The Effect of Mandibular Denture Abstention on Masseter Muscle Thickness in a 97-Year-Old Patient: A Case Report

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This case report describes the effect of complete denture abstention and subsequent rehabilitation with mandibular implant-supported overdentures (IOD) on masseter muscle thickness (MMT) in a 97-year-old patient. MMT was measured bilaterally using an ultrasound scanner during 1 year of wearing a conventional denture, after 101 days of voluntary denture abstention, and 3, 6, and 12 months after delivery of the IOD. MMT decreased by 17% during denture abstention following repeated implant surgery, and returned to 100% during the 12 months with the mandibular IOD. This case suggests that muscle bulk may be related to denture function. *Int J Prosthodont 2010;23:418–420.*

Complete tooth loss results in the remodeling and atrophy of most orofacial tissues, including the masticatory muscles. Whereas it is widely acknowledged that implant-supported overdentures (IOD) allow for a greater occlusal force and chewing efficiency, it remains unknown what effects IODs have on the masticatory muscle bulk. The presented case provides the first insight into the effect of IODs on the masseter muscle bulk.

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Materials and Methods

A 97-year-old man was recruited from a long-term care facility to participate in a randomized controlled trial on implant treatment in elderly patients. He was frail, yet mentally fit and took pleasure in improving his unsatisfactory mandibular denture retention. He wore a maxillary root-supported overdenture and a mandibular complete denture, which was relined during the noninvasive arm of the original trial to which he had been assigned. At baseline, masseter muscle thickness (MMT) was measured bilaterally[1] using an ultrasound scanner and an 8-MHz linear array transducer (100 Falco, Esaote Pie Medical). The thickest part of the muscle between the ramus and fascia (Fig 1) was measured when contracted and relaxed and the mean of the two recordings was used for analysis. Measurements were repeated 3 and 12 months after baseline. At this time, the patient did not see the improvement he had hoped for and expressed his desire to receive implant treatment. Two interforaminal 8-mm Straumann implants were inserted. When the patient presented 7 weeks later for implant loading, he reported that he had chosen not to wear his dentures to avoid complications. Nevertheless, one implant had to be replaced during that visit (Fig 2). After a total of 101 days of voluntary denture abstention, the mandibular complete denture was exchanged for an IOD using Locator abutments. MMT was measured at delivery of the IOD, as well as 3, 6, and 12 months later.

Fig 1 Ultrasound image of the contracted masseter muscle at baseline examination. The MMT was measured as the distance between the ramus and fascia, perpendicular to the ramus.

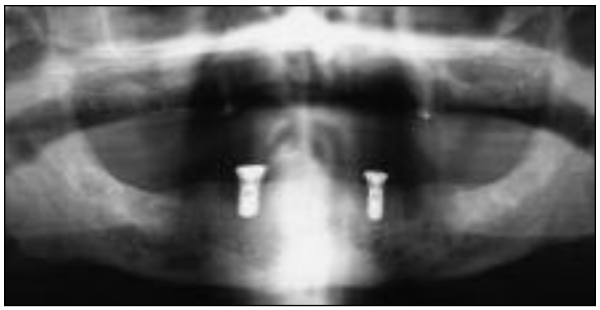

Fig 2 Panoramic radiograph after reimplantation of the mandibular left implant.

Fig 3 MMT during contraction per side. The patient was followed after the relining of his mandibular complete denture, during 101 days of voluntary denture abstention, and after rehabilitation with an IOD. He preferred chewing on his right side but changed sides after insertion of the IOD.

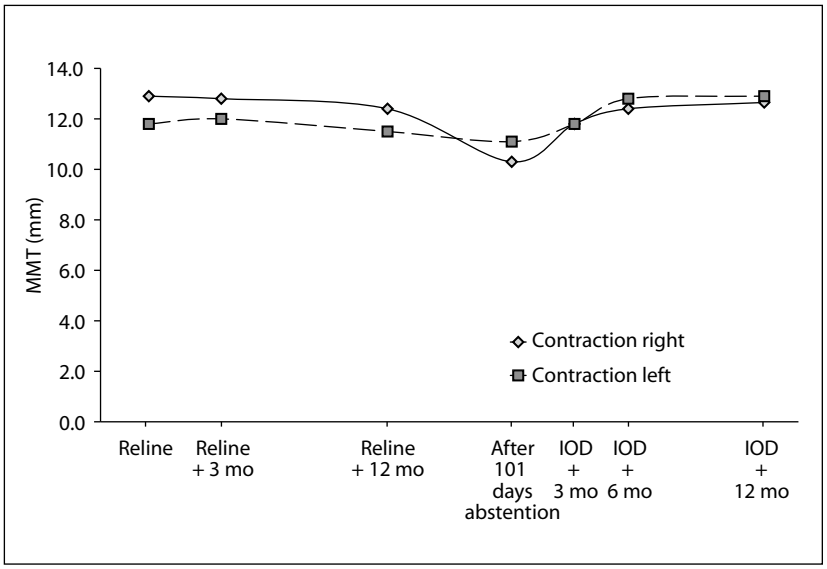

Table 1 MMT (mm) in Contracted and Relaxed Conditions

	Reline	Reline + 3 mo	Reline + 12 mo	After 101 days abstention	IOD + 3 mo	IOD + 6 mo	IOD + 12 mo
Contraction right	12.9	12.8	12.4	10.3	11.8	12.4	12.7
Relaxed right	12.4	12.6	12.7	10.7	11.1	12.0	12.2
Contraction left	11.8	12.0	11.5	11.1	11.8	12.8	12.9
Relaxed left	11.4	12.0	11.6	10.3	11.1	12.1	12.2

Results

MMT varied little during 1 year of wearing a maxillary root-supported overdenture and a mandibular complete denture. After 101 days of denture abstention, MMT had decreased by 17%. This effect was more pronounced on the right, the preferred chewing side. Twelve months after loading of the implants, the muscles regained over 100% of the lost MMT (Fig 3, Table 1). The patient was extremely pleased and reported improved masticatory ability with his IOD, which he wears during the day.

Discussion

Newton et al[2] demonstrated that the cross-sectional area of the masseter muscle decreases with age and wearing of complete dentures. Although a training and detraining effect on thigh muscle bulk was reported for older adults,[3] little is known if masticatory muscle bulk can be regained once lost, especially in elderly and frail individuals. The presented patient suggests a muscular training effect through stabilization of a mandibular complete denture with implants, possibly a result of facilitated chewing and increased occlusal force.[4] The training effect seems to be related to regular oral function in the absence of any signs of parafunction. Detraining atrophy during mandibular denture abstention was more pronounced on the preferred chewing side, possibly because of a previous "better" training. Although this patient lost one implant, there is no evidence for a higher risk of implant failure in elderly patients.[5]

Conclusion

The presented case history suggests that masseter muscle bulk may be regained by improving mandibular complete denture function through stabilization with two interforaminal implants.

Acknowledgments

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Literature Abstract

A prospective study of prenatal mercury exposure from maternal dental amalgams and autism severity

There were two objectives of this prospective, blinded clinical study. First, the relationship between mercury exposure from maternal dental amalgams during pregnancy and the severity of subjects diagnosed with autism spectrum disorders (ASD) was examined. Second, the study aimed to determine if there was a threshold number of maternal dental amalgams during pregnancy above which there was an increase in the severity of subjects diagnosed with an ASD. A total of 100 children born between 1990 and 1999 who were at least 6 years of age presenting at the Genetic Centers of America were prospectively recruited for the study. Patients with known prenatal exposure to mercury-containing drugs were excluded. Each patient was examined by both clinical observation and use of the Autism Treatment Evaluation Checklist (Autism Research Institute) to determine if autism (severe) or an ASD (mild) was present. Other information collected included race, sex, region of residency, and number of maternal amalgams present during pregnancy. Examiners of these two information sets were blinded from one another. Forty patients were diagnosed with autism and 60 subjects with ASD. A logistic regression analysis was used as the statistical tool. The null hypothesis was that the number of maternal dental amalgams during pregnancy would have no effect on autism severity. The mean number of maternal amalgams was 4.6 for those diagnosed with autism and 3.1 for those with an ASD, but the difference was not statistically significant ($P < .05$). The odds of autism were about 1 (no effect) for 5 or fewer maternal amalgams during pregnancy and increased significantly for 8 or more amalgams. More specifically, those subjects associated with 6 or more maternal amalgams had 3.2 times greater odds of being diagnosed with autism, compared to an ASD, than subjects associated with 5 or less maternal amalgams ($P = .0127$). The authors suggest that when using dental amalgams, the issue of mercury exposure in women before and during child-bearing age should be carefully considered, as well as the possibility of subsequent fetal exposure and adverse outcomes. However, they prudently identified that future studies should be made to include possible confounding factors, such as size of the amalgams, nature of the amalgam alloy used, and potential sources of mercury exposure from daily life other than from dental amalgams.

Geier DA, Kern JK, Geier MR. *Acta Neurobiol Exp* 2009;69:189–197. **References:** 43. **Reprints:** Dr Mark R. Geier, The Genetic Centers of America, Silver Spring, Maryland, USA. Email: mgeier@comcast.net—*Elvin W.J. Leong, Singapore*