The Risk of Isolated Atrial or Ventricular Arrhythmia

Jerzy Gajewski, M.D., Ph.D.
Sr. Assoc. Med. Director
John Hancock Mutual Life Insurance Company

This article was a presentation made to the 14th International Congress of Life Assurance Medicine, at its Meeting in Brussels, Belgium, in September, 1982.

It is well known that irregular heartbeats are not infrequently detected on a routine physical examination, and for years conflicting conclusions have been drawn regarding the significance of such irregularities. This is particularly true when sporadic ventricular or supraventricular premature beats (VPB's or SVPB's) are recorded on a routine electrocardiogram, without any evidence, or even suspicion, of heart disease.

Early studies based on a review of voluminous records of Air Force personnel (1) revealed, that out of 67,375 apparently healthy individuals, 2,499 (3.7%) demonstrated 20 different electrocardiographic abnormalities. Total prevalence of individuals with premature beats was 4.9/1,000 for SVPB's and 6.2/1,000 for VPB's, and it was noticed that VPB's increased with age from a low of 4-5/1,000 at age 16-29, to a high 16.1/1,000 in those over 45. Of course, it has to be recognized that subjects of this study—Air Force personnel—did not represent a random sample of the total population, and that this unique age distribution was characterized by a preponderance of younger subjects with virtual absence of any individuals over 60.

Another insight into the prevalence of ventricular premature beats is provided by a now classic epidemiological study of the population of Tecumseh, Michigan (2). In this group, made up of 5,129 persons, ectopy was detected by standard resting electrocardiogram in 264 cases (5.1%), and similarly—as in a previously presented study—a clear increase in rate was observed with increasing age for both sexes, from a low of 18/1,000 in the youngest group to a high 161/1,000 in those over 45. Of course, it has to be recognized that subjects of this study—Air Force personnel—did not represent a random sample of the total population, and that this unique age distribution was characterized by a preponderance of younger subjects with virtual absence of any individuals over 60.

Another confirmation of the fairly high prevalence of VPB's in the general population comes from the University of North Carolina study (3), which included 1,214 white males, considered to be free of any known heart disease. The overall prevalence of the VPB's was 6.7%, and, as before, this prevalence increased markedly with age, from a low of 2% at age 35-39, to a high 15% at older ages. It should be noticed that the prevalence of other electrocardiographic abnormalities, such as ST changes, increased equally sharply, implying that the prevalence of some heart disease was indeed higher at older ages, despite apparent lack of clinical symptoms or other findings.

More recently, Geoffrey Rose and his associates from the Department of Medical Statistics and Epidemiology of the London School of Hygiene and Tropical Medicine presented results of their extensive studies, carried out on over 18,000 male civil servants (4). In their material the prevalence of individuals with frequent premature beats, supraventricular and ventricular combined, did show, as in other studies, an increase with age from a low of 8.4/1,000 at age 40-49 to a high of 26/1,000 at age 60-64.

Retrospective review of 14,000 charts of children seen in the Department of Pediatric Cardiology, Texas Children's Hospital (5), revealed a total of 38 patients with a minimum of 1 year follow-up, who, with absence of history or signs of heart disease, apart from "innocent" heart murmur, demonstrated presence of VPB's when first examined. In 8 out of 17 patients located for a follow-up, unifocal VPB's continued to be present but in all instances those VPB's disappeared during treadmill exercise test. It was concluded, that 2.8% of all screened children with a normal heart had VPB's, and that unifocal VPB's, disappearing with exercise, in otherwise healthy children, are benign and require no treatment or further examinations.

Several investigators have studied the possible relationship between VPB's and sudden deaths. In the previously mentioned Tecumseh study (1, 6), where over 5,000 people were followed for an average 4-year period, it was calculated that the presence of one or more VPB's on a 12-lead electrocardiogram was associated with a threefold increase in the age-adjusted rate of sudden deaths. Further analysis, however, suggested, that this increase correlated equally well with most of the other risk factors, indicating that VPB's probably did not represent an independent risk factor, but reflected a risk corresponding to other causes.

This view has been reinforced by results of the
previously mentioned group from North Carolina (3), in which over 1,200 white males were followed for 11 years. It was shown that the relative risk of "1 hour" sudden death (implying instant or almost instant death) was not increased, and that risk of "24 hour sudden death" was increased only minimally in patients with VPB's on a routine electrocardiogram. As a predictor of sudden death VPB's yielded no advantage over other electrocardiographic abnormalities.

In a combined analysis of the Framingham and Albany groups (7), consisting of 4,120 men, free of coronary heart disease at first examination, and including continuous surveillance of 16 years, it was concluded that "ventricular premature beats were not a significant prognostic finding in persons without clinically manifested heart disease and without other electrocardiographic abnormalities". In contrast the risk of sudden death in these populations correlated positively with high BP, the electrocardiographic pattern of left ventricular enlargement, obesity and heavy cigarette smoking.

On the basis of mostly clinical experience and some experimental work, Bernard Lown of the Harvard School of Public Health has proposed a grading system of ventricular ectopy, which reflects an increasing risk with the higher grades of ectopy (8). In a recent interesting analysis entitled "Ventricular Premature Contractions—Which Should Be Treated?", (9), Richard Whiting summarizes the risk levels of premature ventricular contractions, confirming basic concepts put forward about ten years earlier by Lown.

For many years the insurance industry has been keenly interested in the significance of various electrocardiographic findings. In addition to the early pioneering study of Brandon and others, Rodstein (10), from the Equitable Life Assurance Society, provided an extremely valuable contribution to the field. A group of 712 insured persons with extrasystoles detected on initial examination was followed for an average period of 18 years. 604 persons were considered to represent a standard risk, that is having normal life expectancy, if extrasystoles had been absent. It was shown that the mortality of those 604 individuals with extrasystoles, but without other abnormalities, was not affected by the presence of supraventricular or ventricular extrasystoles, either simple or complex. This study confirmed a previous opinion of Campbell expressed back in 1929, that the presence of extrasystoles in the absence of other evidence of heart disease has little prognostic significance. In contrast, significant excess mortality was observed in those with combination of ventricular ectopy and other risk factors. The overall mortality ratio was 184%.

Similar conclusions have been drawn by Desai and others (11), who in 1973 published results of 3½ years of follow-up on 539 Lahey Clinic outpatients who showed VPB's on their standard 12-lead electrocardiogram, and were matched for diagnosis, age and sex with 494 controls. As in the previous paper, it was concluded that the most important determinant of prognosis in ambulatory patients with VPB's are age and underlying cardiac status. In the absence of clinical heart disease, the presence of VPB's in otherwise normal electrocardiograms had little effect on mortality. More recently, in the already quoted study of 18,403 British civil servants, Rose and others (12) showed that "among men who subsequently died of coronary heart disease, VPB's were present in only 4%—negligibly more than in the controls". Much less optimistic are the results of the Canadian Manitoba Study Cohort (13) where 3,983 men age 25-34, free of coronary heart disease at entry, were followed for an average 10.8 years. 401 persons had VPB's on a routine electrocardiogram, either at entry or later during the follow-up. The incidence of coronary heart disease, analyzed according to the age at detection of ventricular ectopy, showed that for men age 40-49 and 50-59 the relative risk of developing coronary heart disease was significantly higher—1.65 and 1.80 respectively. The authors claimed that VPB's on a routine electrocardiogram, in men age 40-60 without apparent heart disease, identified those at high risk of developing coronary heart disease, particularly sudden deaths where the incidence was over 4-fold. This conclusion however, is subject to a valid criticism, as the authors included in the analysis ectopy experienced not only at the time of original examination, but also those shown during the follow-up period, where they simply could have represented already existing coronary heart disease.

McHenry and others (14) compared rates of ventricular ectopy induced by treadmill exercise testing in several groups of patients. Interestingly, they observed that even in clinically healthy men the rate of VPB's during exercise increased with the level of heart rate: 6% of tested normal individuals showed unifocal VPB's at heart rate below 130/min., 15% at heart rate below 150/min., 29% at heart rate below 170/min., and an impressive 38% of all normal subjects showed VPB's at rate over 170/min. After 6 years of follow-up, the authors concluded that in a group of normals there has been no correlation between the presence of exercise-induced arrhythmias and the subsequent occurrence of heart disease or sudden death.

Introduction of ambulatory electrocardiographic monitoring has added a new dimension to our understanding of the frequency and significance of ventricular ectopy. In a 1976 study reported by the Scientific Affairs Division of GD Searle
leading the authors to conclude that "a minor luminal narrowing in almost 25% of patients, coronary heart disease with more than 50% apparently healthy individuals, detected significant abnormalities. It was concluded that the "clinical syndrome of frequent or complex VPB's" is the cause of frequent or complex VPB's in approximately 25% of patients, coronary heart disease with more than 50% apparently healthy individuals" (21). However, subsequent studies by the same group of investigators utilizing coronary angiography to establish the cause of frequent or complex VPB's in apparently healthy individuals, detected significant coronary heart disease with more than 50% luminal narrowing in almost 25% of patients, leading the authors to conclude that "a minority of apparently healthy subjects with frequent or complex VPB's have significant coronary heart disease".

Most recently in the July issue of the American Heart Journal (23) the same group of investigators published their detailed results of hemodynamic studies obtained during catheterization of 18 asymptomatic patients without apparent heart disease and normal coronary angiograms, but with accidentally discovered frequent ventricular ectopy. Some minor abnormalities described as "subclinical evidence of myocardial dysfunction" were found to be present in those patients, despite the absence of any other signs of clinical or angiographic abnormalities. It is questionable, however, whether these subtle deviations have any significant projection on life expectancy or require treatment.

Paroxysmal atrial fibrillation represents another form of sporadic arrhythmia of previously questionable prognostic significance. A study, published last year by our own Association of Life Insurance Medical Directors of America (24) indicates a benign character, with no excess mortality, of paroxysmal atrial fibrillation occurring in patients without any other detectable cardiovascular pathology. This becomes, however, a major life limiting factor in those with coexisting mitral stenosis, where the mortality ratio reaches almost 1,300%. The group identified as having coexisting signs or symptoms of coronary heart disease also experienced a significantly increased mortality ratio of 321%.

If this review confused you more than clarified the problem, it is because numerous investigations were carried out with a variety of approaches and techniques, and with somewhat conflicting results. It has to be clearly stated that the presence of ventricular ectopy should always raise the possibility of organic heart pathology such as cardiomyopathy, coronary heart disease or mitral valve prolapse. This is particularly true for complex or frequent VPB's. In the absence of any symptoms or clinical findings of heart disease, sporadic SVPB's, VPB's or paroxysmal atrial fibrillation in otherwise well evaluated patients seem to have no adverse prognostic significance and are compatible with normal life expectancy and standard insurance.

Underwriting decisions in such cases should—in my opinion—depend on the completeness of the clinical evaluation in a given case. When a reasonably thorough medical work-up reveals no identifying causes of sporadic low grade ectopy and no other significant risk factors, a normal mortality can be anticipated.
REFERENCES


Physicians Seeking Positions

A Medical Director with over 17 years of diversified experience in occupational, hospital, and private medicine is seeking a position in the insurance industry. M.D. Leiden, 1963. BSc, McGill, 1955. Contact Dr. Michael G. Bunnemeyer, 78 Cherry Brook Drive, Princeton, New Jersey 08540, or telephone (609) 466-2184.

Dr. Robert N. Pyle, Jr., 2418 Wimbledon St., Concord, N.C. 28025, graduated in 1976 from the University of Maryland Medical School. He completed a residency in orthopedics in 1980 at St. Luke's Hospital in New York City. Dr. Pyle is interested in relocating on the east or west coast, or any large city.

Dr. John L. Sorensen, Logan Regional Hospital, 500 East 1400 North, Logan, UT 84321, received his M.D. in 1955 from the University of Utah. Board certified by the American Boards of Internal Medicine and Cardiovascular Disease. He would consider moving to the western United States and Texas.

Dr. Randy B. Edman, 67 Newfield Avenue, Apartment 39, Waterbury, CT 06708, telephone (203) 754-4843. Graduated in May 1980 from University of Rochester School of Medicine and Dentistry. Will complete residency training in Internal Medicine in June 1983. Geographic preference includes northeastern United States, excluding downtown N.Y.C., Boston, Philadelphia and Newark.

Dr. Donald F. Blair, 9006 Cherrytree Drive, Alexandria, Virginia 22309, telephone (703) 780-2597. Available September 1983 after retirement as Captain, Medical Corps, U.S. Navy. Graduated 1948 from Columbia University College of Physicians & Surgeons. Experience includes assignments with Navy's Physical Disability System and Physical Standards/Review Division, and Vice President and Medical Director, Navy Mutual Aid Association.