Injection speed and frequency of adverse reaction to fluorescein angiography

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ABSTRACT

Background: Fluorescein angiography is an ophthalmic examination that documents the blood circulation of the eye. Adverse reactions during fluorescein angiography can occur though and it is important to avoid such events if possible. There are different opinions as to whether the speed of injection affects the incidence of adverse reaction to the dye. This study was designed to find out if there is a difference in the frequency of adverse reaction between fast or slow injection speeds of fluorescein sodium.

Method: A randomised controlled trial was carried out. Total number of analysed patients was 263 who underwent 295 angiographies. Patients were randomised to an injection rate of the fluorescein bolus of one or five seconds. Those patients who had a previous history of adverse reaction to fluorescein angiography were excluded because of the much higher incidence of adverse reactions for those patients.

Results: The total frequency of adverse reaction was 7.11 per cent. The frequency of adverse reaction in the group with the fast injection was 5.4 per cent and in the group with slow injection 8.8 per cent. There was no significant difference between the two groups.

Conclusions: This study shows that the injection rate has no significant influence on the frequency of adverse reactions among patients without a previous history of adverse reactions.

Key words: Injection speed, adverse reaction, fluorescein angiography.


BACKGROUND

Fluorescein angiography is an ophthalmic diagnostic tool that documents the blood circulation of the eye, usually the retina. Fluorescein sodium, a dye with fluorescent abilities, is injected through a peripheral vein and a series of photographs are taken of the fundus as the dye flows through both the choroidal and retinal vessels. These photographs are useful for diagnosis and serve as a guide for treatment. During the procedure the patient's fundus is projected with blue light. The fluorescein sodium molecules absorb the blue light, become excited and emit green fluorescent light (Saine & Tyler 1997) as photographs are taken of the retina.

Side effects, including yellowish discoloration of the skin and yellow-orange coloured urine, occur in all cases. These side effects last for 12 to 36 hours after injection. Adverse reactions during fluorescein angiography can also occur. They are classified as mild (nausea, vomiting, extravasations, vasovagal response), moderate (urticaria, syncope, phlebitis, local skin necrosis, localised nerve palsy) or severe (laryngeal oedema, bronchospasm, neurologic and cardiac reaction, anaphylactic shock (Saine & Tyler 1997, Lipson and Yanuzzi 1989).

The reported frequency of mild and transient reactions, which do not require medical treatment, varies between 1 to 15 per cent. (Chazan et al 1971, Pucarariu 1982, Kwiterovitch et al 1991, Johnson et al 1998, Mc Lauchlan et al 2001, Mai et al 2004, Kwan et al 2005, Torres 2006). Moderate or severe reactions occur rarely. The variation of mild reactions may depend on the examination procedure, the documentation of events, previous reactions and different manufacturing sources among other things. It seems that earlier reports showed a higher frequency of adverse reactions than more recent ones do. Nausea and vomiting are the most common reactions (0.7 per cent to 15 per cent, Chazan et al 1971, Pucarariu 1982, Kwiterovitch et al 1991, Kwan et al 2005, Mc Lauchlan et al 2001, Musa et al 2006). The reason why nausea occurs is unknown but one speculation is that since the fluorescein sodium is soluble, permeable and has a high ph (8+) it easily passes the blood-brain barrier and triggers the nausea response through the hypothalamus (Saine & Tyler 1997). Another suggestion is that the chemoreceptor-trigger zone in area postrema is stimulated. Other suggested causes are anxiety or contaminants of the dye (Lipson and Yanuzzi 1989, Yanuzzi and Baldwin 1974).

It has been discussed whether injection speed affects the incidence of adverse reactions (Saine & Tyler 1997). Rapid intravenous injections have been regarded as conducive to severe reactions since the classic experiments of Hirshfeld et al. in 1931. There are no later reports regarding the influence of injection speed to adverse reaction to angiographies.