

Regadenoson-induced bradycardia and hypotension: Possible mechanism and antidote

See related editorial, pp. 869–870

Regadenoson was first approved by the US Food and Drug Administration in 2008 and the USA has the largest experience of its use. The European Medicines Agency gave approval in 2010 and we were the first site outside the Americas to use regadenoson in routine clinical practice. We were therefore surprised to encounter a number of adverse events consisting of bradycardia and hypotension occurring shortly after administration because such episodes had not previously been published. The recent report in this journal of two instances of asystole related to regadenoson indicates that the phenomenon is not unique to our practice.¹

Following the report of our first year's experience,² occasional vaso-vagal reactions have continued, albeit at a very low frequency. Regadenoson remains our default form of pharmacological stress for myocardial perfusion scintigraphy, but we have become cautious in using it in patients who may not be able to tolerate prolonged hypotension, such as those with severe ischemic left ventricular dysfunction, severe left ventricular outflow obstruction, known cerebrovascular disease and the elderly.

We have not been able to identify any predisposing features for bradycardia and hypotension but we have an unproven hypothesis that submaximal exercise and distraction with conversation reduces the risk. A few severe episodes have been preceded by nausea and retching and this may provide a pointer to the mechanism. Although speculative, the association with nausea points to vagal stimulation initiated by A2 receptors in the *area postrema*, a medullary structure in the floor of the fourth ventricle related to vomiting and autonomic control. Another observation that supports this hypothesis is that we have not been successful in reversing them with

aminophylline. One patient with a prolonged sinus bradycardia of 20/minutes and unrecordable blood pressure did not respond to a total of 250 mg aminophylline IV over 2 minutes but did respond within 30 seconds to 0.6 mg atropine IV.

Those who use regadenoson should therefore consider the risk of vagal stimulation in each patient and choose an appropriate form of stress. They might also consider atropine in patients with regadenoson-induced bradycardia and/or hypotension that does not respond to simple measures such as head-down posture and/or gentle leg exercise.

*S. R. Underwood, DM, FRCP, FRCR,
FESC, FACC, FASNC*

K. A. Latus, MSc

E. Reyes, MD, PhD

K. Standbridge, RN, MSc

S. Walker, RN

*K. Wechalekar, MB, BS, DRM,
DNB (Nuclear Medicine)*

*Imperial College London, London,
United Kingdom*

*Royal Brompton Hospital, London,
United Kingdom*

srunderwood@imperial.ac.uk

References

1. Rosenblatt J, Mooney D, Dunn T, Cohen M. Asystole following regadenoson infusion in stable outpatients. *J Nucl Cardiol*. 2014. doi:10.1007/s12350-014-9898-0.
2. Brinkert M, Reyes E, Walker S, Latus KA, Maenhout AF, Mizumoto R, et al. Regadenoson in Europe: First-year experience of regadenoson stress combined with submaximal exercise in patients undergoing myocardial perfusion scintigraphy. *Eur J Nucl Med Mol Imaging*. 2014;41:511-21. doi:10.1007/s00259-013-2619-0. doi:10.1007/s12350-014-9968-3