

Acta Medica Okayama

Volume 16, Issue 2

1962

Article 1

APRIL 1962

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Abstract

The authors give the schema of the different zones of the body and their points of measuring. They report on some average values registered with Szirmai's myotonometer on persons before and after massage. These myotonometric schemas play a new and important part in systematic measuring of muscles in the field of "Myologia practica".

Acta Med. Okayama 16, 61—70 (1962)

MYOLOGICAL TONUS-CONTRACTION SCHEMA OF MYOTONO-METRIC ZONES OF THE BODY BEFORE MASSAGE

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Received for publication, December 12, 1961

Since the construction of the myotonometer and the myograph by SZIRMAI, and since determination of the principles of myotonometry and myography, a great number of publications (SZIRMAI^{3,4}, JURÁNYI⁵, HABERL⁶, BAJUSZ, BOLLOBÁS⁸, PREZDPELSKA-KOCZOCIK⁹, etc.) confirmed the "Myologia Practica" to be a great progress in medical and veterinary fields. A wide scope of possibilities is opened up by myotonometry and myography, respective examinations of the transversal muscles, of the elementary substances and consequently also of the capillaries of the joints and nerves. They further constitute a means for evaluating the healing effect of medicaments. As previously stated, both of the above biophysic proceedings are based upon measuring voluminal changes in substances and transversal muscles.

Serial measurements made setting up a measuring system necessary. This system comprises working out schema of the different parts of the body and in the first place fixing the particular spots on the body to be measured, considering also constitutional differences.

In 1953 SZIRMAI¹¹ worked out the schema of the abdomen, published in 1955 with the purpose of registering abdominal sensitivity to pain and in order to give a uniform method of registration of abdominal processes. Cases of various diseases have shown since that the simplest way of registering was to follow a schema. A uniform examination method can thus be realized within a single ward as well as in any kind of institution. This is so even though, in the case of persons of different constitution and nutrition (profession), there might be slight divergencies in the registered points: either the abdominal muscle is rounded to the highest degree, or there is a displacement of the part, which respective registration process, should prove best.

With regard to diagnostic, prognostic and other respects in order to register single parts of the body, we worked out a schema of the following parts of the body, of which we made some sketches indicating the most favourable points of measurements.

Fig. 1. Schema for head and neck registration. Experience proves that we are able to register the masseter and the sternomastoideus. In the case of certain professions, e. g. wrestlers, we can register the platysma. In 1951 already, SZIRMAI described the possibility of registering the muscles of the neck with the myograph.

Fig. 2. The muscles of the shoulders and of the upper arms. Both can be registered, the most important measuring spots are marked.

Fig. 3. The flexor muscle of the upper arms.

Fig. 4. The tendon muscle of the forearms.

Fig. 5. The flexor muscle of the forearms and of the hand.

Fig. 6. The flexor of the thigh.

Fig. 7. The tendon muscle of the thigh.

Fig. 8. The flexor of the leg.

Fig. 9. The tendon muscle of the leg.

TABLE I. Values of the stimulus threshold of sensibility to pain measured on healthy persons, a, on patients with appendicitis, b, subacute adnexitis, c and with ulcus ventriculi. +

Point of measurement	Gramm-myotons resp. Gramm-values of pressure				
	a	b		c	d
1. McBurney-point					
2. 5 cm to left of Spina iliaca anterior superior, Szirmai	34	2	11	5	19
3. Kümmell-point	30	12	23	0	21
4. 3 cm to left of Lenzmann-point	30	8	20	8	20
5. 3 cm under the contra-Lenzmann point	34	4	15	0	20
6. 3 cm under Kümmell-point	31	—	21	8	—
7. 5 cm under Kümmell-point	28	21	—	8	—
8. Between navel and processus xiphoideus on the border-line of the upper and the middle third	—	—	—	—	19
	37	—	25	15	18
9. Between navel and processus xiphoideus on the border-line of the middle and the lower third	—	—	18	4	10
10. Between the right costal region and the navel on the border-line of the upper and the middle third	28	—	22	14	23
11. Between the right costal region and the navel on the border-line of the upper and the middle third	28	—	15	5	25
12. Between the left costal region and the navel on the border-line of the upper and the middle third	28	—	27	10	18
13. Between the left costal region and the navel on the border-line of the middle and the lower third	28	—	16	12	14
14. In the height of the navel in the middle to the right	30	—	20	14	15
15. In the height of the navel in the middle to the right	34	—	20	5	15

+ E. Szirmai: Zbl. f. Chirurgie 1956. H. 14.

TABLE 2. The standard values of tonus-contraction measurements at light straining of the spring

Name of the muscle	Tonus Contraction in Myotons	
M. masseter	90	100
M. sternocleidomastoideus	80	102
M. trapezius	78	83
M. deltoideus	75	78
M. triceps caput lat.	80	98
M. caput brevis m. bicipiti	70	90
M. ext. carpi rad. long. 1. /	94	108
2. /	94	112
M. interossei dorsales digit. I.	72	124
M. extensor carpi rad.	90	110
Tendon m. flexor carp. rad.	70	100
M. biceps femoris	90	112
M. vastus lat.	90	120
M. vastus med.	70	90
M. rectus femoris	80	94
M. sartorius	82	104
M. gastrocnemius	84	102
	86	106
M. soleus	82	102
Tendon calc. achillis	90	114
M. tibialis ant.	120	135
M. peroneus long.	90	112
M. pectoralis major	70	90
M. latissimus dorsi	74	96

Our starting value is 50 myotons, 1 myoton 1mm. This value may be reduced from the total value measured. We count total values measured, e. g. for M. pectoralis major 70 myotons, and net values, i. e. starting value reduced from the total value measured, e. g. 70—50=201.

Fig. 10. The schema of the abdomen, published by Szirmai in 1956.

Fig. 11. Schema of the chest.

Fig. 12. Schema of the back.

The schema of the abdomen shows numbers put into brackets, marking the sequence of measurements, e. g. 1 McBurney-point: this number 1 means that measurements start at this point. Here we may observe that there are two ways of registering abdominal sensitivity to pain:

1. We may charge the abdominal wall with the net weight of the apparatus simply by laying it on. Herewith we register the upper parietal layers, we call

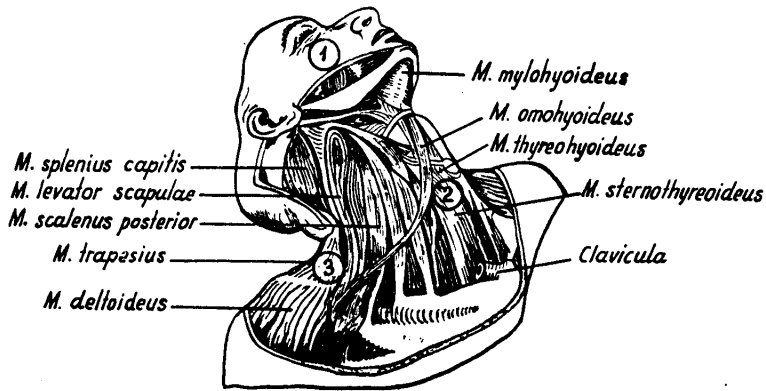


Fig. 1. Head and neck. 1. M. masseter. 2. M. sternocleidomastoideus. 3. M. trapezius of strong-muscled person. Besides above 3 muscles, we may register the contraction of the platysma on the surface and that of almost all muscles perceivable on the sketch.

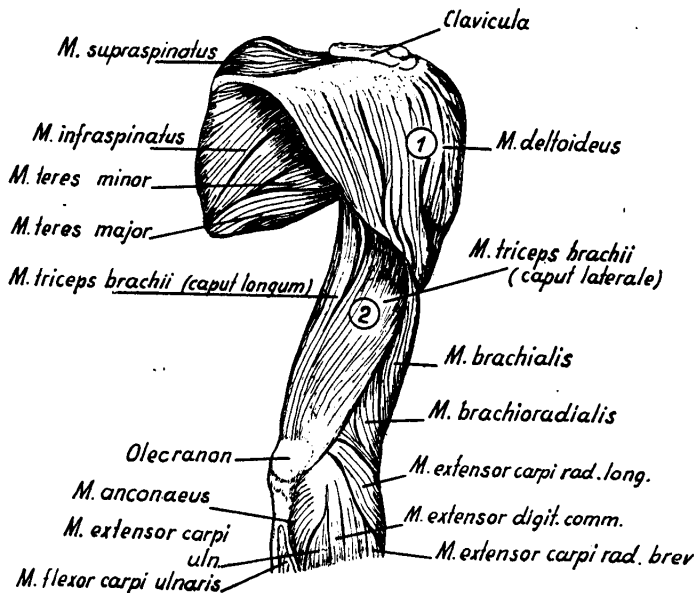


Fig. 2. Tendon of the shoulders and the arms. 1. M. deltoideus. 2. M. triceps caput lat.

the procedure : parietal measuring.

2. In addition to the net weight of the apparatus a pressure is brought to bear on the abdominal wall, thus producing the proper resistance by which we measure and register abdominal sensitivity to pain. The oscillation of the indicator is to be observed the moment pain sets in.

We registered the tonus and contraction values. We also made a great number of measurements on healthy as well as on sick persons after massage, because some examinations made by SZIRMAI¹², and published not long ago,

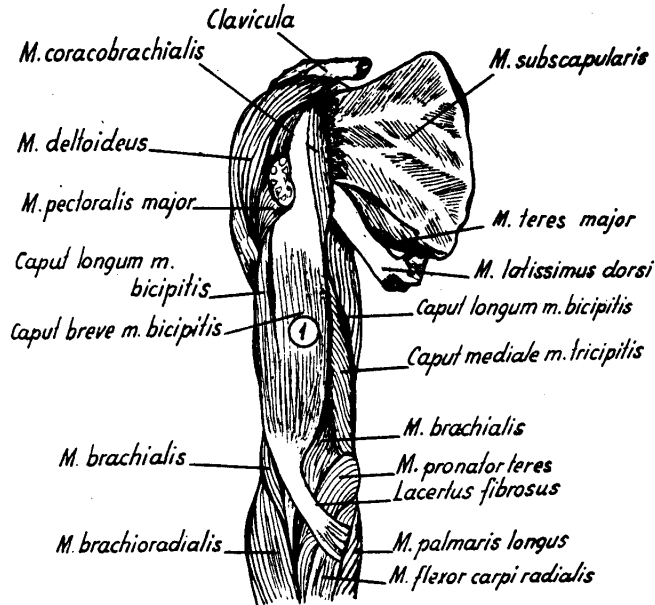


Fig. 3. Flexor of the arms. 1. Caput brevis m. bicipiti.

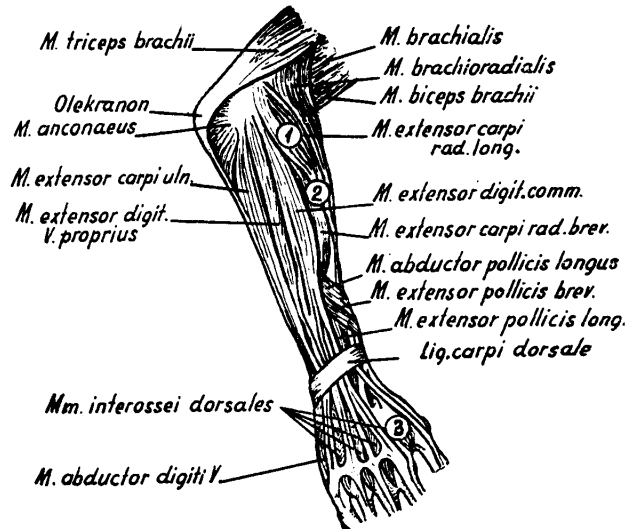


Fig. 4. Tendon of the forearms. 1. bis. 2. M. ext. carpi rad. long. 3. M. interossei dorsales digit. I.

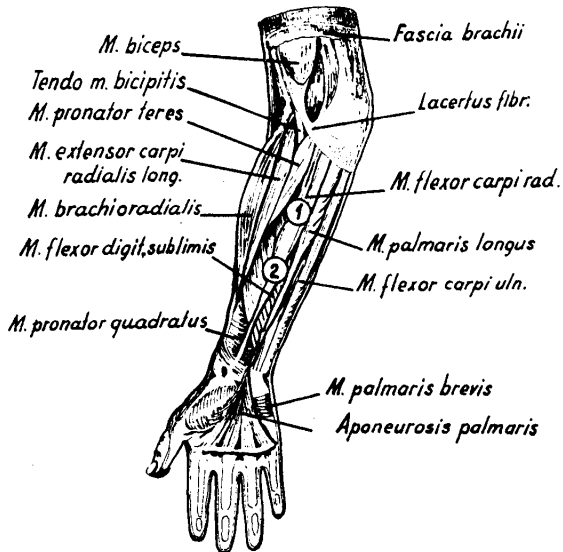


Fig. 5. Flexor of the fore-arms.

1. M. flexor carp. rad. 2. Tendon musc. flex. carp. rad.

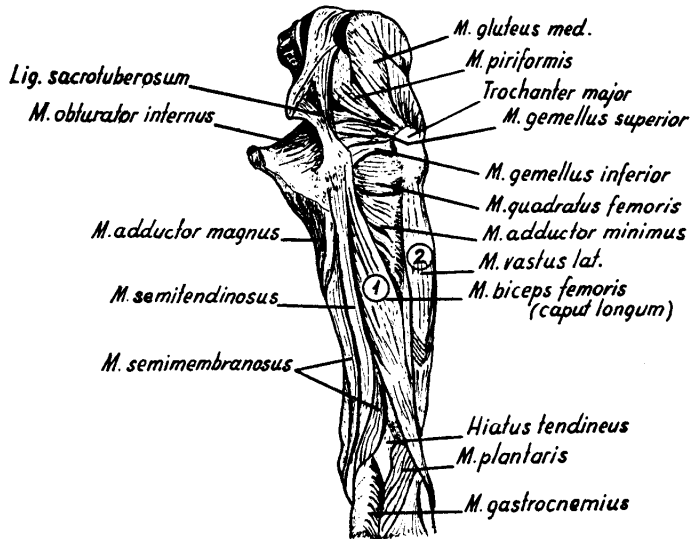


Fig. 6. Flexor of the thighs. At bending or, more seldom also at straining movements. M. biceps femoris and M. vastus lat. are difficult to perceive and thus hard to measure.

refer to the fact that certain symptoms may be influenced and pain may be reduced by stimulating circulation and by slight massage of the suffering zones. On upper and lower extremities results can be registered by means of Szirmai's

myograph. We have demonstrated this in one of our earlier publications.

Based upon experiences on several thousand patients and corresponding to our schemata, we have made measurements before massage as well as before medicaments were administered. Further examinations are under way. This time we only wish to give a few particulars on these examinations made with Szirmai's myotonometer before massage, without going into details of the

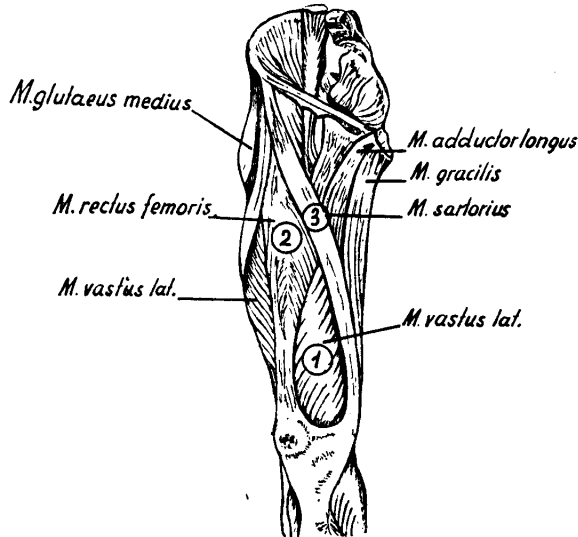
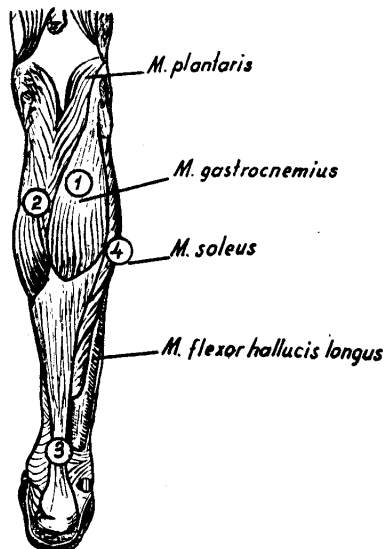


Fig. 7. Tendon of the thighs
1. *M. vastus med.* 2. *M. reclus femoris.* 3. *M. sartorius.*

Fig. 8. Flexor of the legs.
1—2. *M. gastrocnemius.* 3. *M. soleus.* 4. Tendon calcaneus achillis. This means really a mechanical transmission of the movements of the muscles.



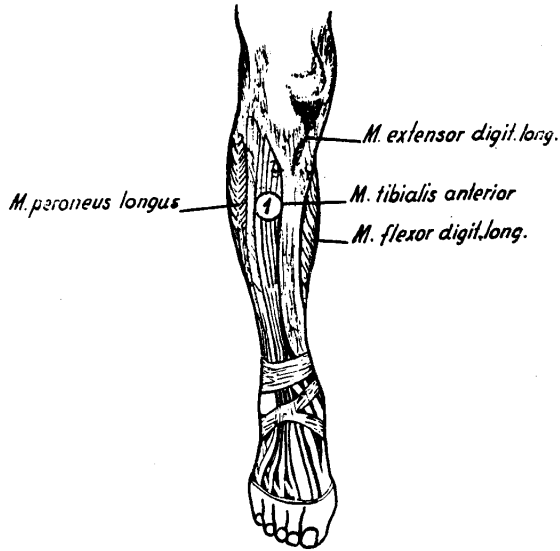


Fig. 9. Extensors of the leg. I. M. Tibialis anterior.
By sportsman M. peroneus longus too.

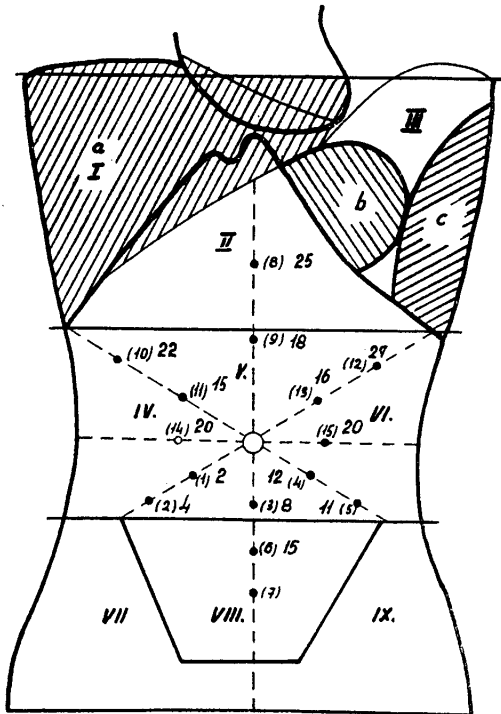


Fig. 10. Szirmai's schema of the abdomen for measuring the sensibility to pain. Tonus measurements are only made on the surface. Pain is caused by mechanical pressure. The numbers in brackets indicate the sequence of measurements of respective points of measurements demonstrated in detail on Table I. Numbers not in brackets indicate values reached in the case of appendicitis. The punctum maximum in this case is the McBurney point where pain is signaled by the patient already at a pressure of 4 myotons = 4 mm longitudinal pressure of the pivot.

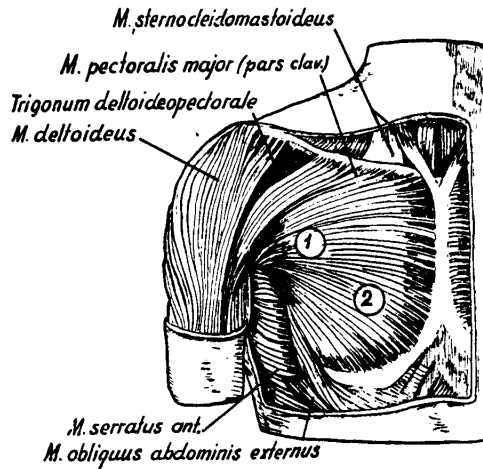


Fig. 11. Muscles of the chest. 1—2. M. pectoralis major.

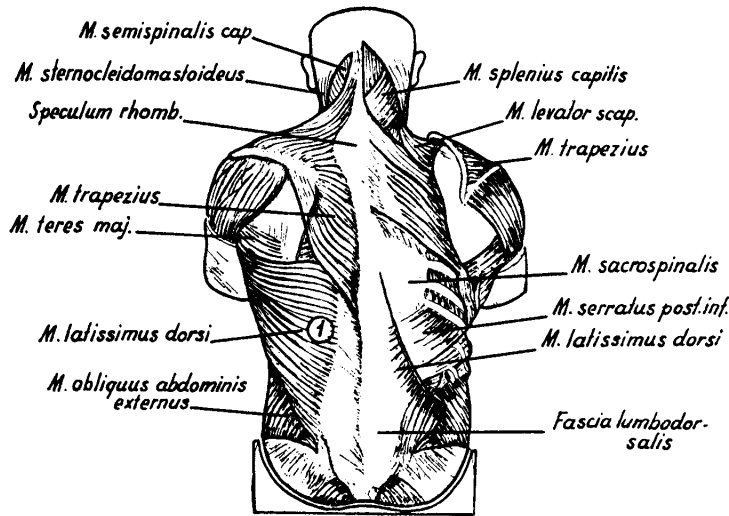


Fig. 12. Muscles of the back. 1. M. latissimus dorsi. 2. M. trapezius.

respective results.

In the above figures we have sketched the schema of different parts of the body. Every sketch presents all particular muscles as well as the average values of every measurable point. Where it is needed, signs and abbreviations are used for tonus-contraction and maximal amplitude values.

We also wish to try to find out what the best way is to register the muscles with the myotonometer, what their most appropriate state, and their most suitable function should be for this purpose.

As we stated above our principal aim was to give a description of the myotonometric zones of the body and to give certain demonstrative values of tonus contraction at the points measured. We thus meant to lay down the fundamental principles of myotonometry. These fundamental aspects and schemata serve as a general guidance for systematic measurements in the fields of physiology and pathology as well as in medical and veterinary lines.

In our following publications we intend to deal with problems in detail, namely, to discuss the values we obtained at measuring points on different zones under morbid or physiologic circumstances and considering certain methods of treatment, massage, etc. Through this article our only intention was to draw attention to the importance of this schema and to its inevitable problems.

SUMMARY

The authors give the schema of the different zones of the body and their points of measuring. They report on some average values registered with Szirmai's myotonometer on persons before and after massage. These myotonometric schemas play a new and important part in systematic measuring of muscles in the field of "*Myologia practica*".

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