pyridostigmine (py-rideoh-stig-meen)

Mestinon, Mestinon SR, Mestinon Timespan, Regonol

Classification
Therapeutic: anticholinesterases
Pharmacologic: cholinergics

Pregnancy Category C

Indications
Used to increase muscle strength in the symptomatic treatment of myasthenia gravis.
Reversal of nondepolarizing neuromuscular blocking agents.
Prevention of lethal effects of poisoning with the nerve agent soman.

Action
Inhibits the breakdown of acetylcholine and prolongs its effects (anticholinesterase).

Effects include:
Miosis, Increased intestinal and skeletal muscle tone, Bronchial and ureteral constriction, Bradycardia, Increased salivation, Lacrimation, Sweating.

Therapeutic Effects:
Improved muscular function in patients with myasthenia gravis.
Reversal of paralysis from nondepolarizing neuromuscular blocking agents.
Prevention of Soman nerve gas toxicity.

Pharmacokinetics
Absorption:
Poorly absorbed after oral administration, necessitating large oral doses compared with parenteral doses.

Distribution:
Appears to cross the placenta.

Metabolism and Excretion:
Metabolized by plasma cholinesterases and the liver.

Half-life:
PO—3.7 hr; IV—1.9 hr.

TIME/ACTION PROFILE (cholinergic effects)

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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<tbody>
<tr>
<td>PO</td>
<td>30–35 min</td>
<td>unknown</td>
<td>3–6 hr</td>
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<tr>
<td>PO SR</td>
<td>30–60 min</td>
<td>unknown</td>
<td>6–12 hr</td>
</tr>
<tr>
<td>IV</td>
<td>2–5 min</td>
<td>unknown</td>
<td>2–3 hr</td>
</tr>
</tbody>
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Contraindications/Precautions
Contraindicated in:
Hypersensitivity to pyridostigmine or bromides; Mechanical obstruction of the GI or GU tract; Known alcohol intolerance (syrup only).

Use Cautiously in:
History of asthma; Ulcer disease; Cardiovascular disease; Epilepsy; Hyperthyroidism.

Adverse Reactions/Side Effects
CNS:
SEIZURES, dizziness, weakness.

EENT:
lacrimation, miosis.

Resp:
bronchospasm, excessive secretions.

CV:
bradycardia, hypotension.

GI:
abdominal cramps, diarrhea, excessive salivation, nausea, vomiting.

Derm:
sweating, rashes.

Interactions
Drug-Drug:
Cholinergic effects may be antagonized by other drugs possessing anticholinergic properties, including antihistamines, antidepressants, atropine, haloperidol, phenothiazines, procainamide, quinidine, or disopyramide.

Prophylaxis of depolarizing muscle-relaxing agents and cholinesterase inhibitors (succinylcholine, decamethonium).

Route/Dosage

Myasthenia Gravis

PO (Adults): Tablets/caps—30–60 mg q 3–4 hr initially; then adjusted as required; usual maintenance dose is 600 mg/d by divided doses (range 60–1500 mg/day).
Extended-release tablets—260–350 mg 1–2 times daily (slowing intestinal transit by 6 hr; may be associated with increased risk of cholinergic crisis; concurrent immediate-release products may be required).

PO (Children): 7 mg/kg (200 mg/m²)/day in 5–6 divided doses.

IM, IV (Adults): 2 mg (1/30 of oral dose); may be repeated q 2–3 hr.
During labor/delivery—1 mg before second stage of labor is complete.

IM (Neonates Born to Myasthenic Mothers): 50–150 mcg/kg q 4–6 hr.

Prevention of Nondepolarizing Neuromuscular Blocking Agents

IV (Adults): 10–20 mg, pretreated with 0.6–1.2 mg atropine IV.

PO (Adults): 30 mg every 8 hr before exposure, stepped up on exposure to gas.

Antidote for Nondepolarizing Neuromuscular Blocking Agents

PO (Adults): 2 mg kg (600 mg/m²)/day in 5–6 divided doses.

IM, IV (Adults): 2 mg (1/30 of oral dose); may be repeated q 2–3 hr.
During labor/delivery—1 mg before second stage of labor is complete.

IM (Neonates Born to Myasthenic Mothers): 50–150 mcg/kg q 4–6 hr.
NURSING IMPLICATIONS

Assessment

● Assess pulse, respiratory rate, and BP before administration. Report significant changes in heart rate.

● Myasthenia Gravis: Assess neuromuscular status, including vital capacity, ptosis, diplopia, chewing, swallowing, hand grip, and gait before administering and at peak effect. Patients with myasthenia gravis may be advised to keep a daily record of their condition and the effects of this medication.

● Assess patient for overdose, underdose, or resistance. Both have similar symptoms (muscle weakness, dyspnea, dysphagia), but symptoms of overdosage usually occur within 1 hr of administration, whereas symptoms of underdose occur later. Evaluate (cholinergic crisis) symptoms may include increased respiratory secretions and saliva, bradycardia, nausea, vomiting, cramping, diarrhea, and diaphoresis. A Tensilon test (edrophonium chloride) may be used to differentiate between overdosage and undosage.

● Antidote to Nondepolarizing Neuromuscular Blocking Agents: Monitor reversal of effect of neuromuscular blocking agents with a peripheral nerve stimulator. Recovery usually occurs consecutively in the following muscles: diaphragm, intercostal muscles, muscles of the glottis, abdominal muscles, limb muscles, muscles of mastication, and levator muscles of eyelids. Closely observe patient for residual muscle weakness and respiratory distress throughout the recovery period. Maintain airway patency and ventilation until recovery of normal respirations occurs.

● Toxicity and Overdose: Atropine is the antidote.

Potential Nursing Diagnoses

Impaired physical mobility (Indications)

Implementing

Implementation

● For patients who have difficulty chewing, pyridostigmine may be administered 30 min before meals.

● Oral dose is not interchangeable with IV dose. Parenteral form is 30 times more potent.

● When used as an antidote to nondepolarizing neuromuscular blocking agents, atropine may be ordered before or concurrently with large doses of pyridostigmine to prevent or to treat bradycardia and other side effects.

IV Administration

● pH: 6.0–7.0

● Benefit IV: Monitor administration. Do not add to IV solutions. May be given through Y-site of infusion of D5W, 0.9% NaCl, D5LR's solution, or D5LR. Concentration: 1 mg/mL. Rate: For myasthenia gravis, administer each 0.5 mg over 1 min. For reversal of nondepolarizing neuromuscular blocking agents, administer each 5 mg over 1 min.

● Storage Compatibility: Glucose, saline, lactate, dextrose, dextrose in water, normal saline, potassium chloride, vitamin B complex with C.

Patient/Family Teaching

● Instruct patient to take medication as directed. Do not skip or double up on missed doses. Patients with a history of dysphagia should have a nonlectric or battery-operated back-up alarm clock to remind them of exact doses. Patients with dysphagia may not be able to swallow medication if the dose is not taken exactly on time. Taking dose late may result in myasthenic crisis. Taking dose early may result in cholinergic crisis. Patients with myasthenia gravis must continue this regimen as a life-long therapy.

● Advise patients to carry identification describing disease and medication regimen at all times.

● Instruct patient to space activities to avoid fatigue.

Evaluation/Desired Outcomes

● Relief of ptosis and diplopia; improved chewing, swallowing, extremity strength, and breathing without the appearance of cholinergic symptoms.

● Reversal of nondepolarizing neuromuscular blocking agents in general anesthesia.

● Prevention of Soman nerve gas toxicity.

Why was this drug prescribed for your patient?