



Perception and Satisfaction of Patients Treated with Orthodontic Clear Aligners

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Abstract

Since their appearance, studies about aligners were focalized on the description, the operating mode, the biomechanics and the efficacy of this system. However, there aren't many published articles about patient satisfaction. Our main goal was to evaluate the perception and satisfaction of patients treated by orthodontic aligners in the private sector of Casablanca in Morocco in order to shed light on the strong aspects and weaknesses of this type of treatment. This descriptive cross-sectional study was conducted by interrogating 68 patients in exclusive orthodontic practices in Casablanca. 93.7% of patients were satisfied to very satisfied with the global duration of the treatment and 92.7% were satisfied to very satisfied with the time necessary to see the first results. 91.2% of patients were satisfied with the current results of the treatment. The main troubles caused by wearing aligners were: problems with pronunciation and speech (48.5%) and mucosal injuries (19.1%). 63.2% of the patients using aligners felt pain, and 4.4% took analgesics for it. With the growing interest in aesthetic appearance, clear aligners represent an alternative to conventional fixed orthodontic treatments. Patients who received treatment with aligners were generally satisfied. Nevertheless, there were some inconveniences following the wearing of aligners.

Subject Areas

Dentistry, Orthodontics

Keywords

Orthodontics, Clear Aligners, Patients, Satisfaction, Perception

1. Introduction

Orthodontics has evolved over the past decades in order to improve the comfort

of the patient and the practitioner. Such a development was also accompanied by a significant increase in the aesthetic demands of patients [1]. Technological advances have enabled the evolution of orthodontic appliances with reduced visibility and increased acceptability. Plastic and ceramic brackets, lingual brackets, white-coated wires, and transparent tray aligners were introduced to the market to overcome the esthetic disadvantages of metal brackets [2].

The concept of clear aligners was introduced by Kesling in 1946 with a “tooth positioning” based on the use of a series of thermoplastic aligners to gradually move the teeth to improved positions. Kesling’s concept has inspired several practitioners for decades including Nahoum (1964), Ponitz (1971) and Sheridan, who associated, in the early 1990s, interproximal reduction or the use of composite attachments. However, Kesling’s concept required significant clinical and laboratory time.

With the significant recent improvements in computer-aided design and computer-aided manufacturing (CAD/CAM), Align Technology (Santa Clara, California) introduced the clear aligner treatment (CAT) in 1997, rendering Kesling’s concept a feasible orthodontic treatment option [2] [3].

Although there is moderate evidence supporting their effectiveness, clear aligners are gaining popularity by offering a more aesthetic, hygienic, and comfortable treatment alternative [3] [4].

For two decades, studies on aligners have focused mainly on the description of the system, the biomechanics specific to aligners and the efficiency in terms of predictability of dental movements. However, few published studies have been interested in patient satisfaction. As far as the authors are aware, there is no previous study evaluating perceptions of clear orthodontic aligners in Morocco. Thus, the main objective of the current study was to assess the satisfaction of patients treated with orthodontic aligners in the private sector in Casablanca in order to highlight the strengths and weaknesses of this treatment modality.

2. Methods

2.1. Type and Period of Study

A descriptive cross-sectional study was carried out on patients treated with orthodontic aligners in exclusive orthodontic practices in Casablanca from December 2018 to May 2019. The study was reviewed and approved by the Ethics Research Committee of Casablanca Dental School. All participants were informed about the different aspects of the study.

2.2. Sample Characteristics

Inclusion criteria:

They were included in our study patients treated with orthodontic aligners in exclusive orthodontic practices in Casablanca and patients who have worn orthodontic aligners for at least one month.

Exclusion criteria:

We excluded from our study patients with special needs and patients in the pretreatment phase for aligners.

2.3. Data Collection

Questionnaire elaboration

A questionnaire was developed including both closed questions answered by simple “yes” or “no” and multiple-choice questions. There were also questions answered by a 4-point Likert scale and some open-ended questions. The questionnaire included 4 distinct parts: general patient information, the choice of treatment, the patient-practitioner relationship and patient satisfaction with the aligner therapy (duration, aesthetics, comfort and pain).

Study's variables

Variables concerning general patient information: quantitative variables including patient's age in the number of years divided into 3 groups: Adolescents from 15 to 19 years old, Young adults from 20 to 39 years old, Adults from 40 to 62 years old and the sex of the patient (male or female). The professional status, which is a qualitative variable, was also recorded (student, free profession, company manager, employee, civil servant, unemployed).

Variables concerning the choice of treatment: qualitative variables including the reason for consultation (for orthodontics or other reasons), the person who motivated the choice of treatment, the reason for choosing treatment with aligners instead of another technique (invisibility, speed, comfort of the device, duration of treatment, ease of maintenance and hygiene) and expectations on quality of life.

Variables concerning the patient- practitioner relationship: qualitative variables about satisfaction with the explanations provided and satisfaction with the expected overall duration of treatment.

Variables concerning patient satisfaction with the aligner therapy: qualitative variables concerning the satisfaction of the patients with the current result, the aesthetics of the aligner and the attachments, the dental and facial aesthetics, the comfort and the ease of hygiene, the inconveniences and the pain caused by aligners.

2.4. Statistical Analysis

Data analysis was performed using Statistical Product and Service Solutions (SPSS) software. It was descriptive for all the variables. The qualitative variables were expressed in numbers and percentages.

3. Results

3.1. Socio Demographic Characteristics

68 patients meeting the inclusion criteria and the exclusion criteria were selected. 80.9% were female. The age of the patients ranged from 15 to 62 years with an average age of 34.7 years with 8.8% of adolescents, 55.9% of young adults

and 35.3% of adults. 23.5% were students, 30.9% were self-employed or company managers and 32.4% were employees.

3.2. Information of Orthodontic Treatment with Aligners

60.3% of patients had never had orthodontic treatment before and 25% of patients had already undergone orthodontic treatment with metal brackets. 55.9% of patients had knowledge of other orthodontic appliances.

Orthodontic treatment had started from 1 to 6 months for 31% of patients, from 7 to 12 months for 38.2% of the patients and had exceeded 12 months for the others.

73.5% of patients did not require extractions before starting treatment.

3.3. Factors of Choice for Aligner Treatment

57.4% of patients opted for aligner treatment on their own. The reasons for choosing this technique were mainly its invisibility (89.7%). 69.1% of patients expected an improvement in self-confidence following treatment with aligners (Table 1).

Regarding age distribution, 95.8% of adults chose the treatment for invisibility and 83.3% of teens expected to improve self-confidence.

3.4. Satisfaction with the Patient Practitioner Relationship

Patient satisfaction with the explanations about aligner treatment:

42.6% of patients were satisfied and 55.9% were very satisfied with the explanations provided regarding the treatment.

Satisfaction with treatment duration and the wear duration of each aligner:

41.2% of patients were satisfied and 25% were very satisfied with the overall duration of treatment. The wearing time of each aligner varied from one week to 3 weeks in our sample. 58.8% of patients were satisfied and 38.8% were very satisfied with the wearing time of each aligner.

3.5. Satisfaction with Aligner Treatment

Satisfaction with the aesthetics of the aligner treatment:

58.8% of patients were satisfied with the aesthetics of the attachments. 18.2% of women and 15.4% of men were unsatisfied with the aesthetics of the attachments.

According to age, 33.3% of adolescents and 21.1% of young adults were unsatisfied with the aesthetics of the attachments.

Satisfaction with the comfort provided by the aligner treatment:

60.3% of patients were satisfied with the comfort of the aligner and 51.5% of patients were satisfied with the ease of hygiene.

57.4% of patients were satisfied with the intervals between control sessions and 50% of patients were very satisfied with the duration of the chairside control.

Table 1. Choice factors for aligner treatment

Variables	Number	Percentage(%)
The person who motivated the choice of treatment		
Patient	39	57.4
Entourage	10	14.7
Patient et entourage	1	1.5
Practitioner	18	26.5
The reason for choosing aligners instead another technique		
Invisibility	61	89.7
Speed	19	27.9
Confort	26	38.2
Treatment duration	16	23.5
Ease of hygiene	35	35.5
Aligner treatment expectations on quality of life		
Work opportunity	5	7.4
Social interaction	24	35.
Self confidence	47	69.1

Satisfaction with the results of the treatment:

Our study showed that patients began to see treatment results from one month to 12 months. 60.3% of patients were satisfied with this duration, 64.7% were satisfied with the price-performance ratio and 91.2% were satisfied with the current treatment outcomes (**Table 2**).

Perception of inconveniences and pain caused by wearing aligners:

The main inconveniences observed by patients after wearing aligners were pronunciation and speech problems (48.5%), mucosal injuries (19.1%) and allergic reactions (17.6%). 29.4% of patients did not notice any inconvenience (**Figure 1**).

63.2% of the patients felt pain after wearing aligners. 42.6% of them felt pain when removing the aligner and 54.4% felt the pain for 1 to 2 days.

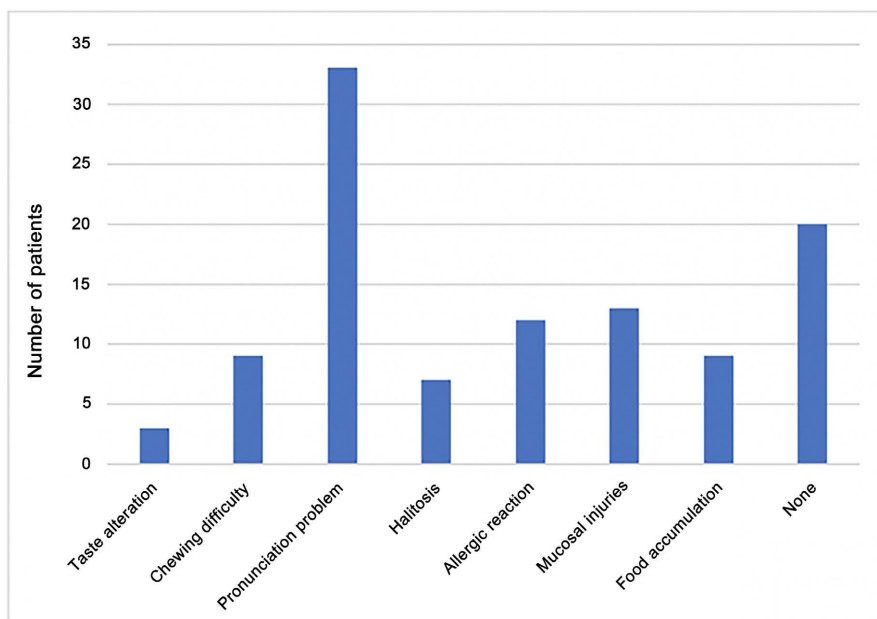
55.9% of the patients who felt pain were able to tolerate it and 4,4% took analgesics. Women tolerated the pain better (91.9%) compared to men (57.1%).

4. Discussion

Technological advances over the past decades have enabled the evolution of orthodontic appliances with reduced visibility and increased acceptability [2]. According to Ziuchkovski *et al.* [5], patients are willing to pay more for themselves and for their children in order to get more esthetic treatment options like aligners and lingual brackets. While numerous studies assessed the orthodontic

Table 2. Satisfaction with the results of treatment.

	Number	Percentage(%)
Improvement of teeth appearance	53	77.9
Improvement of facial aesthetics	26	38.2
Improvement of dental health		35.3
Improvement of self confidence	24	35.3
Improvement of chewing and pronunciation	24	8.8
	6	

**Figure 1.** Inconveniences caused by wearing aligners.

treatment with lingual appliances, few have yet assessed patient satisfaction with clear aligner therapy. To the knowledge of the authors, this is the first study evaluating the satisfaction of patients treated with orthodontic aligners in the private practice in Casablanca in order to highlight the strengths and weaknesses of this treatment modality.

Regarding the sex ratio, our findings showed a predominance of the female sex (80.9%) among patients treated with aligners. This predominance varies in similar studies from 52.4% to 78% [1] [6] [7]. The average age of the patients in our sample was 34.7 years. Several studies found that patients treated with orthodontic aligners are generally adults aged between 28 and 38 years [1] [6] [7]. 30.9% of the patients in our study were self-employed or company managers and 32.4% were employees. Meier *et al.* [8] found that 50.7% of patients seeking Invisalign treatment were employees.

39.7% of the patients in our study had previous orthodontic treatment. 73.5% of treatments were carried out without extractions while 26.5% were carried out with extractions. In fact, in the study by Hsiu-Ching Ko *et al.* [9], orthodontists

tended not to recommend Invisalign® for extraction cases or difficult cases.

As far as patient expectations are concerned, our study showed that patients expect, first, an improvement in self-confidence (69.1%), then an improvement in social interaction (35.3%). Women looked for improved social interaction at 38.2%, while 65.5% of men looked for improved self-confidence. On the other hand, adolescents expected improvements in self-confidence (83.3%).

The patients were overall satisfied with the information provided regarding their treatment (98.5%). This is in line with many studies which highlighted the importance of the patient-practitioner relationship for patient satisfaction [1] [10].

Satisfaction with the duration of treatment was around 70.6% in our study. Meier *et al.* [8] reported that 41% of patients accepted a treatment duration of 1.5 years and 25% accepted up to 2.5 years. Patients in our study were generally satisfied with the duration of wearing each aligner (98.5%). The wearing duration varied between one week (32.4%), 10 days (30.9%) and 2 weeks (32.4%). In fact, in the literature, the recommended wearing duration for an aligner was 2 weeks [11]. Sarah Alansari *et al.* [12] found that vibrational stimulation for 5 minutes per day can reduce the interval between aligner changes without affecting treatment effectiveness.

91.2% of our patients were satisfied with the current results of clear aligner therapy. A similar level of satisfaction was reported by many studies [6] [13]. One of the biggest benefits of aligner therapy is invisibility. Indeed, 92.7% of the patients in our study were satisfied with the invisibility of the aligners. Although several studies [10] [14] were interested in aligner aesthetics, facial aesthetics, and dental aesthetics, no study has assessed patient satisfaction with the aesthetics of attachments. Our study showed that satisfaction with the aesthetics of aligners was correlated with the aesthetics of attachments. According to Thai *et al.* [15], there is a general desire for clear aligners without attachments and ceramic brackets over clear aligners with multiple attachments. 77.9% of patients in our study were satisfied with the aesthetics of the teeth. These findings are in concordance with those by Pacheco-Pereira *et al.* [10], who found that 84% of patients were satisfied with their dentofacial improvement with better occlusion.

The comfort during the treatment period also affects patients' satisfaction. 92.7% of the patients in our study were satisfied with the comfort of the aligners and 97.1% were satisfied with the ease of hygiene. According to Vasquez *et al.* [16], reasons related to comfort and quality of life during use were considered more important by patients.

Regarding the inconveniences caused by wearing aligners, the present study showed that 48.5% had pronunciation and speech problems and 13.2% had difficulty chewing. Fraundorf *et al.* [17] found that Invisalign treatment significantly affected speech, and although patients experience some level of adaptation, speech does not return to normal after 2 months of treatment. Nedwed *et al.* [18] also reported that 44% of the patients had difficulty chewing, mainly be-

cause the teeth were sensitive to pressure or had food particles caught between them due to temporary gaps.

In our study, 19.1% of our patients reported mucosal injuries. In contrast, alajmi' study [19] found that the majority of patients did not experience any irritation. On the other hand, some patients in our study (13.2%) felt bothered by food accumulation. Pacheco-Pereira *et al.* [10] found that food packing between teeth affected 24% of the patients but didn't reduce the overall positive experience that patients reported.

Although the number of patients treated with orthodontics has increased, treatment-related pain remains a major concern. Several studies have reported that 91% to 95% of patients had pain at the time of orthodontic treatment, regardless of the type of orthodontic appliance [20] [21]. Many studies compared pain experienced with different orthodontic appliances [22] [23] [24]. Cardoso *et al.* [21] found that orthodontic patients treated with Invisalign felt lower levels of pain than those treated with fixed appliances during the first few days of treatment. Thereafter, for up to 3 months, differences were not noted.

In the present study, 63.2% of patients experienced pain. In the study by Nedwed *et al.* [18], 35% of patients had no pain and 54% had mild pain while wearing aligners. Tran *et al.* [25] also found that clear aligner therapy produces tooth pain and masticatory muscle soreness of limited significance. The pain intensity was highest at 24 hours and decreased to the lowest level on the seventh-day post appliance placement [26]. As in our study, the pain was, in general, limited to 2 to 3 days [18].

4.4% of our patients used analgesics for pain relief; this has also been reported by other studies [27]. 91.9% of the women in our study tolerated pain, whereas only 57.1% of men tolerated it.

During the survey, we did our best to overcome the difficulties encountered and to avoid bias so as not to alter the value of the results. However, we faced some challenges, including the reduced number of patients and patients' reluctance to share their experience or their will to please the clinician.

5. Conclusions

With the growing interest in aesthetic appearance, aligners represent an alternative to conventional fixed orthodontic treatments, especially in adult patients.

The current study showed that the invisibility of the aligner was the main motivation of patients with the major expectation of improving self-confidence. We noted great satisfaction with the current results as well as several aspects of the treatment such as dental aesthetics, facial aesthetics, comfort and ease of hygiene. Besides the advantages of aligner therapy, many inconveniences have been reported in our study, namely speech problems and pain.

Conflicts of Interest

The authors declare no conflicts of interest.

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