Foxglove Revisited

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Abstract

My practice of anaesthesia includes attending as a critical care physician in the surgical intensive care unit of an academic institution, as well as performing anaesthetics in the operating suites. With the upsurge in the number of patients and their acuity, intensivists and primary care physicians are encountering increasing numbers of patients with atrial fibrillation (AF) [1, 2].

While it can be agreed that countershock in the haemodynamically unstable patient with acute AF is of paramount importance, the chemical options for the treatment of AF (whether for rate control or chemical cardioversion) in a haemodynamically stable patient remain numerous. Such treatments include quinidine, procainamide, disopyramide, flecainide, propafenone, dofetilide, ibutalide, sotalol, amiodarone, verapamil, diltiazem, esmolol, metoprolol, and digitalis, to name a few. The pharmaceutical companies have made new drugs available to us at a dizzying rate.

At our institution the anaesthesiology and surgical attending physicians and their residents seem to favor diltiazem, metoprolol, esmolol and amiodarone for the treatment of the acute onset of postoperative AF in the intensive care setting. These drugs are popular for a good reason; they have a rapid onset of action. While acknowledging the forgoing behaviour of residents and their attending physicians (including myself) I would like provide an important teaching point involving two recent cases.

In the first instance, a 74 year old male, who was admitted with a myocardial infarction and taken for coronary artery bypass grafting, developed AF with a rapid ventricular response postoperatively in the intensive care unit. The patient was treated for several days with amiodarone, diltiazem, metoprolol, and esmolol without success. His heart rate could not be well controlled. The lack of sinus rhythm created difficulties with his ability to be weaned from the ventilator.

In the second instance, an 88 year old female experienced intraoperative pulmonary fat emboli during her right total hip replacement that led to hypotension, hypoxemia, myocardial infarction, renal failure, and acute respiratory distress syndrome (ARDS). In the surgical intensive care unit (in addition to volume, vasopressors, and inotropes) she was treated with amiodarone, metoprolol, esmolol, and countershock for her AF and rapid ventricular rate, but did not respond. Diltiazem was not used because of intermittently low blood pressure.

In both cases, after the above-mentioned therapeutic failures, the patients received an initial dose of digoxin 0.5 mg intravenously. The atrial rate of each patient was controlled within a few hours. The first patient was extubated within 12 hours of receiving digoxin, and in the second patient there was restored renal function and substantial improvement in cardiac index (as measured by a pulmonary artery catheter and transthoracic echocardiography). In neither case could it be determined whether the rate control was due to the digoxin alone, or its use in combination with the other drugs administered. Nonetheless, the use of William Withering's “old drug” foxglove (digitalis) seems to have been important in the recovery of both of these patients [3].

Not only does digoxin have a primary parasympathomimetic effect on the atrial myocardium by slowing conduction and increasing the refractory period of the atroventricular (AV) node, but it also increases vagal tone (decreasing sinoatrial and AV node conduction), causes sympathoinhibition, and decreases serum concentrations of norepinephrine and plasma renin activity [4].

Clinical guidelines were suggested recently regarding AF; the authors assessed 17 drugs in 54 studies [5]. The review and recommendations in regard to rate control concentrated on studies that evaluated calcium channel blockers, beta blockers, and digoxin. Nondihydropyridine calcium channel blockers (diltiazem and verapamil) were found to be more

effective when compared to placebo or digoxin. Also, beta blockers, such as atenalol and metoprolol, were shown to control ventricular rate at rest and when exercising. However, the evidence also suggested that adding digoxin to a beta blocker or a nondihydropyridine calcium channel blocker may provide an additional benefit over administering either beta blockers or nondihyropyridine calcium channel blockers alone [5, 6], an option of which anaesthetists practicing in the postoperative setting should be aware. Although digoxin is a second line drug for the treatment of postoperative atrial fibrillation in the intensive care unit, practitioners should be cognizant of its efficacy in this setting as an adjunct to, or in lieu of, other therapies.

Using the National Ambulatory Medical Care Survey (NAMCS) Fang et al determined that the digoxin use in the United States declined from 76% of the patients with AF in 1980-1981 to 37% of patients in 1999-2000 [7]. This probably reflects the influence of studies that indicate digoxin is less effective than beta blockers or calcium channel blockers in controlling tachycardia related to effort [8].

Even though the NAMCS involves ambulatory patients, as opposed to critical care patients, the decline (or disfavour) of this “old drug” (digitalis) is being reflected in the teaching environment. Thus, our physicians in anaesthesia and critical care training are less exposed to its use and benefits, never fully appreciating the niche that Withering's foxglove still occupies.

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