Science

The Profound Effect of the 1973 Nobel Prize in Dentistry

Aelred C. Fonder, B.A., D.D.S., F.R.S.H.

Excerpt

The awarding to the 1973 Nobel prize for medicine and physiology for research associated with the dental distress syndrome findings will affect dentistry and dental attitudes. The Alexander therapy to normalize body posture through gentle muscle manipulation corresponds to spinal posture normalization by elimination of the masticatory muscle imbalance. Through both processes of normalization, mental and physical health problems are resolved. All systems of the total biologic unit are affected by the posture of the body.

Eyebrows were raised all over the world by the unconventional decision of the Nobel Foundation in awarding the 1973 prize for medicine and physiology to Nobel laureate Tinbergen for research associated with dental-distress findings on the relationship of malocclusion, dental -distress, body posture and behavior.

Tinbergen reviews how Alexander, around the turn of the century, restored proper use of the body musculature to attain normalization of the body posture. An astonishing variety of somatic and mental illnesses were thereby alleviated. Barlow describes the

combined successes developed by the dedicated pupils of Alexander. Continued monitoring and corrective manipulation of the entire body masculature brings about very striking improvements in such diverse areas as high blood pressure, breathing, depth of sleep, overall cheerfulness, mental alertness, resilience against outside pressures, and even refined manual skills.

Basic Anatomy The essentiality of the role of the dental structures can be easily demonstrated through observance of basic anatomy. The jaws and spine are gathered into one basic system by the various fascia surrounding them, (Gray, Philadelphia) so that stress in one area is readily transmitted throughout the region. Any stress or muscle spasm in these areas is reflected in tension in the various fascial sheaths and their corresponding attachments. This is especially true with the masticatory system and the atlas and axis vertebrae in the neck since the masticatory muscles are the most powerful, the most freely movable and the major weight-bearing mechanisms in the head and neck system. Now research has shown how closely these two structures, the jaw and the atlas and axis vertebrae, are linked. Strain or pressure on one will produce a correlative attempt at adjustment on the part of the other. This correlative adjustment in the body's systems is evidenced in the consistency which research has demonstrated of short or reactive leg length and the laterality of axis to the maloccluded side of the temporo-mandibular joint (Berkman, 96 1971). The intricately linked web of the muscles of the body result in reaction of neck muscles when one muscle is changed in the leg and when a neck muscle is released, the toes are affected even when one is lying down (Tinbergen, 1973).

Elimination of Problems This correspondence of the musculature and the autonomic nervous system explains the marvelous effects which are achieved when the dental mechanism is properly aligned and balanced (Fonder, 1975, 1976, 1977, 1979, 1963, 1962, 1968, 1971, 1973). Such adjustments often are the initial step in elimination of such obvious problems as difficulty in swallowing, asymmetrical facial features, one-sided chewing, migration of the jaw in closing, taut muscles in the cervical area, tension in the nape of the neck, arthritic conditions in the TMJ and ligaments and improperly-fitting dentures and the repetitive sore-spots. So, it will no longer come as a surprise that the long list of remissions of systemic and mental problems that Nobel laureate Tinbergen and other renowned scientists attribute to Alexander's muscle therapy are routinely mitigated by physiologic dentistry. This is demonstrated by our research.

Bracco P, Deregibus A and Piscetta R (2004). Effects of different jaw relations on postural stability in human subjects. Neuroscience Letters 356: 228-230.

Effects of different jaw relations on postural stability in human subjects

P. Bracco, A. Deregibus*, R. Piscetta

Biomedical Sciences and Human Oncology Department, University of Torino, C.so Dogliotti 14, I-10126 Torino, Italy Received 22 August 2003; received in revised form 24 November 2003; accepted 27 November 2003 Abstract

Authors investigated the effects of different jaws relations on body posture in a sample of 95 subjects. All subjects underwent a posturometric and stabilometric analysis using a computerized footboard. Tests were performed in three mandibular positions: centric occlusion, rest position and myocentric position, respectively determined by teeth engagement, joints position, and muscles contraction. All subjects showed variations of body posture in the different mandibular positions. Statistical analysis (analysis of variance for repeated measures) confirmed that postural variations in different jaws relations were significant: in particular, the SKN multiple comparison test showed that myocentric position improved postural balance on frontal plane with respect to the other jaw positions considered. q 2003 Elsevier Ireland Ltd. All rights reserved.

Keywords: Trigeminal afferences; Body posture; Stabilometry; Posturography; Transcutaneous electric neural stimulation; Myocentric position; Centric relation

In the last years, a number of researches investigated the various determinants that may influence body posture. Respiration, head and neck position, mood states have been assessed to have effects on posture [1,11,12,18]. Among those determinants, recent studies seem to demonstrate a role of trigeminal afferences and dental occlusion on proprioception, visual and postural stabilization [2,6,7,13].

Moreover, the possibility that there could be a relation between stomatognathic pathologies, such as temporomandibular joint disorders, and postural disorders has been investigated [3,4,15,16].

The aim of the present paper was to verify if different jaws relations modify posture in a sample of human subjects. The sample for the study was constituted of 95 subjects (23 males, 72 females), average age 29 ^ 10 (range 18-52). All subjects were asymptomatic volunteers without information on the aim of the study. They were preventively investigated in order to exclude signs and/or symptoms of temporomandibular disorders and of physiatric disorders. Posture was analyzed in three different mandibular positions: centric occlusion (or intercuspid position): it is the most closed, static position which the mandible assumes determined by the full interdigitation of opposing teeth [17]: it is a position referred to the teeth, obtained asking the patient to close the mouth and get the teeth together in his habitual position.

Rest position: it is the habitual postural position of the mandible when at rest, with the condyles in a neutral, unstrained position in the glenoid fossa [17]. It is a position referred to the temporomandibular joints, obtained positioning two cotton rolls (8 mm thick) between the dental arches, asking the patient to swallow several times and stay at rest. Myocentric position: it is a position established along the neuromuscular

trajectory, most commonly between 1 and 2 mm of vertical closure from physiologic rest position. The neuromuscular trajectory is an induced isotonic closure path of the mandible fromphysiologic rest position, that occurs when postural and masticatory muscles are simultaneously at their resting length and in balanced tonus with respect to one another, to a selected terminal contact therapeutic position (myocentric occlusion). It is a position referred to the muscles, obtained by the transcutaneous electric neural stimulation (TENS) technique, according to Jankelson [8-10]. TENSwas provided and monitored by means of a computerized mandibular scan CMS (mandibular kinesiograph K6-I) and the Myo-monitor J3 (both Myotronics Inc., Tukwila, WA). The kinesiograph is able to recordmandibular position in three dimensions of space and simultaneously record the bilateral Neuroscience Letters 356 (2004) 228-230 www.elsevier.com/locate/neulet 0304-3940/03/$ - see front matter q 2003 Elsevier Ireland Ltd. All rights reserved. doi:10.1016/j.neulet.2003.11.055 * Corresponding author. Via Chambery 4/C, I-10141 Torino, Italy. Tel.: 39-11-799-142; fax: 39-11-650-2068. E-mail address: dere.and@inrete.it (A. Deregibus). electromyographical activity of the masseter, anterior temporalis, sternocleidomastoideus and upper trapezius muscles. Myo-monitor supplies low frequency, low amplitude TENS stimulation to the muscles innervated by the mandibular division of the trigeminal nerve, causing muscles to contract once every 1.5 s.

Each subject underwent the TENS stimulation for at least 450: when a stable mandibular position and a good muscular balance (EMG controlled) were reached, the myocentric position was recorded by an intraoral bite registration acrylic resin material, later used for the fabrication of an orthosis [9].

Subjects posture was evaluated by a computerized posturographic and stabilometric footboard (Moebius Alpha by Ergomed srl, Cremona, Italy). A PC computer calculates

the information and provides responses as load graph (load, expressed in kilograms and perceptual, on each feet supporting point) and stability graph (center of foot pressure, assumed to be body barycenter, and its swinging during time). The center of foot pressure is considered as the real body barycenter, and it is compared to the theoretical barycenter, which occurs when, ideally, the body weight is uniformly distributed on the feet supporting points.

For each subject, three different registrations on the footboard were taken: the first in centric occlusion (maximum intercuspidation, ICP); the second with the cotton rolls (rest position, REST); and the third with the orthosis (myocentric position, MYO). The three tests were recorded consecutively, without moving the subject on the footboard: tests were recorded with open and closed eyes. Closed eyes results were considered in this research.

Both posturometric and stabilometric data were considered: from the load graph, the percent difference of load on right and left lower limbs was calculated. The obtained value was assumed as 'asymmetry index' of weight distribution. Ideally, the global weight has to be distributed 50% on each lower limb, that means asymmetry index is 0. From the stability graph, it was considered the distance from the real to the theoretical barycenter, calculated on X (right/left direction) and Y (posterior/anterior direction) axes. Ideally X and Y distances are close to 0 [5,14]. The analysis of variance for repeated measures (ANOVA) test with the Student-Newman-Keuls Multiple Comparisons post test were performed in order to verify weather eventual postural variations in the different mandibular positions were statistically significant. The statistical analysis was made using a speciphic software (GraphPad Instat Ver 3.01 Graphpad Software Inc. San Diego, CA, USA) The hypothesis is that there is not any difference: if P , 0:05; eventual differences are significant. The test was repeated for the three measures

considered (asymmetry index, x distance, y distance). The post test was then used for relating the average values two by two, to verify which mandibular position eventually corresponded to a significant different posture.

The posturographic examination showed that out of 95 subjects, an asymmetry index closer to 0was found in 26 cases in centric occlusion, in 20 cases in rest position, in 45 cases in myocentric position. In four cases there was no difference about weight distribution in the three mandibular positions. The average asymmetry index value was 6.7 ^ 5.5 for the centric occlusion tests, 6.3 ^ 4.8 for the rest positions tests, 5.3 ^ 4.5 for the myocentric positions tests (Table 1). The stabilometric examination showed that on the x axis (right/left axis) the distance between the real barycenter (center of foot pressure) and the theoretical barycenter was lower in 20 subjects in centric occlusion, in 28 subjects in rest position and in 44 subjects in myocentric position. In three subjects there was no variation of distance. The average x distance value for the centric occlusion tests was 6.7 ^ 5.3 mm, for the rest position tests it was 5.9 ^ 4.6 mm, for the myocentric position tests was 5.3 ^ 4.2 mm (Table 1). On the y axis (anterior/posterior axis) the lower distance between the two barycenters was found in 42 subjects in centric occlusion, in 19 subjects in rest position and in 34 subjects in myocentric position. All subjects showed differences in the distance between the barycenters on y axis. The average y distance value for the centric occlusion tests was 215.1 ^ 15.2 mm, for the rest position tests it was 216.9 ^ 14.8 mm, for the myocentric position tests it was 216.2 ^ 15.0 mm (Table 1). The ANOVA test performed on the asymmetry index results showed that there was a statistically significant

P. Bracco et al. / Neuroscience Letters 356 (2004) 228□230 229 difference of the postural values in the three mandibular difference, for F 1/4 4:639 and therefore P 1/4 0:0108: The Post test evidenced that this significant difference was between centric

occlusion and myocentric position, and between rest position and myocentric position, but not between centric occlusion and rest position (Table 1). The ANOVA test performed on the x distance results was also significant for F 5:753 and therefore P 1/4 0:0038: The Post test evidenced that the difference was significant between centric occlusion and myocentric position, but not between rest position and myocentric position and centric occlusion and rest position (Table 1). Also about y distance, the ANOVA test was significant for F 3:284 and therefore P 1/4 0:039: In this case the Post test confirmed a significant difference only between centric occlusion and rest position (Table 1). The results seem to support the observation that different jaws relations imply differences in body posture. In fact, there was a strong relation between mandibular position and body posture: 91 out of 95 (95.8%) subjects showed variations in load distribution closing mouth either in centric occlusion or in centric relation or in myocentric position. Furthermore, 92 out of 95 (97.9%) subjects showed changes also in the distance between theoretical and real barycenter on x axis, and 95 cases out of 95 (100%) showed changes on y axis. Similar results were observed by the authors in previous experiences [2]. Statistical analysis showed these variations were significantly relevant. Temporo-mandibular disorders are principally a pathologic condition of masticatory muscles and head and neck postural muscles or, at least, a combined pathologic condition of muscles and temporo-mandibular joints. Altering trigeminal afferences and proprioception, those disorders can provoke, with a descending action, an unbalance of the whole postural muscles chains and finally posture alterations. Since an occlusal therapy could induce a re-equilibrium of masticatory muscles, this re-equilibrium could influence, with a descending action, the whole body postural muscles, resulting in an improved posture.

Considering tests performed in centric occlusion, that is an habitual position, as a control group, the sample showed that myocentric position (which is a right-left muscular equilibrium position) seemed to improve postural balance on the frontal plane

in about a half of the subjects with respect to other jaws relations considered: in 45 out of 95 subjects myocentric position improved the asymmetry index and in 44 out of 95 subjects it reduced the x distance. Statistical analysis showed that posture on the frontal plane was significantly different in myocentric position with respect to centric occlusion and rest position. A good balance of masticatory and head and neck muscles seems to be an important factor of postural stability. On the sagittal plane, neither myocentric position nor rest position improved posture with respect to centric occlusion. It must be said that the methodic presents some limitations: stabilometry reduces all human posture to a single point, the center of foot pressure, which is assumed to be the gravity center [5]. There is not information about all districts that contribute to the maintenance of posture: only the final effect of the interaction of all districts could be observed

2. Effects of a neuromuscular dentistry-designed mouthguard on muscular endurance and anaerobic power Shawn M. Arenta1 c1, Jennifer McKennaa1 and Devon L. Golema2

ABSTRACT: Athletes of various sports are required to utilize mouthguards during practice and competitions for protection against orofacial and dental injuries, regardless of the effects on performance. Recent advances in neuromuscular dentistry have led to the development of a mouthguard touted also to enhance the performance through jaw realignment. The purpose of this study was to compare the effects of a neuromuscular dentistry-based mouthguard to a standard, custom-fitted mouthguard (CFM) on muscular endurance, anaerobic power and anaerobic capacity in competitive athletes. Professional and Division I college athletes (n = 22, Mweight = 86.2 -+ 3.1 kg) participated in this double-blind, crossover study. Subjects were randomly assigned to order of use of either the experimental (Pure Power Mouthguard (PPM)) or the traditional CFM. Subjects completed two separate sessions in which they completed three performance tests, which included vertical jump (VJ), bench press (BP) and a 30 s Wingate anaerobic test (WAnT)+eight 10 s intervals, while wearing the assigned mouthguard. Significantly better performance was found for PPM compared with CFM

for VJ (67.6+9.4 cm vs. 65.3+8.6 cm; P = 0.003), 30 s WAnT peak power (11.6 -+ 1.7 W kg- 1 vs. 11.1 -+ 1.5 W kg- 1, P = 0.038), average peak power for WAnT+intervals (10.6 -+ 1.4 W kg- 1 vs. 10.1 -+ 1.2 W kg- 1, P = 0.025) and average mean power for WAnT+intervals (9.0 -+ 1.1 W kg- 1 vs. 8.7 -+ 1.0 W kg- 1, P = 0.034). There were no significant differences for either BP or 30 s WAnT mean power (P>0.48). Compared with a CFM, a neuromuscular dentistry-based mouthguard appears to enhance peak power output, performance and repeated maximal efforts. When required to wear a mouthguard, athletes may benefit from wearing a neuromuscular dentistry-designed mouthguard compared with a CFM.

3. Effects on G Tolerance While Biting Down on a Mandibular Orthopedic Repositioning Appliance (MORA) Levels. HARRY G ARMSTRONG AEROSPACE MEDICAL RESEARCH LAB WRIGHT-PATTERSON AFB OH

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Corporate Author : HARRY G ARMSTRONG AEROSPACE MEDICAL RESEARCH LAB WRIGHT-PATTERSON AFB OH

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Abstract : Biting down against a Mandibular Orthopedic Repositioning Appliance (MORA) that properly aligns the temporo mandibular joint (TMJ) requires voluntary contraction of the masseter and temporal's muscles. The purpose of this study was to evaluate the effects of mouthpieces by a dentist qualified in TMJ alignment. Non-invasive PB, ECG, and facial EMG were -recorded at 1 G during isometric straining in 2 sessions of 2 strains with biting and 2 strains without biting. Using no anti-G suit, subjects were then exposed to sessions of 0.5 Gz increasing 20 second G plateaus on the WPAFB Dynamic Environment Simulator (Human centrifuge) until loss of peripheral vision. Seven physiological variables were recorded including facial EMG, ear pulse, and transcranial doppler signals of cerebral artery flow. G tolerance was recorded for 3 exposures using the MORA and 3 without. The resulting EMG and RMS EMG recordings indicated that subjects were not maximally contracting the involved muscles during biting and that muscle fatigue did not occur. Using the MORA resulted in a 0.3 Gz mean increase in tolerance compared with not using the MORA (p=0.0345).

Descriptors : *G SUITS, *TOLERANCES(PHYSIOLOGY), *ORTHOPEDICS, SIMULATORS, ENVIRONMENTS, HUMANS, DYNAMICS, CENTRIFUGES, ALIGNMENT, VISION, MUSCLES, PLATEAUS, DENTISTS, PERIPHERAL VISION, BONES, ARTERIES, CONTRACTION, EAR, PLACEBOS, MEAN, FLOW, VARIABLES, PULSES, SIGNALS, STRAINS(BIOLOGY), FATIGUE

Subject Categories : Medicine and Medical Research Stress Physiology Life Support Systems

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4. Bull Tokyo Med Dent Univ. 1996 Mar;43(1):1-12. Influence on isometric muscle contraction during shoulder abduction by changing occlusal situation. Wang K, Ueno T, Taniguchi H, Ohyama T.

ABSTRACT: Many studies have been performed on the mandibular orthopedic repositioning appliance (MORA) as an athletic performance enhancer since the late 1970s. The concept that changing the mandibular position would increase the strength and improve the performance of subjects has been a source of controversy among various researchers. The strength of shoulder abduction and electronic activities of six muscle groups in the upper body were tested on seven subjects in this study. The normalized data for four different situations: rest position, MVC (Maximum Voluntary Contraction) in an intercuspal position, MVC with placebo, and MVC with MORA in supported rest position were analysed. Statistical analysis demonstrated that the MVC with MORA was significantly stronger than the rest position for upper appendage strength. The electronic activities of all muscle groups were significantly greater with MORA than those in rest position, and some of them were significantly greater with MORA than with either MVC or placebo situation. THe results suggested that the

muscle activities of the upper appendage were increased by biting MORA in the supported rest position during the shoulder abduction performance.

5. Effect of Increased Maxillo-mandibular Relationship on Isometric Strength in TMD Patients with Loss of Vertical Dimension of Occlusion Tariq Abduljabbar, D.D.S., M.S.; Noshir R. Mehta, D.M.D., M.S.; Albert G. Forgione, Ph.D.; R. Ernest Clark, Ph.D.; Joseph H. Kronman, D.M.D., Ph.D.; Theodore L. Munsat, M.D.; Patrick George, B.S. Volume 15 Issue 1 January 1997

ABSTRACT: The effect on isometric strength of the shoulders and limbs while biting in habitual occlusion, on a bite-elevating appliance and on a placebo appliance was analyzed. Twenty female volunteer patients, presenting with temporomandibular pain dysfunction syndrome and obvious loss of vertical dimension, served as subjects. All were weaker to the manual application of the Isometric Deltoid Press (IDP) when biting, as opposed to maintaining the mandible in an unsupported rest position. Two intra-oral appliances were fabricated for each subject: a bite-elevating appliance (BEA) set by a functional criterion of peak strength to the IDP and a placebo appliance which did not interfere with occlusion but was "set" with a mock IDP procedure. Testing was carried out by the Neuromuscular Research Testing Laboratory of the Neurology Department of Tufts New England Medical Center. Testing was independent of the dentist who fabricated and set the appliances. A standard neuromuscular test with the Maximal Voluntary Isometric Contraction apparatus was used to assess strength of right and left shoulder, elbow and knee flexion and extension as is routinely performed with all neuromuscular disease patients. Twelve strength tests were carried out for each of three conditions: 1. Baseline-biting in habitual occlusion; 2. Elevated-biting on the BEA; and 3. Placebo□biting with the placebo appliance inserted. The order of conditions 2 and 3 was counterbalanced without knowledge of the subjects. Twelve repeated measures ANOVAs (each subject as their own control) were conducted for each of the 12 strength measures. All F-tests indicated a significant main effect for treatment differences ($p < 0.0001$). Mean strength biting on the BEA was consistantly greater ($p <$

0.001) than Baseline or Placebo strength. Baseline and Placebo condition were equivalent. These findings confirmed previous observations at this TMD Center: individuals with loss of vertical dimension of occlusion respond to a bite raising appliance by increased isometric-strength.

6. The Effect of Vertical Dimension and Mandibular Position on Isometric Strength of the Cervical Flexors Hala AL-Abbasi, B.D.S., M.S., D.Sc.; Noshir R. Mehta, D.M.D., M.D.S., M.S.; Albert G. Forgione, Ph.D.; R. Ernest Clark, Ph.D. Volume 17 Issue 2 April 1999

ABSTRACT: This study compared the peak isometric strength of the cervical flexors in deep bite temporomandibular dysfunction (TMD) patients while biting in four bite positions: habitual occlusion, edge-to-edge, lateral shift and retruded. These values were then compared to those of the same subjects' bite positions elevated to a functional criterion (maximum isometric strength of the deltoid muscles). The mean height increase was 2.4 mm with a range of 1.5-3.8 mm. Fifteen of eighteen deep bite subjects met an inclusionary criterion, at least 13.3 Newtons (N) stronger cervical muscle strength with mandible relaxed open than habitual bite. Peak strength biting edge-to-edge was significantly greater than biting in habitual occlusion. Strength was found to increase significantly when biting in each of four mandibular positions when the bite was elevated to the functional criterion. The greatest strength was obtained from elevated habitual and edge-to-edge positions. The findings are of clinical significance, suggesting that cervical muscle isometric strength is affected by bite position and vertical dimension of occlusion. The results suggest that when biting, individuals with deep bite may be functioning at about 60% of their potential cervical flexor, isometric strength. The interaction between occlusal position, vertical dimension and cervical muscle function suggests a craniomandibular-cervical masticatory system.

7. Examination of the Relationship Between Mandibular Position and Body Posture Kiwamu Sakaguchi, D.D.S., Ph.D.; Noshir R. Mehta, D.M.D., M.D.S., M.S.; Emad F. Abdallah, D.M.D., M.S.;

Albert G. Forgione, Ph.D.; Hiroshi Hirayama, D.D.S., D.M.D., M.S.; Takao Kawasaki, D.D.S., Ph.D.; Atsuro Yokoyama, D.D.S., Ph.D.; Examination of the Relationship Between Mandibular. The Journal of Craniomandibular Practice, October 2007, Vol. 25, No. 4. pp. 237-249.

ABSTRACT: The purpose of this study was to evaluate the effect of changing mandibular position on body posture and reciprocally, body posture on mandibular position. Forty-five (45) asymptomatic subjects (24 males and 21 females, ages 21-53 years, mean age 30.7 years) were included in this study and randomly assigned to one of two groups, based on the table of random numbers. The only difference between group I and group II was the sequence of the testing. The MatScan (Tekscan, Inc., South Boston, MA) system was used to measure the result of changes in body posture (center of foot pressure: COP) while subjects maintained the following 5 mandibular positions: 1) rest position, 2) centric occlusion, 3) clinically midlined jaw position with the labial frena aligned, 4) a placebo wax appliance, worn around the labial surfaces of the teeth and 5) right eccentric mandibular position. The T-Scan II (Tekscan, Inc., South Boston, MA) system was used to analyze occlusal force distribution in two postural positions, with and without a heel lift under the right foot. Total trajectory length of COP in centric occlusion was shorter than in the rest position ($p<0.05$). COP area in right eccentric mandibular position was larger than in centric occlusion ($p<0.05$). When subjects used a heel lift under the right foot, occlusal forces shifted to the right side compared to no heel lift ($p<0.01$). Based on these findings, it was concluded that changing mandibular position affected body posture. Conversely, changing body posture affected mandibular position.

8. The effects of a customized over-the-counter mouth guard on neuromuscular force and power production in trained men and women.

Although mouth guards were originally designed for injury prevention, even elite athletes are now using performance mouth guards to improve athletic success. Both expensive custom models and over-the-counter models are available, but the efficacy is not well known. Some athletes remain wary of the perceived potential for detriments

using a mouth guard to their performance. Thus, the purpose of this study was to examine various physical performance tests when using a mouth guard including a customized over-the-counter mouth guard. Twenty-six trained men (25 -+ 4 years; 1.78 -+ 0.07 m; 83.3 -+ 11.4 kg) and 24 trained women (23 -+ 3 years; 1.65 -+ 0.08 m; 62.6 -+ 7.8 kg) volunteered for the investigation. The subjects completed a familiarization period and then balanced and randomized treatment conditions that included: (a) a customized Power Balance performance mouth guard (PB MG); (b) a regular over the counter boil-and-bite mouth guard (Reg MG); and (c) a no mouth guard (No MG) treatment condition. At each visit, the subjects completed a testing protocol that was sequenced in the following order: sit-and-reach flexibility, medial-lateral balance, visual reaction time, vertical jump, 10-m sprint, bench throw, and plyo press power quotient (3PQ). Heart rate and rating of perceived exertion (RPE) were recorded around the 3PQ. Significance was set at $p = 0.05$. Expected significant sex differences existed for all power, strength, and speed variables. Bench throw power (watts) and force (newtons) were significantly higher under PB MG than either Reg MG or No MG or in both men and women. The 3PQ power and force production were higher than that for the other 2 treatments for the PB MG for men only. There were no significant differences for treatment conditions in the heart rate or RPE after the 3PQ test. Men were better able to maintain significantly higher 3PQ power production under PB MG treatment condition compared with the other 2 treatment conditions. Rate of power development was significantly higher in men for the vertical jump when using the PB MG compared with that for other treatment conditions in men only. No differences were observed in flexibility, balance, visual reaction time, or sprint time. The PB MG performance mouth guard improves performance of upper-body loaded power exercises in both men and women and lower body power exercise in men without compromising performance on any other performance parameters.

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Excerpt

The awarding to the 1973 Nobel prize for medicine and physiology for research associated with the dental distress syndrome findings will affect dentistry and dental attitudes. The Alexander therapy to normalize body posture through gentle muscle manipulation corresponds to spinal posture normalization by elimination of the masticatory muscle imbalance. Through both processes of normalization, mental and physical health problems are resolved. All systems of the total biologic unit are affected by the posture of the body.

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Tinbergen reviews how Alexander, around the turn of the century, restored proper use of the body musculature to attain normalization of the body posture. An astonishing variety of somatic and mental illnesses were thereby alleviated. Barlow describes the combined successes developed by the dedicated pupils of Alexander. Continued monitoring and corrective manipulation of the entire body masculature brings about

very striking improvements in such diverse areas as high blood pressure, breathing,

depth of sleep, overall cheerfulness, mental alertness, resilience against outside

pressures, and even refined manual skills.

Basic Anatomy The essentiality of the role of the dental structures can be easily demonstrated through observance of basic anatomy. The jaws and spine are gathered into one basic system by the various fascia surrounding them, (Gray, Philadelphia) so that stress in one area is readily transmitted throughout the region. Any stress or muscle spasm in these areas is reflected in tension in the various fascial sheaths and their corresponding attachments. This is especially true with the masticatory system and the atlas and axis vertebrae in the neck since the masticatory muscles are the most powerful, the most freely movable and the major weight-bearing mechanisms in the head and neck system. Now research has shown how closely these two structures, the jaw and the atlas and axis vertebrae, are linked. Strain or pressure on one will produce a correlative attempt at adjustment on the part of the other. This correlative adjustment in the body's systems is evidenced in the consistency which research has demonstrated of short or reactive leg length and the laterality of axis to the maloccluded side of the temporo-mandibular joint (Berkman, 96 1971). The intricately linked web of the muscles of the body result in reaction of neck muscles when one muscle is changed in the leg and when a neck muscle is released, the toes are affected even when one is lying down (Tinbergen, 1973).

Elimination of Problems This correspondence of the musculature and the autonomic nervous system explains the marvelous effects which are achieved when the dental mechanism is properly aligned and balanced (Fonder, 1975, 1976, 1977, 1979, 1963, 1962, 1968, 1971, 1973). Such adjustments often are the initial step in elimination of such obvious problems as difficulty in swallowing, asymmetrical facial features, one-sided chewing, migration of the jaw in closing, taut muscles in the cervical area, tension in the nape of the neck, arthritic conditions in the TMJ and ligaments and improperly-fitting dentures and the repetitive sore-spots. So, it will no longer come as a surprise that the long list of remissions of systemic and mental problems that Nobel laureate Tinbergen and other renowned scientists attribute to Alexander's muscle therapy are
routinely mitigated by physiologic dentistry. This is demonstrated by our research.