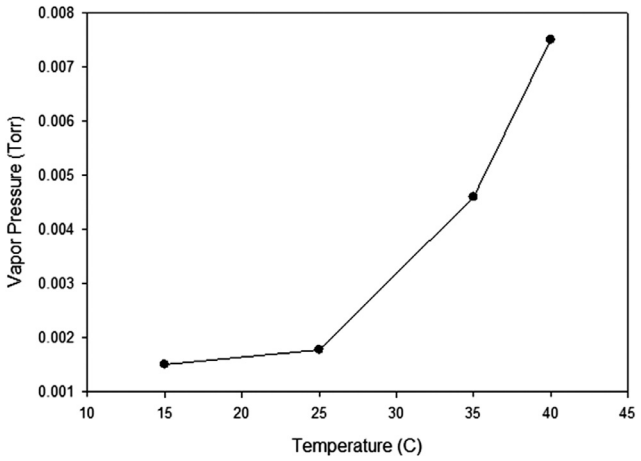

Figure 2. Influence of temperature on the vapor pressure of nitroglycerin. Data are from reference 9.

temperatures in pants pockets produce a suboptimal storage environment for SL NTG and may somewhat explain the preservation of SL NTG tablet potency when tablets were stored in carrying bags compared with pants pockets.[7]

Based on the results of this study and previous work,[7] SL NTG should be carried by patients in a purse or carrying bag rather than in a pants pocket. If this is not practical, then every effort should be made to carry SL NTG in a manner to minimize close contact with the body, for example, a loose pocket such as a jacket or shirt.

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Underlying Differences in the Treatment of Left Ventricular Thrombus With Non-Vitamin K Antagonist Oral Anticoagulants

We read with great interest the manuscript by Fleddermann et al "Efficacy of Direct Acting Oral Anticoagulants in Treatment of Left Ventricular Thrombus."[1] The study included a considerable number of patients (n = 52) with left ventricular (LV) thrombus who were treated with non-vitamin K antagonist oral anticoagulants (NOAC), which doubled the number of cases currently published in the literature. Overall results for NOAC therapy in LV thrombus were promising, whereby majority (82.9%) of the patients reported resolution, whereas 1 patient had an embolic event and 4 had bleeding episodes. The advent and recent rise in usage of NOAC represents an attractive alternative to vitamin K antagonist (VKA). It provides various benefits such as lower bleeding risk, stable anticoagulation effect, fewer drug-drug interactions, which likely confers therapeutic advantage in the treatment of LV thrombus.[2] However, this is not a new concept, as a meta-summary by Leow et al[3] has previously been published, before the systemic review by Kajy et al[4] as cited by the authors. In that study (n = 36), thrombus resolution was met in 87.9% of patients, and there were minimal bleeding and no embolic events.

The patient population with LV thrombus is diverse and various precipitating factors could result in its formation. Although post-myocardial infarction (MI) was once the most common cause of LV thrombus, improvement in percutaneous coronary intervention and management of MI has resulted in its decline and has now been superseded by heart failure as the most common precipitating factor in the contemporary era.[5] This shift in epidemiology plays an important role in the research of LV thrombus treatment. First, based on the data kindly provided by Fleddermann et al, only 19.2% of patients (n = 10) were on concomitant NOAC and DAPT (also known as triple therapy). In contrast, 47.2% of patients were on triple therapy in the meta-summary abovementioned, 39.0% in the systemic review, and 38.0% in a study of post-MI LV thrombus patients by Maniwa et al.[6] The significantly lower rate of triple therapy use reported in this study could be due to the decreasing incidence of post-MI LV thrombus and may result in a falsely lower rate of bleeding than expected. Hence, whereas initial reports of NOAC use in the treatment of LV thrombus are encouraging, the rate of bleeding complication should be interpreted while taking into context the proportion of patients on triple therapy.

Second, both the underlying cause of LV thrombus formation and patients' clinical characteristics could vary across studies. In particular, comorbidities such as cardiovascular risk factors, valvular abnormalities,

and pre-existing heart failure with reduced ejection fraction are potential confounders.[7] Patients included in this study may possess favorable clinical profiles which allowed for the use of NOAC, or did not have concomitant co-morbidities that require warfarin. Thus, the cases studied may only represent a select population and the results may not be generalizable to the entire population of LV thrombus patients. By extension, the authors could perhaps provide supplemental data on the reasons why these patients were started on NOAC rather than warfarin, which may be of use to clinicians in similar situations.

All in all, whereas limitations inherent to the nature of observational studies exist, this study by Fleddermann et al is a welcoming addition to the current literature and advances our understanding of NOAC use in LV thrombus treatment.

Disclosures

The authors have no conflicts of interest to disclose.

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On the QT

The significant study concerning the QT interval in atrial fibrillation as presented by Tooley et al[1] adds meaningful information to a complicated and still somewhat enigmatic subject. They conclude that the value of their study indicates that atrial fibrillation in itself is not causative of an abnormal QTc and that the differences between QTc in atrial fibrillation and sinus rhythm exist because of imperfect heart rate correction formulas. It is common knowledge that the use of Bazett's formula (QTc = QT/RR 0.5) has minor limitations, especially at the higher and lower heart rates of correction. It is still the most utilized "standard" by the cardiology community. It is accepted that in determining the QTc, the Bazett formula tends to overcorrect the interval at high heart rates and undercorrects it at low heart rates. The importance of their second opinion, that by carefully using the correction methods described by the authors, more definitive decisions can be made with respect to therapy for or against the use of specific antiarrhythmic drugs if contemplated. It is interesting that the authors found negligible difference between the manual and computer-derived versions of the QT interval. The errors of computer electrocardiography are well known and significant.[2] These errors have been noted primarily in the clinical interpretation − rhythm, depolarization and repolarization, wave forms, and other specific idiosyncrasies. The accuracy of conduction times (PR, QRS, and QT) has not been given the same attention. It is not unusual to find two different conclusions on the same patient, the same day and same electrocardiogram (ECG) recorder. Similarly, the same holds true from one ECG recorder to another and one program to another. Cardiologists are intimately aware of the difficulties in separating and diagnosing the genetically − induced forms of the long QT syndrome from those medically acquired. Even more difficulty can arise when both are simultaneously present. The QT interval can normally vary from lead to lead (50 to 65 ms) due to inherent QT dispersion just as it can during the same day, other days or from program and instrument differences. In a timely editorial, Conti stated "computers don't often measure the QT interval accurately, and for anyone concerned about QT prolongation, that it be measured by hand."[3] Another perplexing problem and question relates to the significance of depolarization conduction time and its influence on the prolonged QT interval. Is its presence of greater, lesser, or of irrelevant significance and consequence as an additional contribution? This would include the various time durations and forms of left- and right bundle branch block, and nonspecific intraventricular conduction delays. For example, a patient with a QTc of 544 ms and a QRS of 152 ms (left bundle branch block). Assuming a top normal ventricular conduction time as 100 ms, there is a 52 ms contribution of additional time to the QTc caused by depolarization which if subtracted from the total QTc results in a QTc of 492 ms. This obviously poses the question as to whether or not conduction delays in the QRS complex (depolarization) have the same or lesser relevance as those in the ST-T segment (repolarization) in terms of the abnormal QTc prolongation? This would of course, only apply to nonchannelopathy, medically acquired