The Effect of Fixed Implant Prosthodontic Treatment in Mastication Predominance in Patients with Unilateral Posterior Missing Teeth

AUTHORS: KYOSUKE OKI, RIKI KUWATSURO, YOSHIHIRO TSUKIYAMA, YO YAMASAKI, YOSHIKO MATSUMOTO, KIYOSHI KOYANO
Section of Implant and Rehabilitative Dentistry, Division of Oral Rehabilitation, Faculty of Dental Science, Kyushu University, Fukuoka, Japan

Abstract

Background:
The habit of chewing predominantly on one side is called mastication predominance. Excessive mastication predominance may cause stomatognathic dysfunction. Hence, chewing equally on both sides is generally recommended. In our previous study, we found that patients with missing posterior teeth on one side chewed on one side more predominantly than healthy dentate subjects, although there was no significant difference in masticatory efficiency.

Aim:
The purpose was to investigate the effect of prosthodontic treatment for patients with unilateral missing posterior teeth in terms of mastication predominance, and to examine the differences in the effects of treatment with removable partial dentures compared with dental implants.

Materials and Methods:
The sample consisted of 86 patients with unilateral posterior missing teeth who received prosthodontic treatments: removable partial denture (RPD group) or fixed implant prosthesis (IMP group). EMG activities were recorded from the bilateral masseter muscles while subjects were asked to chew chewing-gum freely. The assessment of mastication predominance was conducted before and after prosthetic treatments. The chewing side (right or left) was judged by the level of root mean square EMG amplitude. The mastication predominance was then objectively assessed by mastication predominance index (MPI), the proportion in the number of the difference between the right and left side strokes against the number of total strokes. After cluster evaluation of 70 healthy dentate subjects, 40% of MPI was applied to cut off cut off value. Based on the criteria, MPI before and after treatment was evaluated.

Results:
There was a significant difference in the MPI before and after prosthodontic treatments for both groups. (P<0.05)

When judging, MPI over 40% turned into under 40% by prosthodontic treatment as significant improvement in mastication predominance was observed in the IMP group (P<0.05), especially in the free-end missing unilateral posterior region (P<0.05).

Conclusions:
Mastication predominance was improved by prosthodontic treatments for patients with missing teeth in the unilateral posterior region. Especially in the implant prosthesis group, significant improvement of mastication predominance was observed compared to the removable partial denture group for the patients of free-end missing unilateral posterior region.

Analysis of EMG activity
EMG signals were converted to the root mean square (RMS) values
The number of right- and left-side strokes was counted from the EMG data of chewing test food

Assessment of mastication predominance
Mastication Predominance Score (MPS) and Mastication Predominance Index (MPI) was calculated by the following formula

Conclusions
1. Masticatory laterality was improved by prosthodontic treatments for patients with missing teeth in the unilateral posterior region.
2. Especially in the implant prosthesis group, significant improvement of mastication predominance was observed compared to the removable partial denture group for the patients of free-end missing unilateral posterior region.

References