J07: Beta Blocker Toxicity

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Introduction

Beta blockers are widely used in the management of an extensive range of clinical problems, including hypertension, heart failure, migraine headaches, tremors, and aortic dissection. Although overdoses of these medications, either accidental or otherwise, occur infrequently, beta blocker toxicity is associated with significant morbidity and mortality. The primary mechanism for beta blocker toxicity is through the adrenergic blocking action of these medications. Some beta blockers, such as sotalol, propranolol, and acebutolol, have significant pro-arrhythmic tendencies.

Essentials

- As with all poisoning or overdoses, manage the airway and ensure adequate oxygenation and ventilation while a more comprehensive history is obtained.
- Search for and treat reversible causes: do not overlook other causes of the patient's symptoms.
- Out-of-hospital management of beta blocker overdose is limited and specific therapies should only be undertaken in consultation with CliniCall (see ACP interventions below). Rapid conveyance is indicated for virtually all patients.

General Information

- Consider the possibility of co-ingestion of other drugs in patients who are suspected of beta blocker toxicity, particularly calcium channel blockers, digoxin, clonidine, and cholinergic agents.
- Beta blocker toxicity is generally more severe in individuals with a pre-existing cardiovascular history.
- Patients who have overdosed on beta blocking drugs typically become symptomatic within two hours, and virtually all becoming symptomatic within six hours.
- The most common symptoms are bradycardia and hypotension. Myocardial depression and cardiogenic shock can develop in severe cases. Ventricular dysrhythmias are more common with propranolol and sotalol. Mental status changes, such as confusion, delirium, seizures, and unconsciousness, can occur at virtually any point.
- Respiratory depression has been reported. Bronchospasm and hypoglycemia, produced by the beta blockade, can complicate management.
- Possible electrocardiogram changes include PR elongation, QRS prolongation, and any bradydysrhythmia.

Interventions

First Responder

- Keep the patient warm and protect from further heat loss
- Place the patient in a position of comfort, as permitted by clinical condition
- Protect the airway and ensure adequate oxygenation and ventilation
  - → B01: Airway Management
- Provide supplemental oxygen as required
  - → A07: Oxygen Administration

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain SpO_2 ≥ 94%
  - → A07: Oxygen Administration
- Measure capillary blood glucose levels
- Initiate conveyance; consider intercept with additional resources

Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access and fluid bolus; target systolic blood pressure > 90 mmHg; do not give more that 2 L of fluid
  - → D03: Vascular Access
- Correct hypoglycemia if present:
  - → E01: Hypoglycemia and Hyperglycemia

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Obtain and interpret 12-lead ECG
  - → PR16: 12-Lead ECG
- Treat bradycardia:
  - → C02: Bradycardia
  - Atropine; note that atropine may not reverse bradycardia or offer only partial recovery
  - Transcutaneous pacing may be required, though may be ineffective
- Manage seizures:
  - MIDAZOLam
  - See F02: Seizures for additional details
- If airway management is required, *aggressively* attempt to limit peri-procedural hypotension
- → PR18: Anesthesia Induction
- → PR23: Awake Intubation

CliniCall consultation required prior to initiation and to discuss suitability of any of the following therapies:

- Consider glucagon 5 mg slow IV push if available
- Correct ventricular arrhythmias:
  - Consider calcium chloride.
  - Consider sodium bicarbonate in wide complex dysrhythmias
  - Consider magnesium sulfate (particularly in cases of sotalol-induced ventricular dysrhythmia)
  - Consider EPINEPHrine infusion, escalating in consultation with CliniCall; note that higher dose rates may be required to overcome competitive inhibition

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Bradycardia
  - TVP
- Consider IV glucagon
- Consider IV calcium salts
- Consider IV vasopressor (epinephrine)
- Consider IV high-dose insulin and glucose
- Consider IV lipid emulsion therapy

Evidence Based Practice

Overdose-Poisoning

Supportive

- Activated Charcoal
- Naloxone-IM (Opiate OD)

- Naloxone-IN (Opiate OD)
- Naloxone-IV (Opiate OD)
- Naloxone-SQ (Opiate OD)
- Capnography
- Naloxone-Nebulized (Opiate OD)
- Oxygen
- Oxymetry Monitoring
- Sodium Bicarb (TCA OD)

Neutral

- Glucagon (Beta-Blocker OD)
- Treat & Release (Opiate OD)

Against

- Benzodiazepine antagonist (Benzo OD)

References

1. Barrueto F. Beta blocker poisoning. In UptoDate. 2020. [Link]