoperative orthodontics
Øland J et al. 2011[18]	Author questionnaire	118	<ul style="list-style-type: none"> • Unimaxillary • Bimaxillary 	<ul style="list-style-type: none"> • 56 maxilla • 18 mandible • 44 	1 year
Rustemeyer et al. 2012 [19]	OHIP (Oral health Impact Profile) with additional questions	50 (30 female, 20 male)	<ul style="list-style-type: none"> • Bimaxillary for cl II (21) and cl III (29) 	<ul style="list-style-type: none"> • Both jaws 	12.1±1.4 months
Trovik TA et al. 2012 [20]	1.Oral impact of daily performance (OIDP) 2.Author questionnaire	36	<ul style="list-style-type: none"> • BSSO advancement • Genioplasty 	<ul style="list-style-type: none"> • Mandible 	10 to 14 years after surgery
Silva AC et al. 2013 [21]	Author questionnaire WHOQOL	15	<ul style="list-style-type: none"> • Bimaxillary • Unimaxillary 	<ul style="list-style-type: none"> • 26.7% bimaxillary • 13.3% maxillary advancement • 13.3 mandibular setback 	6 months

*BSSO: bilateral sagittal split osteotomy

Zhou et al. [10] observed that facial and dental appearance changed in 96% and 91% patients, respectively. Chewing ability was improved in 71% of patients and 46% of patients stated that they can eat foods which they could not eat before surgery. TMJ pain was disappeared in 51% of patients and TMJ clicking was improved in two thirds of patients [10].

Maurer et al. [11] reported that from overall 96.1% patients who were satisfied with treatment result, 75% stated appearance improvement and 50% were satisfied with functional (mastication) improvement.

Rocha et al. [13] stated that 13% of their patients were very satisfied with their new appearance following surgical assisted maxillary expansion, 60.9% satisfied and 26.1% little satisfied.

In Turker et al. [13] study, 90% of patients expressed appearance improvement.

Rustemeyer et al. [16] evaluated post-surgical satisfaction in 77 class III patients and observed that 15.6% reported esthetic improvement, 5.1% chewing function improvement and 75.4% both

functional and esthetic improvement. Surgery caused an increase in VAS of esthetic and chewing function. Percentage of patients graded the surgery outcome as excellent was 12.9 [16]. In another study, Rustemeyer et al. [19] reported that patients experience insignificant changes in functional components, including functional limitation, physical disability, physical pain and chewing function; while unsatisfactory esthetic, psychological problems and social disability decreased significantly with orthognathic surgery, thus increasing quality of life [19].

Øland et al. [17] reported that appearance, especially teeth appearance was a powerful motives for seeking treatment. Most of their patients mentioned an improvement in general appearance (75.8%), one fifth of them (21%) did not perceive any change, and a minority (3.2%) reported that their general appearance was worsen [17].

Improvement in overall appearance was fulfilled in 66.1% of patients, while 4.2% of patients' appearance motives were not fulfilled in Øland et al.'s study [18]. In addition, chewing and speaking ability was improved in 72.9% and

23.7% respectively. However, these two abilities were not improved in 5% and 3.2% of patients, respectively [18].

Silva et al. [21] stated that functional problems were the most frequent reason for seeking treatment (40%). Self-esteem was claimed to be good before and after surgery and in 13.3% of patients who had fair self-esteem, better self-esteem was recorded 6 month following surgery, especially in relation to appearance satisfaction. Majority of patients (93.3%) were satisfied with surgical outcome [21].

Chewing, speech and appearance were improved in more than two thirds of Trovic et al.'s [20] patients, among them improvement in chewing was the most dramatic change.

3.3 Overall Satisfaction

16 articles had assessed overall satisfaction [1-3, 5-8,10-18,20,21], from them 14 articles were qualified for quantitative synthesis [1,3,5,8,10-18, 20]. The result of quantitative analysis is shown in Table 3.

Table 3. Satisfaction status in included articles

Satisfaction status	Number of patients	Percentage
Satisfied	793	88.6%
Neutral	25	2.8%
Unsatisfied	77	8.6%
Total	895	100%

Kiyak et al. [2] stated that at 9 months after surgery, overall satisfaction was assessed to be quite high. According to scale analysis, mean satisfaction score was 5.35 (1= not at all satisfied, 7= very satisfied) with none of the responders below score 3. Satisfaction peak was seen on 4 months, but declined significantly from that point up to 9 months [2].

Mean postsurgical satisfaction assessed according to VAS score was reported to be 8.13 +/- 1.97 by Rustemeyer et al. [16]. Expectations were fulfilled in 93.3% of patients in Silva et al.'s study [21] after surgery.

4. DISCUSSION

Review of available data revealed that most of the patients were satisfied with appearance changes, however, in none of the included studies all of the patients were satisfied; some

were neutral and unfortunately, some of the patients were not satisfied at the end of follow up period.

In general, mastication and speech ability and occlusion noticeably improved in patients undergoing orthognathic surgery. In most of the patients, but by no means all of them, TMJ signs and symptoms disappeared after surgery.

Overall satisfaction seems to be quite high. Nevertheless, according to analysis 8.6% of patients were not satisfied with surgical outcomes.

Dissimilarities in study results highlight the multifactorial nature of satisfaction. Different hypothesis have been proposed in order to explain dissatisfaction rates. Various factors may have an effect on this issue, including:

4.1 Gender

Unfortunately, due to insufficient reports regarding satisfaction rates of male and females, it was not possible to assess this issue statistically. The results show considerable controversy. According to Chen [5], Rutemeyer [16,19] and Øland [18], satisfaction was not related to gender. However, in Finlay et al.'s [1] study, female were more likely to mark high scores of satisfaction in questionnaire. In contrast, male patients were more satisfied with the outcome in Øland et al.'s study [17].

4.2 Age

According to included studies, satisfaction was not related to age [1,5,8,16,18,19].

4.3 Marital Status

There was not any relationship between this issue and satisfaction in Chen et al.'s study [5].

4.4 Time of Evaluation

In Kiyak et al.'s [2] study, satisfaction was highest at 4 months and declined from that point up to 9 months. Interestingly, most of the decline occurred in patients who still had orthodontic appliance [2]. In contrast, in Finlay et al.'s [1] and Zhou et al.'s [10] studies, satisfaction continue to increase from surgery up to 12 months and 24 months respectively. In Al-Ahmad et al.'s [8] study, patients who were assessed more than 1 year after surgery were less satisfied compared with patients with shorter evaluation time.

4.5 Motivation and Expectation

In Meade et al.'s [15] study, in young patients, more energized individuals were more satisfied with the outcome. In addition, satisfaction rate was higher in patients with more precise focus on esthetic outcome and oral function component [15].

Kiyak et al. [2] reported that specific motives did not have an impact on satisfaction status. Realistic expectations lead to long term satisfaction in Chen et al.'s [5] study. In Rustemeyer et al.'s [16] study, esthetic improvement caused more satisfaction score. In Øland et al.'s [18] study, patients with functional and social motivation were less satisfied but those with appearance and disease preventing motives were more satisfied. They concluded that fulfillment of motivation had a positive correlation with overall satisfaction score. In addition, increasing self-concept and social interaction at the end of post-surgical orthodontic treatment was correlated with higher scores of satisfaction [18].

4.6 Educational Status

In Chen et al.'s [5] study, education duration had positively affected satisfaction status.

4.7 Psychological Problem

According to Finlay et al. [1], self-esteem score (physical and personal) did not have any relationship with satisfaction. Generally, higher score of neuroticism was observed in dissatisfied patients. In addition, one out of five patients which were not satisfied with surgery was proved to have psychological problem which was not assessed prior to surgery [1]. Satisfaction was not associated with personality state in Chen et al.'s [5] study.

4.8 Type of Deformity and Surgical Approach

According to Kiyak et al. [2] and Finlay et al. [1], patient satisfaction was not affected by type of surgery. However, in Al-Ahmad et al.'s study [8], patients who underwent vertical maxillary excess were all satisfied, however, 75% of patients with laterognathism were dissatisfied. Between these two extremes, 83.3%, 66.7%, and 58.3% of patients with mandibular retrognathism, anterior open bite and mandibular prognathism were satisfied, respectively [8].

Øland et al. [17] compared different profile types before and after surgery and reported that there was no association between profile type and satisfaction score. In another study, this author mentioned that type of surgery had an influence on satisfaction with healing, but not on overall satisfaction. In this regard, the percentage of satisfied patients was more in bimaxillary surgery group compared with monomaxillary surgery [18]. In Rustemeyer et al.'s study [19], type of malocclusion (Class II or Class III) did not affect patients' answers to questionnaires.

4.9 Severity of Deformity

In Chen et al.'s study [5], severity of the problem had a negative influence on satisfaction. The more severe the deformity, satisfaction was more probable after surgery [5].

4.10 Post-operative Difficulties and Problems in Oral Function

Kiyak et al. [2] observed that oral function/dysfunction, pain and paresthesia did not affect satisfaction. In contrast, dissatisfied patients had more pain, numbness, scarring and swelling than their expectation, in Finlay et al.'s [1] study. Chen et al. [5] reported that post-operative difficulties would affect satisfaction at "early post-surgery" and "3 months after surgery", but not at 6 and 12 months after surgery. Analyzing the effect of degree of sensory disorder and chewing ability on patient satisfaction showed a weak positive relationship in Maurer et al.'s [11] study. Al-Ahmad et al. [8] stated that TMJ or nerve dysfunction was not different between satisfied and dissatisfied patients. The frequency of complication was similar in the so-called groups [8]. In Turker et al.'s [13] study, satisfaction with healing was correlated with overall satisfaction. Numbness, sensation, pain in TMJ and mouth opening restriction was not correlated with satisfaction, unless they were raised or persistent [16]. In Rustemeyer et al.'s [19] study, patients with hypoesthesia were more likely to be dissatisfied with appearance.

4.11 Financial Issues

In Kim et al.'s [14] study, most of the dissatisfied patients had financial problems.

4.12 Significant Others Opinion

In Chen et al.'s [5] study, high interpersonal sensitivity, which is the ability to accurately

percepts other's ability and traits [22], and insufficient support or passive acceptance of surgery by relatives of the patient resulted in dissatisfaction in early post-surgical phase. Rustemeyer [16] stated that satisfaction of family and friends has a significant correlation with patients' satisfaction. In Trovic et al.'s [19] study patients whose relatives found changes in appearance were 8 times more likely to be satisfied.

4.13 Sufficiency of Information

Dissatisfied patients said that they were not sufficiently informed about surgery [1,13]. They preferred to be more informed about fixation method and duration, numbness, necessity of soft diet, pain and swelling [1].

4.14 Relapse

In Finlay et al.'s [1] study, none of the dissatisfied patients had experienced relapse.

4.15 Trust to Surgical Team

In Turker et al.'s [13] study, level of patient trust was correlated with patient satisfaction.

4.16 Drop-out from Study

It may be assumed that withdrawal of patients from study would mean their dissatisfaction. Although Finlay et al. [1] reported that these patients did not quit the study because of dissatisfaction; other studies did not report this issue.

Although there are many studies regarding satisfaction after orthognathic surgery, the evidence is not sufficient. There are some limitations which complicates the situation. Some of these limitations include:

- Diversity of questionnaires: There are many validated questionnaire for assessing satisfaction after orthognathic surgery [23] and different studies had used various methods of assessing outcome.
- Different follow-up period
- Surgery conducted by various surgeons: Surgeons' skill and experience is a factor which should not be neglected, however, this issue is hard to assess.

- Racial and ethnical differences and fulfillment of appearance motivations according to racial preferences.

At last, but not the least, it should be mentioned that although most of the patients were satisfied with the outcome, this does not mean that clinicians should not be concerned about this problem. Dissatisfaction may cause several psychological problems in patients and even low percentage of satisfaction should be assessed carefully in order to approximate the percentage to zero.

5. CONCLUSION

It seems that available data regarding patient satisfaction after orthognathic surgery is not sufficient. Most of the studies had reported high percentage of satisfaction with function and appearance. Overall satisfaction among studies was analyzed to be 88.6%. In all of the included studies there were some patients which were dissatisfied with the outcome.

Many factors would affect satisfaction score, including gender, time of evaluation, motivations and expectations, educational status, psychological problems, type and severity of deformity, surgical approach, post-operative difficulties and functional problems, financial issues, significant others opinion, sufficiency of information and trust to surgical team. Nevertheless, diversity of results regarding factors affecting satisfaction and subjective nature of the issue makes it impossible to predict patients' satisfaction after surgery. More studies with standardized questionnaires, proper follow-up period, randomized selection of participants and delicate control of confounding variables are needed.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Finlay PM, Atkinson JM, Moos KF. Orthognathic surgery: Patient expectations; psychological profile and satisfaction with outcome. *British Journal of Oral and Maxillofacial Surgery*. 1995;33: 9-14.
2. Kiyak HA, West RA, Hohl T, McNeil W. The psychological impact of orthognathic surgery: A 9 month follow-up. *Am. J. Orthod*. 1982;81(5):404-412.
3. Posnick JS, Wallace J. Complex orthognathic surgery: Assessment of patient satisfaction. *J Oral Maxillofac Surg*. 2008; 66:934-42.
4. Peterson LJ, Topazian RG. The preoperative interview and psychological evaluation of the orthognathic surgery patient. *J Oral Surg*. 1974;32:583-588.
5. Chen B, Zhang Z, Wang X. Factors influencing postoperative satisfaction of orthognathic surgery patients. *Int J Adult Orthod Orthognath Surg*. 2002;17:217-22.
6. Øland J, Jenson J, Melson B, Elkilit A. Are personality patterns and clinical syndromes associated with patients' motives and perceived outcome of orthognathic surgery? *J Oral Maxillofac Surg*. 2010;68: 3007-14.
7. Philips C, Kiyak A, Bloomquist D, Turvey TA. Perception of recovery and satisfaction in the short term after orthognathic surgery. *J Oral Maxillofac Surg*. 2004;62: 535-44.
8. Al-Ahmad HT, Al-Omari IK, Eldurini LN, Suleiman AA. Factors affecting satisfaction of patients after orthognathic surgery at a University Hospital. *Saud Med J*. 2008; 29(7):998-1003.
9. Cheng LHH, Roles D, Telfer MR. Orthognathic surgery: Patient perspective. *British Journal of Oral and Maxillofacial Surgery*. 1998;36:261-263.
10. Zhou YX, Hagg U, Rabie AB. Patient satisfaction following orthognathic surgical correction of skeletal Class III malocclusion. *Int J Adult Orthodon Orthognath Surg*. 2001;16(2):99-107.
11. Maurer P, Otto C, Bock JJ, Eckert AW, Schubert J. Patient satisfaction with the outcome of surgical orthodontic intervention and effect of esthetic and functional criteria. *Mund Kiefer Gesichtschr*. 2002;6(1):15-8.
12. Rocha NS, Cavalcante JR, de Oliveira e Silva ED, Caubi AF, Laureano Filho JR, Gondim DG. Patient's perception of improvement after surgical assisted maxillary expansion (SAME): Pilot study. *Med Oral Patol Oral Cir Bucal*. 2008; 13(12):783-7.
13. Turker N, Varol A, O' gel K, Basa S: Perceptions of preoperative expectations and postoperative outcomes from orthognathic surgery: Part I: Turkish female patients. *Int. J. Oral Maxillofac. Surg*. 2008;37:710-715.
14. Kim SJ, Kim MR, Shin SW, Chun YS, Kim EJ. Evaluation on the psychosocial status of orthognathic surgery patients. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2009;108(6):828-32.
15. Meade EA, Inglehart MR. Young patients' treatment motivation and satisfaction with orthognathic surgery outcomes: The role of "possible selves". *Am J Orthod Dentofacial Orthop*. 2010;137:26-34.
16. Rustemeyer J, Eke Z, Bremerich A. Perception of improvement after orthognathic surgery: The important variables affecting patient satisfaction. *Oral Maxillofac Surg*. 2010;14:155-162.
17. Øland J, Jenson J, Papadopoulos MA, Melson B. Does skeletal facial profile influence preoperative motives and postoperative satisfaction? A prospective study of 66 surgical-orthodontic patients. *J Oral Maxillofac Surg*. 2011;69:2025-32.
18. Oland J, Jensen J, Elkilit A, Melsen B. Motives for surgical-orthodontic treatment and effect of treatment on psychosocial well-being and satisfaction: A prospective study of 118patients. *J Oral Maxillofac Surg*. 2011;69(1):104-13.
19. Rustemeyer J, Gregerson J. Quality of life in orthognathic surgery patients: Post-surgical improvement in aesthetic and self-confidence. *Journal of Cranio-Maxillo-Facial Surgery*. 2012;40:400-404.
20. Trovik TA, Wisth PJ, Tornes K, Bøe OE, Moen K. Patients' perceptions of improvements after bilateral sagittal split osteotomy advancement surgery: 10 to 14 years of follow-up. *Am J Orthod Dentofacial Orthop*. 2012;141(2):204-12.
21. Silva AC, Carvalho RA, Santos TS, Rocha NS, Gomes AC, Silva ED. Evaluation of life quality of patients submitted to orthognathic surgery. *Dental Press J Orthod*. 2013;18(5):107-14.

22. Carney DR, Harrigan JA. It takes one to know one: Interpersonal sensitivity is related to accurate assessments of other's interpersonal sensitivity. *Emotion*. 2003; 3(2):194-200. questionnaires suitable for oral and maxillofacial surgery. *British Journal of Oral and Maxillofacial Surgery*. 2010;48: 579-90.
23. Kanatas AN, Rogers SN. A systematic review of patient self-completed

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