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Case Report

A case report on metoprolol overdose

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ABSTRACT

Metoprolol overdosing can lead to bradycardia, hypotension and chances of cardiovascular collapse. Here we are going through a case study of 36 year old male patient who consumed 15 metoprolol tablet.He consumed metoprolol tablets under the influence of alcohol.He was brought to the emergency department of a hospital.He was provided with gastric lavage followed by further antidote therapy. Antidote used in glucagon. Glucagon is traditionally considered a first line antidote for beta-blocker overdose. No clear guidelines are present for treatment of metoprolol overdose. Cardiac monitoring and Random blood sugar monitoring was done. As patient attempted suicide, he was provided with the psychiatrist Counseling, nursing care. The Patient was treated for 72 hours.

1. Introduction

Metoprolol is FDA-approved for the treatment of angina, heart failure, myocardial infarction, atrial fibrillation/flutter, and hypertension. Off-label uses include supraventricular tachycardia and thyroid storm. Both oral and intravenous preparations are available. There are immediate and extended-release preparations available orally. There is controversy regarding the selection of beta-blockers in the management of the above conditions. There also is conflicting evidence regarding the optimal selection of a particular beta-blocker in the treatment of each specific disease.[1] Metoprolol is a cardioselective beta-1-adrenergic receptor inhibitor that competitively blocks beta1-receptors with minimal or no effects on beta-2 receptors at oral doses of less than 100 mg in adults. It decreases cardiac output by negative inotropic and chronotropic effects. Metoprolol does not exhibit membrane stabilizing or intrinsic sympathomimetic activity. Administration of metoprolol to normal subjects results in a reduction in heart rate and cardiac output; this appears to be related to the dose and concentration of the drug. Metoprolol is mainly lipophilic, and distribution is typical of a basic lipophilic drug. Based on animal studies, it appears to be almost completely absorbed from the gastrointestinal (GI) tract when taken orally. There is significant hepatic first-pass elimination, which results in around 50% of the oral dose reaching the systemic circulation. It is 11% bound to serum albumin. The half-life of metoprolol is about 3 to 4 hours in most patients for non-extended release tabs. Metoprolol excretion principally occurs via the kidneys.[2] The primary adverse effects of metoprolol include heart failure exacerbation, fatigue, depression, bradycardia or heart block, hypotension, bronchospasm, cold extremities, dizziness, decreased libido, diarrhea, tinnitus, decreased exercise tolerance, glucose intolerance, and may mask hypoglycemia. Abrupt cessation of the drug may lead to a withdrawal syndrome that could cause angina or myocardial infarction. Tachycardia and hypertension are both common in the withdrawal syndrome.[3]

Metoprolol is contraindicated in patients with sick sinus syndrome, second or third-degree heart block (in the absence of pacemaker), decompensated heart failure, hypotension, and with documented hypersensitivity to the drug or components. Also, caution is necessary for patients that have a history of noncompliance as the abrupt cessation

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of the drug can lead to withdrawal syndromes, including angina and myocardial infarction. Patients who have ingested cocaine or methamphetamine have traditionally had a contraindication to the use of selective beta-blocker such as metoprolol. This observation has its basis on case reports, and there is no strong evidence that they cause any deleterious effects. Regardless, agents such as labetalol, which have alpha and beta activity, or calcium channel blockers should be used in these cases. Metoprolol is a pregnancy risk factor Category C drug.[4]

Treatment will vary based on the amount of Metoprolol amount taken, comorbidities, age, and other co-investments. On arrival, assess ABCs and monitor appropriate blood work, including coingestants, ECG, large-bore IVs, and pregnancy status if female. Consult poison control/toxicology early in the course. Treatment choices include volume resuscitation, activated charcoal, whole bowel irrigation, nasogastric lavage, atropine, glucagon, calcium gluconate/calcium chloride, high-dose insulin, vasopressors, Intralipid, transcutaneous, or transvenous pacemaker. Cardiac status and a current fluid balance will guide volume resuscitation. Activated charcoal is typically given 1 g/kg and usually only has efficacy if dosed within 1 to 2 hours of ingestion.[5]

If the patient has any altered mentation, caution is necessary to the possibility of aspiration. Whole bowel irrigation should be a consideration for extended-release preparations or large quantity ingestion. Nasogastric lavage is usually ineffective, except for large quantity ingestions. The clinician may consider atropine use, although it is typically ineffective in moderate-to-severe overdoses. Calcium administration to increase intracellular calcium at a dose of 60 mg/kg over 5 to 10 minutes of calcium gluconate. Calcium chloride at a dose of 10 to 20 mL of a 10% solution is an option if central access is obtained. Glucagon dosing is 50 mcg/kg as a bolus with titration of drip. High-dose insulin at a dose of 1 unit per kilogram bolus followed by 1 unit per kilogram per hour drip.[6]

Administration with dextrose with a drip titrating to euglycemia as well as potassium repletion as needed. Vasopressors with epinephrine or norepinephrine titrated rate and blood pressure. Intralipid, IV lipid emulsion therapy can serve as a lipid sink that extracts the drug from the myocyte. It may also provide free fatty acids as a substrate. It should be noted that the use of this medication will affect some laboratory monitoring.[7]

Consider a transcutaneous or transvenous pacemaker. Extracorporeal membrane oxygenation (ECMO) should be considered for refractory cases.[8]

If the clinician is concerned about intentional overdose, they should order a mandatory psychiatric evaluation. There may also be a need for the possibility of co-ingestants and treatment of those as well. For non-extended or non-sustained-release preparations, 4 to 6 hours of observation without any derangement of mental status or vital signs is sufficient. Any extended-release or sustained-release preparation requires 12 to 24 hours of telemetry observation, depending on the preparation. Extra caution should be a consideration in the pediatric population as very low amounts, including one pill or even one-half pill, which can cause cardiovascular collapse and death.[9]

Metoprolol overdosing is not frequently seen. Metoprolol overdosing can be manifested by sinus bradycardia, hypotension, high grade isoventricular shock, ventricular dysrhythmia, cardiovascular collapse, hypoglycemia, hyperkalemia, coma, respiratory arrest. Patient with metoprolol overdose needs cardiovascular monitoring.

Glucagon can be used as an antidote. Glucagon increases heart rate and myocardial contractibility and improve atrioventricular conduction. Because it may bypass the beta-receptor site, Glucagon can be considered as a therapeutic treatment option for profound beta-blocker intoxications. The doses of glucagon required to reverse severe beta-blockade are 50 microgram/kg I.v loading dose, followed by a continuous infusion of 1-15 mg/h, titrated to patient response.

I.V Glucagon is commonly used to reverse the effect of beta-blocker toxicity. Glucagon is first line therapy and additional supportive care management is provided.

Glucagon treated patients should be monitored for side effect of nausea, vomiting, hypokalemia, and hyperglycemia.[10]

2. Case Report

A 36 years old hypertensive male patient was brought to emergency department 30 minutes post ingestion of metoprolol tablets under the influence of alcohol and the pateint has family-social issues and was shifted to critical care unit post gastric lavage at the time of admission his vitals were PR –87 bpm, B.P - 160/100mmhg, R.R - 18/min, and the patient was afebrile and on neurological examinations all the signs were normal. Movements in all the four limbs were normal after few hours of admission further investigations were carried out investigations like complete blood picture analysis, arterial blood gas, electrocardiogram, 2D echo, HS troponin-I, renal function test, hepatic function test, viral markers, Blood analysis, renal function tests, hepatic function tests, 2D-echo were normal.

Patient has a history of blood donation and I episode of jaundice.

Patient even had a history of lipoma reaction 10 years back.

On day 1 the patient was left nill by mouth till morning, ryles tube aspiration was done emperically IV atropine 1cc, inj. Glucagon 5mg, inj. pantoprazole 40mg, inj.ondansetron 4mg, inj. Cynacobalamin 1 ampoule in 100ml normal saline, 5% dextrose intravenously, dextrose normal saline, ringer

lactate at 70ml / hour, inj. Thiamine100mg in 100ml normal saline, tablet clinidipine 10mg once daily, tablet aspirin (75mg)}+ atorvastatin(20mg) once daily,

On day 2 upon physical examination the patient was restless. Vitals were P.R 86 bpm, B.P -110/80mmhg, GRBS – 102mg/dl, the patient was provided with inj. Pantoprazole 40mg – once daily, inj ondansetron 4mg – once daily, inj. Cynacobalam, inj. Thiamin 100 mg in 100 ml normal saline, tablet. Clinidpine 10mg once daily, tablet aspirin 75mg + atorvastatin 20mg once daily, stop inj. Glucagon 5mg,

inj.atropine, 5% dextrose, was put on hold.

The Patient was referred for psychiatric opinion. The Patient was subjected to MSE (mental status examination) which was found to be positive. The Patient was conscious co-operative but slightly guarded. The Patient has depressing thoughts and has high suicidal tendency. Psychiatrist carried out C.A.G.E.

3. C.A.G.E

1. Have you ever felt you need to cut down on your drinking:- no
2. Have people annoyed you while drinking:- yes
3. Have you ever felt guilt while drinking:-yes
4. Have you ever felt you need a drink in morning to steady your nerves or to get rid of hangover:-yes

So the C.A.G.E score was 3.

He was prescribed with Escitalopram-10mg. He was also prescribed with divalproex 250 mg.

Patient was discharged after 72 hours with Rabeprazole 40 mg, pantoprazole 40 mg, clinidipine 10mg, aspirin 75mg, atorvastatin 20 mg.

4. Discussion

The Patient has ingested metoprolol tablets under the influence of alcohol. The Patient has been a chronic ethanolic since 5 years due to family social problems. The Patient has increased the amount of consumption of alcohol. As patient had been hypertensive due to which metoprolol tablets were easily available. The patient has been under stress, which made him consume tablets and attempt suicide. In case of metoprolol overdose, the patient needed to be monitored for bradycardia and hypotension. In case of such ingestion of beta blocker, gastric lavage is done as emergency treatment. Mechanical ventilator can be needed in patients with severe toxicity. The Patient was subjected to antidote of glucagon which may bypass beta receptor site. Atropine prevents the patient from bradycardia and hypotension. Thiamine is used as a patient is alcoholic and have vit.B1 deficiency so as precautionary measures it is used. As Patient is hypertensive Clinidipine is used. As ECG shows ST depression so aspirin has been prescribed. The Patient os HbSAg positive which should be confirmed by PCR and ELISA. The patient is a chronic alcoholic, he should be counselled regarding that. The Patient has a high suicidal tendency he was counselled by psychiatrists. Patient was sad and has thoughts of suicide. Patient must be provided with family and social support.

The doses of glucagon required to reverse severe beta blockade are 50 micrograms per kg i.v. loading dose, followed by continuous infusion of 1-5 mg/hr, titrated to patient response.

5. Source of Funding

None.

6. Conflict of Interest

None.

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