reentrant tachycardia.

Micro-reentry within the peripheral ramifications of the Purkinje system, and at Purkinje fiber-ventricular muscle junctions has been demonstrated in a variety of experimental preparations. In each case the essential requirement has been the establishment of inhomogeneous conduction and unidirectional block. The arrhythmias generated in these laboratory models have a striking resemblance to those encountered clinically: extrasystoles with fixed coupling, idioventricular rhythm, ventricular tachycardia, and ventricular fibrillation.

It is probable that reentry is a common cardiac event. The conditions necessary for its initiation are encountered in many areas of the heart, especially the diseased heart. The varied electrocardiographic manifestations of reentry reflect the site and size of the circuit, and the speed with which impulses traverse it. Increased understanding of this fundamental electrophysiologic phenomenon should yield more effective therapeutic tools for the management of clinical arrhythmias.

Kenneth S. Gimbel, M.D.*
Cincinnati

Surgeon, U.S. Public Health Service.

REFERENCES

15 Sasyniuk BI, Mendez C: A mechanism for reentry in canine ventricular tissue. Circulation Res 28:3-15, 1971

Reprint requests: Dr. Gimbel, 7825 Glen Orchard Drive, Cincinnati 45237

Acute Hypertensive Effect of Digitalis Glycosides

Digitalis glycosides are among the most widely prescribed drugs. Toxic effects arising from the drug's cardiac effects may be life-threatening and not infrequently fatal; they have recently been given renewed attention. It is less appreciated that extracardiac effects of digitalis may also result in serious complications. Elsewhere in this issue (see page 105), the case of a patient with hypertensive heart disease is reported, who developed severe acute hypertension and a stroke after administration of ouabain.

It has long been known that digitalis affects the peripheral circulation. By means of the technique of cardiopulmonary bypass, Ross and associates demonstrated in dogs that acetyl strophanthidin, ouabain, and lanatoside C produced systemic arteriolar constriction. This pressor effect was not altered by adrenergic blockage and was considered a direct effect upon arteriolar smooth muscle. This is in agreement with earlier work demonstrating increased contractile responses of excised arterial strips in the presence of digitalis glycosides. In studies of patients undergoing heart operations under cardiopulmonary bypass, Braunwald and associates confirmed the arteriolar constrictor effect of digitalis glycosides. This action was found to have an earlier onset and a shorter duration than the inotropic effect.

The hypertensive effect of digitalis glycosides has also been observed in conscious man. Williams and associates administered digoxin 1.0-1.2 mg IV to six normal subjects and acetyl strophanthidin 1.6-1.8 mg IV to two subjects. One hour after digoxin and immediately after acetyl strophanthidin, they observed a rise in resting blood pressure from 129/73 (mean 95 mm Hg) to 156/86 (mean 109 mm Hg). Inasmuch as cardiac output decreased or remained unchanged, this response indicated a rise in peripheral vascular resistance. Ahmed and associates studied the circulatory effect of ouabain 0.75-1.0 mg
IV and found an early (within five minutes) systemic hypertensive effect in the majority of nine normal subjects and 27 patients with heart disease, not necessarily associated with a rise in cardiac output. In almost half the cases, this transient rise in blood pressure exceeded 20 mm Hg systolic and 10 mm Hg diastolic. It was at times associated with headache, visual disturbances, paresthesias and increased shortness of breath. Hypertensive reactions and headaches were observed more readily after the larger dose of the drug. From the same laboratory, Bayliss and collaborators reported hypertensive responses to digoxin, 1.0-1.5 mg IV, in eight of 15 patients with left ventricular failure secondary to hypertensive or ischemic heart disease. This effect was rapid and transient; it occurred within the first half hour. In three cases, a rise in right ventricular pressure was documented without any increase in cardiac output. Increasing dyspnea and orthopnea were observed in all three patients, and frank pulmonary edema in one, who had both hypertensive and ischemic heart disease.

Most recently, Cohn and associates studied the effects of ouabain, deslanoside and digoxin in 13 patients in cardiogenic shock. Arterial pressure always rose within five minutes: systolic pressure by 13.4 mm Hg and mean aortic pressure by 9 mm Hg in 12 patients. This peripheral vasoconstrictor effect of digitalis glycosides usually preceded the onset of the positive inotropic effect. In one patient, an increase in blood pressure from 76/44 (mean 72 mm Hg) to 94/58 (mean 70 mm Hg), which occurred within five minutes of administration of 0.25 mg ouabain IV, was accompanied by acute pulmonary edema. Left ventricular end-diastolic pressure rose from 17 to 28 mm Hg. In another patient in this series, after two successive doses of ouabain 0.25 mg IV, blood pressure rose from a baseline of 140/90 (mean 98 mm Hg), to 176/92 (mean 114 mm Hg), accompanied by a rise in left ventricular end-diastolic pressure from 14 to 25 mm Hg. This patient developed ventricular fibrillation and could not be resuscitated. Acute left ventricular failure was attributed to the increase in afterload and myocardial oxygen demand in the presence of severe heart disease.

Thus, it is recommended that when digitalis glycosides are administered intravenously, this be done slowly, while monitoring systemic blood pressure, especially under circumstances where pressor effects are considered undesirable.

Walter H. Abelmman, M.D.*
Boston

*Associate Professor of Medicine, Harvard Medical School.

References

Opportunistic Are the Fungi

Zimmerman, in a now classic article, called attention in 1955 to the "increasing frequency of fungus infections as important, sometimes lethal complications of other primary diseases." As unfortunately so often happens, this was looked upon as merely an interesting observation.

By 1962, the problem of secondary mycotic infections had risen to proportions to justify the holding of the First International Symposium on Opportunistic Fungus Infections at Duke University Medical Center. At this point, it was obvious that many so-called saprophytic or harmless fungi could become pathogenic and lethal under appropriate conditions. Predisposing conditions could be amply documented, including:

1. A variety of chronic debilitating diseases
2. Corticosteroid administration
3. Prolonged usage of broad spectrum antibiotics
4. Cytotoxin administration or irradiation.

A wide variety of fungi could be incriminated, primarily Aspergillus, Candida, Rhizopus, Mucor, Cryptococcus, and Nocardia. However, many other, more esoteric fungi could be documented as significant pathogens, including Penicillium, Rhodotorula, Cephalosporium, Fusarium, Curvularia, Fusidium, Giberella, etc.