



The Quantitative Myasthenia Gravis (QMG) Test

The Manual

(This Manual is Designed to Accompany the Videotape)

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The QMG

(A Manual and Videotape to Assist in its Evaluation)

This videotape and the accompanying manual have been designed to instruct clinical evaluators and physicians on how to perform the Quantitative Myasthenia Gravis (QMG) test. The Myasthenia Gravis Foundation of America, Inc. Task Force on Clinical Research Standards is recommending that the QMG test be used in all prospective clinical trials in MG¹. The QMG test was first developed by Dr. Bessinger and colleagues² and later expanded by Dr. Richard Tindall^{3,4}. We modified the QMG test and performed an inter-rater reliability study on this outcome measure⁵. This modified QMG test has been used as the primary outcome measure in a prospective study of intravenous immunoglobulin for MG⁶ and in a study of 3,4-diaminopyridine for Lambert-Eaton Myasthenic Syndrome⁷. The QMG test has been shown to correlate well with the myasthenia gravis activities of daily living (MG-ADL) scoring system⁸. The QMG test is easy to administer and requires minimal equipment. The test takes approximately 30 minutes to perform.

References

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7. Sanders DB, Massey JM, Sanders LL, Edwards LJ. A randomized trial of 3,4-diaminopyridine in Lambert-Eaton Myasthenic Syndrome. *Neurology* 2000; 54:603-607.

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EQUIPMENT LIST

1. Spirometer that can be calibrated
2. Mouthpieces that fit the spirometer; nose-clips
3. Disposable gloves (if desired)
4. Stopwatch
5. Cups and water for swallowing tests
6. Goniometer
7. Dynamometer

QUANTITATIVE MYASTHENIA GRAVIS TESTING FORM

Patient Name: _____ Patient #: _____ Date: _____
 MR#: _____ DOB: _____ Sex: ____ Ht.(in): _____ Wt.(kg): _____
 Evaluator: _____ Handedness: _____ Leggedness: _____ Time of Exam: _____
 Anticholinesterase Medication: _____
 Comments: _____

<u>TEST ITEMS WEAKNESS</u>	<u>NONE</u>	<u>MILD</u>	<u>MODERATE</u>	<u>SEVERE</u>	<u>SCORE</u>
GRADE	0	1	2	3	
Double vision (lateral gaze) Sec.	60	11-59	1-10	Spontaneous	
Ptosis (upward gaze) Sec.	60	11-59	1-10	Spontaneous	
Facial Muscles	Normal lid closure	Complete, weak, some resistance	Complete, without resistance	Incomplete	
Swallowing 4 oz. Water (1/2 cup)	Normal	Minimal coughing or throat clearing	Severe coughing Choking or nasal regurgitation	Cannot swallow (test not attempted)	
Speech following counting aloud from 1-50 (onset of dysarthria)	None at #50	Dysarthria at #30-49	Dysarthria at #10-29	Dysarthria at #9	
Right arm outstretched (90°, sitting) Sec.	240	90-239	10-89	0-9	
Left arm outstretched (90°, sitting) Sec.	240	90-239	10-89	0-9	
Forced vital capacity	≥80%	65-79%	50-64%	<50%	
Rt hand grip: male (Kg) : female	≥45 ≥30	15-44 10-29	5-14 5-9	0-4 0-4	
Left hand grip: male (Kg) : female	≥35 ≥25	15-34 10-24	5-14 5-9	0-4 0-4	
Head, lifted (45%, supine) Sec.	120	30-119	1-29	0	
Right leg outstretched (45-50%,supine) Sec.	100	31-99	1-30	0	
Left leg outstretched (45-50%,supine) Sec.	100	31-99	1-30	0	

TOTAL MG SCORE: _____

GENERAL INSTRUCTIONS

1. **Patients must be off pyridostigmine (or any acetylcholinesterase inhibitor medication) for twelve (12) hours prior to testing, (if medically safe to do so).**
2. Perform the tests in the order given in this Manual and shown on the Videotape.
3. Calibrate the respiratory equipment on the day of the test, per manufacturers' instruction, before the test begins. Place the calibration record in folder in an accessible place.
4. For all measurements, record actual numbers as well as grade, i.e. if it takes 30 seconds before a patient sees double, record on the far right box 30/1 for 30 seconds and a grade of 1.
5. Patients must remain seated for the respiratory test.
6. At the end of the scoring sheet, add up the grade for that patient and that becomes the Total QMG Score.

QUANTITATIVE MG SCORE

I. DOUBLE VISION:

Patients' preparation: Patient is sitting. Ask if the patient is experiencing double vision looking straight ahead. If yes, record 0/3 (actual time/grade) on the scoring sheet. If no, ask the patient to look to the right for just an instant and then to the left without moving their head. If the patient sees double in only one direction, record side and record result as 0/3. If there is no eye movement, record as 0/3. If the patient does not see double, or sees double in both directions, have them perform the test as described below gazing to the right.

Explanation to patient: "I need for you to face forward. When I ask, look over to your right (left) side without turning your head. If or when you start to see double, please let me know."

Notes to examiner: Patient's head will usually start to turn in the direction of the gaze. Try to maintain the head in a forward position. Record the time and grade. Example: double vision is evident at 15 sec. In the scoring section, record 15/1.

II. PTOSIS (upward gaze):

Patients' preparation: Patient is sitting. Ask the patient to look straight ahead. If the upper lid is touching the pupil, record as 0/3. Ask the patient to look up at the ceiling without moving the head.

Explanation to patient: "I need you to face forward. When I ask, look up at the ceiling without moving your head. Keep looking up until I tell you to relax."

Notes to examiner: Patient's head will usually start to move up. Try to maintain the head in a forward position. Record time and grade when you see either eyelid (lashes) start to droop. Ex: Right eyelid starts to droop at 9 sec., record 9/2. If neither eyelid touches the pupil, record 60/0.

III. FACIAL MUSCLES:

Patients' preparation: Patient is sitting facing forward.

Explanation to patient: "Squeeze your eyes shut. Do not allow me to open your eyes."

Notes to examiner: If the patient cannot fully close either eye shut, record the grade as 3. No time score is needed on this test. Record grade of the weaker eye.

IV. SWALLOWING:

Patient's preparation: Patient is sitting. Four ounces of water (no ice) is poured into a cup. The water should be no cooler than water fountain cool.

Explanation to patient: "I need for you to drink this water as you normally would."

Notes to examiner: Listen for coughing and/or throat clearing during the test and immediately post test.
Don't ask patients to drink faster than what they feel comfortable doing.

V. SPEECH:

Patient's preparation: Patient is sitting.

Explanation to patient: " Count out loud from 1 to 50 at a comfortable pace."

Notes to examiner: This is one of the most difficult tests to score because of varying accents. Record number when you notice a nasal or slurring of the speech.

VI. RIGHT & LEFT ARM OUTSTRETCHED:

Patient's preparation: The patient needs to be sitting in a chair with both feet on the floor. They must be seated without leaning against the back of a chair. Test both arms at the same time. Arms need to be out to the side at 90°, palms down. (Demonstrate this position). If the patient cannot raise an arm out to 90° due to a shoulder problem, do not test that arm. The elbows are extended through full mechanical range.

Explanation to patient: "I need for you to hold both arms out to the side like this. Keep the arms out as long as possible. If one arm tires more than the other, you may lower that arm and keep the other arm up."

Notes to examiner: It is not uncommon that the arms start to droop. If the arms drop more than 10° from starting position, remind the patient to pull the arms up. If the patient can pull the arms up but cannot maintain that position for longer than two seconds, stop the test. If one arm is lowered, be careful that the patient does not start to lean to the side that the arm was lowered to give the appearance that he/she is maintaining a 90° angle. Record time/grade (ex: 45 sec for right arm is 45/2; whereas 100 sec for left arm is 100/1).

VII: FORCED VITAL CAPACITY:

Patient preparation: Patients must remain seated for this test.

Explanation to patient: "I am testing total lung capacity. I am going to ask you to hold this mouthpiece away from your face. I will then place the nose-clips on your nose. I will tell you to take a deep breath in, and then place the mouthpiece in your mouth. You will blow out as hard and as fast as you can. Keep blowing until I tell you to stop."

Notes to examiner: We are only testing FVC. A minimum of three trials and a maximum of five trials will be performed. The goal is to get the best two trials within 5% of each other. Give a lot of encouragement. Record best FVC (liters and percentage) and grade on sheet, (ex: 2.55 - 60% / 2).

The “normal” FVC values, and therefore the percent predicted calculations can vary with the spirometer that is used. Some spirometers come with specified normal values. That is why the same spirometer should be used each time you test a subject. For multi-site studies, parameters and normal values should be decided so that all sites are using the same information.

VIII: RIGHT & LEFT HAND GRIP:

Patient preparation: Patient is sitting in a chair. The elbow should be at 90°. Support should be under the medial aspect of the forearm and under the dynamometer.

Explanation to patient: "I am testing grip strength. I need for you to squeeze as hard as you can. Nothing will move, but it is measuring how hard you are squeezing."

Notes to examiner: Give vocal encouragement. Record the two trials (kgs) in column and score (ex: if testing a female and results are 10 and 8 kgs, record as 10/1.)

IX. HEAD LIFTED:

Patient preparation: The patient will lie down without a pillow under the head. A pillow may be placed under the knees or the knees bent so that the feet are flat on the bed.

Explanation to patient: "I need for you to lift your head off of the table. Keep it up as long as possible."

Notes to examiner: Place your hand under their head (without touching) to provide some cushion if the head drops back. The head should come up and forward, not just up to the ceiling. If the head drops within 10° of neutral, stop the test.

X. RIGHT & LEFT LEG OUTSTRETCHED:

Patient preparation: Patient is supine with a pillow under the head. Both legs must be out straight and shoes off.

Explanation to patient: "I need for you to hold your right leg up. Hold the leg up in this position as long as possible."

Notes to examiner: Leg must be maintained at 45-50% of hip flexion. If the leg start to droop, ask the patient to lift the leg up. If the patient lifts the leg up, but cannot maintain that position for 2 seconds, stop the test. Watch for hands under the hips and/or rotation of the leg.

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