Fracture of the acrylic resin denture base can be an inconvenient complication, as the patient generally cannot wear the denture until it is repaired. 1 Approximately 68% of dentures are fractured within 3 years after insertion, 2 and denture fracture is the most frequent reason for ceasing denture use. 3 Nakazawa et al 3 also examined removable dental prostheses and found that approximately 10% of denture-wearing patients had problems with mastication, appearance, pronunciation, mobility of abutment teeth, and retention, while 20% of patients had denture fractures. Therefore, preventing denture fracture is crucial for maintaining the patient’s quality of life once starting denture use.

In 1984, denture repair cases were examined, 4 and preventive measures, including reinforcement against denture fractures, were established based on the survey of clinical cases 5 and implemented in the authors’ institution. The purpose of this study was to evaluate preventive measures against denture fracture using clinical surveys of denture fracture cases from 1984 and 2009. The following data were collected: denture repair procedure; location of denture base fracture (with or without reinforcement); and period of denture use from insertion to repair. Significant differences in characteristics between patients treated in 1984 and 2009 were determined using the chi-square test (P < .05). Results: In 2009, denture fractures comprised 55.5% of all repair cases. The most frequent location of denture fracture was around the clasp and metal in the denture base. Approximately 45% of all dentures were reinforced. The mean period from denture insertion to repair was 37 months. The number of denture fractures significantly decreased between 1984 and 2009 (P < .05), and the number of dentures with reinforcement significantly increased (P < .05). The mean period from denture insertion to repair also increased. Conclusion: These findings suggest that denture reinforcement as a preventive measure is effective against denture fracture, allowing patients to use their dentures more effectively. Int J Prosthodont 2018;31:382–385. doi: 10.11607/ijp.5750

Materials and Methods

This study included 128 cases that received denture repair treatment at the authors’ institution in 2009 (October 2009 to September 2010). The following information was collected: denture repair procedure; location of denture base fracture (with or without reinforcement) (Fig 1); and period from denture insertion to repair. The study was carried out in accordance with the Declaration of Helsinki, and the study procedure was approved by the ethics board of the authors’ institution.

Similar to the 1984 survey, denture repair type was classified as denture fracture or other. The former included denture base fracture, artificial teeth.
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detachment, and clasp fracture; the latter included adding artificial teeth and/or reline. The location of denture fracture was classified as shown in Fig 1: denture base fracture at midline; denture base fracture between an existing tooth and the denture base margin; fracture between existing teeth; fracture around the clasp or metal embedded in the denture base; fracture over the root cap; and other local fracture.

Statistical Analyses

Differences in the survey results between 1984 and 2009 were compared, and the effect of preventive measures was evaluated using the chi-square test. Statistical analyses were performed using SPSS 21.0 (IBM), and P values < .05 were considered statistically significant.

Results

In 2009, denture fractures comprised 55.5% of all repair cases (Fig 2); 33.5% were caused by denture base fractures, 11% by artificial teeth detachment, 11% by clasp fractures, 11% by artificial teeth addition, and 33.5% by reline (Fig 3). The most frequent location of denture fracture was around the clasp or metal embedded in the denture base (29%) (Fig 4). Other common locations included denture fracture at midline (19%), denture fracture between an existing tooth and denture base margin (26%), and other local fractures (19%) (Fig 4). Approximately 45% of all dentures were reinforced (Fig 5).

The number of denture fractures significantly decreased from 81% in 1984 to 55.5% in 2009 (P < .05) (Fig 2), while the number of dentures with
Denture repair cases significantly increased from 3% to 45% ($P < .05$) (Fig 5). In addition, the mean period from denture insertion to repair increased from 26 months to 37 months (Fig 6).

**Discussion**

A previous study performed a longitudinal examination of removable dentures, and denture repair cases were examined and preventive measures against denture fracture were developed based on these findings. However, these reports are relatively old; therefore, the present study examined denture repair cases from October 2009 to September 2010 and compared the results between 1984 and 2009 to investigate the longitudinal effects of these preventive measures.

The most frequent cause of denture repair was fracture of the denture base in both 1984 and 2009, followed by artificial teeth detachment. These results are consistent with reports from Darbar et al and Vallittu et al. Denture base fractures comprised 60% of all denture repair cases in both 1984 and 2009, which is similar to reported frequencies of 57.7% and 64%. However, the number of cases of artificial teeth detachment in 2009 was 19.7%, which was smaller than previously reported (29.8% and 26%).

In the present study, denture fracture and artificial teeth detachment cases decreased from 1984 to 2009. The common locations of denture fracture and preventive measures against denture fracture, including reinforcement embedding and denture base thickening around weak denture regions, were identified. For overdentures, covering the coping top by reinforcement might prevent denture fractures around the coping top.

Several preventive measures for denture fractures have been reported. Okuno et al reported that cutting the basal surface of artificial teeth and applying resin monomer may improve adhesion between artificial teeth and the denture base, thereby reducing the number of artificial teeth detachment cases. Hargreaves discussed that most fractures of the mandibular complete denture occurred when the denture dropped, while fractures of the maxillary complete denture occurred because of improper fit to the mucous membrane. Beyli and von Fraunhofer also reported that the most common causes of denture fracture were an ill-fitting denture to the mucous membrane and imbalanced occlusion. These findings taken together suggest that precise instruction for denture care and periodic recall are indispensable for long-term maintenance of remaining teeth and removable dentures.

Because the number of denture fracture cases decreased significantly and the mean duration between denture insertion and fracture was extended, patients are now using their dentures for longer periods than before. One potential reason for the decreased number of denture repair cases might be the increased use of dentures with reinforcement, especially at weak denture regions.

**Conclusions**

In 2009, denture fractures comprised 55.5% of all denture repair cases. The number of denture repairs decreased significantly from 1984 to 2009, while the period from denture insertion to repair increased. Denture reinforcement is effective in preventing denture fracture, thereby allowing patients to use their dentures more effectively and for longer periods.
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References


Literature Abstract

The Efficacy of Air Polishing Devices in Supportive Periodontal Therapy: A Systematic Review and Meta-Analysis

This systematic review analyzes the existing literature on the clinical efficacy of air polishing devices (APDs), discussing the evidence-based data available for justifying their use as an alternative to conventional periodontal debridement in supportive periodontal therapy. The main objective of the review was to assess whether APD was as or more efficient in obtaining successful treatment outcomes compared to conventional methods. Following PRISMA guidelines, a systematic literature search of articles in English up to December 2016 was conducted using the PubMed, Cochrane, and Medline databases. Relevant articles were selected based on specific criteria, and seven studies were included in the final assessment. One more study was added after a manual search of the literature. Due to considerable heterogeneity in study designs and outcome variables measured, only clinical parameters (probing depth, bleeding on probing, and clinical attachment level) were selected for meta-analysis. The studies selected for this systematic review provide some evidence that APDs as monotherapy could be an alternative to conventional debridement of single- and multi-rooted teeth with no furcation involvement during supportive periodontal therapy. Comparing clinical and microbiologic outcomes, APDs seem to be as effective as conventional treatments. The primary advantage for the use of APDs in supportive periodontal therapy seems to be their ability to efficiently remove biofilm without causing damage to the periodontal soft tissues or to tooth and root structure. There may also be an advantage regarding patient comfort and treatment time.

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