

# Motivation for and satisfaction with orthodontic-surgical treatment: a retrospective study of 28 patients

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**SUMMARY** Motivation for starting treatment and satisfaction with treatment results were evaluated on the basis of replies to a 14-item questionnaire and clinical examination of 28 orthognathic patients from 6 months to 2 years after treatment.

The most common reasons for seeking professional help were problems in biting and chewing (68 per cent). Another major reason was dissatisfaction with facial appearance (36 per cent). Many patients also complained of temporomandibular joint symptoms (32 per cent) and headache (32 per cent). Women (8/19) were more often dissatisfied with their facial appearance than men (2/9), but the difference was not statistically significant.

In agreement with earlier studies, the results of orthognathic treatment fulfilled the expectations of almost every patient. Nearly 100 per cent of the patients (27/28) were satisfied with treatment results, although 40 per cent experienced some degree of numbness in the lips and/or jaw 1 year post-operatively. The most satisfied patients were those who stated temporomandibular disorders as the main reason for seeking treatment and whose PAR-index had improved greatly.

The majority of the patients experienced the orthodontic treatment as painful and as the most unpleasant part of the whole treatment, but all the patients were satisfied with the pre-treatment information they were given on orthodontics.

Orthodontic-surgical therapy should be of a high professional standard technically, but the psychological aspects are equally important in the treatment protocol. The professionals should make efforts to understand the patient's motivations for and expectations of treatment. Patients should be well prepared for surgery and supported for a long time after to help them to adjust to post-surgical changes.

## Introduction

Orthodontic treatment of children produces only small, gradual changes in facial structures and the effect of these alterations is combined with growth changes. Orthodontic-surgical treatment of adults leads to rapid alterations in facial appearance and in the functions of the jaws such as respiration, swallowing, speech, and chewing (Kiyak *et al.*, 1982a). Therefore, in orthodontic-surgical treatment the motivation of the patient for seeking treatment and her/his expectations of the results should be considered carefully in treatment planning.

The aim of orthodontic-surgical treatment is to accomplish improved functional occlusion and facial appearance (Jensen, 1978; Cunningham *et al.*, 1995). The follow-up studies indicate that 80–95 per cent of patients are satisfied with treatment results; chewing ability improves in 40–80 per cent and facial appearance in 50–90 per cent (Hutton, 1967; Crowell *et al.*, 1970; Laufer *et al.*, 1976; Olson and Laskin, 1980; Rittersma *et al.*, 1980; Kiyak *et al.*, 1982b, 1984; Jacobson, 1984; Nagamine *et al.*, 1986; Athanissou *et al.*, 1989; Kiyak and Bell, 1991; Finlay *et al.*, 1995; Cunningham *et al.*, 1996a,b). Although proper functioning of the jaws is highly valued

in orthodontic-surgical treatment, satisfaction is usually high if the patient's expectations concerning facial appearance are also fulfilled (Jacobson, 1984; Flanary, 1992).

A considerable number of patients (60–80 per cent) experience post-surgical depression of short duration as part of the difficulties in adjusting to their new appearance (Frost and Peterson, 1991; Cunningham *et al.*, 1996b). Awareness of the possibility of post-surgical depression helps the patient to deal with it (Peterson and Topazian, 1980; Kiyak *et al.*, 1985; Stewart and Sexton, 1987). Post-surgical orthodontic treatment lasting more than 6 months has been shown to increase the tendency to depression and anxiety in orthodontic-surgical patients (Kiyak *et al.*, 1982b, 1985).

Reports on how patients experience orthodontic-surgical treatment are lacking in Finland, although from 1978 to 1992 this treatment approach has increased 10 fold (Lehtimäki, 1978). The aim of this study was to determine the motivation for orthodontic-surgical patients seeking treatment at the Institute of Dentistry, University of Turku, to analyse how the patients experienced the treatment protocol and to compare patient satisfaction with the professional criteria of the treatment result.

## Material and methods

A questionnaire and an invitation to a clinical examination were sent to 30 orthodontic-surgical patients treated during the period 1987–1993 by graduate students in orthodontics at the Institute of Dentistry of the University of Turku. None of the patients was treated by the author (LN), who carried out the follow-up study.

Two of the patients neither returned the questionnaire nor arrived for the examination. Thus, 19 women and nine men participated in the study. The mean age at the time of the examination was 31 years, range 18–46 years. Pre-treatment diagnoses of the craniofacial deformities are shown in Table 1. All patients had pre-operative orthodontics with fixed appliances. The surgical techniques are given in Table 2. Four patients had a follow-up period of 6 months, the others from 11 months to 2 years 10 months.

**Table 1** Diagnoses of the orthodontic-surgical patients.

	<i>n</i>	%
Mandibular retrognathism	13	46*
Mandibular prognathism	9	32*
Mandibular asymmetry	2	7
Maxillary retrognathism	2	7
Open bite	2	7

\*One subject in each of these categories also had an open bite.

**Table 2** Surgical procedures.

	<i>n</i>	%
Bilateral sagittal split osteotomy	13	46*
Vertical ramus osteotomy	4	14
Le Fort I osteotomy	2	7
Bimaxillary osteotomy	9	32

\*Two of these subjects also had a mandibular segment osteotomy.

Intermaxillary fixation was used in four patients. At the time of the examination three patients wore fixed appliances, the others were in the retention phase or in post-retention observation.

Motivations for starting treatment, patients' opinions regarding different treatment procedures, and personal satisfaction with treatment results were evaluated on the basis of replies to a 14-item questionnaire sent to the patients and collected on the examination day. Yates-corrected chi-square test was used to analyse the statistical significance of the differences. The questions are shown in detail in Table 3.

The clinical examination included alginate impressions for plaster models, a wax wafer to record centric occlusion, registration of the functional status of the temporomandibular joints and the masticatory muscles, and a lateral cephalometric radiograph. The records from the follow-up examination were compared with the respective pre-treatment records to evaluate the treatment outcome objectively with professional criteria.

**Table 3** Questionnaire (choices of answer in parentheses).

1. Why did you seek orthodontic-surgical treatment? (Dissatisfaction with facial appearance/eating difficulties/temporomandibular joint problems/symptoms from head/other reason)
2. Were the different treatment alternatives explained to you clearly? (yes/no/I don't know)
3. Did you experience pain during orthodontic treatment? (yes/no)
4. How did you feel about anaesthesia? (an open question)
5. Had you numbness in the lips and/or jaw after operation (yes/no), for how long?
6. (a) Have you noticed a change in chewing ability (yes/no)?  
(b) If your answer was yes, has the chewing ability improved/worsened/I don't know?
7. (a) Have you noticed a change in your appearance? (yes/no)  
(b) If your answer was yes, has your appearance improved considerably/slightly/worsened/I don't know?  
(c) Had you difficulties in adjusting to your changed appearance? (yes/no/I don't know)
8. Have your relatives and friends noticed the change in your facial appearance (yes/no), and how?
9. (a) Were you given adequate information about different treatment procedures?  
(sufficiently/reasonably/far too little)  
(b) I would have wanted more information concerning (an open question)
10. Have you noticed any change in your self-confidence? (yes/no) If your answer was yes, what kind of change?  
(an open question)
11. What was the most unpleasant part in the whole treatment? (an open question)
12. How satisfied are you with the treatment result? (Very satisfied/reasonably satisfied/not satisfied)
13. Treatment results were better/as good as/worse than I expected?
14. Would you undergo the same surgery again? (yes/no /I don't know)

The improvement in the anatomical occlusion was assessed by comparing the plaster models with the PAR index (Richmond *et al.*, 1992a).

At the clinical examination, the values of the maximal movements of the mandible, the amount of horizontal, vertical, and lateral slide of the mandible from the retruded to the intercuspal occlusion (RP-IP), and the number and type of the occlusal contacts on latero-, medio-, and pro-trusion were compared with the respective pre-treatment values using norms by Helkimo (1974).

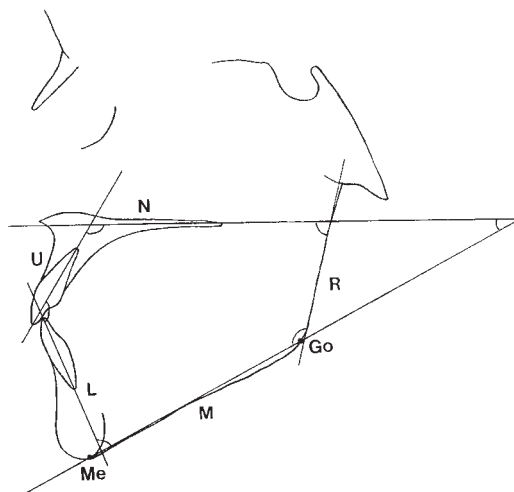
The lateral cephalometric radiographs were analysed using the cephalometric analysis of Koskinen and Koski (1965). Cephalometric points, planes, and angles are shown in Figure 1.

## Results

### *Motivations for seeking treatment*

In the sample of 28 orthodontic-surgical patients the most common reasons for seeking professional help were problems in biting and chewing (68 per cent). Another major reason was dissatisfaction with facial appearance (36 per cent). Several patients also complained of temporomandibular joint symptoms (32 per

cent) and symptoms from the head, mainly headache (32 per cent) (Table 4). Nearly half of the women (8/19) were dissatisfied with their



**Figure 1** Points, planes and angles used in the cephalometric analysis. Menton (Me), lowest point of the mandibular symphysis; gonion (Go), mid-point of the curvature between the lower border of the mandible and the posterior border of the ramus. Palatal plane (N), a tangent to the nasal floor. Long axis of upper incisors (U). Long axis of lower incisors (L). Mandibular plane (M), a line connecting the points Me and Go. Ramus plane (R), a tangent to the posterior border of the ramus excluding the condyle.

**Table 4** Reasons for seeking orthodontic-surgical treatment.

	<i>n</i>	%*
Dissatisfaction with facial appearance	10	(36)
Eating difficulties	19	(68)
Temporomandibular joint problems	9	(32)
Symptoms from head	9	(32)
Other reason	10	(36)

\*A patient stated one or more reasons.

facial appearance, whereas two men out of nine were of that opinion, although the difference was not statistically significant (Yates-corrected chi-square = 0.36, NS). Nearly every man (8/9) had difficulty in eating, while women experienced this less frequently (11/19). However, regarding the frequency of temporomandibular symptoms, there was no statistically significant sex difference (men 2/9, women 7/19; Yates-corrected chi-square = 0.60, NS).

#### *Patients' perceptions of different treatment procedures*

Nearly all patients (26/28) were of the opinion that, at the beginning of treatment, they had received sufficient information about the different alternatives available to treat their malocclusion. The information concerning treatment procedures was sufficient for 18 patients, satisfactory for eight patients and far too little for two patients. Information on orthodontic treatment procedures was satisfactory for all the patients, while six patients would have liked more information about surgery and the possible complications involved. Before surgery, two patients would have liked to speak with someone who had undergone a similar operation.

The majority of the patients (22/28) perceived the orthodontic treatment as painful. The experience of anaesthesia was not unpleasant for 22 patients, whereas the others either felt sick or the recovery stage was difficult and unpleasant.

The most unpleasant part of the whole treatment was the orthodontic appliance (its visibility, the pain involved and the length

of orthodontic treatment) for 10 patients, the immediate post-operative period (swelling, bleeding, pain, numbness, dietary problems) for eight patients, intermaxillary fixation for three patients (four had IMF), a new operation for two patients, a surgical splint (its visibility, the speech difficulties it caused) for two patients, and a scar on the upper lip as a complication of surgery for one patient.

#### *Patients' feelings after orthodontic-surgical treatment*

Almost every patient (27/28) had numbness in the face post-operatively, lasting less than 6 months in 10 patients, 6 months to 1 year in five patients and over a year in 11 patients.

Improvement in biting and chewing ability had been noticed by 20 patients.

Four patients were of the opinion that their facial appearance had improved considerably, while a slight improvement was noticed by 15 patients and one patient felt that her facial appearance had worsened. Three patients had experienced difficulties in adjusting to their changed appearance, but the majority (22/25) had no adjustment problems. The relatives and friends of 21 patients had commented on the post-surgical change in facial appearance, usually positively. Only one patient had received negative comments from her relatives; neither was she herself pleased with the change in her facial appearance.

Nine out of 28 patients had perceived an increase in self-confidence.

#### *Patient satisfaction with the treatment outcome*

The majority of patients (27/28) were very or reasonably satisfied with the treatment outcome. The most satisfied patients were those whose main motivation for seeking treatment was temporomandibular disorders (Table 5). The achieved treatment results were better than expected in 10 patients, while 17 patients considered the results as good as they expected. One patient thought that her expectations had not been fulfilled, and she was dissatisfied with the treatment outcome. Her PAR-index,

**Table 5** The patient satisfaction at the end of treatment/the main reason for seeking treatment.

	Dissatisfaction with facial appearance	Temporomandibular joint problems and eating difficulties
Very satisfied	2	12
Reasonably satisfied	4	5
Not satisfied		1

Four patients could not be placed into either of these categories due to varying reasons for seeking treatment. They were very or reasonably satisfied at the end of treatment.

**Table 6** The patient satisfaction/the improvement of PAR-index.

	Worse/ no different	Improved	Greatly improved
Very satisfied	3	14	
Reasonably satisfied	5	4	
Not satisfied		1	

Assessment using the PAR-index was not undertaken for one patient due to missing molars.

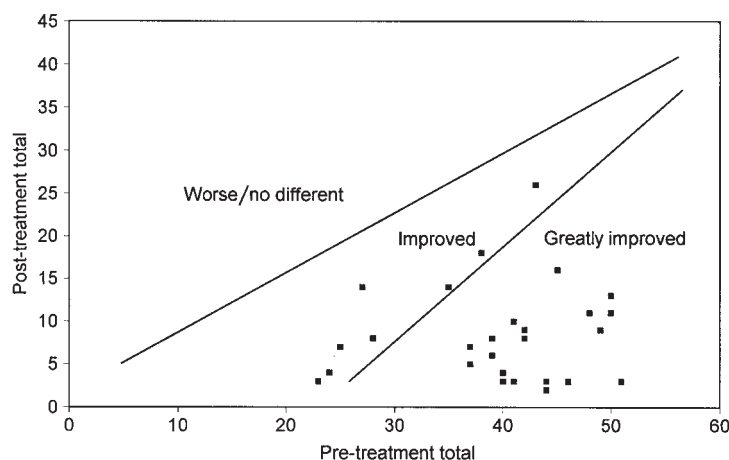
however, showed, that her occlusion had greatly improved (Table 6). Out of the 28 patients, 17 would be willing to undergo the surgery if they faced the same situation again, one would not undergo surgical treatment again, and 10 were unsure in their answer.

### *Professional evaluation of the treatment results*

**Dental cast analysis.** The PAR-index and the nomogram showed that the anatomical occlusion had improved in all the patients; the mean percentage reduction in weighted PAR score was 78 per cent, and 70 per cent (19/27) of the patients had a considerable improvement. The pre-treatment models of one patient could not be studied reliably (Figure 2).

**Functional analysis.** Maximal opening and lateral movements of the jaw were almost the same before and after surgery.

About two-thirds of the patients had  $\geq 1$  mm horizontal and vertical slide between RP and IP pre-surgically, but post-surgically only 10 per cent of the patients had such a slide. Seventeen patients had mediotrusive interferences before and 12 patients after surgery. Five patients had

**Figure 2** The PAR-nomogram showing the improvement of the anatomical occlusion of 27 orthodontic-surgical patients.

canine guidance in laterotrusion before and 18 patients after surgery. Five patients had incisor guidance and symmetrical protrusion before, and 16 patients after surgery.

*Cephalometric analysis.* The cephalometric analysis (Koskinen and Koski, 1965) revealed that the number of patients, whose cephalometric dimensions were pre-surgically two standard deviations outside the mean values, had decreased. This was true especially in the inclination of the lower incisors, and in the angle between the mandibular and the palatal planes.

## Discussion

In this study the sample size was rather small. In a sparsely populated country, such as Finland, the number of possible candidates for orthodontic-surgical treatment is limited. In addition, orthognathic surgery is considered as a treatment of choice only for those patients in whom the other treatment options would compromise the treatment. The severity of cases may explain why dissatisfaction with chewing was a more common reason for seeking treatment than dissatisfaction with facial appearance.

A wish for improved facial aesthetics is another major reason for seeking treatment (Jensen, 1978; Finlay *et al.*, 1995), especially in patients with mandibular prognathism (Laufer *et al.*, 1976; Heldt *et al.*, 1982). A prognathic mandible is aesthetically more disturbing than a retrognathic mandible; patients with mandibular deficiency can 'improve' their facial appearance by posturing the jaw forward. In earlier studies (Peppersack and Chausse, 1978; Kiyak *et al.*, 1981; Flanary *et al.*, 1985; Athanisiou *et al.*, 1989) women had more aesthetic expectations of treatment than men. However, this difference was not statistically significant in our sample.

The gender distribution in the sample was typical for orthodontic-surgical patients; twice as many females as males (Hutton, 1967; Olson and Laskin, 1980; Jacobson, 1984; Proffit *et al.*, 1990).

One-third of the patients were of the opinion that they would have liked to have more information about surgery. It seems that, in addition to verbal information, the patient

should be given written information concerning surgical treatment procedures (Rittersma *et al.*, 1980; Flanary and Alexander, 1983; Garvill *et al.*, 1992; Finlay *et al.*, 1995; Cunningham *et al.*, 1996a,b) and the surgeon carrying out the operation should explain the course of surgical treatment and prepare the patient psychologically for the surgery. For patients who would like to speak with somebody who has undergone the operation, such an opportunity should be arranged. On the other hand, the amount of pre-surgical information has to be planned individually, since all patients do not want to hear a detailed explanation of the operation and the possible complications in advance. In this sample, two patients wanted to hear details about the surgery only afterwards.

Adult patients experience pain associated with orthodontic appliances. In this sample, 22/28 patients had considerable pain in connection with orthodontic appliances and one-third of the patients experienced orthodontic therapy as the most unpleasant part of the whole treatment. Intermaxillary fixation (IMF) has previously been reported as the most unpleasant experience (Hillerström *et al.*, 1971; Laufer *et al.*, 1976). In this sample, four patients had IMF from 5 to 8 weeks, while the others had rigid screw fixation. Six patients had to undergo a further operation to correct the position of the condylar head, but only two of them experienced the second operation as the most unpleasant event.

The majority of the patients (71 per cent) observed an improvement in chewing ability post-surgically. This result is in agreement with earlier studies, where reported results vary between 40 and 80 per cent (Rittersma *et al.*, 1980; Kiyak *et al.*, 1982b, 1984; Jacobson, 1984; Nagamine *et al.*, 1986; Athanasiou *et al.*, 1989; Kiyak and Bell, 1991). As the result is based on subjective assessment by the patients, it is impossible to say whether a real improvement in chewing ability had occurred.

A surprisingly small proportion of the patients (4/28) were of the opinion that their facial appearance had improved considerably, although the relatives and friends of 21 patients had noticed the facial change. The comments which patients receive from those close to them



concerning their changed appearance affect their satisfaction with treatment (Holman *et al.*, 1995). In this study, the patient who was dissatisfied with her facial appearance, had received negative comments about her 'new facial appearance'. This suggests that a patient's family members should also be informed about the facial changes resulting from surgery. Perhaps new video-imaging computer programs may better visualize different treatment alternatives for the patient, but they may also create false expectations.

In accordance with the results of earlier studies, the outcome of orthodontic-surgical treatment fulfilled the expectations of almost every patient. Nearly 100 per cent of patients were satisfied with treatment results, although 40 per cent had some degree of facial paraesthesia 1 year after surgery. The most satisfied patients were those who had undergone treatment because of temporomandibular disorders and whose PAR-index had improved greatly (Tables 5 and 6).

In this sample one patient was dissatisfied with the treatment outcome. She had experienced complications during treatment and a further operation was performed to correct the position of the condyle.

Several methods to evaluate anatomic occlusions objectively were considered at the beginning of the study. The PAR-index, which has been developed for the assessment of the treatment outcome in orthodontic patients, was also considered suitable for assessing orthodontic-surgical treatment results since the features, which are weighted in this index, overjet, overbite, and centreline discrepancies, are problems presented by most orthodontic-surgical patients, although secondary to the skeletal discrepancy. These are also the features the patients see themselves. The PAR-index using a nomogram seems a practical and objective method of analysing the dentoalveolar morphological aspects of orthodontic-surgical treatment on dental casts. According to these criteria, the patients were in clear need, since 70 per cent had greatly improved occlusion, and none belonged to the 'worse or no different' category following treatment. The treatment of the studied patients has been of a high standard since the mean percentage reduction of PAR

score was 78 per cent. A reduction greater than 70 per cent is considered to demonstrate a high standard of treatment (Richmond *et al.*, 1992b).

Post-surgically the patients also had improved occlusion when assessed on the functional criteria of Helkimo (1974). However, 12 patients had mediotrusion interferences at the time of the examination, even though the occlusion had been balanced post-surgically. The occlusion seems to stabilize slowly after treatment.

## Conclusions

Good technical management of orthodontic-surgical treatment is mandatory, but equally important is a good patient–dentist relationship. By interviewing and listening to the patient the clinician should get an understanding of the patient's motivations for seeking treatment and learn what she/he really expects from the treatment. Moreover, practitioners carrying out orthodontic-surgical treatment should learn to distinguish those patients who require professional psychological consultation, if the available resources are not sufficient to send all the patients for psychological evaluation before commencing orthodontic-surgical treatment. The patient must be prepared for surgery individually and must be supported for a long time post-surgery to help her/him adjust to the post-surgical changes.

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