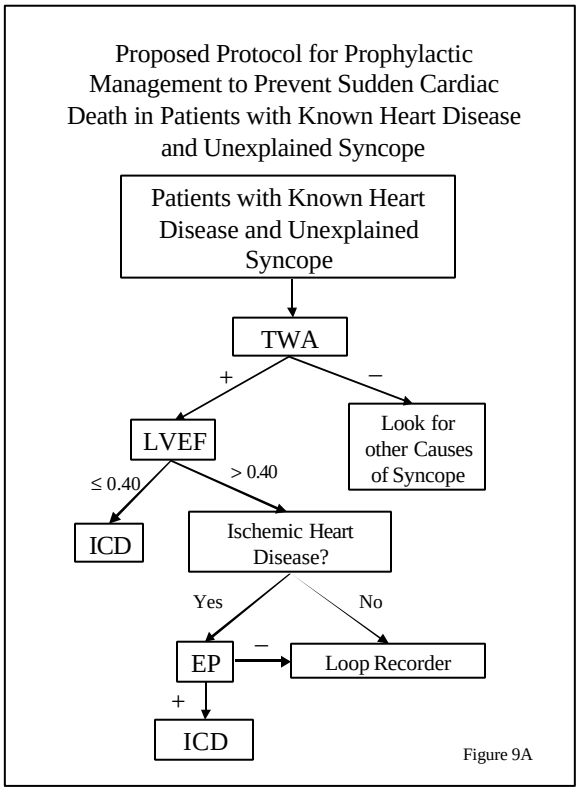
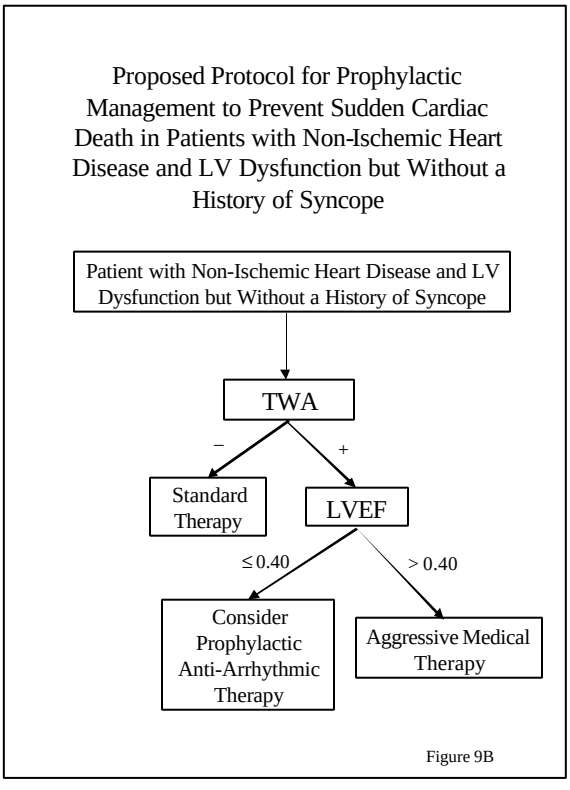
Clinical Use of TWA

T wave alternans can now be conveniently measured non-invasively during exercise stress (or during pharmacologic stress or during pacing). A growing body of clinical data have now been accumulated in a variety of patient populations that suggest that TWA is a powerful predictor of arrhythmic risk. Patients who are TWA positive have a substantial risk of ventricular tachyarrhythmic events and, equally important, TWA negative patients are at quite low risk. In direct comparisons, TWA has compared favorably to other non-invasive risk stratifiers. The data suggest that TWA has a similar positive predictive value to EP but a better negative predictive value[18,27,30-32]. Further, data suggest that TWA status changes with pharmacologically induced alterations in myocardial electrical stability. However, at the present time there are no completed randomized trials that demonstrate that prophylactic treatment with ICDs or drugs, in patients identified to be at risk on the basis of a positive TWA test, results in a reduction in mortality or arrhythmic events. Such trials are only now being organized and will require a number of years to complete.

The current clinical use of TWA in risk stratification can be guided by the existing clinical data that indicate that TWA identifies patients both at high risk of ventricular arrhythmias and a second group at quite low risk. However, in the absence of definitive clinical data demonstrating a clinical benefit of treatment based on TWA status, decisions regarding whether and how to treat high risk patients must rely on clinical judgement. Figure 9 illustrates possible ways that TWA may be integrated into clinical strategies for identifying high-risk patients. These clinical algorithms are to be considered only as tentative proposals until the needed prospective clinical trials are conducted – ultimately prospective clinical trials should be used to guide patient management.

These figures incorporate the following rationales. In these algorithms, a negative TWA test identifies a patient who can now be considered low risk for sudden death. The negative predictive value of TWA is sufficiently high that patients who test TWA negative may not need invasive EP testing (the negative predictive value of TWA appears to be consistently superior to that of EP[18,27,30-32]. In patients with unexplained syncope, patients with a negative TWA test may not need an EP study to determine if they have inducible VT and further diagnostic testing can be directed at other causes of syncope. Patients with reduced LVEF being screened for risk of sudden death who have a negative TWA test, probably do not require a further evaluation with an EP study. Patients with a positive TWA test, especially if they have reduced LVEF, are at high risk of sudden death and may be considered for EP (if they have ischemic heart disease - EP is not generally thought to be of use in patients with non-ischemic heart disease) and prophylactic anti-arrhythmic therapy (ICD or possibly sotalol or amiodarone). Patients with syncope of unknown origin, TWA, and reduced LVEF can be considered to be at very high risk and merit consideration for ICD therapy (with or without an additional EP study depending on the patient).





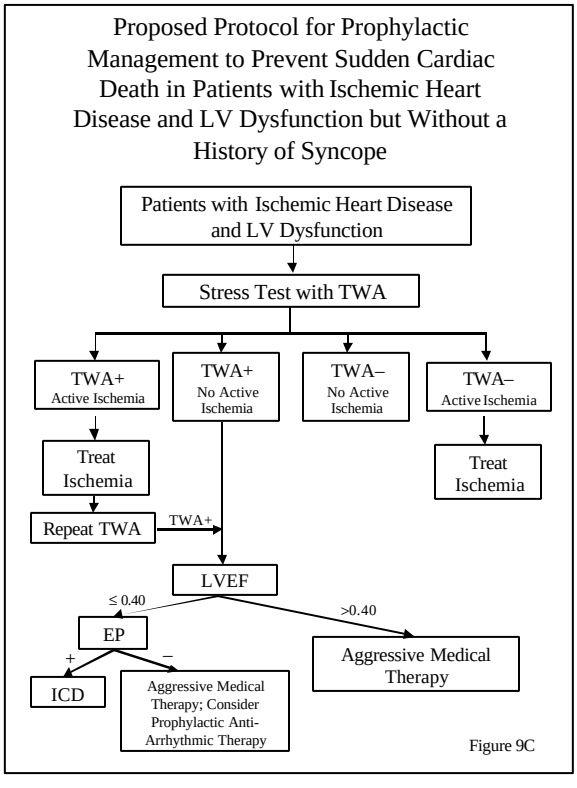


Figure 9. Possible clinical algorithms for the incorporation of TWA and LVEF into clinical risk stratification and patient management to reduce risk of sudden cardiac death. Panel A. Patients with known heart disease and unexplained syncope. Panel B. Patients with non-ischemic heart disease and LV dysfunction but without a history of syncope. Panel C. Patients with ischemic heart disease and LV dysfunction.