

Association between quality of life and severity of profile deviation in prospective orthognathic patients.

Abstract

Aim: to evaluate whether severity of skeletal facial profile deviation assessed by professionals associates with quality of life and psychosocial factors in orthognathic patients with dentofacial deformities and prospective orthognathic treatment.

Materials and method: The study consisted of 55 patients admitted to orthognathic treatment. Skeletal profile was assessed from lateral head films using cephalometric analysis. The following angles were used to assess the sagittal position of upper and lower jaw and profile: SNA, SNB and ANB. For vertical assessment, gonial angle and the angle between SN- and mandibular-plane were used. Merrifield's Z-angle was used to assess soft tissue profile. Severity of skeletal facial profile deviation was assessed with deviation in ANB-angle. Orthognathic quality of life (OQoL) and psychosocial factors were defined with four questionnaires: Orthognathic Quality of Life Questionnaire, Symptom Checklist -90, Rosenberg Self-Esteem Scale, and a body image questionnaire.

Results: Increase in ANB-deviation was associated with increased awareness of dentofacial deformity (Orthognathic Quality of Life Questionnaire subscale awareness of dentofacial deformity, OQLQ-AoDD, $r=0.319$, $p=.017$). OQOL-AoDD was not found to be equal when ANB-angle was divided into three different categories ($\chi^2=6.78$, $p=.034$): G1) ANB = 0-4 degrees G2) ANB < 0 degrees and G3) ANB > 4 degrees. Furthermore, categories G1 and G2 differed significantly ($U=50.5$, $p=.017$). Increase in ANB-angle was also associated with a more positive body image ($r=.342$, $p=.023$). There were no significant correlations between other cephalometric variables, quality of life and psychosocial factors.

Conclusion: Skeletal facial profile seems to associate with some aspects of orthognathic quality of life. Professional cephalometric analysis of the severity of facial profile deviation correlates with patients' awareness of their own facial and dental appearance. Patients with more deviating skeletal profile are more aware of their dentofacial deformities compared to patients with normal values.

Introduction

Orthognathic treatment is accepted worldwide as an option for rehabilitation of severe malocclusions and dentofacial deformities. The treatment aims to harmonize occlusion and jaw function. In addition, it should also focus on improving patients' psychological status and well-being (1, 2, 3). It is commonly acknowledged, that orthognathic treatment can positively affect quality of life (4, 5). Furthermore, it has been reported that this treatment is beneficial for psychosocial factors such as self-esteem, self-confidence, body and facial image and social adjustment (6).

Patients' motives to seek orthognathic treatment vary from functional issues to aesthetic and psychosocial factors (7, 8, 9). Functional issues are often related to occlusion, TMD-symptoms, difficulties in speaking and eating or obstructive sleep apnea (10). Also, headache and facial pain may result in seeking treatment (11). Facial aesthetics seems to positively correlate with career development, peer relations, social status and acceptance, body image and self-esteem (12).

Particularly women seek treatment for aesthetic reasons (13).

Patients with severe malocclusion more often suffer from severe psychosocial problems compared to those with milder occlusal deformity (14, 15). Despite correction of severe malocclusions, Oland et al. (2011) stated that alterations in skeletal facial profile do not associate with post-operative satisfaction. Furthermore, skeletal profile may not be the reason for seeking treatment (7). In general, it is reported that patients are satisfied with orthognathic treatment only few are dissatisfied (16).

The World Health Organization's definition of health (1948) declares: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (17). Clearly, this ideal state cannot be fully achieved. Conception of health is strongly subjective, thus also awareness of facial deformities and their significance can largely vary. Patients with severe malocclusion can be satisfied with their appearance, while minor irregularities can cause significant dissatisfaction to others (18). Therefore, it is unclear whether objective measuring of certain individual health-related parameters could produce reliable information of health in general. The aim of this study was to clarify whether severity of skeletal facial profile deviation assessed by professionals associates with quality of life and psychosocial factors in patients with dentofacial deformities and prospective orthognathic treatment.

Material and methods

Material

This study consisted of 55 patients (15 male and 40 female, age range: 17-61 years) admitted in to orthognathic treatment at two university hospitals, [REDACTED]

[REDACTED] Patients with cleft lip or palate, any syndromes and those whose insufficient Finnish language skills did not allow them to complete the questionnaires were excluded from the study.

Methods

The evaluation of skeletal malocclusion and profile was performed from lateral head films taken prior to or immediately after the first clinical appointment with the orthodontist. Cephalometric analysis was made by one orthodontist using Winceph-software (Winceph, Rise Corporation, Japan). To assess the sagittal position of upper and lower jaw and profile the following angles were used: SNA, SNB and ANB. For vertical assessment, gonial angle and the angle between SN- and the mandibular-plane were used. Merrifield's Z-angle was used to assess soft tissue profile (19). (Figure 1).

The severity of skeletal facial profile deviation was defined based on deviation from the normal ANB-angle, which in the present study was 2 degrees (reference value). Skeletal profile deformity increases as the ANB-angle deviation value increases (Table 1). This evaluation method does not take into account the direction of sagittal malpositioning of the jaw (i.e. mandibular retrognathia or prognathia).

The severity of deviation in facial profile was also stratified in three categories: G1) Normal sagittal relationship, ANB = 0-4, G2) Mandibular prognathia or/and maxillary retrognathia with sagittal Class III relationship, ANB < 0 and G3) Mandibular retrognathia and/or maxillary prognathia with sagittal Class II relationship, ANB > 4.

Patients were asked to assess their own dental appearance on a visual analogue scale (a modified AC scale). The scale was anchored at both ends with a colour photograph from the Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN) (20), with photograph number one indicating a good, attractive occlusion with no treatment need and photograph number ten indicating a definite treatment need based on aesthetics.

Psychosocial well-being, self-esteem and quality of life were assessed with four separate questionnaires: 1) a modified version (21) of the body image questionnaire (22) was used to assess patients' satisfaction towards different body parts. Higher scores in this 20-item questionnaire indicate higher satisfaction. 2) The Orthognathic Quality of Life Questionnaire (OQLQ) (23)

divided into four subscales (oral function, facial aesthetics, awareness of dentofacial aesthetics, and social aspects of dentofacial deformity) was used to evaluate patients' orthognathic quality of life. Higher scores in this 22-item questionnaire indicate poorer orthognathic quality of life (OQoL). 3) The Rosenberg Self-Esteem Scale (RSES)(24). Higher scores in this 10-item questionnaire indicate higher self-esteem. 4) Symptom Checklist 90 (SCL-90) (25) is a self-reported psychiatric questionnaire. Higher scores indicate a greater number of psychiatric symptoms. Patients received the RSES, OQLQ and SCL-90 by mail prior to the first clinical appointment and returned the filled in questionnaires at the first visit. On this occasion patients received the modified body image questionnaire, which was returned at the next appointment.

Statistical analysis

Correlations between ANB-deviation and patients' SCL-90 GSI and different subscales of OQLQ were evaluated with Spearman's rank correlation coefficient. Differences between ANB groups and OQLQ subscale awareness of dentofacial deformity (OQLQ-AoDD) were calculated with the Kruskal-Wallis test. The Mann-Whitney U-test was used to estimate differences between ANB-groups and OQLQ-AoDD. Correlation between body image and ANB-angle as a continuous variable was calculated with Spearman's rank correlation coefficient.

Correlations between all other cephalometric variables and quality of life and psychosocial factors were evaluated using Spearman's rank correlation and Pearsons correlation coefficients.

All analyses were performed with IBM SPSS Statistics, version 24. Statistical significance was set at $p=0.05$.

Ethical aspects

This study was approved by the Ethics Review Committees of the Hospital District of South-West Finland (ETMK 80/180/2009) and the Joint Municipal Authority of the Pirkanmaa Hospital District (ETL R0181). All patients signed informed consent and participation in this study was voluntary.

Results

Correlations with ANB-deviation

Statistically significant positive correlation was found between OQoL-AoDD and ANB-deviation ($r=0.319$, $p=.017$). Patients with larger deviation in skeletal profile are more aware of their dentofacial deformities. There were no significant correlations between other OQoL subscales and ANB-deviation (Table 2).

Differences between ANB-categories

OQoL-AoDD was not found to be equal when ANB-angle was divided into three different groups ($\chi^2=6.78$, $p=.034$). Groups G1 and G2 differed significantly ($U=50.5$, $p=.017$). It seems that patients

with a negative ANB-angle (G2) have a higher awareness of their abnormal facial profile compared to patients with a ~~positive~~ normal ANB-angle (G1).

Correlations with ANB-angle

There was also a positive correlation between body image and ANB-angle, when ANB-angle was considered as a continuous variable ($r=.342$, $p=.023$). Patients with smaller ANB-angle are less satisfied of their body image. On the contrary, the ANB-angle and self-estimated dental appearance did not correlate.

Correlations with other cephalometric angles

A significant negative correlation between SNB and OQOL subscale function ($r = -.277$, $p = .047$) and between Merrifield's soft tissue angle Z and OQOL function ($r=-.287$, $p = .039$) was seen when evaluated with the Pearson correlation coefficient.

Other ~~measured~~ included cephalometric variables had no correlations with quality of life and psychosocial factors.

Discussion

This study was undertaken to analyse the association between severity of skeletal facial profile deviation, quality of life and psychosocial factors among ~~orthognathic~~ orthognathic patients with dentofacial deformities. The possibility to evaluate patients' quality of life based on lateral head films and cephalometric analysis was also studied. According to these results the severity of skeletal facial profile deviation correlates with some aspects of patients' quality of life and psychosocial factors. The association between OQLQ-AoDD and ANB-deviation indicates that professional cephalometric evaluation of the severity of skeletal facial profile deviation correlates with patient's awareness of their own facial and dental appearance. However, it does not correlate with subjective aesthetic discomfort, experiences and behaviour in social interaction, psychological burden and functional aspects in life.

This study showed that patients' self-evaluated need of treatment was not associated with objectively measured deviation of the skeletal facial profile. One explanation for this could be that patients' subjective view of the need for treatment is based on comparison of ones' dental outlook to the Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN) model photographs (26). In this evaluation, the skeletal component of the facial profile has not been taken into account, which may have an effect on the results.

In this study ANB angle deviation positively correlated with OQLQ-AoDD. Thus, it seems that patients with a negative ANB-angle (G2) have a higher awareness of their abnormal facial profile compared to patients with a ~~positive~~-normal ANB-angle (G1).

It has previously been shown that facial deformities have a comprehensive functional impact on patients' lives (27), and the current findings are in line with this suggestion.

There are no previous reports indicating the relationship between severity of skeletal profile deviation, quality of life and psychosocial factors in patients with dentofacial deformities - Stables et al. reported that gender and the amount of overjet associate with poorer patient-reported OQoL (28), but the connection between skeletal profile and quality of life was not analysed. Severe malocclusion and abnormal dental appearance have been reported to have a negative effect on quality of life whereas the effect of orthognathic treatment on life quality seems to be positive (7, 8, 9). Furthermore, changes in facial profile during orthognathic treatment have been reported to have a positive effect on the quality of life (29). The results reported here are somewhat expected due to the fact that malocclusion and dental abnormalities generally affect quality of life. One could assume that evaluation of one's own facial profile abnormality is difficult for the patient and that the severity of possible abnormality would not be significant because the patients observes his/her face ~~profile~~ mainly directly from frontal projection (18). Results in this study show that these patients indeed identify the level of abnormality in their appearance and it has some effect on the quality of their lives.

It is generally known that attractiveness is related to facial profile and that facial aesthetics are an important factor in daily social interaction (30). Nevertheless, results in the present study showed no correlation between the severity of facial profile abnormality and subjective experience of facial aesthetics. In most previous studies, a concave profile is considered less attractive (23, 29, 31). A straight profile is more preferred among the male gender and a slightly convex profile among the female (18). In the present study, patients with concave profiles (negative ANB) had higher awareness of their facial and dental appearance compared to others. One explanation could be the fact that the aesthetic deformity, mainly anterior crossbite, caused by a concave profile is easier to detect when observing one's own mirror image from a directly frontal projection compared to a convex profile.

It is noteworthy that the attractiveness of the facial profile is in many cases estimated differently by the orthodontists and patients. Education, guidelines, norms, ideal ratios and angles guide orthodontists' perception of facial aesthetics and may result in orthodontists being more sensitive to the deviations from an ideal aesthetic profile (18, 32, 33). Moreover, facial attractiveness is mainly evaluated by peers and it is related to cultural background and the prevailing concept of beauty (30,

34, 35). Is it possible for an orthodontist to estimate quality of life based on standard cephalometric analyses? According to our study the professional view only correlates with a patient's subjective awareness of the severity of his/her facial profile abnormality.

This study has some clear limitations. Transversal skeletal asymmetry cannot be reliably estimated from lateral head films and also the vertical malocclusion is not clearly visible in lateral projection. The result of this is that some of the skeletal malocclusions may have been left undetected. The strength of this study derives from a relatively large and well-defined patient cohort. Furthermore, the orthognathic quality of life and psychosocial factors have been estimated using comprehensive, generally accepted and validated questionnaires. Cone beam CT or AP-radiographs should be obtained in future studies in order to overcome this limitation.

Conclusion

Skeletal facial profile seems to associate with only some aspects of quality of life. Professional cephalometric analysis of the severity of facial profile deviation correlates with patient's awareness of their own facial and dental appearance compared to others. Patients with more deviating skeletal profile are more aware of their dentofacial deformities compared to patients with normal values.

Conflict of interest

None to declare

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Figure legends

Figure 1. Cephalometric points and angles used in analysis.

Table 1. ANB-Angle in degrees versus calculated ANB-Deviation

Table 2. Correlations between OQOL subscales and ANB-deviation according to Spearman's rank correlation coefficient

