

Hypothesis: Cough as a Complementary Maneuver to Avoid Vasovagal Syncope

Hipótesis: La tos como maniobra complementaria para evitar el síncope vasovagal

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Vasovagal syncope (VVS) is highly prevalent in the general population. Although its prognosis is benign, in certain cases it implies an increased risk of trauma, as well as deterioration in quality of life. The first line of treatment to avoid this condition consists in informing and advising the patient on the indicated hygienic-dietary measures. In the face of imminent syncope with prodromes, physical maneuvers that rapidly increase blood pressure (BP) are implemented. (1)

Vasovagal syncope induced by the tilt test (TT) can present different BP and heart rate (HR) responses. Sometimes the decrease in HR or asystole is abrupt and precedes the decrease in BP. In the other modalities, if bradycardia occurs, it appears more slowly and is often preceded by decreased BP and the onset of symptoms. When returning to the supine or Trendelenburg position, HR tends to decrease further.

In the presence of low BP, persistent bradycardia can precipitate loss of consciousness or prolong the recovery time from symptoms. Although it is known that cough increases HR (2), to the best of our knowledge, cough has never been proposed as a complementary maneuver to avoid VVS.

In recent years, in our laboratory, when faced with the imminence of a positive TT with decreased BP and HR and presyncope, the patient is placed in the Trendelenburg position while performing regular maneuvers to increase BP, to which cough is added (Figure 1).

To observe the effect caused by the application of cough, we have retrospectively analyzed the behavior of HR during presyncope induced by the TT in two periods: pre and post cough implementation as a complementary maneuver. Patients included in the analysis were those in whom a TT was requested for having presented syncope in the periods 2008-2009 (P1: without cough implementation), and 2017-2018 (P2:

with cough implementation). All patients were over 15 years of age.

In the presence of prodromes accompanied by decreased HR and BP, the patients were placed in the supine or Trendelenburg position, with the legs crossed, and they were asked, if possible, to close their fists. In P2 they were further asked to cough vigorously, and then intermittently for a few seconds upon reaching the supine position. Coughing was indicated only in patients with prodromes, gradual decrease in HR, and no history of chronic obstructive pulmonary disease or cough syncope.

In both periods (P1 and P2) the percentage of patients whose minimum HR was: a) <60 bpm, (beats per minute) and b) <50 bpm was recorded. The results were analyzed using the chi-square test. The TT was positive in 141 patients: in P1 (age 41 ± 19 years, 43% male) and in 118 patients in P2 (age, 47 ± 21 years, 43% male).

The response to the TT was distributed in P1 and P2, respectively, as follows:

- Sharp decrease in HR or asystole: 6 patients (4%) and 4 patients (3%).
- Progressive decrease in HR: 93 patients (66%, age 41 ± 19 years, 44% males) and 92 patients (78%, age 45 ± 19 years, 45% males).
- No change or increase in HR: 42 patients (30%) and 22 patients (19%).

Patients with an abrupt decrease in HR and with rapid loss of consciousness that prevented any maneuver from being performed were scarcely prevalent in both periods. Only P2 patients were asked to cough. When the decrease in HR was gradual and the patient reported prodromes, the number of patients with HR <60 bpm was 49 (53%) in P1 and 5 (5%) in P2 ($p < 0.0001$, OR: 19.3-95% CI: 7.2-52). Heart rate <50 bpm was observed in 11 patients (12%) in P1, and 0 patients in P2 ($p < 0.0007$, OR 25.7- 95% CI: 1.49-444).

Coughing did not worsen any patient’s symptoms.

Although the role of bradycardia as the primary cause of syncope is discussed (3), the possibility that it could worsen or perpetuate cerebral hypoperfusion has triggered attempts with other methods to prevent it. Thus, the usefulness of cardiac pacing to avoid VVS has been evaluated with different results. (4) Currently, the indication of pacemaker is restricted to patients with demonstrated pauses (spontaneous or induced), older than 40 years of age and with unpredictable and

unavoidable episodes due to the absence of prodromes (Figure 2). (1) Cardiac neuroablation has a similar objective when recommending control of extreme bradycardia through vagal modulation. (5)

Cough systematically increases HR briefly. However, this increase seems to be enough to prevent pronounced bradycardia. Although coughing is a commonly applied empirical maneuver in various medical situations that cause bradycardia, it has not been suggested in patients with VVS.

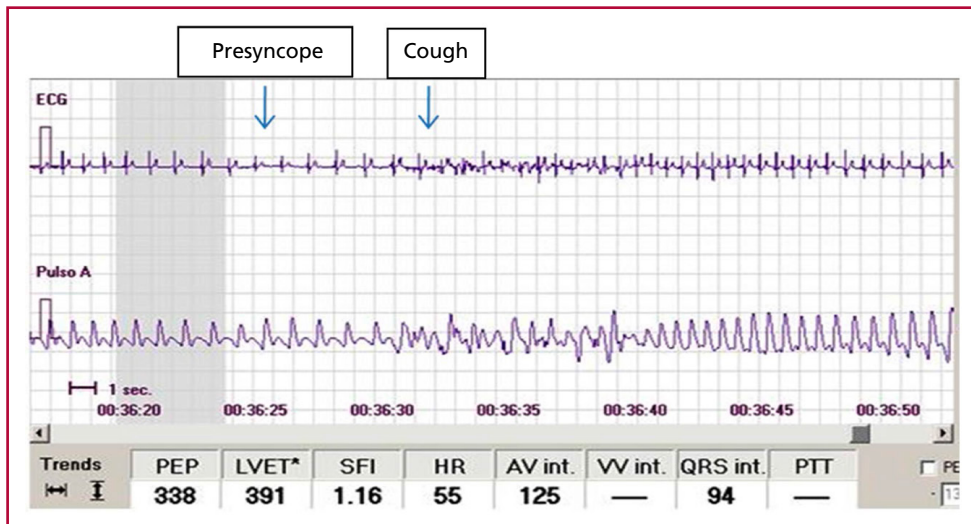


Fig. 1. Positive tilt test. Mixed response at 36 minutes. Blood pressure decreases and the patient refers prodromes. Heart rate (HR) drops from 88 bpm to 53 bpm. The patient coughs while brought to the supine position and the HR increases from 53 to 106 bpm. Then it returns to baseline values.

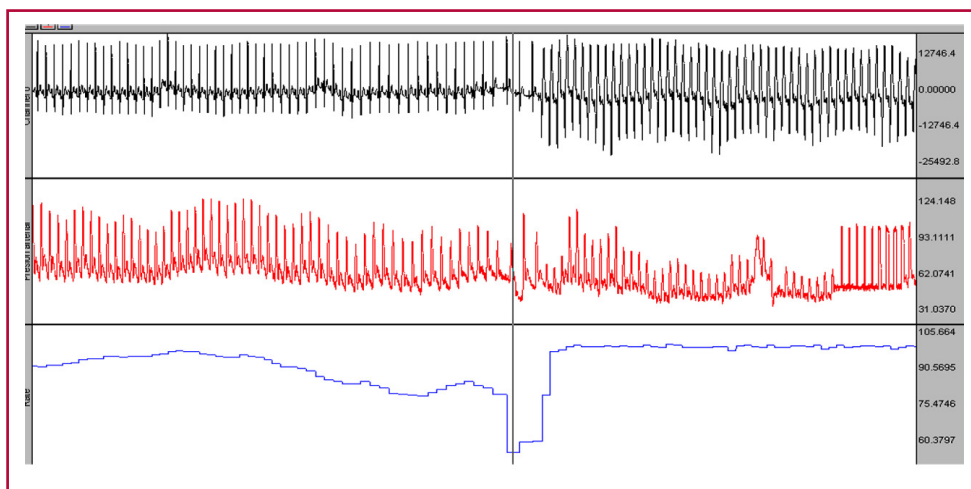


Fig. 2. Rate drop algorithm alteration. Tilt test in a patient with syncope and permanent pacemaker with a rate drop response algorithm. Heart rate begins to decrease before the stimulation mechanism is activated. When it reaches less than 60 bpm, stimulation is triggered at 98 bpm. By programming, the pacing rate descends in steps until sinus rhythm is resumed. In this case, the proper rhythm only recovered after coughing.

By stopping the TT in the pre-syncope stage through maneuvers that prevent it, we probably underestimated the prevalence of cardio-inhibitory responses. However, we were able to reveal the hemodynamic effect of maneuvers that increase BP and HR, which can collaborate with the indications given to the patient to prevent syncope.

Although we have not observed it in this population, the response to cough may be different in patients with sinus dysfunction or dysautonomias.

The efficacy of the maneuvers during the TT cannot be directly extrapolated to clinical efficacy in spontaneous episodes. Maneuvers that increase BP have been clinically evaluated in randomized studies. (6) However, coughing is a simple and safe maneuver to counteract the other component of VVS, that is, bradycardia. These preliminary observations could justify the prospective evaluation of the effect of cough in preventing VVS in the context of spontaneous episodes in a selected group of patients.

Conflicts of interest

None declared.

(See authors' conflicts of interest forms on the website/ Supplementary material)

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