In Individuals with Loss of Molar Support, the Treatment Based on Shortened Dental Arch Concept may not Decrease the Risk of Tooth Loss Compared with Molar Replacement with Removable Partial Prosthesis

SUMMARY

Subjects
This multicenter randomized controlled trial was conducted in Germany in 14 departments of prosthetic dentistry at dental schools and in 1 biomedical center. Individuals older than 35 years, seeking consultation for prosthetic treatments, were recruited from dental school clinics. Those candidates with all molars missing in 1 jaw, with at least the canine and 1 premolar present in each quadrant, who had rejected the implant treatment option, were eligible to participate in this study. A total of 215 participants were enrolled in the study between January 2001 and February 2004. They were randomly assigned to receive either a removable dental prosthesis (RDP group; n = 109, mean age 59.3 ± 11.2, 45.0% female) for molar replacement or to retain a premolar occlusion (SDA group; n = 106, mean age 59.6 ± 10.3, 54.7% female). In both groups, missing anterior teeth were restored by a fixed bridge. The design of the RDP was limited to a conventional cast framework retained by precision attachments. In the SDA group, missing second premolars were replaced by a cantilever fixed partial denture. The opposing jaw was restored up to the first molar (RDP group) or the second premolar (SDA group) to ensure posterior occlusal support. A total of 63 individuals did not receive allocated intervention and were excluded from statistical analyses. Eighty-one participants received an RDP and 69 individuals received an SDA by March 2005. The trial’s participants were assessed 4 to 8 weeks after the treatment (baseline) and were followed for 3 years. A total of 14 individuals in each group were lost to follow-up after receiving the treatment. The power calculation for this ongoing trial was planned for a 5-year observation. Two interim analyses were conducted at 1.5 and 3.0 years’ follow-up.

Key Exposure/Study Factor: The Primary Treatment of Interest
The primary treatment of interest was a precision attachment removable dental prosthesis (RDP) with molar replacement. The control treatment was a shortened dental arch treatment without any molar replacement.

Main Outcome Measure
The primary outcome was the first tooth loss after prosthetic treatment, regardless of the jaw. The modified primary outcome was the first tooth loss in the study jaw.
Main Results

The rates of tooth loss in the RDP and SDA groups were 17% and 14%, respectively. In the RPD group, 5 teeth were extracted in the study jaw and 8 in the opposing jaw, whereas in the SDA group, 5 teeth were extracted in the study jaw and 4 in the opposing jaw. Reasons for the extractions were endodontic complications as well as tooth fracture in both groups and carries only in the RDP group (n = 3). From a total of 22 extractions, 12 were done exclusively in the study jaw (RDP, n = 6; SDA, n = 6). No significant differences between the survival distributions of either treatment were found (Kaplan-Meier survival rate, RDP 0.83, 95% confidence interval [CI]: 0.74-0.91; SDA 0.86, 95% CI: 0.78-0.95). The absolute risk difference was 3%.

Conclusions

The authors concluded that tooth loss occurred more frequently than expected in treated individuals based on the shortened dental arch concept. Moreover, they assumed that the lack of statistical power could be the reason why the study failed to find a difference in outcome between these two types of treatment.

COMMENTARY AND ANALYSIS

Well-designed randomized controlled trials (RCTs) are considered the “gold standard” to assess effects associated with health care interventions. In fact, evidence-based treatment planning relies on a comprehensive assessment of intended and unintended treatment effects.1 Thus, it is clinically important and relevant to provide data on the short- and long-term benefits and harms of treatment modalities that are still subject to controversy, such as restoring the shortened dental arch (SDA).2 Although the overall study results indicate that adult individuals have adequate function and masticatory efficiency when 3 to 5 occlusal units (1 unit = a pair of occluding premolars; 2 units = a pair of occluding molars) are intact,3-9 there is some evidence demonstrating that patterns of missing occlusal support may influence the patient-based outcomes, such as satisfaction and oral health-related quality of life,10 and even in some individuals having no treatment is not valuable.11,12 In fact, the treatment decision making should be based on an individual assessment of the patient’s needs, values, and oral characteristics, such as periodontal health, type of occlusion, parafunctional habits, and temporomandibular disorders.13 This is specifically important in the extreme cases of SDAs, when only 0 to 2 occlusal units remain.14-16

The present report of the Randomized Shortened Dental Arch Study provides data and information on the efficacy of the SDA versus bilateral free-end RPDs. Tooth loss is a relevant outcome, because it has a direct impact on the patient’s quality of life and satisfaction with oral function. Furthermore, its measurement is not prone to error. The interim results of this multicenter randomized controlled trial indicate that there was no statistically significant difference between the treatments in terms of 3-year cumulative incidence rate of tooth loss.

Although the authors adequately reported on sequence generation, allocation concealment, follow-up, and withdrawal,17,18 the results should be interpreted with caution. In fact, RCTs are not immune to bias. Several studies have shown that trial quality has an impact on the effect size.19 Trials that are not blinded tend to result in larger effect sizes than those that are blinded.19 Excluding the data from analysis on individuals who did not receive allocated intervention, results in violation of the intention-to-treat principle and leads to systematic differences between the study aims.20 Although the groups seemed comparable at baseline with respect to some of the risk factors (age, gender, and number of teeth), there may have remained imbalances between the groups with regard to the complexity of preexisting treatments and prosthetic restorations of opposing jaws or other unobserved potential confounders. In addition, the lack of blinding and breaking of the randomization may lead to post baseline differences in important risk factors of tooth loss, such as hygienic adherence.20,21

The authors themselves noted limitations of their study, including the applicability and external validity of the results. This is mainly attributable to the prosthetic restoration of the SDA with crowns and bridges and the specific design of RPDs, which do not reflect a typical clinical reality.

In conclusion, the results of this study are not adequate in establishing any firm conclusion on this issue. Additional RCTs and cohort studies are required to clearly establish and quantify such important effects in the treatment of an SDA. It will be interesting to test the same research hypothesis with selective inclusion criteria based on extreme cases of an SDA.

REFERENCES


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