

# Factors affecting satisfaction of patients after orthognathic surgery at a University Hospital

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## ABSTRACT

**الأهداف:** لمعرفة مدى الرضا لدى المرضى بعد جراحة الفكين التقويمية، وتقييم مدى إدراكهم للتغيرات في الجوانب الوظيفية والنفسية والاجتماعية بعد العلاج. وتحليل العوامل المؤثرة على الرضا.

**الطريقة:** أجريت دراسة إستيعادية سريرية، في مستشفى الجامعة الأردنية - الأردن - عمان، في الفترة ما بين ديسمبر 2006م وحتى ديسمبر 2007م. تم فحص 38 مريضاً خضعوا للجراحة الفكين التقويمية بعد متوسط متابعة (20) شهراً. تضمن الفحص تقييم وظائف الأعصاب، والمفصل الصدغي الفكي باستعمال مؤشر هلكيمو. قام المرضى بتعبئة استبيان عن مدى الرضا بالنتائج، وعن مدى إدراكهم للتغيرات الوظيفية والنفسية والاجتماعية بعد العلاج.

**النتائج:** بشكل عام كان هناك رضا لدى المرضى عن نتائج الجراحة، حيث وافق 82% على الخضوع لنفس العلاج مرة أخرى. قُسم المرضى إلى مجموعتين: «راضية جداً» (25 مريض)، و«أقل رضا» (13 مريض) بناءً على إجاباتهم. وجدت فروق ذات دلالة إحصائية بين المجموعتين تتعلق بالتشخيص، وبالمدّة الزمنية بعد الجراحة. كان جميع مرضى (الزيادة الرأسية في الفك العلوي) راضين جداً، و 75% من مرضى (التشوّهات الفكية الغير متناظرة) أقل رضا. كانت معدلات الرضا أقل لدى المرضى اللذين مر أكثر من عام على العلاجهم ( $p=0.006$ ). كما أظهر المرضى إدراكاً بالتحسن في الوظائف الفموية، والصحة العامة، المظهر، ومهارات التعامل بعد العلاج. ارتبط انخفاض ألم المفصل والعضلات المحيطة، كذلك زيادة حركة الفك بالتحسن في إدراك المرضى للمظهر والصحة العامة على التوالي.

**خاتمة:** على الرغم من ارتفاع نسبة الرضا عن النتائج، إلا أن هنالك عوامل كوظائف المفصل الصدغي الفكي يمكن أن تؤثر على التكيف النفسي والاجتماعي للمرضى بعد العلاج. كذلك، يجب إعطاء المرضى معلومات كافية عن سير العلاج لتحسين مستوى الرضا لديهم مما يؤثر إيجابياً على جودة الحياة لديهم.

**Objectives:** To analyze factors that influence patient's satisfaction with orthognathic treatment and evaluate patient's perception of changes in physical and psychosocial aspects.

**Methods:** In a retrospective clinical study conducted at Jordan University Hospital, Amman, Jordan between December 2006 and December 2007, we examined 38 patients who had orthognathic surgery after an average follow-up of 20 months. Examination included evaluation of nerve function and temporomandibular function with Helkimo index. Patients filled out a questionnaire on treatment satisfaction, and perception of physical and psychosocial changes after treatment.

**Results:** Patients were generally satisfied with the result, 82% agreed they would undergo treatment again. They were divided into "very satisfied" ( $n=25$ ) and "less satisfied" ( $n=13$ ) groups according to satisfaction score, with statistically significant differences found between them concerning diagnosis, and follow-up period, with all vertical maxillary excess patients very satisfied and 75% of asymmetrical deformities patients less satisfied, and less satisfaction by patients more than one year postoperatively ( $p=0.006$ ). Patients perceived improvement in oral function, general health, appearance and interpersonal skills. Lower rates of joint and muscular pain, and increased mobility of lower jaw correlated with better patients' perception of health and appearance.

**Conclusions:** Although patients' report high satisfaction levels, several factors such as the temporomandibular joint function could affect patients' psychosocial adjustment after treatment. Sufficient information for patients on the treatment course is required to improve satisfaction. Controlling these factors could improve patients' quality of life.

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Orthognathic surgery combined with orthodontic treatment aims at treating patients with most dentofacial deformities. Those patients seek treatment with the desire for improvement in esthetics and alteration of functional problems as the most important reasons.<sup>1</sup> Its well-known that patients ratings of outcome might not correlate with those of clinicians.<sup>2</sup> Patients own opinion should therefore be a central aspect in the evaluation of orthognathic treatment outcome and quality. Patients usually report satisfaction with the overall treatment they undergo.<sup>3-7</sup> Various factors that influence patient satisfaction were presented by Flanary et al,<sup>3</sup> including the preoperative expectation that was an important factor for dissatisfaction when they were unrealistic, as was the lack of information on related risks. Other factors included the post-operative complications, nerve dysfunction, type of orthognathic surgery and dysfunction of the temporomandibular joint (TMJ). Many studies have examined the psychosocial effect of orthognathic surgery.<sup>8</sup> Generally, patients became more self-confident and had more social skills after treatment.<sup>1</sup> Other studies stated that patients' perception of problems related to the surgery affected the treatment and its outcome.<sup>9</sup> Few studies assessed satisfaction of patients with orthognathic surgery and their perception of the deformity-related problems in correlation with the clinical outcome. Authors showed different factors that affected patients' satisfaction with their treatment. Rivera et al<sup>10</sup> found that patients main motive was a change in their facial appearance. Jager et al<sup>11</sup> also revealed that patient satisfaction is greatly dependent on the ultimate esthetic result, quality of care and absence of positive complications, while craniomandibular dysfunction was found to be more important for Finish patients.<sup>12</sup> The aim of our study is to assess patients' satisfaction following orthognathic surgery and their perception of changes in physical and psychosocial aspects, and identify clinical variables such as the TMJ function, nerve dysfunction, surgical complications, and other patient-related factors that could contribute to the outcome of treatment.

**Methods.** Patients who had orthognathic intervention at the Department of Oral and Maxillofacial Surgery, Jordan University Hospital, Amman, Jordan during the years 2001-2006, were asked to participate in the present study. Those with clefts, specific syndromes, and facial deformities due to trauma or congenital malformation were not included. Forty-nine patients met the inclusion criteria, 38 attended follow up visits regularly and were contacted and included in the study, 11 patients were untraceable due to changed addresses and contact details. The average age at surgery was 25.3 years (standard deviation 4.9 years; Table 1),

with an age range of 17-44 years. Three orthodontics consultants completed orthodontic treatment, and one oral and maxillofacial surgeon performed the surgery. Model surgery simulating the degree of necessary jaw movements was used to generate the occlusal splint for operative and postoperative use. Osteotomy fixation was carried out via mini-plates. The average post-operative elastic intermaxillary fixation lasted one week on average. Intra- and post-operative complications were recorded and assessed (Table 2), complications details were retrieved from the operation notes and medical files recorded during the hospital stay and outpatient follow-up. Subjects were invited for interview and clinical examination on average 19.8 months (range: 4-56 months) after orthognathic surgery, and were asked to fill out a questionnaire at the same time. A written informed consent was obtained from each patient before the examination. The research protocol had the approval and funding by the Deanship of academic research at the University of Jordan. Clinical examination included the assessment of TMJ dysfunction using the internationally standard Helkimo Index.<sup>13</sup> It also involved evaluation of the nerve function by means of 2-point discrimination and touching with a cotton swab, to determine the presence of dysesthesia, paraesthesia, and hypoesthesia involving the chin and the lower lip bilaterally. The first part of the questionnaire used was based on questions designed by Riedmann et al,<sup>14</sup> and adapted for use with orthognathic surgery patients. It addressed reasons for requesting treatment, the degree of satisfaction with dental and jaw aesthetics before the start of treatment, satisfaction with personal dental and jaw aesthetics after treatment, patients' attitude toward the importance of jaw aesthetics for overall facial aesthetics, satisfaction with surgical and orthodontic treatment outcome (patients who were dissatisfied with the outcome were asked to elaborate their reasons), effect of treatment on social skills and pre-treatment needs and aspects related to treatment organization. The second part of the questionnaire was designed to assess patients' perception of their problems in 4 areas, before, and after surgery. It was originally used by Kiyak et al.<sup>5</sup> This part was designed to measure patients' perception of changes in problems related to oral function, general health, appearance, and interpersonal relationships. The questionnaire was modified by Lazaridou-Terzoudi et al<sup>9</sup> to ask patients to recall their feelings on how they felt about these items before surgery, just after surgery, and their current feelings. The third part of the questionnaire was adapted from questions by Williams et al<sup>15</sup> that addressed the experience at the time of operation both in hospital and at home, benefits of treatment, and the long-term side effects. Scores were assigned to the pre formulated answers of questions,

for subsequent evaluation. In order to have a better examination of the various patient-related factors and their effect on satisfaction, answers to questions related to the appearance of jaws after surgery, satisfaction with the treatment outcome, whether or not this outcome met the pretreatment needs and whether patients would undergo the same treatment again were dichotomized as recommended by Riedmann,<sup>14</sup> forming a total score of satisfaction. Subjects were then divided into 2 groups according to their score in this group of questions, ranging from very satisfied (Group 1), too less satisfied patients (Group 2).

The Statistical Package for Social Sciences software analysis version 15 (SPSS Inc. Chicago, USA) was used to analyze data. Descriptive statistics were calculated for all variables. Group comparison was made using the chi-square test according to Pearson. The average mean value of comparison for age was analyzed using the Student's t-test. A *p*-value of less than 0.05 is considered the level of significance. In relation to the second part of the questionnaire, scores on the problems subgroups were calculated for patients at the different time points. Correlation tests were conducted between the Helkimo index subgroups and the 4 "problem" subscores of the questionnaire. Repeated measures ANOVA was conducted to examine changes in perception of problems by patients across the 3 time points.

**Results.** Patients concerns at the start of treatment were directed towards esthetic needs. Fifty percent of patients reported dissatisfaction with the appearance of the face or jaws as the reason for seeking treatment, while functional concerns alone were mentioned by only 7.9% of the sample, with the rest of the sample (42.1%) presenting with combined esthetic and functional needs. Patients reported high satisfaction with the outcome of the orthognathic surgery, as 81.6% agreed that they would take the decision to undergo the same treatment knowing what they know now about it, a question recommended by Flanary<sup>3</sup> to assess the general satisfaction of patients with surgery. Statistical comparison of the frequency distributions using the Chi-square test according to Pearson was conducted between the 2 groups of satisfaction. It showed no significant differences between the 2 groups according to gender, chief complaint before surgical intervention, and the operation type (Table 3). The average values for age at the operation time showed no significant differences either. The TMJ function is presented with the Helkimo index and its subgroups. Clinical examination revealed that 50% of patients had mild or no interference with joint function ranging from D0 to DI according to Helkimo (Figure 1), and the rest of the sample presenting mainly in the DII

**Table 1 -** Number, mean age, gender of patients, follow-up period, frequencies of primary clinical diagnoses, and surgical interventions used. Group one - highly satisfied with the treatment result, group 2 - less satisfied.

Variable	Group 1 (N=25)	Group 2 (N=13)	Overall (N=38)	
			n	(%)
<i>Age (mean)(SD)</i>	26.12 (5.38)	23.69 (3.38)	25.29	(4.88)
Male	7 (28)	5 (38.5)	12	(31.6)
Female	18 (72)	8 (61.5)	26	(68.4)
< 1 year follow-up period	15 (60)	2 (15.4)	17	(44.7)
1-4.5 yrs follow-up period	10 (40)	11 (84.6)	21	(55.3)
<i>Diagnosis</i>				
Mandibular prognathism	7 (28)	5 (38.5)	12	(31.6)
Mandibular retrognathism	5 (20)	1 (7.7)	6	(15.8)
Anterior open bite	2 (8)	1 (7.7)	3	(7.9)
Laterognathism	2 (8)	6 (46.2)	8	(21.1)
Vertical maxillary excess	9 (36)	0 (0.0)	9	(23.7)
<i>Surgical Operation</i>				
Bimaxillary osteotomy	16 (64)	5 (38.5)	21	(55.3)
Bilateral sagittal split osteotomy	6 (24)	3 (23.1)	9	(23.7)
Le Fort I osteotomy	1 (4)	0 (0.0)	1	(2.6)
Miscellaneous	2 (8)	5 (38.5)	7	(18.4)

**Table 2 -** Frequencies of complications. Group 1 - highly satisfied with the treatment result, Group 2 - less satisfied.

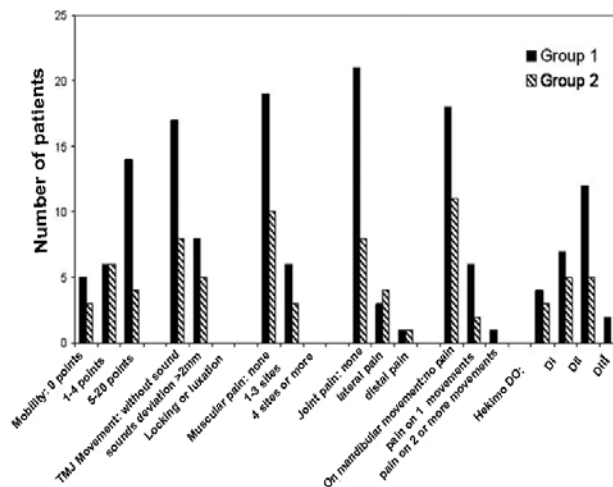
Complications	Group 1 (N=25)	Group 2 (N=13)	Overall (N=38)	
			n	(%)
<i>Intra-operative</i>				
None	22 (88)	12 (92.3)	34	(89.5)
Nerve injury	1 (4)	0 (0.0)	1	(2.6)
Atypical fracture	1 (4)	1 (7.7)	2	(5.3)
Soft tissue injury	1 (4)	0 (0.0)	1	(2.6)
<i>Early postoperative</i>				
None	23 (92)	13 (100.0)	36	(94.7)
Postoperative bleeding	2 (8)	0 (0.0)	2	(5.3)
<i>Late postoperative</i>				
None	19 (76)	12 (92.3)	31	(81.6)
Infected plates	5 (20)	1 (7.7)	6	(15.8)
loarseness of voice	1 (4)	0 (0.0)	1	(2.6)

**Table 3** - Chi-square test results,.

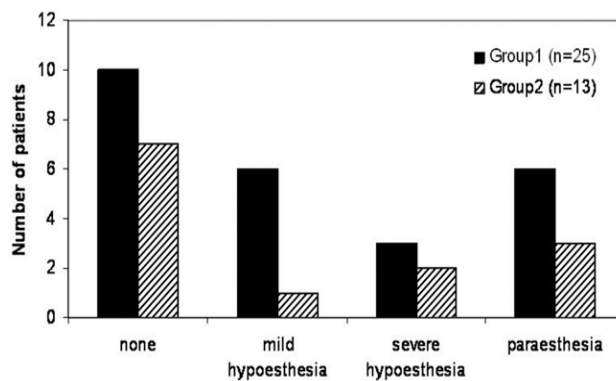
Variable	Chi-square test, P value
Gender	0.514
Diagnosis	0.006*
Surgical operation	0.115
Mobility index	0.282
TMJ function	0.692
Muscular pain	0.949
Joint pain	0.312
Pain on mandibular movement	0.514
Helkimo index	0.500
Nerve dysfunction	0.602
Follow-up period	0.006*
Complication	0.593
Intra-operative	
Early postoperative	0.188
Late postoperative	0.361
Recovery expectations	0.450

TMJ - Temporomandibular joint, \* $p < 0.05$

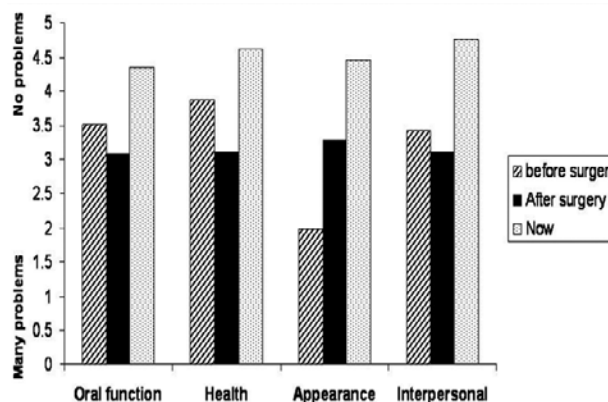
category (44.7%). The distribution of DI and DII joint dysfunction within the groups of satisfaction was 76% for group 1, and 77% for group 2. Appraisal of nerve function revealed that serious alteration of sensation to the distribution of mental nerve at the lower lip and chin (severe hypoesthesia to paraesthesia) was evident in 36.9% of patients (Figure 2). Chi-square test according to Pearson showed no significant difference of TMJ or nerve dysfunction between the 2 satisfaction groups. Statistical comparison of the frequency of distributions between these 2 groups showed a significant difference according to the diagnosis at the beginning of the treatment. All patients with vertical maxillary excess showed high satisfaction with the treatment they had, while 83.3% of patients with mandibular retrognathism, 66.7% of anterior open bite cases, and 58.3% of mandibular prognathism patients showed high satisfaction. However, 75% of laterognathism patients were among the group of less satisfied patients (Table 2). Patients who had a follow-up period of more than a year after surgery reported significantly lower satisfaction compared to patients with shorter postoperative period. No differences were found between the 2 groups according to the frequency of the intra-operative and post-operative complications. In order to analyze the impact of the recovery experience on patients both during their stay in hospital and at home, subjects were divided into 3 categories according to their expectations of the post-operative period. Of the less satisfied group, 41.7% had worse recovery periods than they expected,



**Figure 1** - Frequencies according to Helkimo index and its subgroups for clinical evaluation of temporomandibular joint function. Group 1 - highly satisfied with the treatment result, Group 2 - less satisfied.



**Figure 2** - Frequencies of disturbances to nerve function. Group 1 - highly satisfied with the treatment result, Group 2 - less satisfied.



**Figure 3** - Perceived problems before surgery, after surgery and now (Oral function:  $F = 41.621, p = 0.00$ , Health:  $F = 34.263, p = 0.00$ , appearance:  $F = 74.327, p = 0.00$ , Interpersonal:  $F = 21.145, p = 0.00$ , repeated measures analysis of variance).

**Table 4** - Pearson correlation test results, correlation between “perceived problems” scores with Helkimo components. (\*Correlation is significant at the 0.05 level, †Correlation is significant at the 0.01 level).

Variable	Oral function	General health	Appearance	Interpersonal relationships
Mobility index	0.065	0.123	0.337*	0.047
TMJ function	0.014	0.363*	0.084	0.128
Muscular pain	0.249	0.488†	0.017	0.299
Joint pain	0.330*	0.341*	0.165	0.305
Pain on mandibular movement	0.212	0.018	0.146	0.013
Helkimo index	0.065	0.153	0.311	0.061

TMJ - Temporomandibular joint

compared to 21.7% from the satisfied group of patients, this difference was not significant. The 2nd part of the study was related to patients’ perception of changes in 4 main areas: oral function, health, appearance, and interpersonal relationships. Repeated measures ANOVA was conducted to examine changes in perception of problems across the 3 time points (Figure 3). A linear improvement in all subscales is found, from before treatment until now, and from the immediate phase after treatment to the present, whereas lower scales were scored by patients at the immediate post-treatment phase compared to their scores before surgery with the exception for the improvement in the “appearance” score (all  $p=0.00$ ). Correlation tests were conducted within the ‘problems’ questionnaire subgroups. Improvement in oral function was found to correlate with improved perception of interpersonal relationships by patients, also improvement in the appearance was found to correlate with better perception of health and interpersonal relationships. The correlation between the Helkimo index and its variables, with the perception of problems by patients was examined (Table 4). Higher rates of joint and muscular pain had a negative impact on patients’ perceived general health. While increased mobility of the lower jaw was found to correlate with better patient’s perception of appearance after treatment.

**Discussion.** High satisfaction with the outcome of orthognathic surgery is reported by our patients. Eighty one point six percent answered positively to the question set forward by Flanary<sup>3</sup> and used by several investigators, which indirectly gives the answer to whether patients would undergo the same treatment again knowing what they know about it now. Bock et

al<sup>6</sup> reported 91% of their 102 patients to be satisfied with treatment outcome, 81% of Zhou et al<sup>7</sup> 94 skeletal class III patients reported satisfaction, and Flannary et al<sup>3</sup> also had 90% of their patients in the high satisfaction category. Other studies evaluating different questionnaires also reported high satisfaction of their orthognathic patients.<sup>9,16,17</sup> On the other hand, when patients with orthodontic camouflage treatment were examined, they were found to be as satisfied as patients with surgical orthodontic treatment.<sup>18</sup> Some studies state that post-surgical dissatisfaction is rarely related to the technical skill of the surgeon, but rather from a failure to communicate and to detect and deal with different types of patients.<sup>19</sup> More emphasis should therefore be added to the psychosocial factors when making treatment decisions in addition to the functional and morphological reasons.<sup>20</sup> Many studies attempted to analyze factors that can adversely affect patient satisfaction with their treatment. Functional disturbances to the TMJ after orthognathic surgery has been studied, and despite that orthognathic treatment can reduce symptoms of dysfunction such as pain and discomfort,<sup>21,22</sup> or has no significant effect on the frequency of its signs and symptoms,<sup>23</sup> pronounced symptoms of craniomandibular dysfunction can correlate with lower patient satisfaction after treatment.<sup>6</sup> Most of our patients were classified between D0 and DII according to Helkimo index, with a significant correlation found between the Helkimo index subgroups and patient perception of their problems. The physical as well as the psychological well being of patients could therefore be affected by the functional status of the TMJ. Bock et al<sup>6</sup> were the first group to demonstrate the influence of TMJ function on satisfaction. In our study, we add that TMJ function can also affect patients’ perception of their treatment outcome and therefore have an impact on the quality of life for those patients. Nerve dysfunction was not an important factor to affect patient satisfaction,<sup>24</sup> as was the deformity type, where all vertical maxillary excess patients and most of symmetrical deformities patients showed higher satisfaction, compared to those with asymmetrical deformities. A finding that could be related to the lower satisfaction with the esthetic component of the treatment outcome for those complex types of dentofacial deformities. This underlines the importance of improved esthetics, which motivates many of the patients scheduled for these operations.<sup>25</sup> Patients were less satisfied one year after operation than those with a shorter period postoperatively. Kiyak et al<sup>4</sup> reported a similar pattern of change in satisfaction among their patients and thought that it was due to the expectations of patients that the operation will improve their overall facial features, their physical and psychological characteristics.

In the second part of the questionnaire, patients reported improvement in oral function, health, appearance, and interpersonal relationships compared to the preoperative and immediate stages. This is in accordance with many studies, which indicate that patients achieve psychosocial benefits as a result of treatment including improved self-confidence, body and facial image, and social adjustment.<sup>8</sup>

In conclusion, despite the high patient satisfaction with orthognathic surgery, several factors such as the TMJ function could adversely affect patients' psychosocial adjustment after treatment. Accurate and sufficient information for patients on the course of treatment are required to improve satisfaction. Attempts to control the impact of these factors could have a favorable influence on the patient's quality of life. However, future studies with longer follow-up periods and a larger sample size are required to examine changes in patients' satisfaction and perception of outcome after undergoing orthognathic treatment.

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