STUDY GUIDE

MYASTHENIA GRAVIS

Neurological NursingSOS

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DEFINITION

Myasthenia gravis is a neurological condition that prevents motor neurons and muscles from communicating with each other. It leads to MUSCLE WEAKNESS.

CAUSES

The exact cause is unknown. We do know that it's an autoimmune disorder that triggers the patient's own immune system to attack the connection between neurons and muscles.

PATHOPHYSIOLOGY

Step 1: The Immune System Creates Antibodies to Attack the Postsynaptic Nicotinic Acetylcholine Receptors.

These postsynaptic nicotinic receptors are located at the neuromuscular junction (NMJ).

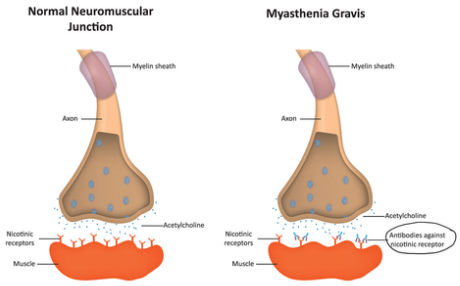

Image of normal NMJ vs. Myasthenia Gravis
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Normally, the neuron releases a neurotransmitter called acetylcholine, which then goes and binds to these nicotinic acetylcholine receptors, and this causes your muscles to contract.

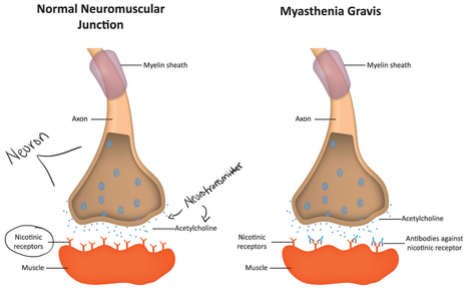

Image showing Neuron & Neurotransmitter
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Step 2: Acetylcholine Can't Bind to the Receptors.

The immune system has attacked the nicotinic acetylcholine receptors, so the acetylcholine can't bind there.

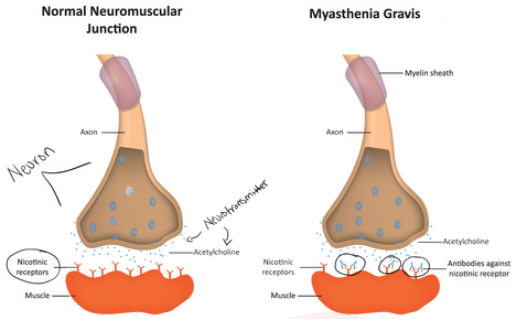

Image showing Neuron & Neurotransmitter
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Step 3: Muscles Can't Contract

Since there are autoantibodies blocking those postsynaptic nicotinic acetylcholine receptors, and the acetylcholine can't bind, the muscles can't contract like they should.

This leads to muscle weakness.

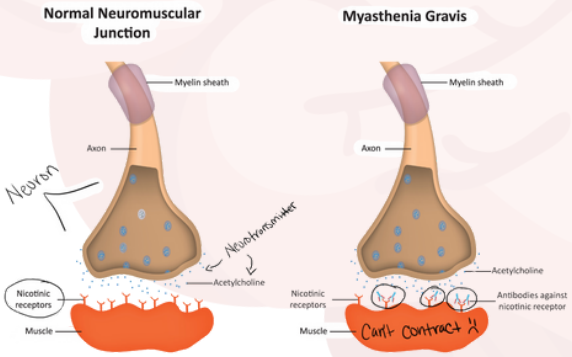

Image showing muscles that can't contract
Joshya / stock.adobe.com

Weakness tends to worsen with repetitive movements and activity as more and more acetylcholine is blocked and then naturally broken down over time. With rest though, muscle contractions can improve. Rest will allow more acetylcholine to build up at the neuromuscular junction and allow it to flood more of the receptors.

STUDY GUIDE

SIGNS AND SYMPTOMS

These are all related to the lack of acetylcholine available to activate a muscle contraction, which leads to muscle weakness. The symptoms will correlate with the area of muscle weakness.

Eye & Vision Changes (Eyelid Drooping (Ptosis), Strabismus, Double Vision, etc.)

One of the first signs and symptoms is eyelid drooping due to the constant muscle contractions that have to occur in order for us to move our eyes and blink. Strabismus happens when one or both eyes does its own thing (looks up, down, in or out). This can lead to double vision.

Weakness in the Face, Neck, Arms, Legs, Hands

Since the muscles can't contract as they should, these muscles groups may be weaker.

Dysphagia, Gagging, Difficulty Protecting Airway

The weakened muscles around the mouth and throat lead to these issues. Muscle weakness gets worse as the day progresses.

Maintaining the patient's airway is the top priority. As those muscles become weakened it can progress to respiratory distress or arrest quickly.

Slurred Speech, Hoarseness

Occurs due to the weakened muscles around the mouth and throat. Muscle weakness gets worse as the day progresses.

Tiredness

This is a VERY common symptom, and is also due to the weakness of the muscles. The patient might be exhausted at the end of the day from doing simple basic activities of daily living.

Difficulty Breathing & Respiratory Distress (Possible Failure)

This is a VERY common symptom, and is also due to the weakness of the muscles. The patient might be exhausted at the end of the day from doing simple basic activities of daily living.

NURSING ASSESSMENT

Vision

Assess their vision, it they have a droopy eyelid (ptosis) and if they are having strabismus with double vision.

Ability to Swallow & Gag Reflex

Make sure the muscles they use to protect and maintain their airway are not affected.

If their neck and mouth muscles tend to become affected as the day progresses, the timing of meals is very important. Have them eat earlier on in the day before the muscles become tired.

Respiratory Effort & Muscles

Assess their respiratory rate and respiratory effort and ability to breathe. The respiratory system can become compromised quickly, so be sure to assess this frequently.

Maintaining the patient's airway and their ability to breathe is your number one priority.

Tensilon (Edrophonium) Test

The tensilon test has 3 main purposes:

- Determine if a patient has myasthenia gravis or not
- Determine if a patient is in a myasthenic crisis
- Determine if a patient is in a cholinergic crisis.

This test is done by a neurologist.

How It's Performed

The patient will be given an injection of the medication tensilon (the generic name for it is called edorphonium)

What is Tensilon?

Tensilon is an acetylcholinesterase inhibitor and it prevents the natural breakdown of acetylcholine.

By preventing acetylcholine from being naturally broken down, it keeps more of it present at the neuromuscular junction and helps to flood the receptors and increase the chances of acetylcholine binding to any receptors that aren't yet blocked by autoantibodies.

This will let more acetylcholine bind to the receptors and hopefully increase muscle contraction.

How to Read the Results

Testing for myasthenia gravis: If there is improvement in muscle contraction and lack of weakness then the test is positive for myasthenia gravis.

This test is usually used in combination with other hallmark signs and symptoms of the disorder.

Testing for myasthenic crisis: If the patient gets better temporarily, then they are in a myasthenic crisis.

A myasthenic crisis happens when there is so much acetylcholine that has been naturally broken down, that there's not enough left to bind to the open nicotinic acetylcholine receptors and stimulate muscle contraction. This can lead to a myasthenic crisis, which causes respiratory distress and respiratory failure.

Testing for cholinergic crisis: If their symptoms worsen when given tensilon, they are in cholinergic crisis.

This means that the neuromuscular junction was already saturated with acetylcholine and now even more acetylcholine is present due to the tensilon. This is caused by the patient receiving too much of their treatment medications for myasthenia gravis.

If a patient is in a cholinergic crisis and is given tensilon, they can decline quickly, so it's important to have emergency supplies very readily available before administering it. Atropine is the antidote to tensilon and will reverse it, so it should be administered if the patient is in a cholinergic crisis.

Atropine is the antidote to tensilon and will reverse a patient in cholinergic crisis.

Myasthenic Crisis	Cholinergic Crisis
Not enough acetylcholine	Too much acetylcholine
Symptoms improve	Symptoms worsen
Not enough medication (need more)	Too much medication (change prescriptions)
	Antidote: Atropine

NURSING INTERVENTIONS

Have Emergency Equipment Ready

Make sure you have oxygen, an Ambu bag, and suction equipment ready at the bedside at all times.

Since myasthenia gravis can compromise the patient's airway and respiratory system, it's VITAL that you have emergency equipment ready at all times.

Assist with Intubation (if needed)

If the patient's respiratory system is severely compromised, intubation may be necessary.

Elevate Head of the Bed

This helps expand the lungs, improve oxygenation, and prevent choking or aspirating during meals.

Monitor Meals & Encourage Small Bites & Larger Meals Earlier in the Day

Swallowing and eating food can become a challenge (especially as the meal progresses or the day goes on). Make sure to monitor their ability to chew and swallow safely. Encourage larger meals earlier in the day when muscles are stronger.

Ensure They Can Ambulate Safely

Muscle weakness can decrease their ability to ambulate safety and increase their risk of falls.

STUDY GUIDE

Move Personal Belongings Where They Can See Them

This can help the patient be more independent if they are having difficulty seeing.

Organize Higher Energy Tasks in the Morning & Encourage Rest

Help them organize their most high energy demand activities in the morning and rest frequently. This will allow their muscles to contract more during these times, since there's more acetylcholine present to help stimulate those receptors.

Educate the Patient on Possible Triggers

Possible triggers include illness, stress, hot temperatures, and hormonal changes (such as menstrual cycles). Minimizing these or preparing for them can help the patient manage their symptoms and know what to expect.

Audit Medications

There are many medications that interact with common meds prescribed for myasthenia gravis, and many medications may make their muscles weakness worse. So it's important they talk with their doctor before they take any other medications.

Give Medications as Prescribed:

Anticholinesterase

Blocks the breakdown of acetylcholine, making it more available at the neuromuscular junction site, therefore increasing muscle contraction.

When giving anticholinesterase medications, watch for signs of cholinergic crisis (bradycardia, pupil constriction, bronchoconstriction, respiratory failure, increase mucous production and saliva, GI upset, and incontinence). Atropine is the antidote to anticholinesterase medications, so that may be given if the patient becomes overmedicated.

Plasmapheresis

This is a possible (and temporary) treatment that removes the antibodies that attack the neuromuscular junction receptors.