Beta Blocker Poisoning or Overdose

Aliases

Anti-hypertensive

Patient Care Goals

1. Reduce GI absorption of oral agents with some form of binding agent (activated charcoal) especially for extended release.
2. Provide early airway protection; this is required as patients may have rapid mental status deterioration.
3. Assure adequate ventilation, oxygenation, and correction of hypoperfusion.

Patient Presentation

Beta blocker or beta adrenergic antagonist medication to reduce the effects of epinephrine or adrenaline

Inclusion Criteria

1. Patients may present with:
    a. Bradycardia
    b. Hypotension
    c. Altered mental status
    d. Weakness
    e. Shortness of breath
    f. Possible seizures
2. Beta blocker agents examples:
    a. Acebutolol hydrochloride (Sectral®)
    b. Atenolol (Tenormin®)
    c. Betaxolol hydrochloride (Kerlone®)
    d. Bisoprolol fumarate (Zebeta®)
    e. Carteolol hydrochloride (Cartrol®)
    f. Esmolol hydrochloride (Brevibloc®)
    g. Metoprolol (Lopressor®, Toprol XL®)
    h. Nadolol (Corgard®)
    i. Nebivolol (Bystolic®)
    j. Penbutolol sulfate (Levatol®)
    k. Pindolol (Visken®)
    l. Propranolol (Inderal®, InnoPran®)
    m. Timolol maleate (Blocadren®)
    n. Sotalol hydrochloride(Betapace®)
3. Alpha/beta-adrenergic blocking agents examples:
    a. Carvedilol (Coreg®)
    b. Labetalol hydrochloride (Trandate®, Normodyne®)

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Assess ABCDs and, if indicated, expose and then cover to assure retention of body heat.
2. Check vital signs, including temperature.
3. Apply a ECG cardiac monitor, examine rhythm strip for arrhythmias, and consider obtaining a 12-lead ECG

4. Check blood glucose level
5. Monitor pulse oximetry and $ETCO_2$ for respiratory decompensation.
6. Identify specific medication taken (noting immediate release vs. sustained release formulations), time of ingestion, and quantity.
7. Obtain a pertinent cardiovascular history or other prescribed medications for underlying disease.
8. Obtain pertinent patient history.
9. Administer patient physical.

Treatment and Interventions

1. Consider **activated charcoal without sorbitol *[EMT].***
    a. If risk of rapid decreasing mental status, do not administer oral agent without adequately protecting the airway.
2. Check **blood glucose level** on all patients, but especially on pediatric patients as beta blockers can cause hypoglycemia in pediatric population.
3. Consider **Atropine Sulfate** for symptomatic bradycardia ***[PARA]***
    a. Adult: 1mg IV/IO q5 minutes (maximum total dose of 3mg)
    b. Pediatric: 0.02mg/kg IV/IO q5 minutes (maximum total dose of 3mg)
4. Consider isotonic IV/IO fluid bolus 20 ml/kg ***[AEMT]***
5. Consider vasopressors after adequate fluid resuscitation (1–2 liters of crystalloid) for the hypotensive patient [see Shock guideline for pediatric vs. adult dosing].
6. Consider transcutaneous pacing if refractory to initial pharmacologic interventions ***[PARA].***
7. Treat seizures per Seizures guideline.
8. If widened QRS (100 msec or greater), consider **Sodium Bicarbonate *[PARA]***
    a. Adult/Pediatric: 1mEq/kg IV/IO max 50 Eq over 5 mins
9. This can be repeated as needed to narrow QRS.
10. For symptomatic patients with cardiac effects (i.e. hypotension, bradycardia) consider **Glucagon *[PARA]/Interfacility]***. (**Dosing not carried pre-hospital, infusion dosing per sending physician)**
    a. **Adult: 5mg IV/IO, can be repeated in 5-10 minutes as necessary**
    b. **Pediatric: 1mg IV/IO push (25-40kg) or 0.5mg IVP (≤25kg) every 5-10 minutes as necessary**

Patient Safety Considerations

- Transcutaneous pacing may not always capture or correct hypotension when capture is successful.
- Aspiration of activated charcoal can produce a patient where airway management is nearly impossible. Do not administer activated charcoal to any patients that may have a worsening mental status.

Notes and Educational Pearls

Key Considerations

1. **Pediatric Considerations:**
    a. Pediatric patient may develop hypoglycemia from beta blocker overdose therefore it is important to perform glucose evaluation.
    b. A single pill can kill a toddler. It is very important that a careful assessment of medications the toddler could have access to be done by EMS and all suspect medications should be brought into the ED.
2. **All Patient Considerations**
    a. Glucagon has a side effect of increased vomiting. Ondansetron prophylaxis should be considered.
    b. Atropine may have little or no effect (likely to be more helpful in mild overdoses). The hypotension and bradycardia may be mutually exclusive and the blood pressure may not respond to correction of bradycardia.
    c. Propranolol crosses the blood brain barrier and can cause altered mental status, seizure, and widened QRS similar to TCA toxicity.

Pertinent Assessment Findings

- Certain beta blockers, such as acebutolol and propranolol, may increase QRS duration.
- Certain beta blockers, such as acebutolol and pindolol, may produce tachycardia and hypertension.
- Sotalol can produce increase in QTc interval and ventricular dysrhythmia.
- Frequent reassessment is essential as patient deterioration can be rapid and catastrophic.

Quality Improvement

Associated NEMSIS Protocol(s) (eProtocol.01)

- 9914215—Medical-Beta Blocker Poisoning/Overdose

Key Documentation Elements

- Repeat evaluation and documentation of signs and symptoms and vital signs as patient clinical conditions may deteriorate rapidly
- Identification of possible etiology of poisoning
- Time of symptoms onset and time of initiation of exposure-specific treatment
- Therapy and response to therapy

Performance Measures

- Early airway management in the rapidly deteriorating patient
- Accurate exposure history
    - Time of ingestion or exposure
    - Route of exposure
    - Quantity of medication or toxin taken (safely collect all possible mediations or agents)
    - Alcohol or other intoxicant taken
- Appropriate protocol selection and management
- Multiple frequent documented re-assessments
- Blood glucose checks (serial if long transport, especially in children)
- Good evaluation of the ECG and the segment intervals

References

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