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Original Article
Vasovagal Syncope
Pak Armed Forces Med J 2019; 69 (Suppl-3): S375-78

DURATION OF HEAD UP TILT TEST FOR EVALUATION OF VASOVAGAL SYNCOPE

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ABSTRACT

Objective: To find out the optimum duration of Head up tilt test (HUTT) to produce a positive response in patients with vasovagal syncope.

Study Design: Descriptive cross sectional study.

Place and Duration of Study: Cardiac Electrophysiology department, Armed Forces Institute of Cardiology/ National Institute of Heart Disease (AFIC/NIHD) Rawalpindi, from Jan 2016 to Dec 2017.

Methodology: Record of patients who underwent HUTT during this period was analyzed. The timing of positive vasovagal response was noted. Positive response was further classified as vasodepressor, cardio inhibitory or mixed.

Results: 1878 patients participated in the study. 1626 (86.6%) developed a positive response to head up tilt test. 455 (28%) patients showed a positive response during the passive phase while 1171 (72%) patients developed a positive response during the provocation phase with sublingual nitroglycerine. More than 96% patients with positive tilt test had done so within 40 minutes of the test (10 minutes into the drug provocation phase).

Conclusion: Majority of positive responses occurred between 10 minute and 30-minute interval in the passive phase, and in the first 10 minute of drug provocation phase. Thus, the drug provocation phase can be shortened to 15 minutes and even up to 10 minutes with slight loss of sensitivity.

Keywords: Head-up tilt test, Syncope, Vasovagal syncope.

INTRODUCTION

Syncope is transient loss of consciousness resulting from transient reduction in cerebral perfusion and is characterised by a sudden onset and rapid recovery[1]. Syncope is common in the general population with reported prevalence of 15-23%[2].

Vasovagal syncope is the most common variety of syncope and is often precipitated by emotional or adrenergic stimuli. However, vasovagal syncope may also occur without any trigger or warning symptoms. Head-up tilt test (HUTT) is a valuable test in the diagnosis of patients with syncope of uncertain origin and helps to differentiate various types of syncope[3, 4].

Different HUTT protocols with various pharmacological agents and duration of test have been used with variable results[5-8]. Most protocols use two stages; A passive phase followed by a provocation phase. Drug like nitroglycerine or isoproterenol is used to potentiate a positive response during the provocation phase. An optimum duration of HUTT is important; a premature termination of test will result in underestimation of cardio inhibitory response while a prolonged test will potentially lead to adverse effects of sustained cerebral hypoperfusion. There is no consensus regarding optimum duration of tilt test. We wanted to assess the optimum duration of HUTT and analysed the duration at which positive result was elicited in patients with vasovagal syncope.

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METHODOLOGY

Descriptive cross sectional study was conducted at Department of Cardiac Electrophysiology, Armed Forces Institute of Cardiology/ National Institute of Heart Disease (AFIC/NIHD) Rawalpindi conducted from Janurary 2016 to December 2017.

All patients between 15-80 years with at least one episode of syncope or presyncope were

included in study while Patients with structural heart disease (left ventricular outflow obstruction[9], severe mitral stenosis), Patients with known drug allergy to nitrates, Patients with severely impaired left ventricular systolic function (ejection fraction less than 35%) and patients with known epilepsy. Non probability consecutive sampling technique was used. Prior Approval was taken from Institutional ethical Reviwe Board (IERB) of AFIC/NIHD. An informed consent was taken before conducting tilt test in all patients.

Record of patients who underwent HUTT during this period was analyzed. The timing at which positive vasovagal response was seen was noted.

Positive HUTT: If patients developed syncope, presyncope, a sudden fall in systolic blood pressure less than 70 mm Hg or a sudden drop in heart rate less than 50 beats per min, the test was labelled as positive.

Vasodepressor response was defined as fall in systolic blood pressure less than 70 mm Hg without a significant reduction in heart rate (less than 10% of the peak value).

Cardio-inhibitory response was defined as a reduction in heart rate less than 50 beats /min with or without asystole.

Mixed response was defined as a fall in both heart rate and blood pressure[3,11].

Head-up tilt test Protocol

All patients referred for evaluation of syncope to cardiac electrophysiology department AFIC/NIHD were evaluated by history, clinical examination, electrocardiogram, transthoracic echocardiography and 24-hour Holter monitoring. An informed consent was taken from all patients. The test was conducted after 4-hour fast in a dimly lit quiet room. Italian protocol with 55-minute duration was employed for HUTT5,[10].

Patients were placed in supine position for 5 minutes (stabilization phase). Baseline blood pressure (systolic, diastolic and mean) and heart rate were recorded. Minute to minute blood pressure recording was done with digital sphygmomanometer and continuous surface ECG recording was monitored. Patients were then tilted to 70o for 30 minutes (passive phase). Patients who did not show symptoms of syncope or presyncope in passive phase were subjected to provocation phase with 500 mcg sublingual nitroglycerin (Angised R-GSK).

Test Interruption: Patients developing syncope or presyncope during the test were promptly made to lie down. The test was also stopped on development of any adverse effect, arrhythmia or on request of the patient.

RESULTS

A total of 1878 patients participated in the study out of which 1538 (81.9%) were males. The mean age of patients was 42.6 ± 18.4 years. Majority of the patients (73.2%) had up to five episodes of syncope (fig-1).

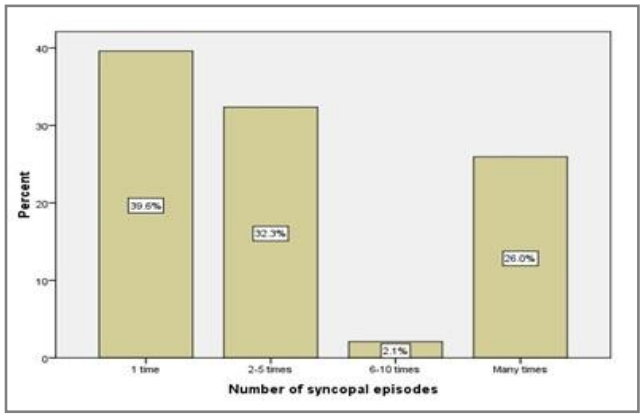

Figure-1: Number of syncopal episodes.

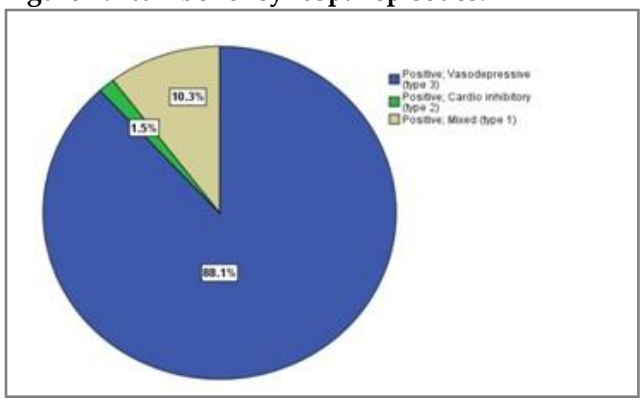

Figure-2: Type of response during tilt test.

Two hundered fifty two patients (13.4%) had a negative tilt test while 1626 (86.6%) had positive response to tilt test. Majority of patients had a va-

sodepressor response followed by mixed response while cardio inhibitory response was seen in only 25 (1.5%) patients with a positive tilt test (fig-2) 455 (28%) patients developed a positive response to tilt test during the passive phase while 1171 (72%) patients showed a positive response during the provocation phase with sublingual nitroglycerine. The percentages of patients during passive and provocation phase showing positive result are shown in fig-3. More than 96%

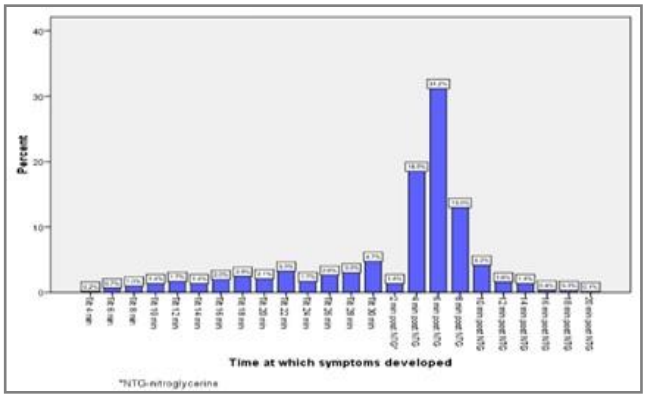

Figure-3: Time of positive response.

patients with positive head up tilt test had done so within 40 minutes of the test (10 minutes into the drug provocation phase). Patients developed no major or life threatening complications during the procedure.

DISCUSSION

We found that 28% of patients with positive head up tilt test developed positive response within the passive phase of first 30 minutes while 72% developed positive response during the drug provocation phase of 20 minutes. In fact, more than 96% patients with positive head up tilt test had done so within 40 minutes of the test (10 minutes into the drug provocation phase). Sixty Eight percent of patients showed positive response during the first 10 minutes after sublingual glyceryl trinitrate while only 3.8% patients were added in the last 10 minutes. This shows that lengthening the head up tilt test protocol beyond 40 minutes was not very productive as far as the positive responses is concerned. Only 3.2% patients had developed a positive response in the first 10 minutes of passive phase.

We also found that in our study 86.6% patients had a positive test with the majority developing a vasodepressor response.

Head up tilt test is a cornerstone in the evaluation of syncope. The European society of cardiology guidelines recommend that tilt testing should be considered for evaluation of patients with suspected reflex syncope[4]. Current opinion suggests that positive tilt test should be seen as hypotensive susceptibility rather than a diagnosis[12, 13].

Various protocols are employed with varying duration of the passive and provocation phases.

The standard Italian protocol is 20-minute passive and 15-minute drug provocation phase[5]. The Newcastle protocol is 40-minute passive and 10-minute drug provocation[6].

The West minster protocol is 60 minute[14]. The European society of cardiology recommends passive phase of tilt of at least 20 min duration and a maximum of 45 min[4]. Clomipramine[15], front loaded glyceryl trinitrate[16] and low dose isoproterenol[17] have also been used for drug provocation in some protocols.

Our findings are similar to that of Liu *et al*[18] who found that majority of positive reactions occurred between 10 and 25 minutes of passive phase. During the nitroglycerin phase, the number of positive responses increased dramatically peaking at 10 minutes. Most positive reactions (96.1%) occurred in the first 15 minutes of provocation phase.

In another study evaluating the optimal duration of head up tilt test after administration of nitroglycerin spray, Javier Lacunza Ruiz *et al*[19] found that most positive responses were concentrated in the 3 to 5 min after drug administration. We agree, in the light of our findings, that the duration of drug provocation phase can be shortened to 15 minutes without loss of sensitivity. A further reduction of provocation phase to 10 minutes can be acceptable with slight loss of sensitivity.

A randomized cross-over trial[10] found that a shorter 25 minute duration front-loaded glyceryl trinitrate protocol was less sensitive but equally specific as compared to a 55 minute Italian protocol of head up tilt test.

Our Study included a large number of patients as compared to these studies listed above making the results robust.

The co-morbids and the medications of the patients were not accurately recorded at enrolment making it a limitation of our study. The blood pressure recording was done at 2-minute intervals which should ideally be done continuously or at one-minute intervals. We did not identify the clinical triggers for syncope as the presence of clinical triggers increases the positivity of head up tilt test and influences the type of response[20]. It is also not clear whether further prolongation of the head up tilt test protocol will lead to a further increase in the number of positive responses. However, only 0.8% positive responses in the last 6 minutes of provocation phase show that any such increase in positive responses with further prolongation of the protocol will be minute.

To summarize, in our study we found that majority of positive responses occurred between 10 minute and 30-minute interval in the passive phase, and in the first 10 minute of drug provocation phase. Thus, the drug provocation phase can be shortened to 15 minutes and even up to 10 minutes with slight loss of sensitivity.

CONCLUSION

The majority of positive responses in head up tilt test occur in the first 10 minutes of drug provocation phase. Therefore, to make the test less time consuming and labor intensive, the provocation phase can be reduced to 10 minutes in high volume centres to benefit maximum number of patients.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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