Expert Consensus Document on Beta-Adrenergic Receptor Blockers and Cocaine Use

To the Editor:

Cocaine use has risen exponentially in all European countries, particularly Spain and the United Kingdom, with a prevalence of users per capita very similar to that of the United States.[1] The fact that cocaine use has become more widespread among Spanish youth is a matter of major concern.[2] As a result, the number of users treated in hospital emergency rooms for medical problems resulting from acute intoxication,[3] such as chest pain,[4] has increased. The extent of the problem in terms of chronic effects, particularly cardiovascular effects,[5] remains to be seen; these effects are likely to be associated with coronary disease.[6,7]

We have read with interest the consensus document on the use of beta-blockers written by a task force of the European Society of Cardiology and published in the *Revista Española de Cardiología*,[8] and would like to point out that no mention was made that these medications are contraindicated when an acute cardiac condition coexists with cocaine intoxication or overdose.

In the case of acute coronary syndrome associated with cocaine use, vasospasms worsen in hypertensive patients treated with propranolol.[9] Labetalol and esmolol are not effective, and alpha-adrenergic stimulation may actually exacerbate vasospasm and hypertension.[10,11] Hence, benzodiazepines, nitroglycerin, and aspirin are recommended as first-line drugs. Alpha-adrenergic receptors (phentolamine) and calcium blockers (verapamil) would be used for second-line hypertension therapy. In cases of ST segment elevation, primary percutaneous coronary angioplasty is recommended over fibrinolysis, which has a higher incidence of coronary vasospasm and a greater risk of bleeding in other organs.[4]

As toxicologists and emergency room physicians, we consider that the attending physician should take this contraindication into consideration not only in patients first seen for an acute coronary syndrome, but also in patients whose clinical condition deteriorates after initiating standard treatment that includes beta-blockers.[12]

Guillermo Burillo-Putze,[a]
Santiago Nogué-Xarau,[b]
Jose Suárez-Peláez,[a]
and Antonio Dueñas-Laita[c]

[a]Servicio de Urgencias, Hospital Universitario de Canarias, Tenerife, Spain.
[b]Unidad de Toxicología, Hospital Clínic, Barcelona, Spain.
[c]Unidad de Toxicología Clínica, Hospital Universitario del Río Hortega, Valladolid, Spain.

REFERENCES

1. Observatorio Europeo de las Drogas. Informe anual 2005: el estado del problema de las drogas en Europa. Available from: http://ar2005.emcdda.europa.eu/es/home-es.html
2. Delegación del Gobierno para el Plan Nacional sobre Drogas. Observatorio español sobre drogas. Informe 2004. Ministerio de Sanidad y Consumo. Available from: http://www.pnsd.msc.es/Categoria2/publica/pdf/oed-2004.pdf
3. Sanjurjo E, Montori E, Nogué S, Sánchez M, Munné P. Urgencias por cocaína: un problema emergente. Med Clin (Barc). 2006;126:616-9.
4. Hahn I, Hoffman RS. Cocaine use and acute myocardial infarction. Emerg Med Clin North Am. 2001;19:493-510.
5. Lange RA, Hillis D. Cardiovascular complications of cocaine use. N Engl J Med. 2001;345:351-8.
6. Kloner RA, Rezcalla SH. Cocaine and the heart. N Engl J Med. 2003;348:487-8.
7. Burillo-Putze G, Hoffman RS, Duenas-Laita A. Cocaína como posible factor de riesgo cardiovascular. Rev Esp Cardiol. 2004;57:595-6.
8. Lopez-Sendon J, Swedberg K, McMurray J, Tamargo J, Maggioni AP, Dargie H, et al (Grupo de Trabajo sobre Bloqueadores Beta de la Sociedad Europea de Cardiología). Documento de Consenso de Expertos sobre bloqueadores de los receptores beta-adrenérgicos. Rev Esp Cardiol. 2005;58:65-90.
9. Lange RA, Cigarroa RG, Flores ED, McBride W, Kim AS, Wells PJ, et al. Potentiation of cocaine-induced coronary vasoconstriction by beta-adrenergic blockade. Ann Intern Med. 1990;112:897-903.
10. Boehrer JD, Moliterno DJ, Willard JE, Hillis LD, Lange RA. Influence of labetalol on cocaine-induced coronary vasoconstriction in humans. Am J Med. 1993;94:608-10.
11. Sand IC, Brodt SL, Wrenn KD, Slovis CM. Experience with esmolol for the treatment of cocaine-associated cardiovascular complications. Am J Emerg Med. 1991;9:161-3.
12. Sen A, Fairbairn T, Levy F. Best evidence topic report. Beta-Blockers in cocaine induced acute coronary syndrome. Emerg Med J. 2006;23:401-2.

Response

To the Editor:

Cocaine use has increased at an alarming rate, with the attendant increase in cardiovascular complications. Acute coronary syndrome related to the use of cocaine (or crack) can

no longer be considered incidental in Spain. Although statistics are inadequate and may vary from one area to another, Spanish hospitals with a catchment area of 500 000 inhabitants see about 2 to 4 cases each year. Although the relative incidence continues to be very low, the condition is still a medical problem, and the observation made by Burillo-Putze et al[1] is important from the practical point of view.

Any form of cocaine–inhaled or smoked–inhibits presynaptic catecholamine and dopamine uptake, which increases stimulation of the respective postsynaptic receptors and, consequently, produces vasoconstriction, tachycardia, hypertension, and increased oxygen consumption.[2] Coronary spasm, estimated by the decrease in coronary artery diameters, has been demonstrated in various studies, particularly when cocaine is associated with tobacco use.[2] The use of beta-blockers to treat any of the cardiovascular manifestations of cocaine use (hypertension, arrhythmias, acute coronary syndromes) is controversial. Although beta-blockers can reduce hypertension and tachycardia, they can also induce vasospasm. In general, beta-blockers are contraindicated in patients with ischemia secondary to vasospasm, as was described in the consensus document of the European Society of Cardiology (page 1348).[3] One of the few clinical trials (perhaps the only one) to address this problem was conducted with 30 volunteers who underwent catheterization and were given cocaine for diagnostic purposes, confirming a decrease in coronary artery diameters; subsequent administration of intracoronary propranolol increased the degree of vasoconstriction.[4] Based on this unique study, the use of beta-blockers in cocaine users is contraindicated, although the study has important limitations: *1)* in practice, intracoronary beta-blocker injections are never used, *2)* propranolol is not the drug of choice in acute coronary syndromes, *3)* other beta-blocker effects can be beneficial, and *4)* no comments regarding general clinical data are reported. Another interesting and unanswered question has to do with the relative effect of different beta-blockers. Perhaps beta-blockers that also inhibit alpha receptors (the cause of cocaine-induced vasoconstriction), namely, labetalol, carvedilol, and bucindolol, will have a different effect than propranolol or other beta-blockers without alpha action. Unfortunately, this hypothesis has not been tested in clinical trials.

In short, vasoconstriction or coronary spasm plays an important role in patients with cocaine-induced acute coronary syndromes. This situation may be similar to acute coronary syndromes secondary to vasospasm outside the context of cocaine use, although no clinical studies have been done to support this recommendation. Although the European guidelines make practically no specific reference to the problem, a concerned reader can find highly specific recommendations in the most recent guidelines of the American Heart Association/American College of Cardiology.[5,6] Nevertheless, these recommendations are based on logic, and not on clinical evidence, which is nonexistent. Antiplatelet therapy is essentially the same, and nitroglycerin is the preferred drug to treat acute ischemia or possible hypertension. Tachycardia is treated preferably with diltiazem or verapamil. When there is persistent pain with ST segment elevation, emergency catheterization is recommended (due to potential coronary occlusion secondary to thrombosis, rather than spasm). Thrombolytic therapy is recommended if catheterization cannot be performed within 90 minutes. Careful use of beta-blockers in patients with hypertension and sinus tachycardia is recommended if the patient is also receiving nitrates or calcium blockers (IIb, evidence C).[6] According to the same reasoning, it is also inadvisable to administer beta-blockers to stable patients who occasionally or regularly use cocaine, regardless of whether they have heart disease.

José López-Sendón[a] and Juan Tamargo[b]

[a]Servicio de Cardiología, Hospital Universitario La Paz, Madrid, Spain.
[b]Departamento de Farmacología, Universidad Complutense de Madrid, Madrid, Spain.

REFERENCES

1. Burillo-Putze G, Nogué-Xarau S, Suárez-Peláez J, Dueñas-Laita A. Documento de consenso sobre bloqueadores de los receptores betaadrenérgicos y consumo de cocaína. Rev Esp Cardiol. 2007;60:1334.
2. Afonso L, Mohammad T, Thatai D. Crack whips the heart: a review of the cardiovascular toxicity of cocaine. Am J Cardiol. 2007;100:1040-3.
3. López-Sendón J, Swedberg K, McMurray J, Tamargo J, Maggioni AP, Dargie H, et al. Expert consensus document on β-adrenergic receptor blockers. The Task Force on Beta-Blockers of the European Society of Cardiology. Eur Hear J. 2004;25:1341-62.
4. Lange RA, Cigarroa RG, Flores ED, McBride W, Kim AS, Wells PJ, et al. Potentiation of cocaine-induced coronary vasoconstriction by beta-adrenergic blockade. Ann Intern Med. 1990;112:897-903.
5. Antman EM, Anbe DT, Armstrong PW, Bates ER, Green LA, Hand M, et al. ACC/AHA Guidelines for the Management of Patients UIT ST-Elevation Myocardial Infarction. AHA. Available from: www.americanheart.org
6. Anderson JL, Adams CD, Antman EM, Bridges CR, Califf RM, Casey DE, et al. ACC/AHA 2007 Guidelines for the management of patients with unstable angina/non-st-elevation myocardial infarction. J Am Coll Cardiol. 2007;50:e1-157.