Supplement to Hypersensitivity Reactions - The Lalli and Weber Effects

When using contrast media in medical imaging the user should be aware about two linked effects that may influence the frequency of acute hypersensitivity reactions, the Lalli and Weber effects.

Lalli Effect

In the heydays of high osmolar ionic contrast media use in the 1970s it was demonstrated that fear and anxiety play an important role in the occurrence of hypersensitivity reactions to iodine-based contrast media (ICM), now termed the Lalli effect (Lalli, 1974; Thomsen, 2012). Anxiety causes the limbic system to interact with the hypothalamus. As contrast media pass the blood-brain barrier, it can interact with the hypothalamus and reticular formation of the medulla. In the hypothalamus the vasomotor system and respiratory system can become activated, leading to shock or respiratory arrest. Reticular formation activation can lead to nausea and emesis, as well as vagal reactions with bradycardia, hypotension, and bronchospasm. Finally, in the ventral and lateral funiculi of the spinal cord and in the stellate ganglion the sympathetic autonomous nervous system can become activated, which may result in pulmonary oedema, skin urticaria, or even ventricular fibrillation or cardiac arrest (Lalli, 1980 and 1981). It was shown that diazepam may be beneficial in apprehensive patients scheduled for imaging with ICM (Lalli, 1981).

Weber Effect

The Weber effect is a well-known reporting bias from pharmacovigilance studies. The reporting of adverse effects after regulatory approval of a drug to the market peaks at the end of the second year after approval, and declines steadily thereafter (Weber, 1984). In the field of contrast media this effect has been demonstrated for gadopentetate (Aran, 2014) and for gadobenate (Fakhran, 2015). It was also demonstrated for nonsteroidal anti-inflammatory drugs (Hartnell, 2004), but could not be demonstrated for other drugs in the same Food & Drug Administration's Adverse Events Registration System (FAERS) (Hoffman, 2014). In daily medical imaging practice, it is important to realize that when one specific contrast medium is substituted for another, a significant transient increase in the frequency of reported hypersensitivity reactions may be seen (Davenport, 2013; Forbes-Amrhein, 2018).

Literature

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