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Review

Role of head-up tilt table testing in patients with syncope or transient loss of consciousness

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ABSTRACT

The tilt table test (TTT) is a useful method for the management of reflex syncope. However, the TTT is incomplete and has several problems. The indications for this test are established using guidelines. The TTT is not suitable for all syncopal patients. It is currently unclear (1) When should the TTT be used, (2) for which types of patients TTT should be performed, and (3) does the TTT provide useful information to guide indication for pacing therapy for reflex syncope. The answers to these questions appear in recent reports from two guidelines published by the European Society of Cardiology and the Japan Circulation Society. The indications for TTT do not apply to all syncopal patients, but selected patients. For patients with low risks and rare syncopal events, the TTT is not necessary, even when diagnoses are unconfirmed. The TTT is used not only for diagnosis of reflex syncope, but also for many clinical management of several conditions (i.e., exclusion of cardiac syncope). Positive TTT results cannot predict the effects of pacing therapy for reflex syncope. The decision to use pacing therapy should be based on documented electrocardiograms and other findings, including TTT results.

Contents

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1. Introduction

The tilt table test (TTT) has been used to reproduce neurally mediated reflexes in laboratory settings for over 20 y [1]. In clinical settings, the TTT is useful for diagnosis of reflex syncope, and discrimination of reflex syncope from other transient losses of consciousness, including cardiac syncope and epilepsy [2,3]. However, the TTT has several problems, most importantly, its low sensitivity and specificity [4–7]. For example, a negative TTT result is often obtained in cases of typical vasovagal syncope (low sensitivity), whereas a positive TTT result is obtained in cases without any episodes of syncope (low specificity). Another drawback of the method is the cost of the TTT. For the TTT, single-purpose tools, such as a tilt table and a beat-to-beat blood pressure monitor, are needed [8]. In addition, a considerable amount of time is needed for testing. Thus, the following questions can be raised: should the TTT be applied to all syncopal patients, and which types of patients are suitable for the TTT. Recently published guidelines answer these questions, with the most important article being the 2009 European Society of Cardiology (ESC) guidelines [8].

2. Methodology of the TTT

First, knowledge of the TTT protocols is required. Fig. 1 depicts the method of TTT. These protocols were reported with variations in the initial stabilization phase, duration, tilt angle, type of support, and pharmacological provocation since the first reports published by Kenny et al. [1]. The ESC guidelines recommend a tilt angle between 60° and 70° [8]. The most commonly used protocol is the low-dose intravenous isoproterenol test, that uses incremental doses to increase the average heart rate by 20–25% over baseline (usually <3 μg/min) [9]. The next protocol, called the "Italian protocol", uses 300–400 mg of sublingual nitroglycerine after a 20-min passive phase [10]. The results from both protocols reveal similar rates of positive responses (61–69%), with a high specificity (92–94%). In the Italian protocol, however, a venous cannulation is not necessary, and the pre-tilt phase can be shortened to 5 min [8]. The protocol is simple and fast, saving substantial time during busy clinical situations, and has few adverse effects, such as headache. In addition, no deaths were reported during either protocol. Our institute usually chooses the Italian protocol with few exceptions. TTTs with clomipramine are used for selected patients with syncope that is triggered by emotional distress [5,6]. These TTTs may be useful as biofeedback training for counter-pressure maneuvers in such patients [11].

3. What situations require the TTT and which ones do not?

3.1. Situations where the TTT is not performed for diagnosis

3.1.1. In situations where diagnosis of reflex syncope is already certain

In reflex syncope, the TTT is not necessary to confirm an already certain diagnosis. For example, vasovagal syncope can be diagnosed when a patient has a syncopal episode immediately after emotional distress (due to fear, pain, instrumentation, and venipuncture), that was associated with typical prodromes (symptoms before syncopal events) from autonomic activation (i.e., sweating, facial pallor, nausea, pupillary dilatation, slight palpitations, yawning, and/or hyperventilation) [8,11]. However, situational syncope can be diagnosed when the syncope is triggered by specific circumstances, which include the following: during or immediately after micturition, defecation, coughing, swallowing, laughing, eating, and vigorous activities or exercise [8]. When either type of syncope is diagnosed, it is considered a reflex syncope. In these situations, the TTT is not necessary for diagnosis confirmation.

3.1.2. In situations where cardiac syncope is suspected

Criteria for risk stratification, particularly to identify patients with a suspicion of cardiac syncope, have been established [8]. In these patients, the first choice is to perform a cardiac evaluation; the TTT should not be performed initially. For these patients, the presence or absence of a heart disorder, which can manifest during syncopal attacks and cardiac arrhythmias, should be investigated [11]. Before the TTT, other cardiac tests, including an

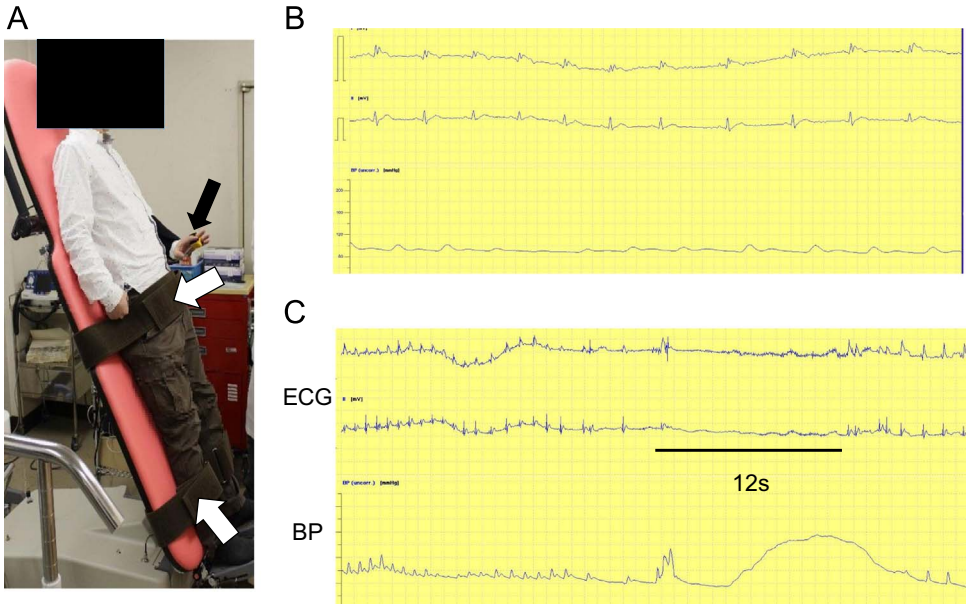

Fig. 1. A. Outline of the tilt table test. Tilting angle of 60°. Beat-to-beat blood pressure monitor on the left arm (black arrow). For the patient's safety, support belts are necessary to prevent falling. If necessary, a venous cannulation was placed in the appropriate position. B. Monitoring during the tilt table test. Two-lead ECG of the upper area. Beat-to-beat BP monitor in the bottom area. In usual practice, twelve-lead electrocardiograms are rare. ECG = electrocardiogram, BP = blood pressure. C. Long asystole during syncope Induction of syncope with 12 s of asystole. ECG = electrocardiogram, BP = blood pressure.

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