Drugs to Treat Muscle Spasms

1. Muscle Spasms
   - Involuntary contraction of a muscle or muscle group
   - Causes pain and decreased function
   - Causes may be epilepsy, hypocalcemia, acute and chronic pain syndromes, trauma
   - Drug therapy may include analgesic anti-inflammatory agents, (e.g. aspirin), and centrally acting muscle relaxants.

2. Agents- Centrally Acting Muscle Relaxants
   - Baclofen (Lioresal)
   - Diazepam (Valium)
   - Carisoprodol (Soma)
   - Chlorphenesin (Maolate)
   - Chlorzoxazone (Paraflex, Parafon Forte, Remular-S)
   - Cyclobenzaprine (Flexeril)
   - Medaxalone (Skelaxin)
   - Methocarbamol (Robaxin)
   - Orphenadrine (Norflex)
   - Tizanidine (Zanaflex)

3. Mechanism of Action for Centrally Acting Muscle Relaxants
   - Mechanism uncertain, but probably from sedative properties
   - Has no direct effect on skeletal muscle
   - Diazepam and tizanidine enhance presynaptic inhibition of motor neurons in CNS
   - Enhancing effects of GABA (gamma-aminobutyric acid), an inhibitory neurotransmitter
   - Baclofen suppresses hyperactive reflexes in spinal cord (possibly by mimicking the actions of GABA on spinal neurons)

4. Therapeutic Uses
   - Treats localized spasm
   - Decreases pain
   - Increases ROM (Range of Motion)
   - Reduces spasticity from multiple sclerosis, spinal cord injury, and cerebral palsy, but not stroke, Parkinson’s disease, or Huntington’s chorea

4. Adverse Effects
   - CNS depression (drowsiness, dizziness, lightheadedness)
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- Potential liver damage
- Physical dependence
- Baclofen side effects: nausea, constipation, urinary retention
- Cyclobenzaprine and orphenadrine- Atropine-like effects (dry mouth, blurred vision, photophobia, urinary retention, constipation)
- Tizanidine- dry mouth, hypotension, hallucinations, and psychotic symptoms
- Metocarbamol- urine discoloration (brown, black, or dark green)
- Chlorzoxazone- causes hepatic necrosis and should not be used
- Diazepam- potential for fetal harm during pregnancy, especially during the first trimester. Readily enters breastmilk, increasing to toxicity in infant

5. Patient Teaching Needed
   - Avoid hazardous activities if significant CNS impairment occurs
   - Avoid alcohol or other CNS depressants (prevent intensified depressant effects)
   - Abrupt withdrawal can cause hallucinations, paranoid ideation, and seizures. When discontinued, withdraw gradually.
   - Warn women of childbearing years about potential for fetal harm if they become pregnant while taking diazepam (a benzodiazepine). If pregnancy occurs, drug should be withdrawn.
   - Discourage women from breastfeeding while on diazepam

6. Medication Administration
   - Usually oral route
   - IV or IM route possible for methocarbamol or diazepam
   - Baclofen may be administered by intrathecal infusion using implantable pump, if needed
   - Diazepam may be given with food if gastric upset occurs. May be given rectally for treatment of seizures.

7. Agents- Direct Acting Muscle Relaxants
   - Spasticity is movement disorder with heightened muscle tone, spasm, and loss of dexterity
   - Usually combined with physical therapy
   - Dantrolene (Dantrium)- promotes muscle relaxation by acting directly on skeletal muscle
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8. Mechanism of Action for Direct Acting Muscle Relaxants
   o Relieves spasm by suppressing release of calcium from the sarcoplasmic reticulum (SR) so skeletal muscles are less able to contract
   o Therapeutic doses have minimal effects on smooth muscle or cardiac muscle

9. Therapeutic Uses
   o Treats spasticity from multiple sclerosis, cerebral palsy, spinal cord injury, or stroke
   o Treats malignant hyperthermia, a rare, life-threatening syndrome from anesthesia or succinycholine, a neuromuscular blocking agent

10. Adverse Effects
    o Decreases strength, and may reduce overall function
    o Liver damage- contraindicated with active hepatic disease (cirrhosis, hepatitis). Use lowest effective dosage for shortest time necessary
    o Muscle weakness, drowsiness, diarrhea, anorexia, nausea, vomiting, acne-like rash

11. Patient Teaching Needed
    o Signs of liver dysfunction (jaundice, abdominal pain, malaise)
    o Need liver function tests before initiating treatment and periodically
    o Monitor for reduction in muscle strength
    o Avoid hazardous activities if significant depressant effects occur
    o Avoid CNS depressants

12. Medication Administration
    o If no beneficial effects within 45 days, drug should be withdrawn
    o Usually oral dosing. May be given IV push when treating Malignant Hyperthermia crisis
    o For prevention of Malignant Hyperthermia prior to surgical anesthesia, give dantrolene 1-2 days prior to surgery

13. Therapeutic Goal
    o Relief of signs and symptoms of muscle spasm and spasticity