Observational study investigating tooth extraction and the shortened dental arch approach

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Observational study investigating tooth extraction and the shortened dental arch approach

Short title

Tooth extraction and shortened dental arch

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Keywords

Tooth extraction

Dental arch

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Abstract

Background; The Shortened Dental Arch (SDA) provides a cost effective dentition, considering the population is aging and retaining teeth for longer.

Objective(s): Observe the reasons and sites of tooth extraction, and assess the functional dentition over 15 years in dental practice.

Method; Subjects were recruited who required permanent tooth extractions between 2000-2015. The reasons for extractions were chosen from twelve extraction codes. Data was also collected for demographics, tooth position, root treated teeth and functional pairs remaining. Patient centred factors on tooth extraction and comments on chewing ability and aesthetics were recorded.

Results: Nine hundred and fifty one teeth were extracted in 900 patients. The mean age was 60 years (SD 20, SE 7, 95% CI 46,74). Reasons for extraction were periodontal disease (n=361, 38%), periapical infection (n=288, 34%) or tooth and tooth-root fractures (15%). Extractions included 201 (21%) second molars, 179 (19%) first molars, 152 (16%) second premolars, 95 (10%) first incisors, 86 (9%) second incisors, 76 (8%) canines and 67 (7%) first premolars. Following extractions, median functional pairs were 12, interquartile range (IQR) 19-7. Individuals with >10 functional pairs (60%, n=571) had no complaints with chewing ability or aesthetics.

Conclusions: Periodontal disease and periapical infection were the main causes for the extraction. First and second molars, followed by second premolars were the most commonly extracted teeth. The present study supports the SDA in creating a functional dentition, provided existing teeth and restorations are preserved/maintained and anterior aesthetic tooth replacement is ensured.

Background

Teeth are lost due to oral disease processes such as caries and periodontal disease, which reduces the number of tooth-to-tooth contacts or functional tooth units. However, an increasing number of older adults are retaining their teeth for longer (1). The reasons and pattern of tooth loss is important to understand the impact on the remaining dentition and oral function. It is also important to consider whether the space needs to be restored or left as it is. (2).

Since the early 1970s, fluorides in toothpaste and increased preventive measures have reduced tooth loss to manageable proportions in most sections of our society. The first Adult Dental Health Survey (ADHS) (3) in 1968 showed that 37% of adults had no remaining teeth. In the latest ADHS survey in 2009 (4) this figure of edentulous patients had fallen to 6% (including 2.7 million individuals). In 1968 it was a rarity for someone over 85 years to have any remaining teeth, whereas in 2009 more than 50% of persons over 85 years of age still had some natural teeth. It is important to note that the latest survey does not include data from Scotland and that the pattern of dental disease, tooth loss and other major health problems is likely to be higher in deprived communities in the UK (5). Furthermore, in younger individuals, there is also a problem with tooth loss often due to cultural barriers in high-risk individuals (6). Nonetheless, assuming future tooth loss continues at a low rate, then over 90% of those aged 35 – 44 years in the 2009 survey would have a realistic prospect of retaining a functional dentition of 21 or more teeth by 80 years of age [7].

The number of functional pairs provides an indication of general tooth loss and whether the patient has sufficient remaining teeth for oral function, based on the shortened dental arch (SDA) concept (Kayser 1981; Naka et al. 2014). This concept generally involves the retention of 20 or more natural teeth (functional dentition) with at least four occlusal units (one unit corresponds to a pair of occluding premolars and two units corresponds to a pair of occluding molars) (8). Often posterior teeth are lost and the SDA concept is a minimal treatment intervention approach based on the notion that satisfactory oral function can be achieved without complete dental arches and teeth lost do not necessarily require replacement (9). Other options include removable or fixed prosthodontic appliances to replace posterior teeth. The SDA concept aims to prevent prosthodontic overtreatment in the posterior regions of the dentition and provide oral function. As a result it is often cost effective (10). Despite this, in the experience of the operators, the SDA concept is often widely accepted by the dental profession but less commonly carried out. Some practitioners may even feel inexperienced in its application. Therefore, the aim of this study was to observe the reasons and sites of tooth extraction and assess the functional dentition over 15 years in dental practice.

Methods

Data collection was based on the Faculty of General Dental Practice (FGDP) UK national research study for Vocational Dental Practitioners (VDPs) and their Trainers in 2000-2001 (FGDP (UK) 2001). All dentate and partially dentate subjects who needed to have at least one tooth extraction by one experienced operator over 15 years in dental practice (between 2000-2015) were recruited consecutively. The practice was mixed NHS and private. All teeth were permanent teeth and this included extractions for orthodontic reasons. Deciduous teeth were excluded from this study. The emphasis was on the extraction of teeth with poor prognosis, the maintenance of remaining teeth/restorations and the replacement of anterior teeth and premolars to ensure a functional dentition where possible.

Table 1 includes the data collection sheet for tooth extraction. The date of birth and gender were recorded for each subject. Then for each tooth to be extracted, the tooth notation (FDI) and whether the tooth was previously root canal treated were recorded. Twelve criteria were used to describe the reason for extraction of the teeth and included periodontal disease, recurrent periapical infection, fractured tooth root, fractured tooth crown, caries, orthodontics, treatment plan, appearance, clearance, root perforation, fractured restorations and others. Periodontal criteria for extractions included mobile teeth impacting the patient's ability to chew effectively and causing pain on biting. Teeth with pulpal pathology were managed where possible by endodontic therapy, although teeth with recurrent periapical infection or insufficient coronal tooth structure for restoration were extracted. The twelve criteria reflect the dentist centred reasons for extraction, but in the notes patient centred factors around the reasons for extraction were also recorded.

Local anaesthetic was administered using buccal and lingual/palatal infiltrations for all extractions. Overall no sedation was used. Surgical extractions, if required, involved no flaps but guttering, dividing and luxating the roots. The patients were reviewed. The number of teeth (and number of functional pairs) remaining following tooth extractions was also recorded. In addition, data was recorded including whether the patient felt the loss of teeth impacted on their ability to chew effectively and aesthetics.

Conventional or minimal preparation bridges, dentures or single tooth implant crowns were used to replace anterior teeth for aesthetics. Premolar extractions were replaced as required to satisfy aesthetics or the minimal 10 functional pairs/units. A functional pair or unit was defined as a pair of occluding anterior teeth or premolars; likewise, a pair of occluding molars constituted two functional units. Patients with at least 10 functional units including anterior teeth entered a maintenance phase including oral hygiene instruction, 6 monthly visits to the practice hygienist and repair/replacement to existing direct restorations as required. The appointments involved diet analysis, professional cleaning, oral hygiene instruction with disclosing solution and (if necessary) tobacco cessation advise (12). Patients who were susceptible to caries including xerostomia were seen more regularly and prescribed high fluoride toothpaste. Patients who were susceptible to periodontal disease (Basic Periodontal Index 3 or 4 on at least one tooth) were seen four times per year by a hygienist in addition to the twice-yearly dentist appointments. The hygienist appointments involved sub gingival debridement with local anaesthetic.

Data were described descriptively. The reasons for tooth extraction were presented in a bar chart in addition to the incidence of tooth extraction by site. Comments made by the subjects on extractions and chewing ability following extractions were also recorded.

Results

Nine hundred and fifty one teeth were extracted over the 15-year period in 900 patients. The mean age was 60 years (SD 20, SE 7, 95% CI 46, 74) and just over half were female (52%). The ethnicities were Caucasian (n=597, 99.5%) and the remainder mixed race or black (n=3, 0.5%). The proportion of patients who owned their own home in London was 45% (n=405) and the percentage renting was 50% (n=450). The proportion receiving benefit was 5% (n=45). Patients diagnosed with xerostomia and receiving high fluoride concentration toothpaste was 20% (n=180). No medical co-morbidity precluding extractions were recorded. Of the teeth extracted, 133 (14%) had been root canal treated. The mean survival time of root canal treated tooth was 10 years. Less than 1% of extractions resulted in complications including dry sockets, which were managed successfully without antibiotics.

Figure 1 shows the reasons for extraction for teeth. This included 361 teeth (38%) extracted due to periodontal disease and 288 teeth (34%) extracted due to periapical infection. A further 95 teeth (10%) were extracted due to tooth-root fracture and 47 teeth (5%) were extracted due to tooth-crown fracture (in which there was insufficient coronal tooth structure for restoration). The teeth with tooth-root fracture were recorded as surgical extractions. Other reasons for extractions included caries (n=29, 3%); orthodontics (n=28, 3%); treatment planning (n=28, 3%); for appearance (n=19, 2%); root perforation (n=10, 1%); for clearance (in a rare circumstance involving multiple carious teeth) (n=1, 0.1%); or other reasons (n=5, 0.5%). The case involving clearance was excluded for the purposes of the present study. No teeth were extracted due to fracture of a restoration. Patients' primary reasons for retaining teeth included its aesthetic importance and the cost involved in restoring the tooth or prognosis if badly broken down. Many patients responded that they were "keen to retain their existing teeth" or that the teeth were "important when I smile".

Figure 2 shows a bar graph for the pattern of tooth loss at each tooth site. It can be seen that the largest bars are for the first and second molar teeth and the second premolars. A total of 505 (53%) of teeth were extracted from the maxilla and 446 (47%) teeth were extracted from the mandible. Extractions included 380 (40%) first and second molar tooth extractions, 152 (16%) second premolars, 95 (10%) first incisors, 95 (10%) wisdom teeth, 86 (9%) second incisors, 76 (8%) canines and 67 (7% first premolars).

Following extractions, the median number of functional pairs remaining was 12, interquartile range (IQR) 19-7. The proportion of individuals with at least 10 functional pairs was 60% (n=571). The proportion of individuals with at least 8 functional pairs was 71% (n=675). Of the subjects with at least 10 functional pairs remaining

following extractions (including anterior teeth), there were no complaints regarding chewing function or aesthetics. Subjects with lower distal extension dentures and 10 functional pairs often reported, "I don't wear my denture" and "food gets stuck underneath". Anterior tooth loss was replaced with either a denture, bridge or implant crown. Subjects with fewer than 10 functional units remaining reported problems with chewing function. Quite often this was improved using a well fitting cobalt chrome tooth supported denture, using strategic abutment teeth. In these cases patients said they "felt more confident in public", "were able to socialise with friends more easily", or were "able to eat more foods". Alternatively, a bridge or implant crown was provided. Often patients with acrylic dentures reported, "difficulty eating".

Conclusions

This study shows that the most common reasons for tooth extraction over a 15-year period in dental practice (2000-2015) were periodontal disease (n=361, 38%) and the presence of recurrent periapical infection (n=288, 34%). Most of the extractions occurred in the 53-67 year old age group. There were very few interventions in subjects aged below 46 or above 74 years old. The most commonly affected teeth were first and second molars (n=380, 40%). Following extractions, the median number of functional pairs remaining was 12 (IQR 19-7). Subjects with at least ten functional pairs remaining (including anterior teeth) reported few problems with chewing or aesthetics.

Previous research conducted in dental practice (with similar ethnic and gender balance) also shows most clinical interventions occur in patients between 55 and 65 years of age (13)(14). The commonest reasons for extractions were periodontal disease and periapical infection, followed by tooth-root and tooth-crown fractures. Perhaps the most significant finding especially when compared with previous studies (15) (16) was that virtually no teeth were extracted as the result of active caries. Part of this may be due to the strict preventive policy at the practice (described in the method) and all patients were enrolled on hygienist visits and regular maintenance. The caries risk of the population was low and this is reflected in the high proportion (almost half, 45%) owning property in London and the low proportion (5%) receiving benefits. Those patients with xerostomia (20%) were prescribed high concentration fluoride toothpastes (2800ppm fluoride), but the majority of patients (80%) were using standard 1450ppm fluoride concentrations. The importance of prevention in the elderly population cannot be understated. This group are at an increased risk of oral disease due to factors such as poor nutritional status, the cumulative effects of dental disease, medical interventions and decreased dexterity and ability to maintain their oral hygiene (17).

In a study by Agerholm et al 2001 (15), questionnaires distributed to random samples of general dental practitioners (GDPs) in England and Wales compared reasons for extraction of teeth in 1997 and 1986. As expected there were regional differences in extractions, but overall the GDPs were less likely to extract teeth in the latter decade (15). Furthermore, extractions due to common dental diseases (often caries or periodontal disease) were taking place later in life. This was similar in the present study, in which the mean age of subjects

was 60 years. In addition, although extractions due to caries were relatively higher than in the present study, they were more common in the younger age group (<50 year olds). In another similar study conducted in Scotland (16), data on the reasons for extraction of teeth in 1999 was compared to 1984. Again, fewer teeth were extracted in the later decade, but caries was the commonest reason for extraction in all age groups. However, in similarity to the present study, periodontal disease was the most common reason for tooth extraction in subjects over 40 years old in 1984. These studies, together with the ADHS 2009 (4), indicate that the proportion of tooth extractions overall is reducing. However there are variations in the reason for extraction geographically and at different times. Dental diseases are more prevalent in those with worsening socio-economic status (5), perhaps in contrast to the population enrolled within the present study in central London.

Patient centred factors around the reasons for tooth extraction have been reported anecdotally and include the strategic location of the tooth, importance they place on the remaining teeth, their ability (and willingness to pay for care that is required if a tooth could be saved, willingness to undergo treatment and availability of specialist care to resolve complex issues (18). Similar reasons were recorded in the present study in particular the aesthetic importance of the tooth and the cost of restoring and prognosis if extraction were to be avoided. The most common tooth extraction groups were first and second molar teeth and second premolars. Molars are more difficult and expensive to restore and maintain and have less aesthetic importance. As recommended in the SDA approach it is a cost effective tooth for extraction, moving the emphasise for restoration to the anterior teeth (10). We must nonetheless emphasise that the results of this study do not replicate what other dental practices and clinicians would do in their decisions to extract or otherwise.

The median number of functional pairs remaining was 12 in the present study and the majority of subjects (60%) had sufficient functional pairs according to the SDA concept (7). The number of functional tooth pairs indicates whether the patient can still masticate their food without additional prostheses (7). However, conflict still exists between studies on what is the ideal number of functional units required to maintain oral function (2). Nonetheless, most elderly individuals (>60 years old) should be able to function acceptably with a SDA, provided there were sufficient numbers of tooth-to-tooth contacts (typically anterior teeth and 4 posterior occlusal units posteriorly) (2). This enables improvements in the condition of the exiting teeth and stabilising/improving occlusal contacts without extending the arch with prostheses such as dentures (2). In contrast, difficulty chewing has been shown to be more common in conditions involving fewer occlusal contacts, unacceptable appearance of teeth (and loss of anterior teeth) and poorly fitting dentures (2). In the present study, subjects with at least 10 functional pairs (as defined by the SDA) reported no problems with chewing ability and no aesthetic concerns if anterior teeth were present. The importance of replacing missing anterior teeth, as opposed to posterior teeth, has also been reported previously (19). The existing teeth and restorations were maintained with occlusal contacts and this avoided having to extend the arch. Similarly, work from the Dutch group has found no clinically significant differences between subjects with a SDA of 3 to 5 occlusal units and subjects with complete dental arches regarding variables such as masticatory ability, signs

and symptoms of Temporomandibular Disorder, migration of remaining teeth, periodontal support and oral comfort (8). In addition, oral health related quality of life has been shown to be acceptable for subjects with at least 17 teeth (in the UK) (20). The present study supports the SDA in fulfilling the requirements of the functional dentition provided the existing teeth and restorations are maintained and anterior aesthetic tooth replacement is ensured.

Forecasting the future and based on the Adult Health Survey (1) and aforementioned studies (15)(16), it is likely that in another ten years, more people will be retaining their teeth for longer. Therefore, projecting forwards, we might postulate that the functional dentition will become a reality for the population into their 70^{th} and 80^{th} decades and beyond. This reflects a shift in the provision of Prosthodontic care and continues to question at what point is it suitable to provide a partial denture (or perhaps a so called creeping denture), as teeth are lost? In the present study, the focus has been on repair and replacement of the existing teeth, endodontic therapy and avoidance of extraction of anterior and premolar teeth where possible. It was preferable to avoid a denture if sufficient functional pairs could be maintained according to the SDA concept. This delayed the provision of further prostheses except in cases involving anterior tooth loss or where there were fewer than ten functional pairs post-extraction. This shift in service provision over the decades reflects reductions in overall tooth loss and should focus on retaining key teeth. As a consequence, it delays the continued resorption of the alveolar ridges in the edentulous, which itself can make provision of a subsequent conventional complete denture more difficult to tolerate (21). An option for the latter is the McGill consensus (22), which suggests an implant retained over denture for the mandibular prosthesis. However this also depends on there being sufficient bone as well as financial considerations. Furthermore, the number of dentists capable and confident in providing conventional complete dentures has fallen. The maintenance of any prostheses creates further problems, which can be challenging.

The authors recognise that the maintenance of teeth in an aging population creates challenges especially in light of the increasing prevalence of dental disease, including tooth wear in younger individuals (23)(24) or caries in at risk groups (6). This will require on going focus on the prevention of common dental diseases throughout life (17)(24)(25)(26)(27) to reduce problems such as aesthetic issues, gingival recession (28), dentine hypersensitivity (24)(29) and consequences of advanced tooth wear processes such as complex treatment planning. Many of these preventive measures will involve the use of altered oral hygiene practices, reduced brushing force (26), avoidance of acidic beverage frequency (24) and specialised dentifrices to protect tooth tissue (27)(29)(30).

This observation study conducted in a central London practice shows that periodontal disease and recurrent periapical infection were the main reasons for the extraction of teeth. Molar teeth and second premolars were the most common teeth extracted. 60% of the subjects in this study (mean age 60 years old) were retaining sufficient teeth for 12 functional tooth-to-tooth units. Subjects with at least 10 functional units (and no missing anterior teeth) could function without additional prostheses. The present study supports the SDA in fulfilling

the requirements of the functional dentition in dental practice, with maintenance of existing strategic teeth for longer.

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References

1. NHS information centre. Adult Dental Health Survey 2009 – First Release. 2010;1–19.
2. Naka O, Anastassiadou V, Pissiotis A. Association between functional tooth units and chewing ability in older adults: a systematic review. Gerodontology. England; 2014 Sep;31(3):166–77.
3. Gray P, Todd J, Slack G, Bulman J. Adult dental health in England and Wales in 1968. London HMDO. 1970;
4. Steele J, O'Sullivan I. Executive Summary Adult Dental Health Survey 2009. London: The Stationary Office; 2011.
5. White DA, Tsakos G, Pitts NB, Fuller E, Douglas GVA, Murray JJ, et al. Adult Dental Health Survey 2009: common oral health conditions and their impact on the population. Br Dent J. England; 2012 Dec;213(11):567–72.
6. Olley RC, Hosey MT, Renton T, Gallagher J. Why are children still having preventable extractions under general anaesthetic? A service evaluation of the views of parents of a high caries risk group of children. Br Dent J. England; 2011 Apr;210(8):E13.
7. Kayser AF. Shortened dental arches and oral function. J Oral Rehabil. England; 1981 Sep;8(5):457–62.
8. Kanno T, Carlsson GE. A review of the shortened dental arch concept focusing on the work by the Kayser/Nijmegen group. J Oral Rehabil. England; 2006 Nov;33(11):850–62.
9. BDA. BDA evidence summary Shortened dental arch therapy in old age. 2013; Available from: https://www.bda.org/dentists/education/sgh/Documents/Shortened dental arch therapy in old age.pdf
10. WHO World Health Organization Expert Committee. Recent Advances in Oral Health. Geneva; 1992.
11. FGDP (UK). National VDP Research Study.
12. Pau A, Olley RC, Murray S, Chana B, Gallagher J. Dental hygienists' self-reported performance of tobacco cessation activities. Oral Health Prev Dent. England; 2011;9(1):29–36.
13. Frost PM, Radford DR. The extensively restored posteriortooth has a high incidence of tooth fracture. Eur J Prosthodont Restor Dent. England; 2007 Dec;15(4):153–8.
14. Frost PM. An audit on the placement and replacement of restorations in a general dental practice. Prim Dent Care. England; 2002 Jan;9(1):31–6.
15. Agerholm D. Reasons for extraction by dental practitioners in England and Wales: a comparison with 1986 and variations between regions. J Dent. England; 2001 May;29(4):237–41.

16. McCaul LK, Jenkins WM, Kay EJ. The reasons for extraction of permanent teeth in Scotland: a 15-year follow-up study. Br Dent J. England; 2001 Jun;190(12):658–62.

17. Austin RS, Olley RC, Ray-Chaudhuri A, Gallagher JE. Oral disease prevention for older people. Prim Dent Care. England; 2011 Jul;18(3):101–6.

18. Preshaw PM, Walls AWG, Jakubovics NS, Moynihan PJ, Jepson NJA, Loewy Z. Association of removable partial denture use with oral and systemic health. J Dent. England; 2011 Nov;39(11):711–9.

19. Armellini DB, Heydecke G, Witter DJ, Creugers NHJ. [Effects of removable partial dentures on the quality of life in people with shortened dental arches]. Ned Tijdschr Tandheelkd. Netherlands; 2009 Dec;116(12):687–93.

20. Steele JG, Sanders AE, Slade GD, Allen PF, Lahti S, Nuttall N, et al. How do age and tooth loss affect oral health impacts and quality of life? A study comparing two national samples. Community Dent Oral Epidemiol. Denmark; 2004 Apr;32(2):107–14.

21. Tallgren A. The continuing reduction of the residual alveolar ridges in complete denture wearers: a mixed-longitudinal study covering 25 years. 1972. J Prosthet Dent. United States; 2003 May;89(5):427–35.

22. Feine JS, Carlsson GE, Awad MA, Chehade A, Duncan WJ, Gizani S, et al. The McGill consensus statement on overdentures. Mandibular two-implant overdentures as first choice standard of care for edentulous patients. Gerodontology. England; 2002 Jul;19(1):3–4.

23. Bartlett DW, Lussi a, West NX, Bouchard P, Sanz M, Bourgeois D. Prevalence of tooth wear on buccal and lingual surfaces and possible risk factors in young European adults. J Dent [Internet]. Elsevier Ltd; 2013 Nov [cited 2014 Aug 28];41(11):1007–13.

24. Olley RC, Moazzez R, Bartlett D. The relationship between incisal/occlusal wear, dentine hypersensitivity and time after the last acid exposure in vivo. J Dent [Internet]. Elsevier Ltd; 2015;43(2):248–52.

25. Olley RC, Gallagher JE. Tobacco usage and control: information and advice for primary dental care practitioners. Dent Updat [Internet]. 2010/03/12. 2010;37(1):40–2, 45–6, 49–50 passim.

26. Sehmi H, Olley RC. The effect of toothbrush abrasion force on dentine hypersensitivity in-vitro. J Dent. England; 2015 Dec;43(12):1442–7.

27. Olley RC, Moazzez R, Bartlett D. Effects of dentifrices on subsurface dentin tubule occlusion: an in situ study. Int J Prosthodont. United States; 2015;28(2):181–7.

28. Olley RC, Wilson R, Moazzez R, Bartlett D. Validation of a Cumulative Hypersensitivity Index (CHI) for dentine hypersensitivity severity. J Clin Periodontol [Internet]. 2013;40(10):942–7.

29. Olley RC, Parkinson CR, Wilson R, Moazzez R, Bartlett D. A novel method to quantify dentine tubule occlusion applied to in situ model samples. Caries Res [Internet]. 2014 Jan [cited 2014 Mar 22];48(1):69–72.

30. Mullan F, Paraskar S, Bartlett DW, Olley RC. Effects of tooth-brushing force with a desensitising dentifrice on dentine tubule patency and surface roughness. J Dent [Internet]. Elsevier Ltd; 2017;(2016).

Tables

Table 1

Data collection sheet

Subject code	Date of birth	Gender	Date of extraction	Number of teeth extracted	Tooth notation of extracted tooth/teeth (FDI)	Teeth to be extracted root canal treated?	Length of survival of tooth to be extracted	Number of teeth remaining	Number of functional pairs remaining	Reason for tooth extraction	Patient comments

Figures

Figure 1

Reason for tooth extraction

Figure 2

Incidence of tooth extraction in the maxilla and mandible