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Beta Blocker Use in Cocaine Induced Chest Pain

Introduction

1. Cocaine is one of the most used illicit substances in the US. Cocaine-associated complications, most commonly chest pain, account for roughly 40% of all drug-related emergency department visits.
2. Cocaine can cause chest pain or acute coronary syndrome (ACS) by increasing myocardial oxygen demand and decreasing oxygen supply through vasoconstriction.
    a. This occurs because cocaine blocks the reuptake of norepinephrine and dopamine, causing an accumulation of catecholamines at the post-synapse, therefore acting as a sympathomimetic agent.
    b. Activates alpha receptors, calcium influx into smooth muscle, and can lead to coronary vasoconstriction
3. The use of beta blockers in cocaine induced chest pain is controversial. Earlier studies suggested beta blockers usage in this population was harmful due to causing an unopposed alpha stimulation leading to an increase in blood pressure and coronary artery vasoconstriction.

Pharmacology		
	Labetalol	**Propranolol**
Dose	0.25 mg/kg IV OR 100-200 mg PO	60 – 120 mg PO daily or
Administration	IV	IV/intracoronary
PK/PD	Onset: 5 minutes Half-life: 6 – 8 hours	Onset: Within 5 minutes Half-life: 3-6 hours
Adverse Effects	Orthostatic hypotension, bradycardia, dizziness, fatigue	Hypotension, bradycardia, sleep disorders, dizziness, agitation
Drug Interactions and warnings	May mask hypoglycemia	CYP1A2, CYP2D6, may mask hypoglycemia
Compatibility	Administer at a rate of 10mg/minute	Can administer IV push over 1 minute
Comments	B1, B2, and a1 activity	B1 and B2 activity

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Overview of Evidence			
Author, year	Design/ sample size	Intervention & Comparison	Outcome
Lange et all, 1990	Prospective, randomized double-blind controlled trial 10 participants	- Measured heart rate, arterial pressure, coronary sinus blood flow, and epicardial left coronary arterial dimensions - Intranasal saline or cocaine (2mg/kg) administration followed by intracoronary propranolol administration	Intracoronary propranolol administration caused **no change in arterial pressure or rate pressure**, but further **decreased coronary blood flow and increased coronary vascular resistance**
Boehrer et al, 1993	Prospective, controlled 9 participants	- Patients undergoing catheterization for chest pain had heart rate, mean arterial pressure, and coronary arterial area - Administer intranasal cocaine, followed by IV saline or labetalol (0.25mg/kg) infusion	Labetalol reduced heart rate, blood pressure; **no effect on coronary artery cross sectional area**
Dattilo et al, 2008	Retrospective 60 participants	- Outcomes included myocardial infarction and in hospital mortality. Excluded patients on a beta blocker prior to admission - Beta blockers used included metoprolol, atenolol, labetalol. Propranolol, carvedilol	Beta blockers associated with **decreased incidence of myocardial infarction**
Rangel et al, 2010	Retrospective 151 participants	- Evaluated EKG changes, troponin, levels, length of stay, vasopressor use, intubation, and death between patients that did and did not receive beta blockers. - Beta blockers used included metoprolol, atenolol. Labetalol, and carvedilol	Beta-blocker use associated with **greater reduction in blood pressure and death**
Gupta et al, 2014	Retrospective 600 participants	- Evaluated outcomes of patients experiencing a myocardial infarction that received a beta blocker at any point in time	The majority of cocaine-positive patients with myocardial infarction received beta blockers and showed **no difference in hospital mortality**
Lo et al, 2019	Review and meta-analysis 1447 participants	Evaluated all-cause mortality, myocardial infarction of five previous studies	Beta blocker use is **not associated with adverse clinical outcomes** in patients presenting with acute chest pain related to cocaine use

Conclusions

- ACC/AHA recommends against the use of beta blockers due to the risk of exacerbating coronary artery spasm.
    - Deaths from cocaine induced MI are relatively low, this driving the further questioning of risk vs benefit of beta blocker administration
- Propranolol and esmolol were associated with worsening vasoconstriction and an increase in blood pressure
- Other agents such as metoprolol, labetalol have very limited data
    - Most negative data were observed in animals
    - Human retrospective data show no harm or potential benefit
- More recent retrospective studies suggest that there is no difference in MI incidence or mortality in patients with a positive UDS for cocaine that also received a beta-blocker.
    - These meta-analyses suggest that beta blocker use was not associated with adverse clinical outcomes, and even a potential benefit in some studies reducing the incidence of MI
- From the limited data, a beta blocker with alpha and beta activity such as labetalol may be preferred if needed in these situations.
- Although beta blockers may not be as detrimental in cocaine associated chest pain as previously thought, more data is needed to assess if the use of beta blockers provides a true benefit in this patient population.

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References

1. Micromedex [Electronic version].Greenwood Village, CO: Truven Health Analytics. Retrieved January 17, 2021, from http://www.micromedexsolutions.com/
2. Shin D, Lee ES, Bohra C, Kongpakpaisarn K. In-Hospital and Long-Term Outcomes of Beta-Blocker Treatment in Cocaine Users: A Systematic Review and Meta-analysis. *Cardiol Res*. 2019;10(1):40-47. doi:10.14740/cr831
3. Richards JR, Hollander JE, Ramoska EA, et al. β-Blockers, Cocaine, and the Unopposed α-Stimulation Phenomenon. *J Cardiovasc Pharmacol Ther*. 2017;22(3):239-249. doi:10.1177/1074248416681644
4. Lange RA, Cigarroa RG, Flores ED, et al. Potentiation of cocaine-induced coronary vasoconstriction by beta-adrenergic blockade. *Ann Intern Med*. 1990;112(12):897-903. doi:10.7326/0003-4819-112-12-897
5. Lo KB, Virk HUH, Lakhter V, et al. Clinical Outcomes After Treatment of Cocaine-Induced Chest Pain with Beta-Blockers: A Systematic Review and Meta-Analysis. *Am J Med*. 2019;132(4):505-509. doi:10.1016/j.amjmed.2018.11.041
6. Pham D, Addison D, Kayani W, et al. Outcomes of beta blocker use in cocaine-associated chest pain: a meta-analysis. *Emerg Med J*. 2018;35(9):559-563. doi:10.1136/emermed-2017-207065