SciForschen
Open HUB for Scientific Research

ISSN 2378-7090

International Journal of Dentistry and Oral Health

Research Article | Volume: 3.1 | Open Access

An Empirically Derived Model of Patient Attitudes toward Having a Shortened Dental Arch Condition

Anneloes E Gerritsen[1]*, Nynke de Blaauw[2], P Finbarr Allen[3], Dick J Witter[4] and Nico HJ Creugers[5]

[1]Assistant Professor, Department of Oral Function and Prosthetic Dentistry, College of Dental Sciences, Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands
[2]MSc Communication Science, Department of Oral Function and Prosthetic Dentistry, College of Dental Sciences, Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands
[3]Professor and Dean, Faculty of Dentistry, National University of Singapore, Singapore
[4]Senior lecturer, Department of Oral Function and Prosthetic Dentistry, College of Dental Sciences, Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands
[5]Professor and Chair, Department of Oral Function and Prosthetic Dentistry, College of Dental Sciences, Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands

***Corresponding author:** Gerritsen AE, Department of Oral Function and Prosthetic Dentistry, College of Dental Sciences, Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands, Fax: +31-24-3541971; **E-mail:** anneloes.gerritsen@radboudumc.nl

Received date: 19 Sep 2016; **Accepted date:** 07 Oct 2016; **Published date:** 13 Oct 2016.

Citation: Gerritsen AE, de Blaauw N, Allen PF, Witter DJ, Creugers NHJ (2016) An Empirically Derived Model of Patient Attitudes toward Having a Shortened Dental Arch Condition. Int J Dent Oral Health 3(1): doi http://dx.doi.org/10.16966/2378-7090.220

Abstract

Aim: To explore attitudes of people with shortened dental arches toward absent posterior teeth and posterior tooth replacements.

Methods: Participants were included after purposive sampling for a variety in age, gender, socioeconomic status, and for types of shortened dental arches with and without tooth replacement. Transcripts of face-to-face semi-structured interviews with open-ended questions were thematically analyzed using MAXQDA software.

Results: After interviewing four females and five males (age ranging from 57 to 86 years), three main attitudes were identified: (1) neutral attitude resulting in 'without restraint acceptance of absent posterior teeth', and negative attitudes in which (2) 'resistance against having absent posterior teeth' prevailed, and (3) 'resistance against (needing a) tooth replacement' prevailed. Main themes regarding 'resistance against having absent posterior teeth' were functional discomfort ((assumed) functional problems) and emotional discomfort (feeling of not being intact). Reluctance to undergo treatment was an important reason to refuse tooth replacement resulting in secondary acceptance of absent posterior teeth. Main themes for 'resistance against tooth replacement' were a feeling of being handicapped that was associated with (needing a) dental prostheses and reluctance of having a foreign body in the mouth. Wearing a dental prosthesis in spite of a negative attitude was considered as secondary acceptance of tooth replacement.

Conclusion: In a conceptual model, three main attitudes toward the shortened dental arch condition were recognized resulting in direct or secondary acceptance of absent posterior teeth or demand for tooth replacement.

Keywords: Qualitative study; Shortened dental arch; Patient's attitudes; Posterior tooth replacement

Introduction

Today, dentists in many countries consider the shortened dental arch concept an effective and efficient treatment strategy for patients with reduced dentitions [1,2]. This is supported by clinical studies demonstrating no clinically relevant impairment with respect to perceived chewing function, nutritional status, and quality of life, and no or only slightly increased risks for caries, periodontal disease, signs and symptoms of temporomandibular disorders, and occlusal tooth wear for moderate shortened dental arches (SDAs), which are dentitions with a complete anterior region and a reduction of teeth starting posteriorly, and comprise of 3 to 5 posterior occlusal pairs [1-11].

Since the first international publication on the shortened dental arch concept in the early 1980s [12] fundamental societal transformations took place probably influencing patients' attitude toward the acceptance of absent posterior teeth. Whereas in the past tooth loss was often accepted as a part of a natural ageing process, nowadays patients expect to remain their teeth for life. Contemporary patients may have high expectations regarding (oral) health care, are assertive and have access to abundant information about disease and treatment options via media such as the Internet. Consequently, if tooth loss occurs they are more demanding regarding tooth replacement. Therefore, it can be assumed that, although a moderate shortened dental arch can fulfill the requirements of a functional dentition [1,2,4], an increasing number of patients inquire about the possibilities of replacement of their absent posterior teeth. This might be even true for patients missing posterior teeth for a lengthy period; whilst treatment options for shortened dental arches in the past were limited (lengthening the dental arch with a distal-extension removable dental prosthesis or no lengthening) at time treatment decisions were made, patients might reconsider this after learning about new treatment possibilities, such as implant treatment.

Patients increasingly expect a prominent role in the decision making process (shared decision making) related to their health and treatment and expect (oral) healthcare providers to deliver personalized information and advice that is not merely based on evidence [13]. For an effective participatory discussion between patient and dentist it is imperative that the patient's view and attitude are understood and taken into account. The present qualitative study explores perceptions and attitudes of people with a shortened dental arch towards absent posterior teeth and replacement treatment. Such insights are considered useful in facilitating effective communication between clinician and patient.

Materials and Methods

To describe and explain patient's attitudes and views, we followed the grounded theory approach as described by Woods et al. [14]. This approach implies an iterative process of a systematic collection and thematic analyses of data. The purpose of grounded theory is to develop a theory that conceptually explains human motivation or patterns of behavior by means of a qualitative research methodology [14]. The 'Consolidated criteria for reporting qualitative research' (COREQ) for design and reporting criteria for qualitative studies were applied [15].

Recruitment of participants

The ethical committee of the Radboud University Nijmegen Medical Center permitted the conduct of this study by decision cmo-nr 2010/316. Participants were selected by means of purposive sampling aiming to select informational rich cases for in-depth study. The purposive sampling aimed to include a variety of participants with respect to gender and socioeconomic status (SES), types of SDA (uni- and bilateral, and moderate (3 to 4 natural posterior occluding pairs) to extreme SDA (0 to 2 natural posterior occluding pairs)) with or without experience with posterior tooth replacement including fixed and partial removable dental prostheses.

Oral condition	Perceived oral health and dental status
History of tooth loss	When? Reason? Feelings about tooth loss
Management of tooth loss	Why were lost posterior teeth (not) replaced? Other options / preferences considered Barriers Conscious decision? Level of knowledge / (missing) information / understanding
Experience	Appearance / self-esteem Speech / taste / eating /chewing process Social comfort / intimate relations Maintenance / oral hygiene Pain / comfort Acceptance / adaptation

Table 1: Initial Topic Guide for the Semi-structured Interviews

Electronic patient files of regular attendees of the Radboud University Nijmegen Medical Center College of Dental Science clinic were searched to find people that fulfilled the following inclusion criteria: (1) dentitions with a complete anterior region and a reduction of teeth starting posterior with or without prosthodontic tooth replacement, (2) a confirmed duration of at least one year of having an SDA condition, and (3) aged 50 years and over.

Selected potential participants were invited by telephone for an interview; all agreed to participate. Prior to the interview the participants received a confirmation letter with written information about the study and the interview date and location.

Data collection

A trained female interviewer (AEG) conducted face-to-face semi-structured interviews with open-ended questions. Participants were aware of the fact that the interviewer was a dentist. However, she never treated them nor was there intention to do so in the future. Participants were informed that they would be interviewed about their shortened dental arch condition. The topic guide developed for the interviews was based on the work from Cronin et al. [16] and earlier published oral health models [17,18]. All involved researchers agreed upon the initial topic guide which included the topics 'oral condition', 'history of tooth loss', 'management of tooth loss' and, 'experience' (Table 1).

The one to one interviews were conducted either in an office (not a clinical setting) or at the participants' homes, depending on their preference. During the interview presence of non-participants was avoided, but noted this when was inevitable. Interviews were digitally audio-recorded and notes were taken contemporaneous and afterwards by the interviewer.

Participants were asked to give information in response to the submitted topics as much as possible and were encouraged to raise any further relevant issues. Additionally collected data included age, gender, SES and number of present teeth, fixed dental prostheses (FDPs) and partial removable dental prostheses (PRDPs) (Table 2). Confidentiality and anonymity of the participants were preserved. All participants were in good cognitive condition.

Respondents*	Age	M/F	SES	Teeth present (including FDPs)	Posterior Prostheses	Confirmed years of having an SDA condition
R1	63	M	High	17-25 47-35 and 37	FDP 13-(15)-17	15
R2	86	F	Middle	16-26 45-35	FDP (implants) 23, 24, 25 FDP 16-14; FDP 33-35	33
R3	72	F	High	16 and 14-25 45-36	FDP 23-26 Cantilever FDPs 34-36 and 43-45 (after 20 years lower PRDP)	35
R4	60	M	High	16-26 45-35	None	4
R5	65	F	Low	15-26 43-35	FDP 14-16 and 24-26 Lower PRDP	32
R6	57	M	Middle	15-25 and 27 44-36	None	2
R7	75	F	Low	17-25 45-35	FDP (implant) 25	25
R8	81	M	High	16-27 47-36	FDP 16-13 FDP (implants) 34, 35, 36	10
R9	70	M	Middle	17-27 45-34	Lower PRDP	40

Table 2: Descriptive Details of Participants at Time of the Interview
*In sequence of interview date
SES: Socioeconomic Status; FDP: Fixed Dental Prosthesis; PRDP: Partial Removable Dental Prosthesis; SDA: shortened dental arch.

Transcription and data analysis

All interviews were transcribed verbatim and were subjected to thematic content analysis. The software MAXQDA 2007 was used for organizing and managing the data analysis [19]. Data collection and analysis were carried out simultaneously aiming to improve the topic list coding system.

Two researchers (AEG & NB) coded the transcripts separately, but analyzed the data together. The thematic analyses started by determining the inter-coder agreement for every transcript. After every three interviews an in-between-analysis was performed. Topics brought up by the respondents that were not included in the initial topic list were added if considered relevant and the coding system was refined accordingly. Not-corresponding coding was discussed by the researches until agreement was reached.

Several triangulation methods were used to ensure the trustworthiness and reliability of the study [20]. First, investigator triangulation was achieved by regular discussions between the researchers on interpretation of the data. Secondly, findings of observational notes, interviews and, occasionally, feedback sessions with experts formed the within-method triangulation. Reliability was further enhanced through the consistent use of techniques such as paraphrasing and summarization for clarification during the interviews [21], by increasing the credibility of interpretations through the use of participants' quotes and codes and (sub) themes [22]. Dental status as stated by the participant was crosschecked for congruency with their dental records.

Results

For the present study, 9 participants were interviewed; mean duration of the interviews 55 ± 23 (28-105) minutes. Brief descriptive details of the participants are presented in table 2. Four females and five males, with ages ranging from 57 to 86 years presented with uni- or bilateral SDA of varying lengths with and without fixed and/or removable posterior tooth replacements. Shortest confirmed time of the duration of an SDA condition was 2 years and the longest was 40 years.

After analysis of the data three main attitudes toward shortened dental arches were identified and integrated in an empirical model: (1) a neutral attitude: an attitude of acceptance of absent posterior teeth without restraint (no demand for tooth replacement), (2) a negative attitude toward absent posterior teeth (resistance against having absent posterior teeth prevails) or (3) a negative attitude toward tooth replacement (resistance against (needing) tooth replacement prevails) (Figure 1). The recruitment of participants was stopped after nine interviews because no new topics emerged and one or more participants represented the 'end-points/arms' of the model (informational saturation).

Neutral attitude; acceptance of absent posterior teeth without restraint

Participant R7 accepted her shortened dental arch without any restraint. She seemed to be hardly aware of the fact that she has no molars. The following quote illustrates her feeling about the absent molars.

Quote: R7: *"I don't even notice.* AEG: *"You don't notice?"* R7: *"No not at all, no."* AEG*: And do you have any feeling about this? Do you experience any feelings according to this?* R7: *"No, not at all, no, no, no."*

A demand for replacement of molars seems to be completely absent.

R7 being asked about considering replacement: *"no, because I have no complaints at all, and people don't see it, so ….."*

The fact that R7 demanded an implant to replace tooth 25 indicates that resistance against treatment *sec* is no reason to avoid molar replacement. Acceptance of absent molars does not necessarily mean acceptance of absent premolars. In other words, SDA length seems to play a role in accepting absent posterior teeth, even for people who do not miss their molars at all.

Quote: R7:*"… no, because after they extracted it* [tooth 25], *it felt empty …. such a big gap, I don't want that."*

Negative attitude; resistance against having absent posterior teeth

The two major themes identified considering resistance against having absent posterior teeth were 'functional discomfort' because of (assumed)

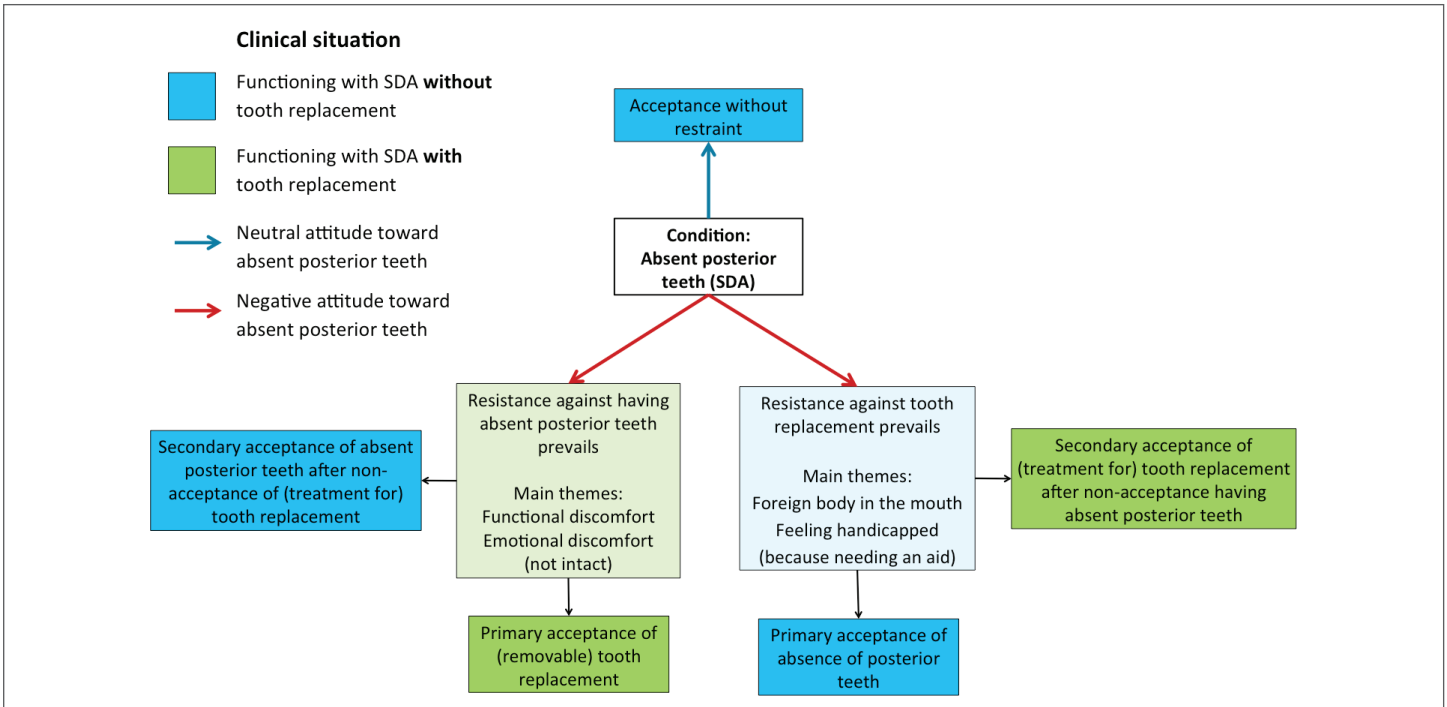

Figure 1: Illustrative Diagram Summarizing Attitudes of Patients with Shortened Dental Arches towards Absent Posterior Teeth and Posterior Tooth Replacement

functional problems and 'emotional discomfort' because of a feeling not being intact. The following quote illustrates how absent molars can cause a feeling of not being intact and could influence emotional well-being:

Quote R6: "*[…] I worked as furniture maker for years on end and that is quite heavy labour […] but that is 13 years ago now but these days when I do something I notice that everything is more difficult and goes slower … and that fits with … that when I feel blue sometimes … when I then run my tongue along my teeth then my tongue slips through, and then it feels like something is lacking.*"

For some participants their negative attitude against having absent posterior teeth resulted in a positive mind-set towards tooth replacement (R5 and R8). People with this mind-set generally will experience improved functionality after tooth replacement.

Quote R5 (having a mandibular distal-extension RDP): "*Yes, yes, it's the first thing I do, put it in, the denture, huh? Sometimes, euh, I did forget it a couple of times, I thought hmmm, I miss something! […] Yes, then you notice … then you miss it for sure, then you are … I think, oh, I must chew more on this side and not here because then I am biting on my gum, really, yeah. Yes, if you don't wear it than you really do miss it!*"

However, a negative attitude against having absent molars did not result by definition in a positive mind-set towards tooth replacement. Reluctance to undergo treatment was for most participants the main reason to decline tooth replacement; the remedy was considered worse than the disease. For example R1 about tooth replacement by implants: *"I completely don't think about those kinds of things yet because when I see how other people mess around with that kind of … euh … what is called…bone transplantations and … and taking stuff from hips and walking with sticks, no no, the only 'sticks' I have are for use on the golf course and nothing else!"*For both R1 and R4 reluctance to undergo treatment resulted in secondary acceptance of absent molars.

Negative attitude; resistance against (needing) tooth replacement

For the negative attitude 'resistance against tooth replacement' two main themes were identified: (1) a feeling of being handicapped (associated with needing a dental prosthesis) or (2) aversion toward a foreign body in the mouth. This negative attitude always concerned PRDPs; fixed replacements were appraised equivalent to natural teeth. R2 for example expressed her aversion to have a foreign body in her mouth like this (about a dentist's proposal to provide a metal frame PRPD): *"No that was never made."* AEG (referring to something R2 said earlier about appearance)*: "Was that mainly because of your appearance you didn't want that?"* R2*: "No, not because of my appearance but I just didn't want to have something like that in my mouth, something that is not…something with a plate…that… I just didn't want to have that in my mouth!"*

Nevertheless, R2 accepted extensive treatment (three (implant supported) FDPs) for maintaining her SDA condition. R2 expressed adequate functioning without molars and acceptance of her dental condition.

R2 about chewing: AEG*: "Did I understand you well that you can chew as well as somebody with all molars?" R2: "Yes, yes, of course I cannot judge that, but I don't have the feeling that I am handicapped in that way, no no."*

R9 expressed a negative attitude towards medical aids in general because they emphasize being handicapped which makes him feel embarrassed.

R9 (about his hearing aids): *"Yes, yeah, yeah. I also have...I always call them my little plugs, hearing aids. Yes, I had those things behind my ear. I thought it was horrible, I felt deeply embarrassed. […] Yes, it is visible, everybody…the bus for disabled people will come soon, from that song you know…."*

R9 expressed dislike for the sensation of a foreign body caused by his metal frame PRDP. R9: *"I think my chopper is another story."* AEG: *"Your chopper'? You mean your partial denture? Why?"* R9: *"Yes, because…yes, I think it is…it remains…eating is still…I call it different. You have something in your mouth, something artificial I would say. Because, despite of having it already for a long time…yes still…well, awkward is maybe too… I would rather be without than with* [partial denture] …, *I eat more tastier I guess."* He says that he is still wearing his prosthesis most of the time because of (as he says) social reasons and his admiration for the handicraft involved in the making of his prosthesis (he is a retired engineer).

R9: "*Yes, I always have …, I don't want to call it an aversion, but I think the piece of technique is quite beautiful and that they can make stuff like that and everything and I walk around with such a beautiful thing in my mouth!*"

During leisure he prefers not to wear his prosthesis: R9 (on being asked if there have been periods of not wearing his prosthesis): *"Yes, yeah, yeah, I can…I think…yes on holiday. Fourteen days and then…that we were in a hotel and I thought it is okay here."* But on social occasions he would wear his prosthesis. AEG: "*So when eating you don't benefit much from it* [the denture]?" R9: "*No, but let's say when I want to look on my Sunday best I put it in.*" Wearing a PRPD in spite of a negative attitude against it was considered as 'secondary tooth replacement acceptance'.

For R3 none of both attitudes dominated; analysis of her interview showed both characteristics of resistance against having absent posterior teeth ('functional discomfort') and resistance against tooth replacement ('foreign body in the mouth'). This inconsistency is illustrated by the struggle between her conviction that wearing a PRPD is indispensible for adequate chewing whilst precisely this PRDP hinders adequate chewing. R3 (being asked about wearing her distal-extension RDP for eating): *"no, I didn't put it in then."* AEG: *"You did not put it in?"* R3: *"no, not always, sometimes I did but not always although I know it is not right."* AEG: *"Is that so?"* R3: *"yes, because you cannot chew well then. In that case you actually only chew with your front teeth."*

Considering the feeling of a foreign body she mentioned: *"When you have it* [distal-extension RDP] *in for some time, I think, o, then it starts ..., it is for one thing strange in your mouth, because it is not of your own and then it also starts to hurt again and then it starts to grind, and you get sore spots, and then I think, off you go!"*

Discussion

This qualitative study showed different attitudes toward absent posterior teeth that fit in a model, which distinguishes between primary and secondary acceptance of an SDA condition. A qualitative study design was chosen to find a wide range of ideas, perceptions and experiences of people with an SDA condition; the study was not aiming to search for quantitative data on the prevalence or distribution of these matters. When interpreting the results of this qualitative study, context specific conditions should be taken into account. The data were collected from a purposive sample of the dental school where the SDA concept was more or less 'invented' and often applied if applicable; therefore informational bias might have influenced the participants' ideas. Moreover, this sample represents a cohort of relatively old regular attendees visiting the dental school for many years, indicating a positive attitude toward oral health care. The specific demand for dental implants by three participants (R2, R7, and R8) is an illustration of this positive attitude. Repeating this study in another setting would provide a broader basis for the model and clinical decision making for partially dentate people.

Although initially not intended, an empirical model started to evolve from the analyses of the first three interviews. In the attempt to get an overview of underlying issues of the participants' attitudes toward their shortened dental arch, a schematic model matured. This model summarizes the principle outcomes of the study and is rather an illustrative diagram than a theoretical framework. Ultimately all 'end-points/arms' of the model were represented by one or more participant, which was

considered as an indication for data saturation. By this empirical model we attempted to describe and illustrate attitudes of people towards their shortened dental arches, however the model needs further validation. Gender, age, SES, dental condition and its duration might influence the three attitudes and the primary or secondary acceptance of an SDA condition. The present study does not provide information to reveal extent nor direction of such influences. A systematic review synthesizing qualitative studies on patient's perceptions of loss of teeth and prosthetic rehabilitation recognized that negative impact of tooth loss is independent from variations in age, gender, cultural background and SES [23]. Recent studies on changes in oral health-related quality of life after prosthodontic rehabilitation showed ambiguous outcomes in associations of quality of life and age, gender and type or type of prosthodontic restoration [24,25].

In essence, the method we used is close to the methodology that Nordenram et al. [23] described to synthesize outcomes of qualitative studies: quotes (citations) were categorized into 'first level' themes, integrated and summarized into 'second level' themes and synthesized in our model as comprehensive 'third level' themes (resistance/acceptance of dental condition) [23]. In the present study, the underlying themes ('second level' themes) related to the participants' attitudes that were identified were: 'functional discomfort', 'emotional discomfort', 'foreign body sensation', and 'feeling handicapped'. Awareness of the potential role of these themes by the clinician is pivotal in a shared decision making process in treatment planning. A proper shared decision making process includes a phase in which initial preferences are recognized, and deliberated in a way that they can evolve to an informed preference. According to the shared decision making model of Elwynet al. (2012) [26] it is essential to elicit what patients already know, and whether this knowledge is accurate. Evidence obtained from qualitative studies on patient perspectives can provide clinicians with a better understanding of what may underlie patients' wishes. The use of standardized methods, such as proposed in the systematic review [23] is advised to strengthen the level of evidence.

With this model in mind it can be reasoned that information sharing is especially important if a patient does not feel content with his dental status, but is reluctant to pursue treatments replacing posterior teeth. It is advisable to ask patients who seem to accept having absent posterior teeth despite functional and/or emotional discomfort (secondary acceptance of absent posterior teeth), why they don't seek for tooth replacement. In this case it is recommended to check whether the latter is based on accurate knowledge. In this study some participants had some inaccurate ideas, especially on implant treatment. For example R1 believed that he would need crutches because he presumed that bone had to be harvested from his hips. Communication, including evidence-based information, between dentist and patient is essential in this respect.

From patients who reluctantly wear a PRDP (secondary acceptance of tooth replacement) it is important to know why they do so. Again, if based on inaccurate knowledge, it is appropriate to inform the patients about risks and benefits of functioning with an SDA without replacement or about alternative treatment options for replacement.

The use of a shared decision process makes way for the so-called 'socio-dental approach'. This approach is a comprehensive needs assessment model that integrates both normative and subjective measurements in assessing needs for dental care [27]. Usually, an approach that addresses subjective impact-related needs leads to a reduction of prosthodontic treatment and only seldom to whish fulfilling dental treatment, i.e. using dental 'treatment' without a medical or dental therapeutic need [28,29].

It should be noted that the interview responses are mainly from people who have had their dental condition for a long time. It is plausible that during this period the societal transformations, increased expectations regarding oral health, and increased influence of media as mentioned in the introduction have changed participants' views, values and expectations over the years (response shift) [30]. It is also possible that the apparent acceptance of the SDA condition is due to a functional adaptation. However, we have no indications that response shifts due to societal changes made participants reconsider their previous treatment decisions over the years, except possibly for respondent R3, for whom her mandibular distal-extension RDP was replaced by two cantilever FDPs. We consider it likely that R3 was initially not well informed about alternative treatment options and that she revised the initial treatment decision after a 'new' option was introduced to her. This example shows that regular probing and/or verification of patients' wishes is meaningful for patients that express 'secondary acceptance' (active surveillance).

To our knowledge the present study is the first to report on attitudes of patients who had an SDA condition for several years up to more than 40 years. Reasons to choose or refuse treatment for partial edentulism have been studied previously by Leles et al. [31]: a great variety in patients' reasons was reported such as complexity, similarity to natural teeth, better mastication. The participants of the present study raised reasons alike; however, the design of this qualitative study does not allow drawing conclusions about the relative importance of the mentioned reasons. A qualitative study amongst people who recently received a PRDP reported difficulties in accepting the prosthesis [32]. The study reported that especially for people who are initially reluctant to treatment, clear information about consequences of wearing a partial denture is accommodating the eventual acceptance. This finding underlines again the importance of implementing a shared decision process in prosthodontics.

Conclusion

Three main attitudes toward the shortened dental arch condition were: (1) acceptance of absent posterior teeth without restraint, (2) resistance against having absent posterior teeth prevails, (3) resistance against (needing) tooth replacement prevails. These attitudes lead to direct or secondary acceptance of absent posterior teeth or demand for tooth replacement and were synthesized into a conceptual model.

Acknowledgement

The authors appreciate all participants for their willingness and time to share their views and experiences, which laid the basis for this study.

References

1. Gotfredsen K, Walls AW (2007) What dentition assures oral function? Clin Oral Implants Res 18 Suppl 3: 34-45.
2. Kanno T, Carlsson GE (2006) A review of the shortened dental arch concept focusing on the work by the Kayser/Nijmegen group. J Oral Rehabil 33: 850-862.
3. Fueki K, Yoshida E, Igarashi Y (2011) A structural equation model to investigate the impact of missing occlusal units on objective masticatory function in patients with shortened dental arches. J Oral Rehabil 38: 810-817.
4. McKenna G, Allen PF, O'Mahony D, Cronin M, DaMata C, et al. (2015) The impact of rehabilitation using removable partial dentures and functionally orientated treatment on oral health-related quality of life: a randomised controlled clinical trial. J Dent 43: 66-71.
5. McKenna G, Allen PF, O'Mahony D, Flynn A, Cronin M, et al. (2014) Comparison of functionally orientated tooth replacement and removable partial dentures on the nutritional status of partially dentate older patients: a randomised controlled clinical trial. J Dent 42: 653-659.
6. Reissmann DR, Heydecke G, Schierz O, Marre B, Wolfart S, et al. (2014) The randomized shortened dental arch study: temporomandibular disorder pain. Clin Oral Investig 18: 2159-2169.

7. Tan H, Peres KG, Peres MA (2015) Do people with shortened dental arches have worse oral health-related quality of life than those with more natural teeth? A population-based study. Community Dent Oral Epidemiol 43: 33-46.

8. Walter MH, Hannak W, Kern M, Mundt T, Gernet W, et al. (2013) The randomized shortened dental arch study: tooth loss over five years. Clin Oral Investig 17: 877-886.

9. Walter MH, Marre B, Vach K, Strub J, Mundt T, et al. (2014) Management of shortened dental arches and periodontal health: 5-year results of a randomised trial. J Oral Rehabil 41: 515-522.

10. Wolfart S, Muller F, Gerss J, Heyedcke G, Marre B, et al. (2014) The randomized shortened dental arch study: oral health-related quality of life. Clin Oral Investig 18: 525-533.

11. Zhang Q, Witter DJ, Bronkhorst EM, Bartlett DW, Creugers NH (2014) Occlusal tooth wear in Chinese adults with shortened dental arches. J Oral Rehabil 41: 101-107.

12. Käyser AF (1981) Shortened dental arches and oral function. J Oral Rehabil 8: 457-462.

13. Dieterich A (2007) The modern patient - threat or promise? Physicians' perspectives on patients' changing attributes. Patient Educ Couns 67: 279-285.

14. Woods P, Gapp R, King MA (2016) Generating or developing grounded theory: methods to understand health and illness. Int J Clin Pharm 38: 663-670.

15. Tong A, Sainsbury P, Craig J (2007) Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care 19: 349-357.

16. Cronin M, Meaney S, Jepson NJ, Allen PF (2009) A qualitative study of trends in patient preferences for the management of the partially dentate state. Gerodontology 26: 137-142.

17. Brondani MA, Bryant SR, MacEntee MI (2007) Elders assessment of an evolving model of oral health. Gerodontology 24: 189-195.

18. Locker D (1988) Measuring oral health: a conceptual framework. Community Dent Health 5: 3-18.

19. Kuckartz A (2007) MaxQDA, the art of text analysis. VERBI software. Research GmbH, Germany, Marburg.

20. Denzin NK (1970) The research act: A theoretical introduction to sociological methods, D. Aldine Publishing Company, Chicago.

21. Pope C, Mays N (2006) Qualitative research in health care. Blackwell publishing, Oxford.

22. Krefting L (1991) Rigor in qualitative research: the assessment of trustworthiness. Am J Occup Ther 45: 214-222.

23. Nordenram G, Davidson T, Gynther G, Helgesson G, Hultin M, et al. (2013) Qualitative studies of patients' perceptions of loss of teeth, the edentulous state and prosthetic rehabilitation: a systematic review with meta-synthesis. Acta Odont Scand 71: 937-951.

24. Jenei A, Sandor J, Hegedus C, Bagyi K, Nagy L, et al. (2015) Oral health-related quality of life after prosthetic rehabilitation: a longitudinal study with the OHIP questionnaire. Health Qual Life Out 13: 99.

25. Omo J, Sede M, Esan T (2016) Quality of life in subjects with shortened dental arch rehabilitated with removable metal-based partial dentures. Eur J Prosthodont 4: 25-31.

26. Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, et al. (2012) Shared decision making: a model for clinical practice. J Gen Intern Med 27: 1361-1367.

27. Sheiham A, Tsakos G (2007) Oral health needs assessment. In: CM Pine, R Harris, Rebecca (eds) Community Oral Health. 2nd Edition, New Malden, Quitessence 59-79.

28. Ab-Murat N, Sheiham A, Watt R, Tsakos G (2015) Treatment needs and skill mix workforce requirements for prosthodontic care: a comparison of estimates using normative and sociodental approaches. BMC Oral Health 15: 36.

29. Ryu JI, Tsakos G, Sheiham A (2008) Differences in prosthodontic treatment needs assessments between the standard normative and sociodental approach. Int J Prosthodont 21: 425-432.

30. Schwartz CE, Andresen EM, Nosek MA, Krahn GL, RRTC Expert Panel on Health Status Measurement (2007) Response shift theory: important implications for measuring quality of life in people with disability. Arch Phys Med Rehabil 88: 529-536.

31. Leles CR, Martins RR, Silva ET, Nunes MF (2009) Discriminant analysis of patients' reasons for choosing or refusing treatments for partial edentulism. J Oral Rehabil 36: 909-915.

32. Smith PA, Entwistle VA, Nuttall N (2005) Patients' experiences with partial dentures: a qualitative study. Gerodontology 22: 187-192.