SHORT HEAD-UP TILT TEST
EVALUATION OF TIME TO SYNCOPE IN NITROGLYCERINE POTENTIATED

ORIGINAL
PROF-1853

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ABSTRACT... Objective: The aim of the present study was to evaluate the time to syncope in Nitroglycerine potentiated short Head-up tilt test. **Study Design, Settings & Duration:** This was a descriptive cross sectional study conducted in Armed Forces Institute of cardiology from May 2006 to May, 2007. **Patients and methods:** A total number of 90 patients with orthostatic intolerance both male and female were studied. Head-up tilt test protocol consisted of a Stabilization phase which lasted for five minutes Passive tilt phase: Patients were tilted at 70˚ for orthostatic stress for 15 minutes. In case of no symptoms the test continued with the drug provocation phase which lasted for 15 minutes. The patients were administered 400µg of nitroglycerine sublingually in aerosol preparation. Development of symptoms were noted at 5, 10 and 15 minutes. **Results:** A total number of 90 patients were examined during the study period. The tilt table test was classified as positive in 58.9 % of patients and was negative in 41.1%. The test was positive in five patients without the drug provocation (9.4%). The responses were classified as positive vasodepressor in 35.8%, 15.09% as mixed and cardioinhibitory 15.09% in patients of neurally mediated syncope. The total time to display of symptoms to positivity in HUTT was 17.89± 6.99. The mean time to syncope after the administration of nitroglycerine was 5.61± 4.17 minutes. **Conclusions:** Our study concludes that the drug administered phase can be reduced to 12±3 minutes.

Key words: Tilt table test, vasodepressor , mixed, cardinhibitory

INTRODUCTION

Since its introduction in 1986 tilt table test is widely used in hospitals for the management of patients having orthostatic intolerance[1]. It has emerged as a safe, useful, and cost-effective diagnostic tool during the last decade greatly improving insight in the management of patients with orthostatic intolerance[1,2]. Head up tilt test by imposing an orthostatic stress during tilt reproduces the symptoms in a controlled surrounding[3]. There is no commonly accepted protocol up till now for the implementation of its method. Many centres use different variations of protocols and the passive tilt test protocol of 40 -45 minutes being one of them[4].

To increase the applicability of the test and to shorten its duration while preserving its specificity several pharmacological agents are employed such as isoproterenol or nitroglycerin are used to increase a subject's susceptibility to orthostatic intolerance[5]. Administration of isoproterenol increases the number of positive responses but requires intravenous infusion and has frequent side effects, while nitroglycerin is frequently used to obtain a diagnostic effectiveness similar to isoproterenol, but with more ease of administration[6,7]. Nitrates are potent venodilators and are lipid soluble. Once administered it enters the smooth muscle of the smooth muscles of the vessels where it undergoes metabolic activation to nitric oxide causing venous dilation and pooling of blood in the legs in the upright posture[8,9]. Various protocols are employed for the administration of nitrates such as intravenous infusion, sublingually in tablets or as aerosol[10]. The dose, angle of inclination (60º or 70º), and duration of tilting before and after the administration of the drug are also important[2,3,4].

The duration of tilting is of special importance because it is one of the main constraints to the clinical use of the Tilt Table testing. The maximal duration of the

pharmacological phase is still not clearly determined. In various published protocols it ranges from 15 to 30 min but it has recently been recommended that it can be reduced to 10 min. The purpose of this study was to determine the optimal duration of the pharmacological phase of the tilt-table test potentiated with sublingual nitroglycerin in aerosol.

SUBJECTS AND METHODS

The study was conducted at the Electrophysiology Department of Armed Forces Institute of Cardiology / National Institute of Heart Diseases (AFIC / NIHD) in a period of one year from May, 2006 to May 2007. A total number of 90 patients with orthostatic intolerance who fulfilled the inclusion criteria of more than one episode of unexplained syncope, pre syncope, dizziness, light headedness were included in the study.

Patients were tested from the outpatient department and wards of the Electrophysiology department of AFIC / NIHD, Rawalpindi. The data collecting tool was a structured questionnaire proforma which was filled for every patient with informed consent. Patient preparation: Drugs disturbing the cardiovascular and autonomic nervous systems and those likely to affect intravascular volume were discontinued for at least twenty four hours before the test: ACE inhibitors, Calcium channel blockers,-Receptor blockers, Tricyclic antidepressants, Diuretics, Nitrates, Opiates.

The test was performed after eight hours of fasting to avoid vomiting and aspiration. Testing was conducted from 0800 to 1400 hrs, in a quiet environment, and at a constant room temperature. The tilt table used was electrically motored. While in the Head-up tilt position, the patients were strapped to tilt table and asked to avoid movement of the lower limb musculature and joints in order to maximize venous pooling. A physician experienced in advanced cardiac life support and advanced resuscitation equipment was immediately available for any type of emergency at all times.

Head-up tilt test protocol consisted of a Stabilization phase which lasted for five minutes and their baseline heart rate and blood pressure measurements were obtained. Passive tilt phase: Patients were rapidly brought to tilt at 70˚ for orthostatic stress and the duration was of 15 minutes. The test continued in case of no symptom with the drug provocation phase. Drug provocation phase: The duration was 15 minutes and the patients were administered 400µg of nitroglycerine sublingually in aerosol preparation. Development of symptoms was noted at 5, 10 and 15 minutes in to the drug provocation phase. Post tilt phase: The patients remained in a supine position for five minutes after drug provocation in supine position. During tilting the blood pressure and the heart rate was continuously monitored and recorded. Test Interpretation: The test was considered positive if patient developed syncope, Pre syncope or abnormal heart rate and /or blood pressure response associated with marked reduction of the heart rate and/or blood pressure, classifying the responses as mixed, cardioinhibitor and vasodepressor.

Statistical analysis was done by using SPSS17. Demographic data are given as mean values as ± SD. Categorical data is described as frequencies and percentages.

RESULT

A total number of 90 patients were examined during the study period. There were 8 females and 82 males. The mean age of the patients studied was 33.98± 12.39. Characteristics of the demographic variables are given in Table I. The tilt table test was positive in 53 patients (59 %) with the majority of patients testing positive during pharmacologic phase. During the passive phase of the test there were 5 positive responses (9.4%) of the 53 patients who had a positive response to head up tilt test and 48 patients tested positive with drug provocation (90.56%). The results were classified as positive vasodepressor in 35.8%, 16.98% as mixed, cardioinhibitory in 15.09% patients. Postural orthostatic tachycardia syndrome POTS was seen in 28.3 % and dysautonomic response in 3.77% of patients.

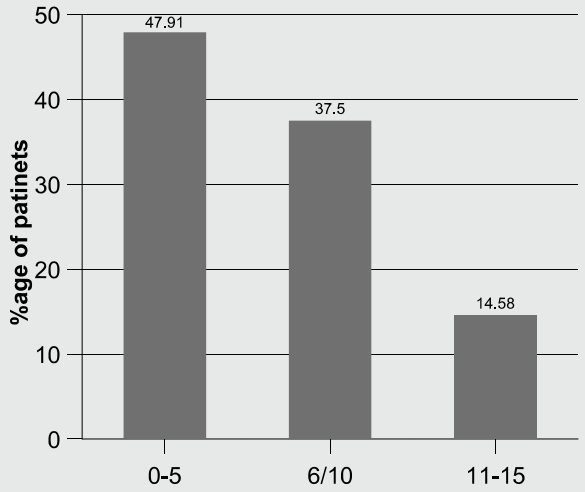
The total time to display of symptoms to positivity in HUTT was 17.89± 6.99 including both the passive phase and drug provocation phase. The mean time to syncope after the administration of nitroglycerine was 5.61± 4.17 minutes. Out of the 48 patients who tested positive after

Table-I. Demographic values and the responses of the patients to tilt test

	Mean	Standard Deviation
Age	33.97	± 12.15
Weight	65.09	± 10.84
Height	5.607	± .312
BMI	19.17	± 2.96
Positive test (%)		
Passive	5 (9.4%)	-
Drug challange	48 (90.6%)	-
Time to syncope after NTG administration	5.61 ± 4.17	-
Total test time	17.86 ± 6.99	-
Type of positive response (%)		
Vasodepressor	19 (35.8%)	-
Mixed	9 (16.98%)	-
Cardioinhibitory	8 (15.09%)	-
Dysautonomic	2 (3.77%)	-
POTS	15 (28.3%)	-

Key: BMI: Body mass index, NTG: Nitroglycerine, POTS: Postural orthostatic tachycardia syndrome

Fig-1.Percentage of patients testing positive after nitroglycerine administration



Time to syncope after nitroglycerine administration in minutes

the administration of the nitroglycerine 23 patients tested positive in the first five minutes (47.9%). The number of patients testing positive in the next 5 minutes were reduced to 18 giving a 37.5 % and only 7 patients tested positive in the last 5 minutes 14.5% -Fig-1.

DISCUSSION

Head up tilt test is commonly used to evaluate patients of orthostatic intolerance. The usefulness of head-up tilt testing has been demonstrated in various studies. In this study the short duration of the tilt table testing was evaluated in terms of time to syncope and the use of nitroglycerine.

The pattern of heamodynamic responses seen was similar to previously patterns described in the literature with the predominance of vasodepressor and mixed. There was no excess of cardioinhibitory in the study[2,3,4,6].

Currently various protocol are in practice in the clinics in which nitroglycerine is used and their results published accordingly. The protocol employed for tilt table testing in this study has a short passive phase as well as a short drug provocation phase which is of 15 minutes each. During tilt testing in this protocol a few positive responses were seen in the passive phase. Majority of the positive responses were observed after the administration of the drugs and a few response were observed towards the end of tilt testing. In a comparative study conducted by Parry SW on front- loaded' 20 minute glyceryl trinitrate tilt table testing the time to syncope was 11.3 minutes[11]. However, in that study nitroglycerine was administered after 10 minutes of supine period and the time to syncope after the administration of nitroglycerines was 5.61± 4.17. This result is comparable to the results of our study in which there was a passive phase but the drug phase was of 15 minutes. Another study by Swissa et al shows results that are completely comparable to the results of

our study. In that study time to syncope was 6.5 ± 2.9[12]. On the other hand, that study had been carried out in pediatric and adolescent patients. The majority of the results in this study occurred after the administration of nitoglycerine.

Raviele et al found that syncope occurred between a range of 3 to 17 minutes. Where as in that study, nitroglycerine tablets were used instead of aerosol preparation which is used in our study and the pharmacological phase was of 25 minutes. In our study the pharmacologic phase was of 15 minutes and the results of time to syncope are comparable to the study by Raviele et al[13]. In a study conducted by Nava et al the total time to syncope was 18.87±6.7 including the nitroglycerine provocation phase[6]. This is comparable to the total time to syncope of our study which was 17.89± 6.99. In a research conducted by Parakash et al on the diagnostic evaluation of the presyncope and syncope the time to syncope was 26±12 minutes[14]. The protocol for tilt in that study was of longer duration which is still longer for the total duration of our study. In our study nitroglycerine was used in an aerosol preparation. The results obtained might be because of the better bioavailability and uniform absorption of the nitroglycerine.

Thus it can be concluded from the results of the present study, that the drug administered phase can be reduced to 12±3 or 15 minutes. The mean time to symptom reproduction in patients can be reduced as compared to the conventional protocols being practiced.

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