

STANDARDISED POSITIONS FOR MUSCLE TESTING

Robert J. S. Reynolds, S.R.N., M.C.S.P.

Superintendent Physiotherapist,
Queen Mary's Hospital for Children, Carshalton

Reprinted from the September, 1950, edition of *Physiotherapy*, by kind permission of the Chartered Society of Physiotherapy

SINCE 1943, in which year the Medical Research Council standardized the calibration of muscle charting, we in Queen Mary's Hospital have found its use a great help when comparing charts of muscle tests carried out at the original hospitals treating poliomyelitis cases in the acute stage with our own charts of muscle tests carried out by us in the convalescent stage. We have still found discrepancies in those cases where a muscle appears from the chart to have become weaker—a phenomenon which we know does not occur in poliomyelitis. We have even found these discrepancies in charts of muscle tests carried out by our own staff. We investigated the reason for this, and found that different physiotherapists tested a muscle, or a group of muscles, in different ways. The use of accessory muscles according to the position used, gives us a varied evaluation of the power of the muscle. We have therefore tried to find a method of standardizing the positions in which the muscles are tested, bearing in mind the fact that we are endeavouring to find a true evaluation of the muscle, or in some cases a group of muscles, eliminating as far as possible the action of accessory muscles and preventing substitution.

Our method of testing muscles is outlined below. There is stated the muscle or muscle group to be tested, the starting position, and the movement to be performed. We do not change the position to eliminate gravity, or have gravity resisting or assisting; we use the physiotherapist's hands for these purposes. This calls for great skill on the part of the physiotherapist.

The patient should be thoroughly warmed before muscle testing takes place, preferably by soaking in hot water. The test should be carried out in a warm room, so that only the minimum of clothing is required, and all the muscles are exposed to view along their complete length. Thus, any substitution of muscle is immediately detected. All testing is carried out from two basic positions: lying either prone or supine, with the arms at the side and the feet over the edge of the plinth. No exertion is required to maintain these positions and the entire mental effort of the patient can be directed to the muscle being tested. No session should be continued if the patient shows evidence of tiring or lack of concentration.

The physiotherapist supports the limb where possible, with one hand holding bony prominences and with the fingers of the other hand directly over the insertion of the muscle. There are two exceptions to this rule: internal and external rotation of hip and shoulder. In these exceptional cases it is not suitable to have the fingers over the insertion of the muscles performing the movements.

With the hands and fingers in these positions, the physiotherapist is able to support the part in normal alignment, to direct motion accurately according to normal function, guiding both the brain path and the physical effort of the patient, to register the

least flicker in a muscle, and, if necessary, to give resistance or assistance such as the muscle requires to ascertain its true value.

The positions and movements are the same as those used in treatment for re-education. This means that the procedure is one of normal routine to the patient and not something different for muscle testing requiring special effort on his part. We find that any extra effort usually calls forth accessory muscles and substitution. The muscle test is not usually carried out for charting purposes until after the first one or two treatments, by which time the physiotherapist has had an opportunity of gaining the patient's co-operation and of teaching him that which is required of each muscle.

Method of Testing

In practice, we have found it most satisfactory to have two people to carry out the test—one doing the test, the other making the chart. With either a doctor and a physiotherapist, or two physiotherapists, in attendance, an under-evaluation or an over-evaluation of a muscle is much less likely to occur.

Trunk

(1) *Erector Spinae*.—Patient face downwards. Fix pelvis. Arms to side. Raise head and shoulders.

(2) *Rectus Abdominis*.—Patient lies on back. Hands across chest on opposite shoulders. Raise head and shoulders. (Further flexion of the trunk causes the hip flexors to come into action.)

(3) *Abdominal Obliques*.—Patient lies on back. For left obliques roll head and shoulders to left and vice versa.

(4) *Quadratus Lumborum*.—Patient lies face downwards. Shorten leg by tilting pelvis. (No side flexion of trunk, this may be performed by erector spinae acting on one side or by the abdominal obliques.)

Lower Extremity.

(1) *Gluteus Maximus*.—Patient lies face downwards. Oppose buttocks to each other. (No hip extension; this can be carried out by biceps femoris.)

(2) *Hip Abductors*.—Patient lies on back. Hold foot vertically by heel, with leg horizontal. Patient abducts leg.

(3) *Hip Adductor*.—Patient lies on back. Hold foot vertically by heel with leg horizontal. Abduct leg. Patient adducts leg.

(4) *Hip Flexors*.—Patient lies on back. Lower leg hangs over edge of table. Patient raises thigh off table. (N.B.—Differentiate sartorius and psoas.)

(5) *Hip Extensors*.—See tests for gluteus maximus and hamstrings. The normal action is initiation by biceps femoris, and stabilizing by gluteus maximus.

(6) *Hip Rotators*.—Patient lies on back. Place hand on knee. Patient rotates hip in both directions.

(7) *Knee Extensors*.—Patient lies on back. Hold knee flexed at 30° with hand behind knee. Patient to raise foot off table. Help to be given by other hand behind ankle if necessary. Quadriceps and knee may be pushed back against the plinth by strong hip extensors.

(8) *Knee Flexors*.—Patient face downwards. Patient to raise foot off table. Differentiate between inner and outer hamstrings by palpation of tendons behind the knee.

(9) *Calf Muscles*.—Patient face downward with foot over edge of table. Patient to pull the heel back. (Not lying supine, push foot down; this may be performed by strong toe flexors.)

(10) *Tibialis Anticus*.—Patient lies on back. Patient to pull foot up and in. Palpate tendon on front of ankle if necessary.

(11) *Tibialis Posticus*.—Patient lies on back. Patient to pull foot down and in. Palpate tendon distal to internal malleolus if necessary.

(12) *Peroneus Tertius*.—Patient lies on back. Patient to pull foot up and out.

(13) *Peroneus Longus and Brevis*.—Patient lies on back. Patient to pull foot down and out. Note the four angle movements requiring pure and distinct muscle action.

(14) *Extensor Hallucis*.—Patient lies on back. Foot in mid position. Patient to extend toe.

(15) *Flexor Hallucis*.—Patient lies on back. Foot in mid position. Patient to flex toe.

(16) *Extension and Flexion Digitorum*.—As for extension and flexion hallucis.

Neck

(1) *Neck Flexors*.—Patient lies on back. Head well over edge of table. Patient elevates head. Look for unilateral deviation.

(2) *Neck Extensors*.—Patient face downwards. Head well over edge of table. Elevate head.

(3) *Sterno-Mastoids*.—Patient lies on back. Head well over edge of table. Flex neck and rotate head to opposite side. Palpate both clavicular and sternal heads.

Upper Extremity.

(1) *Trapezius*.—Shrug shoulders in lying position.

(2) *Rhomboids*.—Patient face downwards. Shoulders well down. Approximate scapulae.

(3) *Deltoid*.—Fix scapula with hand on spine. Patient abducts arm from side.

(4) *Internal Rotators of Shoulder*.—Test for internal rotation with arm, slightly away from side, at 20°, and elbow at 90°.

(5) *External Rotators of Shoulder (Spinati)*.—Test for external rotation with arm, slightly away from side, at 20°, and elbow at 90°.

(6) *Pectorals*.—Patient lies on back. Adducts arms across chest.

(7) *Biceps*.—Patient lies on back. Arm to side, palm upwards. Flex el

- (8) *Brachio-Radialis*.—Patient lies on back. Arm to side, forearm in mid position. Flex elbow.

(9) *Triceps*.—Patient lies on back. Test with upper arm in both horizontal and vertical positions. Extend elbow.

(10) *Pronators and Supinators of Forearm*.—Patient lies on back. Test with forearm in both horizontal and vertical positions. Rotate forearm.

(11) *Wrist Extensors*.—Patient lies on back. Forearm vertical. Thumbs and fingers flexed. Extend wrist from flexed position. Note deviation.

(12) *Wrist Flexors*.—Patient lies on back. Forearm vertical. Thumb and fingers flexed. Flex wrist from extended position. Note deviation.

(13) *Thumb Extensors*.—Fix wrist and first metacarpal. Patient to extend thumb.

(14) *Thumb Flexors*.—Fix wrist and first metacarpal. Patient to flex thumb.

(15) *Thumb Opponator*.—Hand palm upwards. Hold both thumb phalanges extended. Patient to oppose thumb to little finger.

(16) *Thumb Adductors*.—Hand palm downwards. Abduct thumb. Patient adducts thumb.

(17) *Thumb Abductors*.—Hand palm downwards. Hold both thumb phalanges in order to distinguish between extension and true abduction. Patient to abduct first metacarpal.

(18) *Finger Extensors*.—Fix wrist and metacarpals. Flex fingers. Patient extends fingers.

(19) *Finger Flexors*.—Fix wrist and metacarpals. Extend fingers. Patient flexes fingers. Note whether there is flexion of all phalanges.

(20) *Finger Adductors*.—Hand palm downwards. Abduct fingers. Patient adducts fingers. Test each finger individually.

(21) *Finger Abductors*.—Hand palm downwards. Adduct fingers. Patient abducts fingers. Test each finger individually.

It will be noticed that all these tests are performed by using concentric, not eccentric, muscle action. We find that mixing eccentric with concentric muscle action confuses the patients.

We still find difficulty in defining the last two stages of the standard calibration, *i.e.*, '(4) Against Resistance,' and '(5) Normal,' as different physiotherapists have varying ideas of these conceptions. We endeavour to arrive at a standard by comparing the muscle or muscle group being tested with its fellow to see whether it can be considered 'normal.' If the same muscle or muscle group of both sides of the body is affected, we compare it with the musculature of an unaffected part of the body. We still find this last comparison far from ideal.

Conclusion

By using these standardized positions we have found that the number of discrepancies has been reduced considerably and that this method of testing has materially assisted towards the attainment of a true evaluation of initial muscle power, and has helped forward the improvement of muscle which results from treatment.