

# Difference Between Myasthenic Crisis and Cholinergic Crisis

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## Key Difference - Myasthenic Crisis vs Cholinergic Crisis

Myasthenic crisis can be described as a complication of [myasthenia gravis](#) where there is a sudden worsening of the associated clinical features. Cholinergic crisis is due to the accumulation of acetylcholine in the neuromuscular junction. Inactivation of acetylcholinesterase [enzyme](#) that cleaves Ach in the neuromuscular junction is the reason for this condition most of the time. **The administration of edrophonium causes aggravation of the symptoms of the cholinergic crisis, but it alleviates the symptoms of myasthenic crisis.** This is the **key difference** between the two disorders.

## What is Myasthenia Gravis?

Myasthenia gravis is an autoimmune disorder characterized by the production of [antibodies](#) that block the transmission of impulses across the neuromuscular junction. These antibodies bind to the postsynaptic Ach receptors thus preventing the binding of Ach in the [synaptic cleft](#) to those receptors. Women are five times more affected by this condition than males. There is a significant association with other autoimmune disorders such as rheumatoid arthritis, SLE, and autoimmune thyroiditis. Concurrent thymic hyperplasia has been observed.

## Clinical Features

- There is weakness of proximal limb muscles, extraocular muscles, and bulbar muscles
- There are fatigability and fluctuation with regard to the muscle weakness
- No muscle pain
- Heart is not affected, but the respiratory muscles can be affected
- Reflexes are also fatigable
- Diplopia, ptosis, and dysphagia

## Investigations

- Anti ACh receptor antibodies in the serum
- Tensilon test where a dose of edrophonium is administered that gives rise to a transient improvement of the symptoms that lasts for about 5 minutes
- Imaging studies
- ESR and CRP

## Management

- Administration of anticholinesterases such as pyridostigmine
- Immunosuppressants such as [corticosteroids](#) can be given to the patients who do not respond to anticholinesterases
- Thymectomy
- Plasmapheresis
- Intravenous immunoglobulins

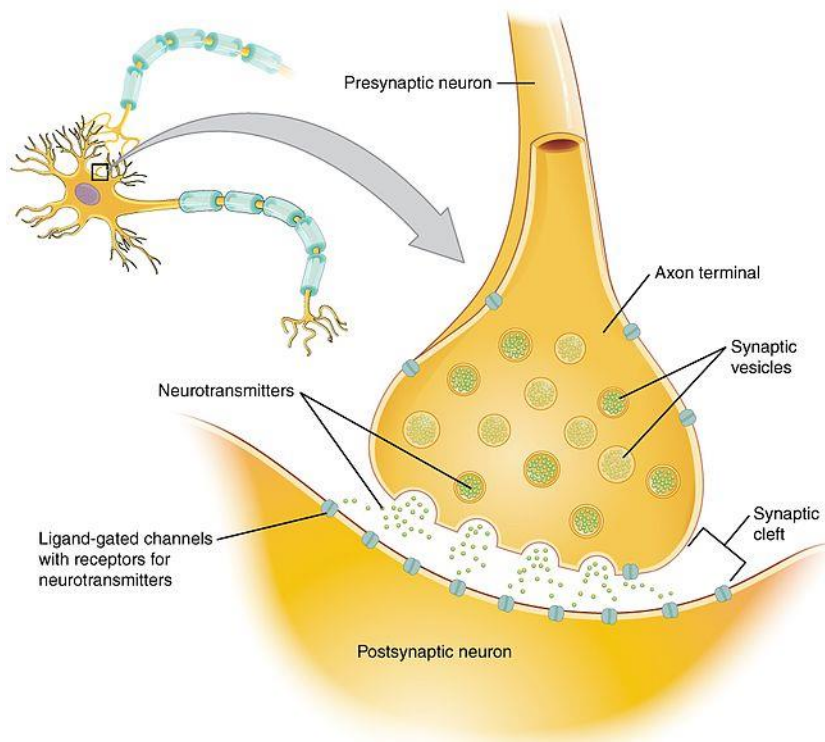
There are two medical crises that can occur in a patient having myasthenia gravis as the myasthenic crisis and cholinergic crisis.

## What is a Myasthenic Crisis?

Myasthenic crisis can be described as a complication of myasthenia gravis where there is a sudden worsening of the associated clinical features. Urgent intubation is required to prevent fatal consequences following respiratory failure.

### Clinical Features

- Dyspnea
- Dysphagia
- Dysphonia
- Sometimes cough
- Symptoms improve with edrophonium



**Figure 01: A Neuromuscular Junction**

## Treatment

- Ventilator support
- Use of anticholinergic, immunosuppressants, and immunoglobulins
- Intravenous fluid administration to prevent hypovolemia

## What is Cholinergic Crisis?

Cholinergic crisis is due to the accumulation of acetylcholine in the neuromuscular junction. Inactivation of acetylcholinesterase enzyme which cleaves Ach in the neuromuscular junction is the reason for this condition most of the time.

In myasthenia gravis, there is an increase in the cholinergic activity owing to the lack of inhibition by dopamine. To counter this, drugs with anticholinesterase activity are prescribed. An overdose or accumulation of these drugs can impair the action of anticholinesterase enzyme thus giving rise to a cholinergic crisis.

## Clinical Features of Cholinergic Crisis

- Salivation
- Lacrimation
- Urination
- [Diarrhea](#)
- Pupillary constriction
- Impairment of respiratory muscle activity can cause a respiratory failure
- Abdominal cramps
- Nausea and vomiting
- Excessive secretions

Diagnosis of a cholinergic crisis is through the administration of edrophonium. In the presence of a crisis, edrophonium results in a transient aggravation of symptoms.



**Figure 02: Patient suffering from Cholinergic Crisis**

## **Treatment**

Ventilator support is given to prevent a respiratory failure

Atropine also can be administered to countermand the excess ACh activity.

## **What are the Similarities Between Myasthenic Crisis and Cholinergic Crisis?**

- Both are life-threatening conditions that are considered as medical emergencies
- Ventilator support is required to save patient's life in both diseases.

## **What is the Difference Between Myasthenic Crisis and Cholinergic Crisis?**

### **Myasthenic Crisis vs Cholinergic Crisis**

Myasthenic crisis can be described as a complication of myasthenia gravis where there is a sudden worsening of the associated clinical features.

Cholinergic crisis is due to the accumulation of acetylcholine in the neuromuscular junction. Inactivation of acetylcholinesterase enzyme that cleaves Ach in the neuromuscular junction is the reason for this condition most of the time.

Symptoms	
Symptoms improve with edrophonium.	Symptoms improve with edrophonium
Clinical Features	
<p>Clinical features of myasthenic crisis</p> <ul style="list-style-type: none"> <li>· Dyspnea</li> <li>· Dysphagia</li> <li>· Dysphonia</li> <li>· Sometimes cough</li> <li>· Symptoms improve with edrophonium</li> </ul>	<p>Clinical symptoms and signs of cholinergic crisis</p> <ul style="list-style-type: none"> <li>· Salivation</li> <li>· Lacrimation</li> <li>· Urination</li> <li>· Diarrhea</li> <li>· Pupillary constriction</li> <li>· Impairment of respiratory muscle activity can cause a respiratory failure</li> <li>· Abdominal cramps</li> <li>· Nausea and vomiting</li> <li>· Excessive secretions</li> </ul>

## Summary - Myasthenic Crisis vs Cholinergic Crisis

Myasthenic crisis can be described as a complication of myasthenia gravis where there is a sudden worsening of the associated clinical features. Cholinergic crisis is due to the accumulation of acetylcholine in the neuromuscular junction. Inactivation of acetylcholinesterase enzyme which cleaves Ach in the neuromuscular junction is the reason for this condition most of the time. Edrophonium aggravates the symptoms of cholinergic crisis but gives rise to a transient relief of the symptoms of myasthenia gravis. This is the main difference between myasthenic and cholinergic crises.

### Reference:

1.Kumar, Parveen J., and Michael L. Clark. Kumar & Clark clinical medicine. Edinburgh: W.B. Saunders,2009.

### Image Courtesy:

1.'1225 Chemical Synapse'By Young, KA., Wise, JA., DeSaix, P., Kruse, DH., Poe, B., Johnson, E., Johnson, JE., Korol, O., Betts, JG., & Womble, M. [\(CC BY 4.0\)](#) via [Commons Wikimedia](#)  
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