Lecture 5

Neuromuscular weakness in the ICU

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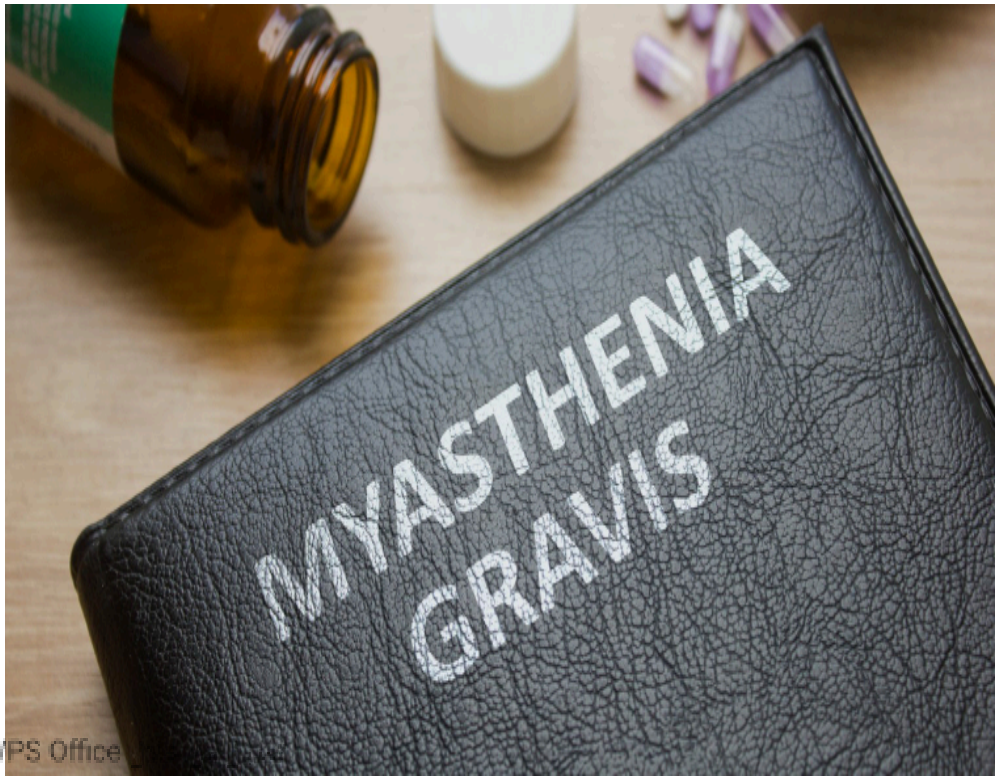


Neuromuscular weakness in the ICU

_also known as Intensive Care Unit-Acquired Weakness(ICU-AW,)

is often caused by a combination of **critical illness myopathy(CIM)**

and **critical illness polyneuropathy(CIP.)**

_ These disorders lead to diffuse ,symmetrical muscle weakness ,primarily

in the limbs and respiratory muscles ,but sparing the face and eyes.

_These can significantly prolong ventilation duration ,ICU stays,

and lead to long-term disability.

* It include (**Myasthenia gravis)** and (**Guillain-Barré syndrome).**

Myasthenia gravis(MG)

patients require ICU admission primarily for a myasthenic crisis ,a life-threatening complication characterized by severe respiratory muscle or bulbar weakness requiring mechanical ventilation.

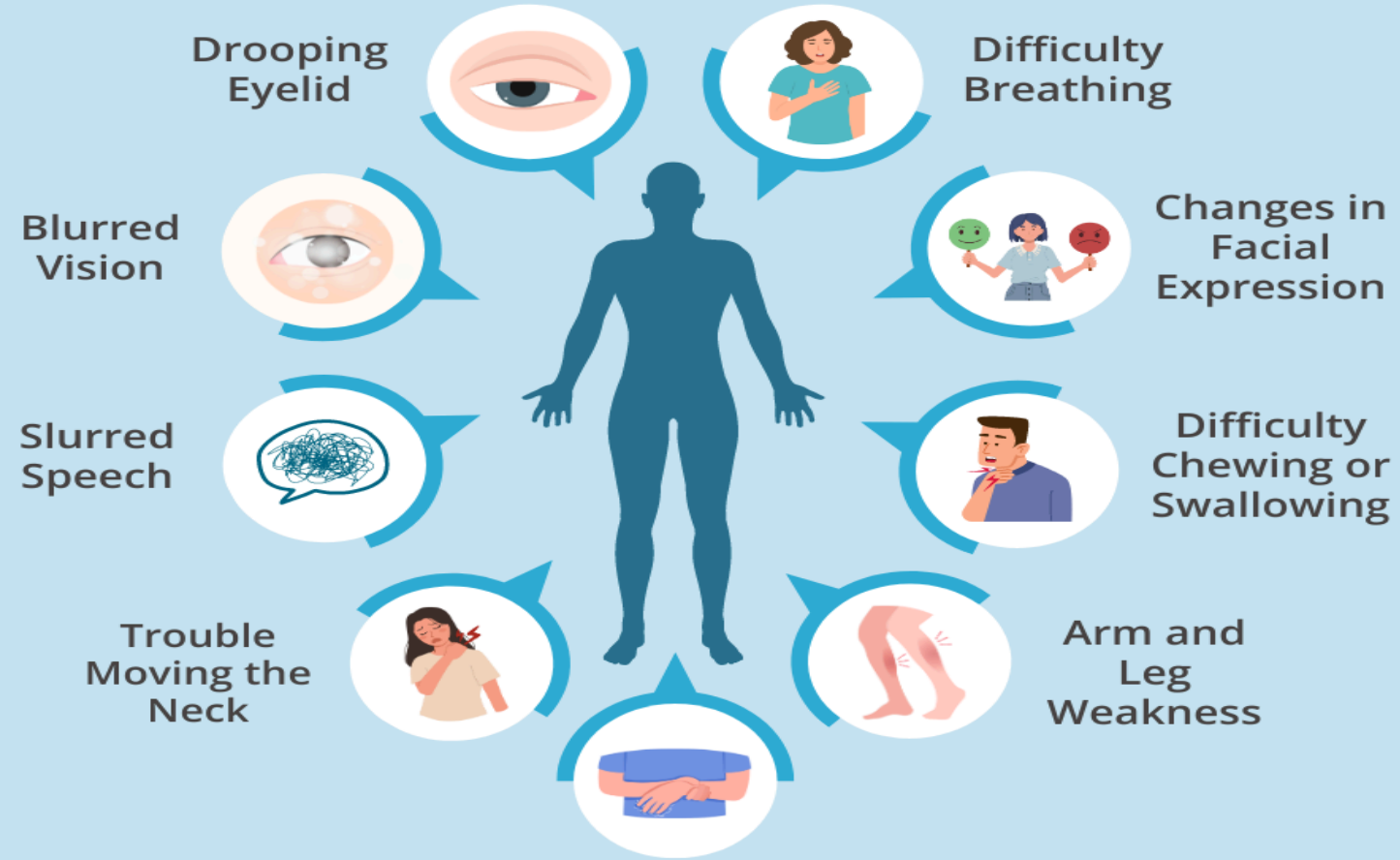
* *ICU management* focuses on :_

1) prompt respiratory support

2) immunotherapy to reduce autoantibodies

3) identifying crisis triggers.

How Myasthenia Gravis Affects the Body



EVERYDAY HEALTH

Myasthenic crisis vs. cholinergic crisis

Myasthenic crisis : An exacerbation of MG due to insufficient anticholinesterase medication(Pyridostigmine)or worsening disease.

Cholinergic crisis :Caused by an overdose of anticholinesterase medication ,which leads to muscle weakness by overstimulating neuromuscular junctions.

Differentiation:

* Cholinergic crisis is rare with standard pyridostigmine dosing but can occur with self-medication.

* A cholinergic crisis may present with muscarinic symptoms like bradycardia ,increased secretions ,and diarrhea.

* A definitive edrophonium(Tensilon)test is used but is now controversial and requires caution due to its potential side effects.

Management of Myasthenic Gravis in the ICU

1) Respiratory management

_ **Airway protection** :is to preventing aspiration due to weakened bulbar (throat and mouth) muscles ,which can cause difficulty in swallowing and clearing secretions.

_ **Ventilatory support** :Patients with respiratory failure are treated with either noninvasive ventilation(NIV)or endotracheal intubation.

_ NIV :used in patients with mild-to-moderate respiratory distress who have adequate bulbar muscle strength.

- Starting NIV early can prevent the need for intubation.

_ Intubation :used in patient has severe bulbar weakness ,a weak cough , or a rapidly declining respiratory status or NIV fails.

_ **Respiratory monitoring** :measurements of forced vital capacity (FVC)and negative inspiratory force(NIF) help in respiratory muscle strength ,but abnormalities often appear after a crisis is happening.

Intubation and extubation for MG patients

Intubation :A non-depolarizing paralytic ,such as rocuronium ,is used at a reduced dose because MG patients are sensitive to these agents.

_ Avoid succinylcholine because MG increase succinylcholine resistance.

_ Use lung-protective ventilation settings to improve respiratory function.

Extubation :Can be considered after muscle strength improves significantly.

2) Acetylcholinesterase inhibitors (Pyridostigmine)

_is a common first-line medication to treat MG.

_It prevent the breakdown of acetylcholine which allows for more acetylcholine to be available to stimulate muscles and strengthening muscle contractions.

_This leads to temporary symptom relief, such as reduced muscle weakness, but the effect lasts a few hours, requiring multiple doses a day.

Risk factors for extubation failure_

* age over 50 years
* underlying pulmonary disease
* MuSK-antibody positive

status(severe MG).

3) Immunomodulatory treatments

1)Plasma exchange(PLEX :)This procedure filters pathogenic antibodies from the blood ,It have a more rapid effect than intravenous immunoglobulin(IVIg.)

A typical course involves several sessions over a period of days or weeks.

2) Intravenous immunoglobulin(IVIg :)This provides healthy antibodies from donors,It is an alternative to PLEX and is delivered over several days.

3)Corticosteroids : In severe cases ,high-dose intravenous methylprednisolone may be given.

4)Long-term immunosuppressants :like azathioprine or mycophenolate mofetil are provide sustained immunosuppression after the acute crisis has resolved.

Guillain-Barré syndrome(GBS)

Is a respiratory failure and autonomic dysfunction that can lead to life-threatening complications like paralysis and cardiovascular instability.

_ requires ICU admission in up to one-third of cases.

_ patients are monitored for respiratory and cardiac issues and may require mechanical ventilation ,intensive supportive care for complications ,and therapies like intravenous immunoglobulin (IVIg)or plasma exchange(PLEX.)

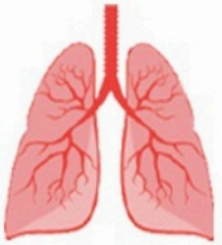
_ ICU Care include managing ventilation ,preventing infections (especially pneumonia ,)and supporting functions such as nutrition , pain management ,and bowel/bladder control.

Symptoms of Guillain-Barré syndrome

Difficulty speaking and swallowing

Abnormal sensations, like tingling

Paralysis of legs, arms and/or facial muscles



Chest muscle weakness and difficulty breathing

Rapid muscle weakness

Pain in your limbs and spine

Imbalance and clumsiness

Induction for ICU admission

1)Rapidly progressing weakness :are at higher risk for respiratory or bulbar muscle involvement.

2)Respiratory distress :About %20 to %30 of GBS patients develop respiratory failure requiring mechanical ventilation.

3)Bulbar palsy :Weakness of facial ,pharyngeal ,and laryngeal muscles can impair swallowing and cough reflexes ,increasing the risk of aspiration pneumonia.

4)Severe autonomic dysfunction :include significant fluctuations in blood pressure ,heart rate irregularities ,and cardiac arrhythmias ,which can be life-threatening.

5)Reduced vital capacity(VC :) Serial monitoring of vital capacity is , necessary with intubation if the VC falls below 20 ml/kg.

GBS management in the ICU

1. Immunotherapy

is aiming to suppress the autoimmune attack on the peripheral nerves.

***Intravenous immunoglobulin(IVIg :)**are given intravenously over five days.

This treatment is widely used for its efficacy and ease of administration.

***Plasma exchange(PE:)**

It is considered as effective as IVIg ,though it is more invasive.

2. Respiratory support

_Managing respiratory function is a primary concern in the ICU.

_Respiratory function is monitored closely ,with measurements of vital capacity and negative inspiratory force.

_Pulse oximetry is a late indicator and is not sufficient for early detection of respiratory failure.

_Mechanical ventilation(MV)is initiated if respiratory function deteriorates.

_In cases of prolonged ventilation ,a tracheostomy may be performed after about two weeks

3. Autonomic dysfunction management

Continuous monitoring of heart rate and blood pressure is necessary to manage life-threatening autonomic instability.

** Hypertension/Hypotension :Mild fluctuations are often managed conservatively ,but severe cases require short-acting medications.

** Orthostatic hypotension may be treated with IV fluids.

** Bradyarrhythmias :These can be triggered by minor stimulation and may require atropine or ,rarely ,a temporary pacemaker.

4. Supportive and symptomatic care

1)**Pain management** :Severe neuropathic pain is common. Treatment include non-opioids ,gabapentin ,and carbamazepine.

2)**Nutrition** :Patients with swallowing difficulties or ileus require nutritional support via a nasogastric tube or parenteral nutrition.

3)**Thromboembolism prevention :**As prolonged immobility increases the risk of deep vein thrombosis(DVT)and pulmonary embolism , patients typically receive anticoagulants(e.g. ,heparin.)

4)**Infection control** :Intensive monitoring is needed to prevent hospital-acquired infections like pneumonia and sepsis.

5)**Positioning and rehabilitation :**Frequent repositioning and early physical therapy prevent pressure ulcers and contractures and support muscle function.

6)**Psychological support** :are necessary for patients who may have anxiety ,depression.