

# ASYMMETRY INDEX OF MASTICATORY MUSCLE AS A PARAMETER FOR ANALYSIS OF THE TMD TREATMENT OUTCOMES

Cláudia Maria de Felício<sup>1</sup>; Melissa de Oliveira Melchior<sup>1,2</sup>; Cláudia Lúcia Pimenta Ferreira<sup>1</sup>;  
Marco Antonio Moreira Rodrigues da Silva<sup>2</sup>

- 1- Department of Otorhinolaryngology, Ophthalmology and Head and Neck Surgery - Faculty of Medicine of Ribeirão Preto, University of São Paulo (USP), Brazil  
2- Department of Restorative Dentistry, Dental School of Ribeirão Preto, USP, Brazil  
E-mail: cfelicio@fmrp.usp.br

## INTRODUCTION

The therapy most frequently employed for the treatment of Temporomandibular disorder (TMD) is the occlusion splint (OS). Orofacial exercises have also been applied, with work directed at stomatognathic functions, i.e., orofacial myofunctional therapy (OMT), being included in certain approaches. The literature indicates that evidence is weak and further studies are needed (Michelotti et al, 2005).

Analysis of the asymmetry of muscle pairs on the right and on the left by surface electromyography (EMG) has been performed in order to identify the effects of the use of the OS, but we did not detect any studies using it in order to analyze the effects of the OMT.

The objective of the study was to assess the TMD treatment outcomes based on the asymmetry index (AI) of the mandible elevating muscles.

## METHODS

Thirty subjects with articular TMD were randomly divided into 3 groups: 10 subjects treated with stabilization OS (OS group), 10 treated with OMT (OMT group) and 10 were used as controls with TMD (group CTMD). Eight subjects with no signs or symptoms of TMD represented the asymptomatic group (group C). The

diagnosis was based on the RDC/TMD (Dworkin, Leresche, 1992). The EMG was recorded using an eight-channel surface electromyograph (Lynx Tecnologia Eletrônica -EMG1000). Active differential surface electrodes were positioned centrally and parallel to the direction of the fiber bundles of each masseter and temporal muscle. A reference electrode was placed on the patient's arm. The clinical conditions investigated were: (1) maximum voluntary dental clench and (2) maximum voluntary dental clench with cotton rolls for 5 secs.

The EMG signals were recorded and later calculated as muscle activity evaluated as root mean square (r.m.s.) of amplitude ( $\mu\text{V}$ ). The asymmetry index (AI) between muscle pairs was calculated as described by Kibana, Ishijima and Hirai (2002); Saifuddin et al, (2003).

Analysis of variance (ANOVA) was applied for inter-group analysis, followed by the Tukey post-test. The intra-group phase (diagnostic x final) comparison was performed by the *t*-test for paired data. All calculations were made using the Statistica software, with the level of significance set at 0.05.

## RESULTS AND DISCUSSION

ANOVA for AI data showed no significant differences in phase D between groups, between muscles, or an interaction effect ( $p > 0.05$ ). In phase F there was a significant

difference between groups { $F= 5,85$ ,  $p= 0,002$ }. The Tukey post-test revealed differences between OMT and OS ( $p=0.001$ ), and between OS and C. The probability of equality between groups OMT and C increased from 26% to 92% from phase D to phase F.

*Comparison of AI between phases:* There was a decrease in AI between phases for both muscles in the OMT group, with a significant difference for the masseters ( $t = 2.49$ ,  $p < 0.05$ ). There was no significant difference in AI between phases in the OS, CDTM and C groups for the masseter and temporal muscles ( $p > 0.05$ ).

In the present study, surface EMG was employed to determine the AI between pairs of mandible elevating muscles and to compare groups, as well as to analyze the effect of treatment. The higher the AI, the greater the disequilibrium of EMG activity between sides (Kibana, Ishijima and Hirai, 2002). Asymmetry has been reported to be present also in control subjects, but the indices are significantly higher in individuals with TMD (Alajbeg et al, 2003). In TMD the change in muscle recruitment may be a compensatory mechanisms for pain relief, or asymmetric recruitment may precede the development of the muscle pain symptom (Nielsen et al, 1990).

A goal of OMT was to equilibrate the mandible elevating muscles on the right and on the left. Another goal was to keep the functional space free under resting conditions, a fact that might have contributed to the interruption of the constant nociceptive stimuli coming from the occlusal asymmetry between the right and left sides. Phase comparison revealed a significant reduction of AI in the masseter muscle only in group OMT, indicating an

improvement of the functional equilibrium between sides.

The increase of AI in the OS group may have been due to the bite deprogramming caused by splint and consequently to conditioned avoidance of nociceptive stimuli. Alajbeg et al (2003) reported that, after OS treatment the level of temporal muscle asymmetry during clenching increased significantly.

## SUMMARY/CONCLUSIONS

(1) the groups with TMD and the control group did not differ significantly during the diagnostic phase although the asymmetry index of group C was lower than for the other groups; (2) there were differences between groups in the final phase; (3) only the OMT group presented a significant difference in AI from the diagnostic to the final phase; (4) AI was useful to define therapeutic goals and conducts and to evaluate and confirm the results in an objective manner.

## REFERENCES

- Alajbeg, I.Z., Valentic-Peruzovic, M., Alajbeg, I., Illes, D. (2003). *Coll Antropol.* **27**, 361-71.
- Dworkin, S.F., Leresche, L. (1992) *J Craniomandib Disord Facial Oral Pain.* **6**:301-55.
- Kibana, Y., Ishijima, T., Hirai, T. (2002). *J Oral Rehabil.* **29**,58-63.
- Michelotti, A., de Wijer, A., Steenks, M., Farella, M. (2005). *J Oral Rehabil.* **32**,779-85.
- Nielsen, I.L., McNeill, C., Danzing, W., Goldman, S., Levy, J., Miller, A.J. (1990). *Am J Orthod Dentofacial Orthop.* **97**,20-34.
- Saifuddin, M., Miyamoto, K., Ueda, H.M., Shikata, N., Tanne, K. (2003) *J Oral Rehabil.* **30**,578-86.