Original Article

Patients' Expectations and Experiences of Fixed Orthodontic Appliance Therapy

Impact on Quality of Life

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ABSTRACT

Objective: To compare patients' expectations of the impact of wearing fixed orthodontic appliances on life quality with realties experienced over a 6-month period.

Materials and Methods: Two-hundred and seventeen consecutive orthodontic patients (mean age 13.1 $\pm$ 1.5 years) self-completed a 37-item Child Perception Questionnaire (CPQ) in relation to how they expected wearing fixed orthodontic appliances would affect their QoL during orthodontic treatment. The CPQ assessed the attributes of oral symptoms, functional limitations (FL), emotional well-being (EWB), and social well-being (SWB). Expectations were compared with the patients' pretreatment values and reported experiences at 1 week, 1 month, 3 months, and 6 months after insertion of the fixed appliances.

Results: The response rate was 91% (197/217). Patients expected that wearing fixed appliances would considerably compromise their overall oral health–related QoL (OHQoL) compared with pretreatment ($P < .001$). At 1 week they reported that EWB ($P < .001$) and SWB ($P < .05$) were less compromised than expected. At 1, 3, and 6 months, FL ($P < .001$), EWB ($P < .001$), SWB ($P < .001$), and overall OHQoL ($P < .001$) were less compromised than expected.

Conclusions: This study indicated the impact on QoL after insertion of fixed orthodontic appliances was considerately less than what child patients expected.

KEY WORDS: Quality of life; Malocclusion; Orthodontic treatment; Patient-assessment

INTRODUCTION

In recent years, research workers and clinicians have paid increasing attention to the patients' perspectives of their oral health status and oral health care systems.[1,2] Assessing patients' expectations is central to understanding oral health needs, patient satisfaction with treatment, and ultimately the perceived overall quality of health systems.[3,4]

Within the field of orthodontics there is long-standing recognition that malocclusion and dentofacial anomalies can produce immense physical, social, and psychological upset.[5,6] Increasingly, patient-centered measures are used to assess these subjective attributes in assessing orthodontic need and in determining the outcomes of orthodontic care.[7–9] There is some understanding of patients' expectations of outcomes from orthodontic therapy and growing evidence of how their perceptions of orthodontic treatment have benefited them.[10–12] However, there is little understanding of patients' expectations of the orthodontic treatment process and their anticipation of likely sequelae of orthodontic treatment aside from pain.[13,14]

Greater understanding of patients' expectations of the orthodontic treatment process and how it affects their day-to-day living or quality of life (QoL) is important in many ways. Their expectations of treatment, often unfounded, may discourage them from seeking care.[15,16] In addition, unrealistic understanding of orthodontic treatment processes and sequelae can influence compliance with treatment.[17,18] Furthermore, un-

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derstanding patients' expectations of treatment can help inform ''informed consent'' as well as help patients develop coping methods to deal with treatment sequelae.[19,20]

This study aimed to determine patients' expectations of how fixed orthodontic appliance therapy affects QoL and to compare their expectations with realities experienced over a 6-month period during fixed orthodontic appliance therapy. Specifically, the aim was to determine the magnitude, the aspects, and when patients' oral health–Irelated QoL (OHQoL) during orthodontic treatment differed from their expectations before treatment.

MATERIALS AND METHODS

The study design was a prospective cohort study. A consecutive sample of children seeking orthodontic care at the Faculty of Dentistry, The University of Hong Kong, was screened for recruitment into this study. The inclusion criteria were that patients had a perceived need for orthodontic treatment and were about to undergo fixed orthodontic appliance therapy. Exclusion criteria were patients with chronic medical conditions requiring use of medication; those who had received any type of orthodontic treatment previously; and those with craniofacial anomalies such as cleft lip and palate, untreated dental caries, or poor periodontal health status (presence of calculus or periodontal pockets—Community Periodontal Index grades 2 or higher).[21]

After screening, 217 patients were recruited, assessed at pretreatment, and monitored during fixed orthodontic appliance therapy at 1 week, 1 month, 3 months, and 6 months. The local ethics committee approved the study. The children's primary care givers provided their informed consent for their children to participate in this study, and the children provided their assent to participate.

Measures

The data-collection instrument was the Child Perception Questionnaire (CPQ), the child component of the child OHQoL measure.[22] The CPQ consists of 37 items covering four domains: oral symptoms (OS), functional limitations (FL), emotional well-being (EWB), and social well-being (SWB). Each item is scored on a 5-point Likert scale to rate the impact of its oral health status on the particular aspect of QoL (described by the item), with responses ranging from ''none of the time'' (score 0) to ''every day or almost every day'' (score 4).

Patients self-completed the CPQ at six different time points: at pretreatment screening to determine current status (T_0), before receiving treatment to assess anticipated changes of QoL as a result of wearing fixed orthodontic appliances (T_{ex}), 1 week after insertion of fixed appliances (T_1), 1 month after insertion of fixed appliances (T_2), 3 months after insertion of fixed appliances (T_3), and 6 months after insertion of fixed appliances (T_4). The root of the questions for assessment at T_0, T_1, T_2, T_3, and T_4 was ''In the last while because of your teeth, lips, jaws or mouth how often have you . . . (ie, had bleeding gums)?'' In assessment of treatment expectation, patients were asked to rate ''In the next while after you get your braces (during treatment) how often do you expect . . . (ie, to have bleeding gums)?''

Data Analysis

CPQ domain scores were derived by summating responses to items within each domain, and overall scores were derived by summating domain scores. A high overall or domain score represents poor OHQoL. Because the data followed a Poisson distribution (even after log transformation), nonparametric tests were used in the data analysis. The Friedman test was used to determine statistical difference in the CPQ scores (overall and domain level) over the study period. The Wilcoxon signed rank test was used to determine statistical difference between anticipated CPQ scores (T_{ex}) and CPQ scores at T_0, T_1, T_2, T_3, and T_4. In addition, the deviation between mean of T_{ex} and mean scores of T_0, T_1, T_2, T_3, and T_4 was calculated and the ''relative'' deviations (RDs) were calculated by the following formula: $RD = 100 \times (T_{ex} - T_i)/T_{ex}$, where $T_i = T_0$, T_1, T_2, T_3, or T_4.

RESULTS

Ten patients failed to comply with treatment and were discharged. Ten other patients failed to complete the questionnaires at one or more of the five observational points of the study. Thus, the overall response rate was 91% (197/217). The mean age of the patients was 13.1 $\pm$ 1.5 years. Fifty-three percent (n = 104) were girls and 47% (n = 93) were boys, and all were of Hong Kong Chinese ethnicity.

There were significant differences in overall CPQ scores ($P < .001$), OS scores ($P < .001$), FL scores ($P < .001$), EWB scores ($P < .001$), and SWB scores ($P = .003$) among the six time points (Table 1.)

Overall CPQ scores at T_{ex} were significantly higher than the mean scores at T_0 ($P < .001$), T_2 ($P < .001$), T_3 ($P < .001$), and T_4 ($P < .001$), though there was no significant difference between T_{ex} and T_1 ($P > .05$) (Table 2). Mean OS scores at T_{ex} were significantly higher than the mean scores at T_0 ($P < .001$), T_3 ($P < .01$), and T_4 ($P < .01$), whereas there was no significant difference between T_{ex} and T_1 ($P > .05$) and

Table 1. Comparison of Mean Scores of Expectation (T_{ex}) and Baseline (T_0) and at 1 Week (T_1), 1 Month (T_2), 3 Months (T_3) and 6 Months (T_4) After Insertion of Appliance (N = 197)

	T_{ex}		T_0		T_1		T_2		T_3		T_4		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*P**
Overall	27.4	18.3	20.7	14.4	25.6	15.6	22.5	13.5	21.1	14.2	20.4	13.1	<.001
Subdomains													
Oral symptom	8.5	3.8	6.6	3.5	8.5	8.5	8.0	3.5	7.8	3.6	7.7	3.2	<.001
Functional limitation	8.0	6.2	5.1	4.7	8.1	5.8	6.5	5.0	6.0	4.7	5.6	4.4	<.001
Emotional well-being	5.4	6.4	4.5	5.5	4.1	5.6	3.5	4.8	3.1	4.8	2.9	4.6	<.001
Social well-being	5.6	5.8	4.4	4.8	5.0	5.0	4.4	4.1	4.3	4.4	4.2	4.2	.003

* *P*-values were obtained with the Friedman test.

Table 2. Deviation of Mean Scores Among Expectation (T_{ex}) and Baseline (T_0) and at 1 Week (T_1), 1 Month (T_2), 3 Months (T_3), and 6 Months (T_4) After Insertion of Appliance[a]

	$T_{ex} - T_0$			$T_{ex} - T_1$			$T_{ex} - T_2$			$T_{ex} - T_3$			$T_{ex} - T_4$		
	Mean	SD	RD %[b]	Mean	SD	RD %	Mean	SD	RD %	Mean	SD	RD %	Mean	SD	RD %
Overall	6.9***	16.3	25.0	2.1	15.4	7.5	5.0***	13.4	18.4	6.1***	15.4	22.4	7.2***	15.4	26.1
Subdomains															
Oral symptom	1.8***	3.9	21.5	0.0	3.9	0.2	0.5	3.6	5.4	0.7**	3.5	8.1	0.8**	3.8	9.8
Functional limitation	2.9***	6.2	36.4	0.1	6.5	0.4	1.5***	5.6	18.8	2.0***	5.5	25.5	2.4***	6.0	30.0
Emotional well-being	0.9*	5.3	15.9	1.4***	4.8	25.2	1.9***	4.4	34.8	2.3***	5.0	42.2	2.5***	5.0	45.9
Social well-being	1.3***	4.9	22.3	0.7*	4.9	11.6	1.2***	4.6	21.1	1.3***	5.2	23.4	1.5***	5.1	25.9

[a] Means were obtained by subtracting T_0, T_1, T_2, T_3, and T_4 from T_{ex}. The Wilcoxon signed rank test was used to test differences.
[b] RD % = $100 \times (T_{ex} - T_i)/T_{ex}$, where $T_i = T_0$, T_1, T_2, T_3, or T_4.
* $P < .05$; ** $P < .01$; *** $P < .001$.

T_2 ($P > .05$). Mean FL scores at T_{ex} were significantly higher than the mean scores at T_0 ($P < .001$), T_2 ($P < .001$), T_3 ($P < .001$), and T_4 ($P < .001$), whereas there was no significant difference between the scores at T_{ex} and T_1 ($P > .05$). Mean EWB scores at T_{ex} were significantly higher than the mean scores at T_0 ($P < .05$), T_1 ($P < .001$), T_2 ($P < .001$), T_3 ($P < .001$), and T_4 ($P < .001$). Mean SWB scores at T_{ex} were significantly higher than the mean scores at T_0 ($P < .001$), T_1 ($P < .05$), T_2 ($P < .001$), T_3 ($P < .001$), and T_4 ($P < .001$).

The RD in overall CPQ between T_{ex} and T_0 was 25% and ranged from 15.9% (EWB) to 36.4% (FL) among the CPQ domains (Table 2). The RD in overall CPQ between T_{ex} and T_1 was 7.5% and ranged from 0.2% (OS) to 25.2% (EWB) among the CPQ domains. The RD in overall CPQ between T_{ex} and T_2 was 18.4% and ranged from 5.4% (OS) to 34.8% (EWB) among the CPQ domains. The RD in overall CPQ between T_{ex} and T_3 was 22.4% and ranged from 8.1% (OS) to 42.2% (EWB) among the CPQ domains. The RD in overall CPQ between T_{ex} and T_4 was 26.1% and ranged from 9.8% (OS) to 45.9% (EWB) among the CPQ domains.

DISCUSSION

The response rate was good (91%), indicating the feasibility of using patient-centered outcome measures in orthodontic research and practice. Interestingly, the CPQ scores at screen (pretreatment) were low compared with the possible range of CPQ scores, suggesting that despite having a perceived orthodontic treatment need the effect on QoL was modest. However, the mean CPQ values approximated those of studies involving other patient groups with malocclusion.[22,23]

There were obvious differences in overall CPQ scores and domain scores among the six study points. Patients expected that while undergoing fixed orthodontic therapy their QoL would be markedly compromised compared with pretreatment. This has implications in informing and reassuring patients that their expectations of wearing fixed appliances are often worse than what they are likely to experience.

Assessments of the differences between expectations and realties experienced were calculated in two ways: mean difference and RD. The mean difference provides an indication of the change in CPQ score,

whereas the RD provides an indication of the magnitude of the difference as a percentage of the difference between expectations and experiences relative to expectations. Because QoL is a relative rather than an absolute, the results of any OHQoL measurement need to be interpreted in light of baseline values.[24]

In reality, 1 week after the insertion of fixed appliances, patients' anticipated compromise to the QoL approximated their experiences with respect to OS and FL encountered. During the initial stages of orthodontic treatment, pain and FL (such as diet restrictions) are reported to be common. Moreover, these are key anticipated concerns of patients with respect to orthodontic treatment.[25] However, as treatment progressed, OS and FL were significantly less compromised than anticipated. This may reflect either actual decreases in OS and FL experienced, adaptation to treatment, or learned experience of treatment.[26]

With respect to EWB and SWB, whereas patients had anticipated a compromise to their EWB compared with pretreatment values, in reality at all time points of treatment (1 week, 1 month, 3 months, 6 months) their reported experiences indicated that this did not occur. Moreover, the RD values suggested that, with progression of treatment, EWB was considerably less compromised than anticipated. The apparent paradox of less-compromised EWB during treatment compared with anticipations is likely to be related to emotional benefits of orthodontic treatment such as acceptance of malocclusion and dealing with it when undergoing orthodontic treatment.[12,27] The apparent paradox of less-compromised SWB during treatment compared with anticipations is likely to be related to widespread use of orthodontic services and social acceptance of treatment of malocclusion in Hong Kong.[28]

CONCLUSIONS

- Patients expected that wearing fixed appliances would considerably compromise their overall OHQoL compared with pretreatment.
- However, fixed orthodontic appliance therapy did not affect patients' QoL during treatment as much as patients had expected, with the exception of OS and FL during the initial stages of treatment.
- The greatest deviation between expectation and experience was with respect to EWB, which was considerably less compromised than anticipated.

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