

Background Syncope is one of the main diseases threatening the public health. The causes of syncope include cardiac syncope, reflex syncope, orthostatic hypotension, brain-derived syncope, metabolic, psychogenic syncope etc. The definition and classifications of syncope was updated by European Society of Cardiology in 2009. Based on the new guidelines of syncope, the causes of syncope can be divided into three main reasons: cardiac syncope, reflex syncope, orthostatic hypotension. Exclude the unexplained syncope, vasovagal syncope is now accepted as the most common cause of syncope. Head-up tilt-table testing (HUT) has become an important tool to diagnosis and evaluation VVS. Now few studies for syncope of hospitalised patients can be found.

Objective (1) Assess the causes and compositions of hospitalised patients whose discharge diagnosis had syncope. (2) We sought to determine whether there are age-related differences of haemodynamics in vasovagal syncope patients. (3) We also sought to determine whether VVS can be diagnosed and predicted according to the history, physical examination and auxiliary examinations (electrocardiogram, Holter, echocardiography).

Methods A retrospective analysis was undertaken in 754 patients diagnosed with syncope who had been admitted to Peking University People's Hospital from January 1990 to March 2011. Clinical characteristics of patients and the reasons of syncope were collected. (1) Based on the new guidelines of syncope in 2009, analysis of the causes (including cardiac syncope, reflex syncope, orthostatic hypotension and unexplained syncope) and compositions of syncope was done. According to age, all the patients were divided into three age groups (≤ 45 years, 45–65 years, > 65 years), we compared the distributions of different causes of syncope among the three age groups. (2) 142 cases of VVS patients whose diagnosis and classification were clearly defined were selected. According to age, the patients were divided into three age groups (≤ 45 years, 45–65 years, > 65 years), we compared the distributions of different types of VVS (cardipinhibitory response, pure vasodepression, mixed response) among the three age groups. (3) 231 patients who had undergone the process of HUT were divided into HUT (+) group and HUT (–) group, we compared the gender, ages, prodrome syndromes (including blurred vision, palpitations, nausea/vomiting), related histories (hypertension, cervical spondylosis, cerebral infarction and drinking histories), electrocardiogram indexes (heart rate, the duration of P wave and QRS wave, PR interval period, QTC) between the two groups. And then analyse the correlation of HUT (+) and the clinical and electrocardiogram indexes mentioned above. (4) 110 patients who had records of Holter examination were studied, we compared the Holter characteristics (including heart rate, the average of heart rate, the fastest and the slowest heart rate, time domain index of heart rate variability SDNN) between the HUT (+) group and the HUT (–) group respectively. And then analyse the correlation of HUT (+) and the Holter indexes mentioned above. (5) 194 patients who had records of echocardiography examination were studied, we compared the echocardiography characteristics (including E peak, A peak, E/A, LA, LV, EF) between the HUT (+) group and the HUT (–) group respectively. And then analyse the correlation of HUT (+) and the echocardiography indexes mentioned above. (5) 142 patients who had positive response of HUT were studied. Their haemodynamic responses (including the changes of systolic/diastolic blood pressure heart rate) during tilt-induced collapse in different age groups (≤ 45 years, > 45 years) were analysed.

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RESEARCH FOR 754 HOSPITALISED PATIENTS WITH SYNCOPE AND ANALYSE THE RELATED FACTORS OF VASOVAGAL SYNCOPE

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Results (1) Seven hundred and four of 754 patients can be defined as syncope according to the latest guidelines. The causes and the compositions of syncope were cardiac syncope (13.6%), reflex syncope (28.4%), orthostatic hypotension (3.0%) and unexplained syncope (54.8%). VVS accounted for 20.9% in all patients. (2) The proportion of cardiac syncope, reflex syncope, orthostatic hypotension, unexplained syncope in patients ≤ 45 years were 8.0% versus 24.2% versus 3.0% versus 64.8% respectively; and in patients 45–65 years (include 65 years) were 11.0% versus 38.0% versus 1.6% versus 49.4% respectively; and in patients > 65 years were 25.8% versus 21.1% versus 4.9% versus 48.1% respectively. The distributions of different causes of syncope among the three age groups were statistically significant ($p < 0.001$). (3) Because only one of the 142 VVS patients was cardiac inhibitory type, so we just compare the distributions of vascular decompression and mixed type of VVS among the age groups. The proportion of vascular decompression and mixed type in patients ≤ 45 years were 83.3% versus 16.7% respectively, and in 45–65 years (include 65 years) were 70.5% versus 29.5% respectively, and > 65 years were 90.5% versus 9.5% respectively. The distributions of different types of VVS among the three age groups were not statistically significant ($p = 0.68$). (4) HUT(+) was age related (OR 0.98, 95% CI 0.962 to 1.000, $p = 0.044$). This research did not find that HUT (+) was associated with gender, prodrome syndromes (including blurred vision, palpitations, nausea/vomiting), histories (hypertension, cervical spondylosis, cerebral infarction and drinking histories). (5) Adjusting for age and gender, HUT (+) was not related with electrocardiogram indexes (heart rate, the duration of P wave and QRS wave, PR interval period, QTC). (6) Adjusting for age and gender, HUT (+) was related with time domain index of heart rate variability SDNN. Compared the patients of SDNN HUT (+) was related with E peaks (OR 0.13, 95% CI 0.033 to 0.564). The lower the E peaks' value, the higher risk of HUT(+). This research did not find that HUT(+) was associated with A peak, E/A, LA, LV and EF values. (8) Compared with the patients of less than 45 years old, the patients of VVS older than 45 years old systolic blood pressure dropped more significantly when syncope occurred (4.47+24.7 vs 54.1+27.1, $p = 0.045$).

Conclusions (1) Among hospitalised patients whose discharge diagnosis include syncope, in addition to unexplained syncope, VVS is the most common type of syncope. (2) In addition to unexplained syncope, among the hospitalised patients who were older than 65 years old, cardiac syncope was the most common cause of syncope. Reflex syncope was prevalent in patients who were less than 65 years old. (3) The distributions of vascular decompression and the mixed type of VVS among the three age groups (≤ 45 years, 45–65 years, > 65 years) were not significant. (4) The occurrence of VVS was age-related, young patients had a higher risk of VVS The occurrence of VVS was not associated with gender, prodrome syndromes, relevant histories and the electrocardiogram indexes that were checked after the admission to the hospitals, these results suggest that the gender, prodrome syndromes, relevant histories and electrocardiogram indexes have limited values to diagnosis and prediction the syncope of VVS (5) VVS was related with time domain index of heart rate variability SDNN, SDNN values that checked on basic conditions may have some values to diagnosis and predict the occurrence of VVS (6) HUT (+) was related with E peaks. The lower the E peaks' values, the higher risk of HUT (+), this result suggests that echocardiography index (E peaks) that checked on based states may

have a certain value for diagnosis and predict the occurrence of VVS (7) The haemodynamic changes of VVS patients were age related, compared with the patients of less than 45 years old, the patients with VVS and older than 45 years had systolic blood pressure that dropped more significantly when syncope occurred.