

Blue Color Vision as a Rare Sign of Digitalis Toxicity

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Abstract

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Case Reports

We report a 73-year-old woman who had taken an amount of 0.25 mg/day of digoxin for an unknown period of time because of chronic congestive heart failure and chronic atrial fibrillation. She was admitted due to nausea, vomiting, abdominal pain, atrial fibrillation with a slow ventricular rate and with a short corrected Q-T interval in an electrocardiogram of 345 milliseconds, high serum digoxin level of 4.2 nmol/L, and interestingly color vision disturbances: blue colored vision. After discontinuation of the digitalis treatment, all signs of digitalis toxicity, including blue color vision, disappeared within five days(*Iranian Heart Journal 2011; 12 (2):46-48*).

Keywords: Digitalis toxicity ■ Color vision disturbance

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Digoxin remains a frequently prescribed cardiac drug used in the treatment of congestive cardiac failure and supraventricular tachyarrhythmias.¹ Cardiac glycosides have a narrow therapeutic index, and there is considerable overlap in the serum concentration of the drug between patients with and without toxicity. Furthermore, the type and extent of the underlying heart disease are important determinants of the clinical response to any given dose or concentration of cardiac glycoside. Despite continuing advances in the understanding of the basic pharmacology of cardiac glycosides, digitalis intoxication remains a common clinical problem.^{2,3} Physician education programs and increasing use of serum or plasma concentration data have, however, been shown to be capable of substantially reducing the incidence of digitalis toxicity, so the clinical diagnosis of digoxin toxicity remains a common medical problem, particularly in the elderly, where it is often difficult to diagnose.

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Features of digoxin toxicity are usually non-specific and consist of cardiac and non-cardiac effects. Non-cardiac manifestations include symptoms of fatigue, anorexia, nausea, vomiting, headaches, and confusion. Disturbances of vision—for example, blurring, central scotomas, glare effects, and altered color perception, are a less common but more specific presenting complaint and these various visual complaints are frequently seen as the initial signs of digitalis toxicity. Symptomatic color vision disturbances—for example, xanthopsia, are found in up to 15% of intoxicated patients,⁶ although formal testing reveals a much higher incidence of color deficiency. For instance, in one of the prior studies about 80% of the intoxicated patients showed generalized color vision deficiencies; and importantly recent data suggest that the manifestations of digoxin toxicity among younger and older patients do not differ.^{6,7}

Case report

We report a 73-year-old woman who had taken an amount of 0.25 mg/day of digoxin tablet for an unknown period of time because of chronic heart failure due to atherosclerotic heart disease and chronic atrial fibrillation. She had an emergency admittance due to nausea, vomiting, and color vision disturbances: blue colored vision. To ascertain the presence of blue colored vision in the patient, the emergency physician showed her a numbers of objects with different colors and she saw them in “blue”. Also, there were other signs of digitalis toxicity: diffuse abdominal pain, atrial fibrillation with a slow ventricular rate (heart rate=43 beat/second, Fig. 1) and with a short corrected Q-T interval in an electrocardiogram of 345 milliseconds, and high serum digoxin level of 4.2 nmol/L. Additionally, other admission laboratory findings were as follows: hemoglobin=11.2gr/dl, creatinine=1.4mg/dl, serum sodium=141meq/L, and serum potassium=5.8meq/L. In addition on hospital day 2, an ECG was performed, which demonstrated QRS complexes with an alternating shift in the axis (Fig. 2).

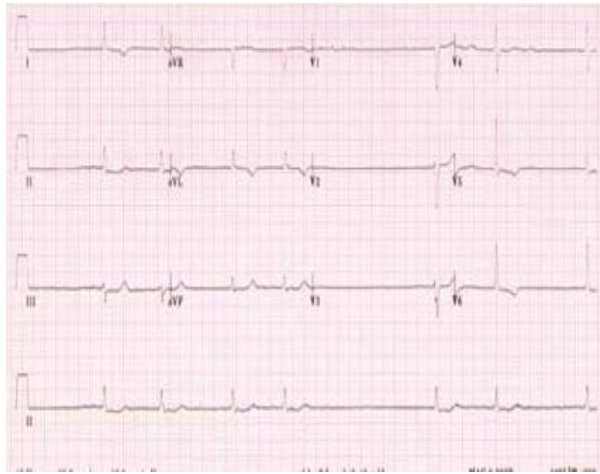


Fig. 1. Atrial fibrillation with slow ventricular response

A diagnosis of bidirectional ventricular tachycardia was made and the arrhythmia spontaneously abated. After discontinuing the digitalis treatment, all the signs of digitalis toxicity, including blue color vision, disappeared within five days.



Fig. 2. Bidirectional ventricular tachycardia. Note the alternating QRS axes and right bundle-branch block type morphology.

Discussion

Disturbances of color vision are a frequently reported sign of digoxin toxicity. Routine color vision testing of elderly patients taking digitalis showed a high incidence of color deficiency, suggesting that the impairment of retinal function could occur even at therapeutic drug levels.^{3,4,5}

The reasons for the eye's susceptibility to the untoward effects of digitalis are not fully understood. There is evidence that the retina is the primary site of drug toxicity.⁸ Several retinal cells express digitalis sensitive isoforms of sodium-potassium ATPase (Na⁺K⁺ ATPase) —for example, photoreceptors, Muller cells, and the retinal pigment epithelium.⁹⁻¹⁰ Clinical electroretinography and in vitro cell studies have shown that toxic levels of digoxin lead to rod and cone dysfunction,

with cones being affected to a greater extent.¹¹⁻¹³ These effects were reversed following dose reduction or cessation of therapy.

It has been suggested that the effects of digoxin on color vision may be continuous, commencing with a slight impairment of hue discrimination and then to a red-green deficiency as toxicity increases. Advanced age is known to adversely affect blue-yellow discrimination as a result of reduced transmission of short wavelengths of light through the ocular media.¹⁰⁻¹³

These results suggest that color vision assessment may be of use in screening for digitalis toxicity at the bedside and in assessing the degree of digitalis intoxication in a patient.

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