Research Note

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Functional Measuring of Muscle Tone

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The Function Tonometer was invented to measure the working condition of the oral-facial muscles. It is manufactured by Dru Tec GmbH in Bremen, Germany and marketed by MFT Products in Matzendorf, Switzerland.

The Function Tonometer (Figure 1) is a manometer with an analog reading. It has two indicating needles or hands, a black main needle (1a) and a red drag needle (1) which stops at the highest obtained pressure rate and can be adjusted by means of a key (3). This kind of reading was chosen because the equipment is used in the medicinal area under restrictive safety precautions. The Tonometer does not use electricity or batteries, so that it can be ready to use at any time or place.

The unit was designed to be used by the patient for home practice as well as by the therapist in the office, so it had to be durable, easy to transport, relatively inexpensive, and would not require a highly trained staff and a complicated operating and repair manual.

Like every other manometer, the Function Tonometer has to be adjusted to the local height above sea level as the first step. This is achieved by the following procedure: The small plastic stop (2) in the lower part of the viewing screen is removed. The screw underneath is turned with a small screwdriver to set the black needle to zero in relation to the local air pressure, then the stop is replaced. This adjustment is necessary only if the black needle is not at zero position during the first operation.

The Function Tonometer measures muscle tone in millibars, ranging from 0 to 250 mbars. The measurements can be read precisely and in a standardized rate. When the device is given to patients for training purposes, the analog reading is preferred to the digital method. The red drag needle (1) permits the control of the maximum effort. The black indicating needle (1a) continually gives the actual data. For readjusting the drag needle, a key (3) is attached to the instrument to be readily available at all times. With the key, the red drag needle can be set to a desired measure as a goal for exercising and therefore functions as an additional motivation.

Figures 1

The tube (4) which connects the instrument to the mouthpiece (5) is made of polyurethane plastic which offers sufficient flexibility for handling but does not falsify the results through the stability of its wall. Its fixation at the instrument serves as a handle (4a) allowing sufficient mobility and control of the reading during measuring for the patient as well as the therapist. The length and the diameter are standardized for the blue connecting tube (inner: 4mm, outer: 6mm) and for the mouthpiece (inner: 3mm, outer: 6mm). These dimensions should not be changed, so that readings can be accurately compared from one performance to another and compared to standards which are presently being established. The mouthpiece resembles a drinking straw. It is easily and securely snapped to the connecting tube by a special fixing device (5a). The mouthpiece can be sterilized in a solution or can be discarded. For hygienic reasons, the entire tube and mouthpiece can be removed and sterilized by twisting the connecting screws (4b and 5b).

INSTRUCTIONS FOR USE

The Function Tonometer has three possibilities for application:

1. Diagnosis
2. Documentation
3. Training device in therapy

Figure 2 illustrates four separate muscle fields which can be tested using the Function Tonometer. Field A is the Orbicularis. Field B is the Buccinator. Field C is the Velum and Pharyngeal musculature. Field D represents the Sublingual musculature.

First the patient is asked to hold the mouthpiece between the lips at the midline with one hand supporting the tube. The instrument can either be set on the table on its rubber feet or held by the handle with the other hand. Now the patient is instructed to blow up his/her cheeks as strongly as possible like a balloon. The red drag needle will move to and stop at the mbar measurement of maximum tone for lip closure. A slight amount of additional pressure will leak through the lips around the mouthpiece but this is not considered to be significant. For diagnosis and documentation purposes, the obtained pressure is recorded for Field A, Orbicularis.

The next test measures the muscle tone of velum closure (C). The patient is instructed to "blow up the balloon" until the black indicating needle reaches the red drag needle position established during step one. The patient is then asked to breathe in and out through the nose while keeping the cheeks blown up. In cases of insufficient pharyngeal closure, the pressure will now be released in the back of the mouth until the maximal

closing tone equals the pressure. The black indicating needle will go down to this value and the mbar measurement will be noted.

If the muscles in the front and the back of the oral cavity can maintain the pressure indicated, test step three targets the cheeks. The muscle tone of Field B, primarily the Buccinator, is tested by the following procedure.

Method one: The patient is now asked to reach the mark of the red drag needle by creating (blowing) air pressure in the mouth, completely within the dental arches. He/she is not to blow up the cheeks; they must remain flattened. The velar muscles must close off the back of the oral cavity so that the patient can continue to breathe through the nose. The value reached will be somewhat smaller and again is written down.

Method two: The patient is asked to blow up the cheeks like a balloon. The cheeks are then flattened, using gentle pressure from the fingertips if necessary. This raises the pressure inside the oral cavity. The mbar reading is recorded.

By comparing the measurements for each muscle field, the weakest part of the chain can be identified and can be addressed during therapy activities. During treatment, the tests can be repeated and documented. The rising of the pressure readings will indicate improvement in the tonicity and efficiency of the muscle fields.

In myofunctional therapy, the Function Tonometer may be useful with a number of exercises. Our exercises can be divided into "Static" exercises, which involve attaining and holding a position of pressure and "Kinetic" exercises, which involve alternately stressing and relaxing the muscle tone. The advantage of performing both static and kinetic exercises with the Tonometer is that, because of the two needles, the patient has a visual clue at all times to his/her actual and absolute efforts. The desire to hold or reach the given position of the needles has a stimulating and motivating effect on the patient's performance. By positioning the drag needle, the therapist can set the goal and the patient can practice without direct and constant supervision.

For the Orbicularis region, the straw is usually held in the center of the lips. In the static mode of exercising, the patient may first blow the needles as high as possible and thereafter try to hold the black one near the red one for a given time (5 seconds, 10 seconds, etc.)

In the kinetic mode, the black needle goes up to the red needle, then down, up, and down, etc. for a given number (5 times, 10 times, etc.). This can be modified for different portions of the Orbicularis, such as "blow up...the top lip, the bottom lip, the right side, the left side, purse your lips, flatten your lips". The goal always is to get or keep the black needle near the target, the red needle.

Figure 2

Figure 2

For the Buccinator region, the needles are at first blown to the maximum mark. Additional tension in the cheeks will then result in an upward movement of the needles. This, too, can be conducted in either the static or the kinetic mode. In the static mode, the black needle is to stay with the red needle for a given time. In the kinetic mode, the black needle goes up, down, up, down, as the cheeks are tensed and relaxed. The exercise can be modified to have the patient blow up both cheeks or alternate left cheek and right cheek. When the Buccinator is the target, the fingers are allowed to help keep the lips closed around the mouthpiece.

For the Velum and Pharynx region, the main rule is to breathe continually and consciously through the nose after the needles have been blown up to the maximum or target reading. This requires maintaining the pressure and tone for a Hold Exercise, while counting an assigned number of breaths. This also may be done as a Kinetic Exercise. The black needle is blown up, held for one breath, released during the next breath, blown up again, etc. During these training procedures, the fingers may again help keep the lips closed if needed.

SUMMARY

Testing muscle fields requires functional conditions. The procedure for measuring has to put the musculature under conditions as they occur in physiological functioning. Furthermore a measuring instrument should be economical and easy to handle in the course of the daily routine.

The Myofunctional Therapist presently has a number of measuring instruments available. Some of them need to be adjusted before every operation. Others give only comparative readings, having no absolute reference. Others measure states which do not represent normal functions of the musculature and therefore do not allow conclusions about the state of the muscle in relation to function. Some apparatuses are highly sensitive and can only be handled by highly trained persons. In this category we find the highly precise electronic equipment being highly expensive to purchase and to repair.

It seems that the Function Tonometer is in all points compatible when weighing the pros and cons. It directly reads the actual muscle tone under conditions which occur during normal function. The device can be used for diagnostics and documentation as well as in functional training. The output is a defined mechanical range (pressure in mbar) and needs not be adjusted before each measurement. Used in treatment, it motivates by visual feedback. The results are reproducible at any time, at any location, and by any person, even young patients. The instrument has an easy handling, favorable costs in purchase and operation, and is not easily damaged. The assembly is not electrically operated and thus is not under restrictive rules nor the need of an energy supply.

The Function Tonometer is indeed a flexible and useful tool to aid in diagnosis, documentation, and treatment procedures.

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Clinical Testing of the Orofacial Musculature

Muscle	No.	Exercise	P O S T	M O B L	M O T I	S T R E
Outer MM						
Nasalregion						
M. NASALIS	1	Blowing the nostrils, Amazement				
M. Depr.Sept	2	Nibble Rabbit				
Upperlipreg						
M.LevLab&	3	Bar upper teeth				
M.Orbicul	4	Pull a face, Duck's bill				
M.Zygomaris	6					
M.Risorius	7	Dog's growl				
M.Lev.Lab.s.	8					
M.Lev.Angul	9					
Lowerlipreg						
M.Depr.Ang.	10	Contempt				
M.Depr.Lab.i.	11	Eee', Disgust				
M.Mentalis	12	Elevator'				
M.Platysma	13	Stout Neck				
Mouthregion						
M.Orb.cent	4a	'Ooo'				
M.Orb.med	4b	Cherry mouth'				
M.Orb.Periph	4c	Trunk				
Cheekregion						
M.Buccinator	5	Letter slot				
M.Zygomatic.	6	Crooked-				
M.Risorius	7	Grin				
INNER M.M.						
Tongue						
Total		Tongue freeze				
Tip		Hold and pull				
Body		Palatogramm				
Surface		Little dent				
Transv.Mm.		Spread Tongue - slim Tongue				
Synergism.		Teeth wiper, Cheek bump				
Reflexfunct.		Swallow crumbs				
Velum						
Total		K-K-K', Balloon				