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Long-term follow-up indicates unimpaired oral health-related quality of life for people having shortened dental arches

Anneloes E. Gerritsen*, Dick J. Witter, Nico H.J. Creugers

Department of Oral Function and Prosthetic Dentistry, College of Dental Science, Radboud University Medical Center, P.O. Box 9101, Philips van Leydenlaan 25, 6500 HB Nijmegen, The Netherlands

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ABSTRACT

Objectives: To assess and analyse OHRQoL of people with shortened dental arches (SDA) in a long-term cohort study.

Methods: All participants of a long-term cohort study on SDA who were still attending the university dental clinic and still had an SDA (SDA group) with 3–5 posterior occluding pairs and intact anterior areas, an SDA plus removable dental prosthesis (SDA plus PRDP group) or complete dental arch (CDA group) completed the Dutch version of the Oral Health Impact Profile (OHIP-49NL) and additional questions on satisfaction with their dental status (yes/no). Mann-Whitney tests were performed for OHIP total scores and OHIP domain scores. The chance that the difference in median OHIP scores between the groups was larger than 6 OHIP units, was calculated by a bootstrapping procedure.

Results: 10 participants were eligible for SDA group and 11 for CDA group. The SDA plus PRDP group (n = 1) was excluded from analyses. Mean follow-up period was 29.3 ± 5.5 for SDA group and 36.7 ± 5.5 years for CDA group. Mean OHIP-49NL score was 13.9 ± 10.9 for SDA group and 11.3 ± 8.6 for CDA group. Differences in mean total scores and mean scores per domain were not statistically different. The probability that a difference in median OHIP total scores between groups was larger than 6 OHIP units was 0.25. Both groups showed high percentages of satisfaction with dental condition, except for dental appearance.

Conclusion: OHRQoL of people with a long-term SDA condition was similar to that of people with CDA.

Clinical significance: People having SDA for long periods are expected to report similar OHRQoL and satisfaction levels/oral comfort as people with CDA.

1. Introduction

Today, the shortened dental arch (SDA) concept is globally accepted by dental professionals, but - despite a large body of circumstantial evidence that SDA provides sufficient functionality - not widely practiced [1]. The reluctance to practice the concept might be at least partially based on dentists' beliefs of patients' negative attitudes toward a shortened dental arch. Studies are needed in which patients are asked directly about how they perceive the SDA condition to assess their attitude.

Because an SDA condition is a consequence of tooth loss it might be expected that oral health-related quality of life (OHRQoL) is impaired. Indeed, a systematic review provided evidence that tooth loss is associated with impaired OHRQoL [2]. Outcomes of this meta-analysis indicated that not only the number, but also the location and distribution of missing teeth affect the severity of OHRQoL impairment. Loss of posterior teeth seems to have less negative impact on OHRQoL than loss of anterior teeth and distributions with fewer occluding pairs of teeth present are associated with more negative impacts.

Epidemiological studies on OHRQoL of people with SDA comprising a complete anterior region and 3 – 5 posterior occluding pairs reported no negative impacts on OHRQoL [3,4]. These outcomes are based on cross-sectional data from a large study among relatively young individuals (aged 35–44 years) in Brazil [3] and from a telephonic interview survey among a general population in Australia with 80% of the participants being younger than 55 years [4]. Moreover, several clinical trials reporting on OHRQoL of people with an SDA compared SDA subjects with and without distal-extension removable dental prostheses (PRDP) [5–7]. The findings of these studies were inconclusive: one study [6] reported better OHRQoL for participants treated based on the SDA concept compared to PRDP treatment at one-year follow-up, another [7] reported similar results for participants with SDA with and without PRDP at one up to five years follow-up, whilst the third [5] (one-year follow-up) concluded that "prosthetic restoration (PRDP and

* Corresponding author.
E-mail addresses: anneloes.gerritsen@radboudumc.nl (A.E. Gerritsen), dick.witter@radboudumc.nl (D.J. Witter), nico.creugers@radboudumc.nl (N.H.J. Creugers).

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implant-supported fixed dental prostheses (FDP)) for SDAs may benefit OHRQoL in patients needing replacement of missing posterior teeth". The authors of a recently conducted meta-analysis based on the one-year follow-up results of these three studies concluded that the SDA concept appears to be as acceptable as restoration with PRDP with respect to OHRQoL [8].

To better understand the degree of impact of having an SDA it is informative to compare OHRQoL of people with an SDA condition with that of people having a complete dental arch (CDA) as a reference. In previous publications we reported on functionality, stability and sustainability of cohorts of people with SDA, SDA with distal-extension PRDP, and CDA after 27–35 years follow-up [9,10]. The aim of the present study was to assess and analyse the OHRQoL of participants of this cohort study. Apart from statistical differences, the minimal important difference (MID) may be useful as a benchmark to assess what is clinically significant in terms of patient-based outcomes [11]. It was hypothesized that OHRQoL is most impaired in people with SDA and least in people with CDA, but that differences do not exceed the MID.

2. Methods

2.1. Data collection

Participants from a prospective observational cohort study on SDA, which started in 1981, were invited to participate in the present study. The initial longitudinal study included participants with an SDA with 3–5 posterior occluding pairs (POPs) and intact anterior areas with and without distal-extension PRPD, and participants with CDA. Teeth replaced by FDPs were considered as present. All participants were regular attenders of the Medical University dental clinic for check-ups and, if necessary, dental treatments. Detailed information on the sampling method has been presented in a previously published report [12].

For the present study all SDA and CDA participants of the initial cohort who were still attending the dental school and still had an SDA (SDA group), SDA plus PRDP (SDA plus PRDP group) or CDA (CDA group) dental condition were invited to participate. The current dental condition of the participants was initially determined from their dental record and then verified by clinical examination. All participants completed the validated Dutch version of the Oral Health Impact Profile (OHIP-49NL) [13]. The reference period was 3 months and each statement was scored on a Likert type scale ranging from 0 (never) to 4 (very often). Additionally questions about general satisfaction with dental condition, satisfaction with dental appearance and satisfaction with mastication were answered (yes/no).

Twenty-two participants were eventually eligible for this study: 10 for the SDA group, 1 for the SDA plus PRDP group, and 11 for the CDA group. One participant having an SDA plus PRDP condition at the start of the study ceased wearing her PRDP after 17 years. After she stopped wearing the PRDP the SDA condition of this participant could be followed up for 15 years and was therefore included in the SDA group. All participants gave their informed consent. Because only 1 participant (67 years old male; 41 years follow-up; 3 posterior occluding pairs; OHIP total score 5, highest OHIP item score 2 (occasionally) for food catching ('functional limitation')) was available for the SDA plus PRDP group; by, this group was excluded from analyses. Individual domain scores were plotted to visualize the distribution of these scores for each group.

The ethical committee of the Radboud University Medical Center permitted the conduct of this study by decision cmo-nr 2010/316.

2.2. Statistical analysis

To compare OHRQoL of SDA group and CDA group, Mann-Whitney tests were performed for OHIP-49NL total scores and OHIP domain scores of the two groups using SPSS 22.0 software. The level of significance was set at $p = 0.05$. Moreover, the difference in OHIP outcomes between SDA group and CDA group were related to a reference minimal important difference (MID) value of 6 OHIP units [11,14]. To calculate the chance that the difference in median OHIP scores between the groups was larger than 6 OHIP units, bootstrapping (1000× re-sampling) was applied to construct a probability distribution for the difference in medians.

Table 1
Characteristics of the participants in the shortened dental arch (SDA) group and the complete dental arch (CDA) group.

	SDA (n = 10)	CDA (n = 11)
Mean age in years (SD)	67.4 (8.2)	67.8 (9.6)
Range in years	53.7–80.1	52.1–80.9
Gender distribution (% females)	80	72
Years of current dental condition (mean (SD))	29.3 (5.5)	36.7 (5.5)
Mean number (SD) of posterior occluding pairs at time of assessing OHRQoL	3.9 (0.7)	8.1 (0.8)

3. Results

Participants from both SDA group and CDA group had a similar mean age and age range (Table 1). The mean follow-up period was longest for CDA group (36.7 ± 5.5 yrs.). Female participants were overrepresented in both groups (72 and 80% respectively).

The plot of individual domain scores (Fig. 1) shows that the variation in scores between groups was rather small except for one individual in SDA group with rather high scores for 'in front of psychological disablility' and 'handicap' and one individual in CDA group with relative high scores for 'functional limitation' and 'physical pain'.

Mean OHIP-49NL score for SDA group was 13.9 ± 10.9; for CDA group this was 11.3 ± 8.6 (Table 2). Differences of mean total scores and mean scores per domain between the two groups were small and not statistically different (p-values ≥ 0.25). Domain differences were largest for 'functional limitation' and 'pain': participants with SDA reported higher impact for 'functional limitation' whilst participants with CDA reported higher impact for 'pain'. Both groups showed high percentages of satisfaction with their dental condition and mastication, but not for dental appearance.

Based on the probability distribution, constructed using bootstrapping, the probability that the median OHIP total score for SDA group was ≥6 OHIP units (MID) below that of CDA group was 0.085, whilst the probability that the median OHIP total score for SDA group was ≥6 OHIP units (MID) above that of CDA group was 0.166.

4. Discussion

To our knowledge, a prospective observational cohort study that started in 1981 is the first and longest-running study on SDA [12]. Previous publications of this study reported outcomes regarding functionality, stability and sustainability of SDA, SDA with distal-extension PRDP, and CDA after 27–35 years follow-up [9,10]. The present study is the first in this longitudinal study to report on OHRQoL; an earlier publication presented outcomes indirectly indicating OHRQoL related to the SDA condition by using a questionnaire assessing satisfaction with masticatory function [15]. Moreover, in that report only a comparison was made for SDA with and without PRDP whilst validated OHRQoL instruments did not exist at that time. It was remarkable that only 1 participant in the SDA plus PRDP group was available for this study. However, a previous report showed that the dental condition in this group was not stable: on the one hand a substantial number of participants in this group had their PRDP replaced by (implant-supported) FDPs. On the other hand several participants lost some POPs and did not meet the inclusion criteria anymore [10]. With respect to possible selection bias in general, we have no indications that participants in the present study diverge from original participants lost to