

## **RELATIONSHIPS BETWEEN OCCLUSION, POSTURE AND VISUS DIAGNOSTIC APPROACH**

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We are often faced with postural disorders correlated with malocclusion. The role of proper bite fitting in the genesis of malposture is still being much argued. In recent years, many research workers endeavoured to find more or less sophisticated diagnostic systems apt to identify ascending and/or descending or mixed syndromes.

In the frame of this research work, I concentrated on investigating a possible relationship between occlusal disharmony, malposture and impaired ocular vision.

Everything started with a kinesiologic test check correlated with ocular convergence capability: i.e. by forcing a very convergent podalic posture, a patient's capability to focus from close up is reduced, on the average, by at least 30%. This should be a clear sign that contraction of some muscle chains triggers a reflex contracture of others, which impairs the function, in this case either hypofunction of the Musculi Rectis Medialis involved in the adduction movement, or hyperactivity in rest position of the antagonistic Musculi Rectis Lateralis and partly of the not directly involved Musculi Minores Obliquis and Majores Obliquis.

In Ophthalmology, orthoptics is the branch which studies and monitors eye motility defects and its deviation from the orthogonal line. A postural pathology, well known by ophthalmologists, is named "Ocular Torticollis". In other words, the patient takes an altered head posture, by adjusting it so that he can obtain the best possible vision, in the adaptative attempt to compensate for his motility deficit. An extreme example is given by severe squinters, who, therefore, use only one eye to see, or by persons who have lost one eye: they keep their head bent to the side affected by the vision defect, so that the eye they use will be located in the centre of a visual field, as symmetrically as possible on the left and on the right.

Based on these data, a question struck me: having ascertained that improper bites may cause reflex/compensative postural adjustments and vice-versa, that orthoptic modifications may lead to postural changes; that a change in muscle chains may affect the accommodation capability, my question is: may improper bite fitting also cause vision defect and vice-versa?

In collaboration with the Orthoptics Department of the Ophthalmology Clinic of the Genoa University, I tried to obtain an answer to this query by examining numerous in-patients.

### **Methods**

The investigation scheme is simple: after an ophthalmologic examination to rate the eye motility deficit, the following tests are made: dental, gnathologic examination with muscle palpation, postural inspection on scoliometer and weighing scale and with the aid of Polaroid photos, rating of the apparent length of the legs on the coach, followed by muscle tenderness and occlusal re-equilibration by a modified Meeresman test, the length of the legs and the pain level on digital palpation are then rated again, together with a postural re-examination on the scoliometer with photo. If the parameters have improved, a descending syndrome may be suspected and, always with the aid of the appliance in the patient's mouth, the eye motility defect will be reconsidered.

The results are amazing, all patients examined, according to the above parameters, obtained benefits: their pathology became less severe or in some cases it even disappeared, and all this within about 15 minutes! Conversely, the patients who showed no benefits after the Meeresman test, did not show any significant orthoptic modifications.

### **Cases**

Some of our cases had a very significant value.

*Case-record n° 1.* DM. S. aged 20, on ophthalmologic examination, showed near-sighted exophoria, associated with L/R convergence failure in superodextroversion. Ocular torticollis, with the head bent to her left shoulder. The patient referred visual fatigue after working hard, recurrent ophthalmic migraine. On digital

palpation, severe pain in the four Pterygoids and left laterodeviation, on the scoliometer a marked head flexion to the left and forward and a 16-kg weight imbalance were observed! After relaxation, on digital palpation, a residual pain in the Right Int. Pterygoid level 1, on the scoliometer the head was re-aligned, upright, the weight was perfectly redistributed (rare) the follow-up orthoptic examination report reads: nearsighted and farsighted orthophoria, persisting exophoria in superodextroversion, reduced vertical squint (R/L). Our first thought was to assess whether the orthoptic problem was caused by malposture which, in turn, was due to dysgnathia. (Fig.1)

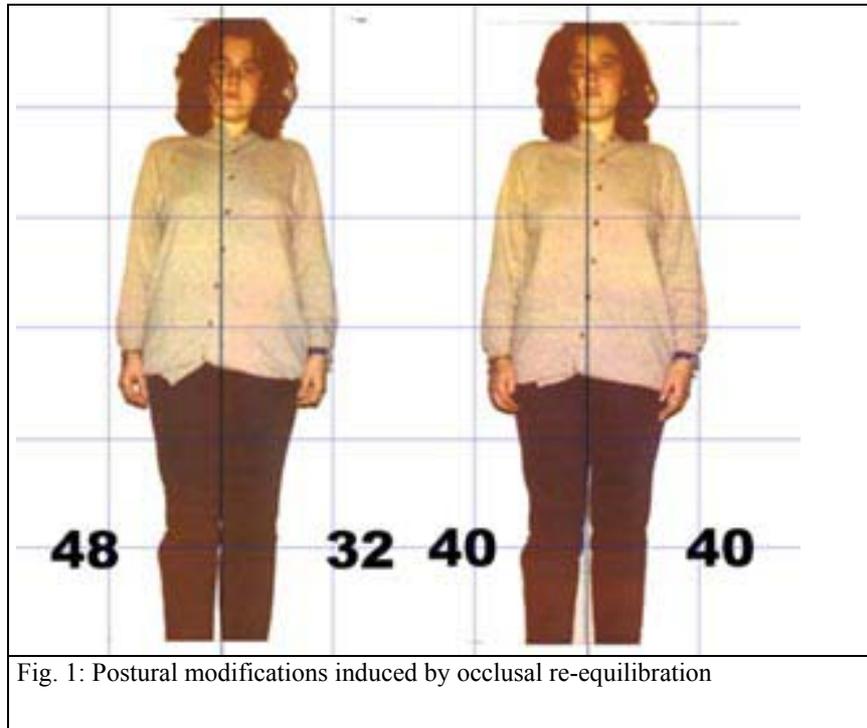


Fig. 1: Postural modifications induced by occlusal re-equilibration

*Case-record n°. 2.* G.E. aged 23, came to the Ophthalmology Clinic because of frequent headaches, that she referred as probably due to her vision (after long study hours), often associated with difficulty to focus the script of the books. She wore “supporting” reading glasses. On orthoptic examination, the patient showed moderate nearsighted exophoria, farsighted orthophoria, ocular torticollis with the head bent to her left shoulder due to hypofunction of the Musculus Major Obliquus of the left eye, on digital palpation the whole muscular region of the face including Pterygoids, Temporalis, Digastric, Mylohyoids and even Masseters was contracted, terminal click on the right and reciprocal clicking in the first 2/3 of the range of movement to the left. On aural palpation, retrusion on closing is perceived, associated with a moderate compression pain, hypertrophy of the Right Temporalis and Masseter at clenching; on the coach, the left leg was shorter, on the scoliometer, the head was bent to the left, the right shoulder lower, +3 kg imbalance on the right side. After relaxation, the legs return equal length, the imbalance is reduced to 1 kg, the head is upright; on digital palpation, only the Pterygoids were still a little aching, the click has disappeared and crepitation was no longer appreciable. No condylar retrusion was noticed; on clenching, the contraction was symmetric. The ophthalmic examination reported: nearsighted and farsighted orthophoria, the ocular torticollis had almost completely disappeared. Was it caused by a hypofunction of the Major Obliquus? Considering the apparently good conditions of dentition, the decision was taken thoroughly to investigate this case through a kinesiography: a poor dynamics was observed with little identification of occlusion and a significant variation of the velocity graph at maximum mouth opening variation, upon electromyographic examination, no contraction of the Masseters was observed (Fig. 2).

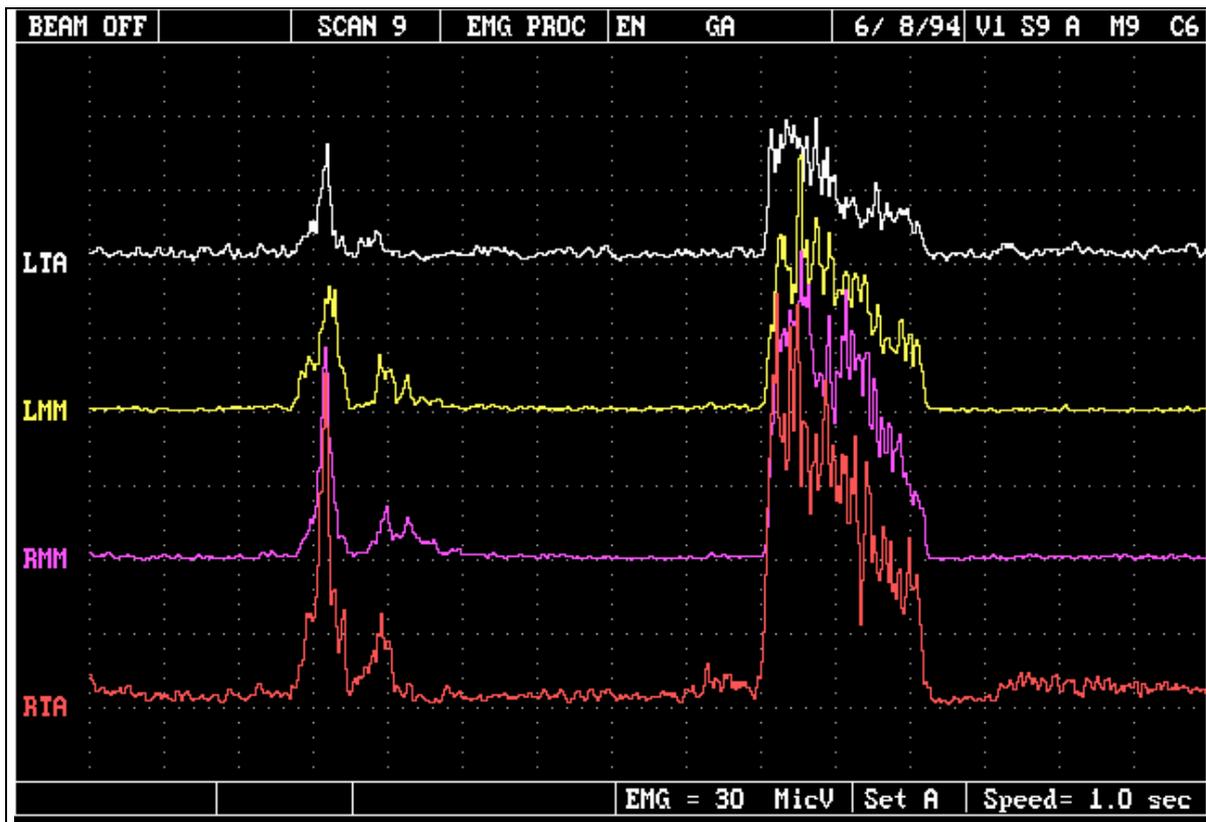


Fig. 2: Surface electromyography (Myotronics) of Temporalis and Masseters. Note that the latter are not activated at swallowing.

A myocentric occlusion was observed, indicating the presence of a small anterior wall and a negligible mandibular deviation.

Before a coronoplasty was performed, the lateralities were checked, two balancing interferences on the vestibular ridges of the linguodistal cusps of the seventh lower teeth were observed (Fig. 3,4).

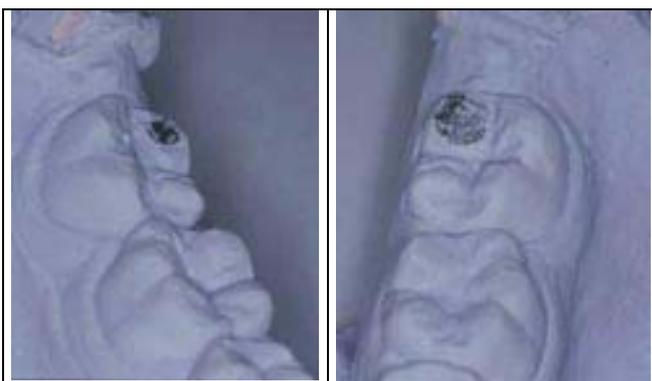


Fig. 3,4: balancing interferences on the vestibular ridges of the linguodistal cusps of the seventh lower teeth.

After a coronoplasty only of these points was made, the electromyography became immediately normal (Fig. 5).

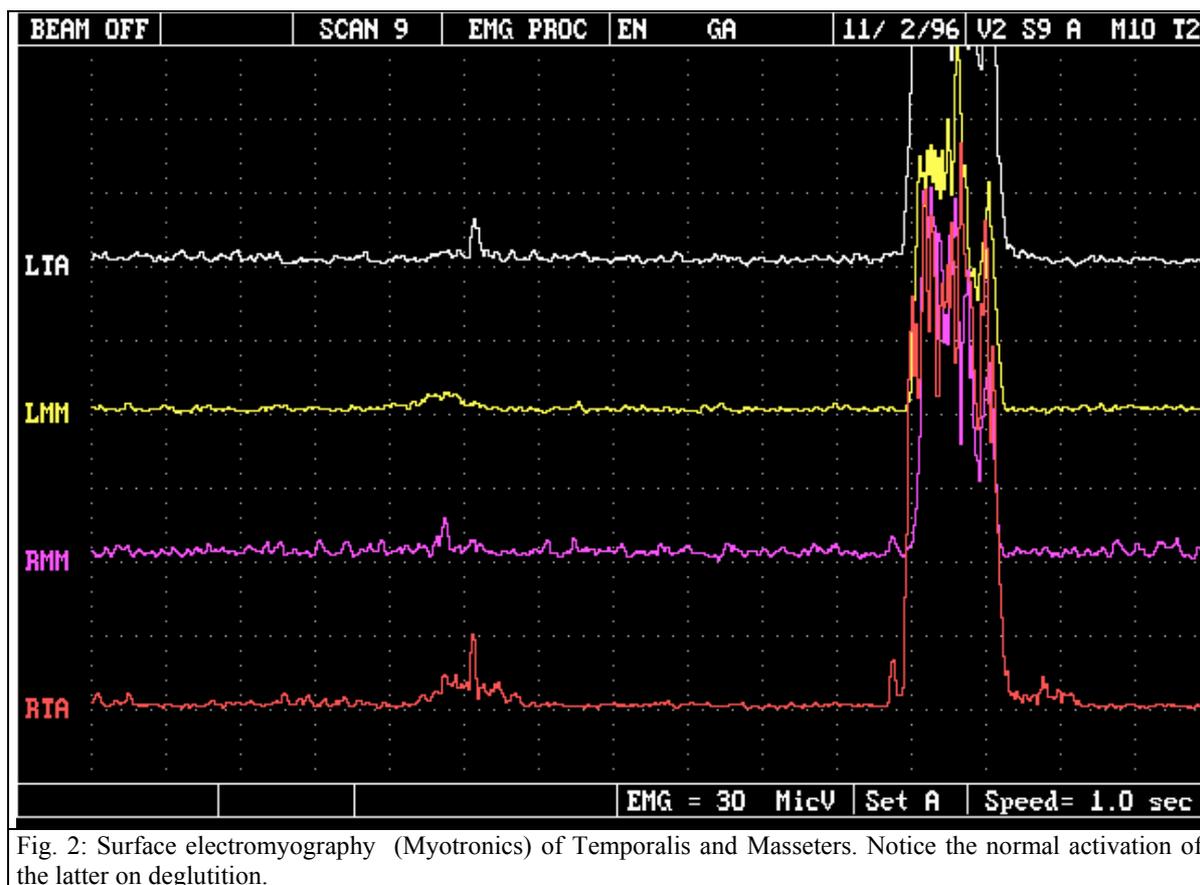


Fig. 2: Surface electromyography (Myotronics) of Temporalis and Masseters. Notice the normal activation of the latter on deglutition.

The patient was sent for an ophthalmic examination where no more alterations were found. I re-examined the patient periodically, at three-month intervals, only to make sure that no interferences were present and, after a couple of years, she did no longer need to wear glasses when she studied, she was no longer affected by migraine and she referred no eye fatigue symptoms during her study.

*Case-record n° 3.* This case is the most important. P.M. aged 18, suffered from a left eye exotropia associated with hypertropia, a severe ocular torticollis with the head bent to her right shoulder, she underwent two surgical squint correction operations, which did not obtain the expected results. She has made corrective exercises for a moderate scoliosis since she was aged 8, her right knee had meniscus problems. On gnathologic examination, the picture was dramatic, showing pain (level 4) in Pterygoids and Masseters, associated with hypertrophy and Temporalis and Masseter pain at maximum clenching, to the extent that she did not allow me to palpate any other muscles! Marked hyporotation of the head, especially to the left, shorter left leg, shorter left arm, her head was strongly bent and turned to the right, imbalance with +5 kg on the right (on the meniscus side), her right shoulder was lower (Fig. 6).

After relaxation, on digital palpation, practically everything became normal; to patient's great astonishment, only a residual pain remained in the right Internal Pterygoid level 1, her legs returned equal length, head rotation had increased, however, on the scoliometer, her posture had worsened, her head was more upright but more turned to the right; her left shoulder was lower and the imbalance reached +8 kg.

It stands out immediately that the patient, though having clinically improved her stomatognathic picture had significantly worsened her posture. (Fig. 7)

We decided to investigate more thoroughly by applying prismatic lenses and removing the gnathologic appliance. Again, we were faced with a postural modification, the patient was much more upright, her right shoulder was lower, the head was up but still slightly bent to the right, however, her imbalance still remained + 8 Kg on the right (Fig. 9).

We decided to apply the bite again, together with prismatic lenses (Fig. 10), her shoulders were then level, the head still remained slightly bent to the right but the imbalance was drastically reduced to +2 Kg on the right!



Fig. 7,8,9,10: Notice the postural modifications induced. 7: habitual, 8: occlusal re-equilibration (worsening), 9: prismatic lenses only (improvement of the ocular torticollis but worsening of the overall posture), 10: prismatic lenses and occlusal re-equilibration (improved ocular torticollis, posture and weight distribution)

This representative case makes us to ponder over the reasons causing such alternating modifications and we believe we can assume that the postural and scoliotic problems stemmed from a vision defect, causing a compensating occlusion to counterbalance the current pathology. The occlusal gnathologic re-equilibration thus worsened the postural pattern since it canceled a reflex compensation. Conversely, the ocular re-equilibration alone allowed the patient to eliminate her ocular torticollis; however, in our case, the presence of dysgnathia and no longer a compensation still triggered an adaptative postural mechanism.

Finally, a re-equilibration of both pathologies have been able to eliminate all mechanisms by which the patient is compelled to take a strongly pathologic posture.

This case must evoke a consideration: we must be very careful when we start a gnathologic rehabilitation treatment; it is extremely important to check the patient's posture before and after the myocentric survey in order not to be faced with a case like this one, which would certainly cause a failure. By removing an adaptative mechanism to compensate for a pathology having an other than dental etiology, we would either worsen the algetic syndrome or destroy the abutment teeth in an unconscious attempt to restore the lost compensation.

### Conclusions

A possible relationship between occlusion, posture and visus (phoriae) has been proven. All tested patients, who were found to be suffering from gnathologic and algetic problems, obtained an orthoptic improvement and, in some cases, their phoriae disappeared after occlusal re-equilibration and reduction of their algetic symptoms. Postural muscle chain systems are likely to interact with the muscles involved in their motility. Therefore, a closer collaboration between these branches of medicine is required to achieve a better overall success and for the patient's cenesthesia.

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## Curriculum

**Piero Silvestrini Biavati** obtained his M.D. Degree in 1980 and specialized in Odontostomatology in 1983, Ph.D. since 1996.

Practice in Genoa, Italy. For several years, he was a Lecturer on “Prosthesis and Gnathology” at the University of Genoa and was Head of the Department for the same disciplines from 1983 to 1999. He is Author of more than 100 publications and Member of various Scientific Associations, among which *AIKECM-ICCMO (International College of Cranio Mandibular Orthopedics)*, *AIG (Accademia Italiana di Gnatologia)*, *COL (Cenacolo Odontostomatologico Ligure)*. [pierosilv@virgilio.it](mailto:pierosilv@virgilio.it)

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