
**Adenosine 5'-Triphosphate Test in the Management of Patients With Syncope.**

Flammang D¹, Benditt DG, Church TR, Pelleg A.

**Abstract**

The response to adenosine 5'-triphosphate (ATP) identifies patients with syncope who might benefit from pacemaker therapy (ATP test). Two measures have been used to determine the outcome of the ATP test, which have lead to contrasting conclusions regarding its utility: (1) the duration of cardiac pause (CP) mainly due to AV block and (2) the longest RR interval (RRmax). We tested the hypothesis that the discrepancy regarding the utility of the ATP test is mainly because of the different way the 2 measures determine the outcome of the test. Post hoc analysis was applied to data obtained from patients with syncope (n = 33) with a positive and negative ATP test based on the CP duration and RRmax, respectively, subjected to pacemaker therapy. In 19 and 14 patients, the pacemaker was programmed to function as AAI pacing at 30 ppm (control) and as DDD pacing at 70 ppm, respectively. During the follow-up period of 17.0 ± 8.6 months, syncope recurred in only 1 of the 14 patients with DDD pacing; in contrast, 10 of 19 patients with AAI30 pacing experienced syncope within the first 5.3 ± 5.2 months of follow-up (P < 0.009; recurrence rate). The ATP test, the outcome of which is determined by the CP measure, is a useful diagnostic test for the identification of patients with bradycardic syncope who may benefit from pacemaker therapy; the identification of such patients would be missed when the RRmax measure is used to determine the outcome of the test. The efficacy of DDD pacing suggests that atrioventricular nodal conduction block is the primary cause of syncope in patients with a positive ATP test based on the CP measure.

Heart Rhythm. 2015 Feb 12.

**Orthostatic Hypotension of Unknown Cause: Unanticipated Association with Elevated Circulating N-Terminal Brain Natriuretic Peptide (NT-proBNP).**

Krishnan B¹, Patarroyo-Aponte M¹, Duprez D¹, Pritzker M¹, Missov E¹, Benditt DG².

**Abstract**

**BACKGROUND:**

The pathophysiology of orthostatic hypotension (OH) is multifactorial with the most frequent causes being adverse effects of cardioactive drugs. In 20%-40% of cases, the etiology is unknown. In recent reports altered levels of endogenous neuropeptides have been observed in non-cardiac syncope, but B-type natriuretic peptide (BNP) and its amino-terminal cleavage fragment (NT-proBNP) have not been studied.

**OBJECTIVE:**

The aim of this study is to assess the possibility that BNP with its diuretic and vasorelaxant properties could contribute to OH.
METHODS:

This prospective observational study comprised 85 consecutive OH subjects (58 women, age 49±23 years) referred to a tertiary care syncope clinic. All patients had normal LV systolic and diastolic function, and clinical and laboratory findings consistent with euvoolemia or modest hypovolemia. In 45/85 (53%) individuals an OH cause was determined.

RESULTS:

Among the remaining 40 patients (21 women, age 57±16 years) with OH of unknown cause, 6/40 (15%) exhibited unexpectedly elevated plasma NT-proBNP levels (14000, 5210, 2570, 7990, 3480, and 6680 pg/ml). By contrast, NT-proBNP values were normal (i.e., <300 pg/ml) in the remaining 34 patients with OH of unknown cause and 45 patients with OH of known etiology. At 8 to 12 months follow-up, volume repletion therapy requirements in patients with initial increased NT-proBNP diminished in conjunction with gradual fall of NT-proBNP concentrations.

CONCLUSIONS:

In select patients markedly elevated levels of BNP or NT-proBNP may be associated with and possibly contribute to symptomatic OH.


Impact of Transient Hypotension on Regional Cerebral Blood Flow in Humans.

Lewis NC, Smith KJ, Bain AR, Wildfong KW, Numan T, Ainslie PN.

Abstract

We examined the impact of progressive hypotension with and without hypocapnia on regional extracranial cerebral blood flow and intra-cranial velocities. Participants underwent progressive lower-body negative pressure until pre-syncope to inflict hypotension. End-tidal carbon dioxide was clamped at baseline levels (isocapnic trial) or uncontrolled (poikilocapnic trial). Middle and posterior cerebral artery blood velocities (transcranial Doppler), heart rate, blood pressure and end-tidal carbon dioxide were obtained continuously. Measurements of internal carotid artery and vertebral artery blood flow were also obtained. Overall, blood pressure was reduced by ~20% from baseline in both trials (P<0.001). In the isocapnic trial, end-tidal carbon dioxide was successfully clamped at baseline with hypotension, whereas in the poikilocapnic trial it was reduced by 11.1 mm Hg (P<0.001) with hypotension. The decline in the internal carotid artery blood-flow with hypotension was comparable between trials (-139 ± 82 ml; ~30%; P<0.0001); however, the decline in the vertebral artery blood flow was -28 ± 22 ml/min (~21%) greater in the poikilocapnic trial compared with the isocapnic trial (P=0.002). Regardless of trial, the blood flow reductions in internal carotid artery (-26 ± 14%) and vertebral artery (-27 ± 14%) were greater than the decline in middle cerebral artery (-21 ± 15%) and posterior middle cerebral artery velocities (-19 ± 10%), respectively (P≤0.01). Significant reductions in the diameter of both the ICA (~5%) and VA (~7%) contributed to the decline in cerebral perfusion with systemic hypotension, independent of hypocapnia. In summary, our findings indicate that blood flow in the VA, unlike the ICA, is sensitive
to changes hypotension and hypocapnia. We show for the first time that the decline in global CBF with hypotension is influenced by arterial constriction in the ICA and VA. Additionally, our findings suggest TCD measures of blood flow velocity may modestly underestimate changes in CBF during hypotension with and without hypocapnia, particularly in the posterior circulation.


Diagnostic utility of carotid artery duplex ultrasonography in the evaluation of syncope: a good test ordered for the wrong reason.

Kadian-Dodov D1, Papolos A1, Olin JW2.

Abstract

AIMS:

Syncope refers to a transient loss of consciousness and postural tone secondary to cerebral hypoperfusion. Guidelines recommend against neurovascular testing in cases of syncope without neurologic symptoms; however, many pursue carotid artery duplex ultrasonography (CUS) due to the prognostic implications of identified cerebrovascular disease. Our objective was to determine the diagnostic utility of CUS in the evaluation of syncope and the identification of new or severe atherosclerosis with the potential to change patient management.

METHODS AND RESULTS:

We reviewed records of 569 patients with CUS ordered for the primary indication of syncope through an accredited vascular laboratory at an academic, urban medical centre. Findings on CUS, patient demographic, clinical and laboratory information, and medications within 6 months of the CUS exam were reviewed. Bivariate relationships between key medical history characteristics and atherosclerosis status (known vs. new disease) were examined. Among 495 patients with complete information, cerebrovascular findings could potentially explain syncope in 2% (10 patients). Optimization of cardiovascular risk factors would benefit patients with known (56.6%) and new atherosclerosis (33.5%) with suboptimal lipid control, (LDL > 70 in 42.2 and 34.9% respectively; LDL > 100 in 15.7 and 20.4%), and those not on high-intensity statin therapy (80 and 87.5%) or antiplatelet medications (13.2 and 50.6%).

CONCLUSION:

CUS is a low-yield diagnostic test in the evaluation of syncope, but it is useful in the diagnosis of atherosclerosis and identification of subjects who would benefit from optimal medical therapy.

QJM. 2015 Jan 27.

Syncope causes transient focal neurological symptoms.
Abstract

The prevalence of focal neurology (FN) as a consequence of syncope is unknown. The aim of the study was to determine its prevalence, risk factors and short-term consequences. A consecutive sample of syncope-unit attendees during a 9-month period had detailed diagnostic syncope evaluation as per European Cardiac Society guidelines coupled with assessment for FN present during syncope/pre syncope by screening questionnaire, follow up interview and neuroimaging (1.5T MRI). All participants were followed up for 24 months. Risk factors for FN were identified by comparing FN cases with syncope controls without FN (3:1 ratio). 540 consecutively attended for investigation of syncope (n=401) and pre syncope (n=139). Thirty-one (5.7%) had FN events during hypotensive symptoms, mean age 49 years (19-85). The majority of FN cases had vasovagal syncope (VVS); 22 (71%), while 8 had OH (25.8%), and one (3.2%) had cardiac arrhythmia. Median duration of FN was 15 minutes (IQR 34.5). MRI in 28 (90%) was normal and in 3, old cerebral infarction was evident. Risk factors for FN/syncope were frequent syncope (p=0.008), childhood syncope (p=0.005), and delayed diastolic recovery during active stand (p=0.02). During 24-month follow-up and targeted intervention, no patients developed recurrence of FN. One in 20 patients with syncope/presyncope have co-extant focal neurology, which during 24-month follow-up, does not progress to a persistent deficit (>24 hours). Awareness of co-occurrence of FN and syncope is important as stroke misdiagnosis results in aggressive anti-hypertensive management and future events may ensue.

Echocardiography. 2015 Jan 2.

Prognostic Value of Stress Echocardiography in Patients Presenting with Syncope.

Po JR, Chaudhry FA, Balasundaram K, Shami W, Penesetti S, Kommaraju KK, Mohareb S, Patel S, Agarwal V, Argulian E.

Abstract

BACKGROUND:

Evaluation for ischemia is appropriate in patients at risk for or with a history of coronary artery disease presenting with syncope. The aim of this study is to determine the prognostic value of stress echocardiography in patients presenting with syncope.

METHODS:

We examined our database of all patients undergoing stress echocardiography at our institution. Patients referred due to syncope were grouped as high risk based on any of the following: (1) known history of coronary artery disease, (2) left ventricular ejection fraction <50%, (3) moderate or severe mitral or aortic valve regurgitation, and (4) moderate mitral or aortic valve stenosis. The main outcomes were the presence of ischemia on stress imaging and all-cause mortality using the social security death index.

RESULTS:
A total of 225 patients were identified; mean age was 64.3 ± 14.5 years, the mean follow-up duration was 29.2 ± 13.8 months. There were 163 patients in the low-risk group and 62 patients in the high-risk group. On imaging, 7% of the overall cohort had ischemia. The low-risk group had 5 (3%) patients with ischemia and the high-risk group had 10 patients (16%) with ischemia (P < 0.01). The mortality rate was significantly higher in the high-risk group (3.99%/year vs. 1.02%/year; P = 0.02); this difference was not affected by the presence of ischemia.

CONCLUSIONS:

High-risk patients with syncope as defined by appropriateness criteria and existing evidence carry a higher risk of ischemia and all-cause mortality. The presence of ischemia may not be predictive of long-term outcome in this group.


Journal Club: Head CT scans in the emergency department for syncope and dizziness.

Mitsunaga MM1, Yoon HC.

Abstract

OBJECTIVE:

The purpose of this study was to determine the yield of acutely abnormal findings on head CT scans in patients presenting to the emergency department with dizziness, near-syncope, or syncope and to determine the clinical factors that potentially predicted acutely abnormal head CT findings and hospital admission.

MATERIALS AND METHODS:

We retrospectively reviewed the electronic medical records of all patients presenting to an HMO emergency department between July 1, 2012, and December 31, 2012, who underwent head CT for a primary complaint of dizziness, syncope, or near-syncope. The primary outcomes were head CT scans with acutely abnormal findings and hospital admission. Binary logistic regression was used to assess the association between clinical variables and acute head CT findings and between clinical variables and hospital admission.

RESULTS:

Of the 253 patients who presented with dizziness, 7.1% had head CT scans with acutely abnormal findings, and 18.6% were admitted. Of the 236 patients who presented with syncope or near-syncope, 6.4% had head CT scans with acutely abnormal findings, and 39.8% were admitted. The following three clinical factors were found to be significantly correlated with acutely abnormal head CT findings: a focal neurologic deficit (p = 0.003), age greater than 60 years (p = 0.011), and acute head trauma (p = 0.026).

CONCLUSION:
Our results suggest that most patients presenting with syncope or dizziness to the emergency department may not benefit from head CT unless they are older, have a focal neurologic deficit, or have a history of recent head trauma.


**Fit elderly men can also stand: orthostatic tolerance and autonomic cardiovascular control in elderly endurance athletes.**

Mellingsæter MR, Wyller TB, Ranhoff AH, Wyller VB.

**Abstract**

**BACKGROUND AND AIMS:**

Endurance training may reduce orthostatic tolerance. Elderly people are prone to orthostatic intolerance, but the impact of endurance training in old age has been insufficiently explored.

**METHODS:**

54 healthy men; 30 endurance athletes and 24 controls, free from medication and chronic diseases, were subjected to head-up tilt tests: 30º for 10 min and 70º for 40 min. Non-invasive recordings of blood pressures, heart rate, stroke volume, end diastolic volume, total peripheral resistance, heart rate variability, blood pressure variability, and baroreflex sensitivity were obtained. We registered terminations of test due to frank syncope or unbearable presyncopal symptoms.

**RESULTS:**

Mean age 71 years (range 65-84); athletes had lower body mass index (23.4 versus 24.8, p < 0.05) and lower resting heart rate (50 versus 61, p < 0.01). Blood pressures and total peripheral resistance were equal. End diastolic volume index, baroreflex sensitivity, and heart rate variability were higher among athletes, both HF-RRI (high-frequency variability, reflecting parasympathetic activity) and LF-RRI (low-frequency variability, reflecting both sympathetic and parasympathetic activity). Syncope or presyncopal symptoms occurred in 11 persons, 4 athletes and 7 controls (p = 0.2). Cox Regression analysis showed that higher heart rate at rest was the only variable associated with syncope.

**DISCUSSION:**

Orthostatic tolerance was not reduced among elderly endurance athletes. Rather, there was a trend towards better orthostatic tolerance, which might be attributed to stronger parasympathetic cardiovascular control and larger blood volume.

**CONCLUSIONS:**

Better orthostatic tolerance might be an additional benefit of physical activity in older age.
Recent syncope and unexplained falls are associated with poor cognitive performance.

Frewen J¹, King-Kallimanis B¹, Boyle G², Kenny RA¹.

Abstract

OBJECTIVE:

to compare cognitive performance in participants with and without syncope and unexplained falls in a large population representative sample aged 50 years or older.

METHODS:

participants of the Irish longitudinal study on ageing (TILDA) were studied. Participants with a history of syncope and/or unexplained falls in the past 12 months were compared with those with no reported events. Cognitive performance was measured using the Montreal cognitive assessment (MoCA) score. Multivariate linear regression analysis controlling for potential confounders was performed to compare cognitive function by syncope and falls status.

RESULTS:

five thousand eight hundred and forty-six participants were analysed, median age 62 years (inter-quartile range = 14), and 54% were female. Five hundred and forty-nine (9.4%) had a syncopal event and/or an unexplained fall in past 12 months. One hundred and two (1.8%) subjects had two-plus syncopal events in the same period. There was a significant association between syncope/falls history and lower MoCA score, following adjustment for all confounders (B = -0.4; -0.69, -0.11; P = 0.006). Higher syncope burden was also associated with lower performance; however, this was largely explained by confounders. There was no age interaction with these findings.

CONCLUSION:

participants who experienced syncope and/or non-accidental falls in the previous year have poor global cognitive performance compared with case-controls. There was no effect of age on our results. Further investigation of the association between syncope burden, unexplained falls and cognitive decline is required to establish a relationship between these disorders.


Predictors of cardiovascular autonomic neuropathy in patients with type 1 diabetes.

Tannus LR¹, Drummond KR¹, Clemente EL¹, da Matta Mde F¹, Gomes MB¹; Brazilian Type 1 Diabetes Study Group (BrazDiab1SG).

Abstract
Cardiovascular disease (CVD) is the leading cause of mortality in patients with type 1 diabetes (T1D). The cardiovascular autonomic neuropathy (CAN), although considered as an independent risk factor for CVD, remains underdiagnosed. The aim of this paper was to determine the prevalence, predictors of CAN in patients with T1D and its association with other chronic complications of diabetes. Patients with T1D underwent a clinical-epidemiological survey, had blood and urinary samples collected, performed ophthalmoscopic and clinical neurological examination and cardiovascular reflex tests. One hundred and fifty one patients with T1D, 53.6% female, 45.7% Caucasian, mean age of 33.4 ± 13 years, diabetes duration of 16.3 ± 9.5 years, and glycated hemoglobin levels of 9.1 ± 2% were evaluated. The prevalence of CAN in the studied population was 30.5%. CAN was associated with age (p = 0.01), diabetes duration (p = 0.036), hypertension (p = 0.001), resting heart rate (HR) (p = 0.000), HbA1c (p = 0.048), urea (p = 0.000), creatinine (p = 0.008), glomerular filtration rate (p = 0.000), urinary albumin concentration (p = 0.000), LDL (p = 0.048), free T4 (p = 0.023), hemoglobin (p = 0.01) and presence of retinopathy (p = 0.000), nephropathy (p = 0.000) and diabetic neuropathy (p = 0.000), the following symptoms syncope (p = 0.000), post prandial nausea (p = 0.042), early satiety (p = 0.031), sexual dysfunction (p = 0.049), and gustatory sweating (p = 0.018). In logistic regression model, it was observed that only resting HR, diabetic neuropathy, and retinopathy were independent associated with CAN. In conclusion, CAN is a common chronic complication of T1D affecting about 30% of the studied population and is associated with the presence of other chronic complications. Indicators of CAN included age, diabetes duration, hypertension, resting HR, diabetic neuropathy and retinopathy, and symptoms suggestive of autonomic neuropathy. This study confirms the importance of systematic and early screening for CAN.


Syncope recurrence and mortality: a systematic review.

Solbiati M1, Casazza G2, Dipaola F3, Rusconi AM4, Cernuschi G4, Barbic F3, Montano N4, Sheldon RS5, Furlan R3, Costantino G4.

Abstract

AIMS:

Data on adverse events and death rates following syncope are heterogeneous among studies, and knowledge of syncope prognosis could help to better define the correct management of patients.

METHODS AND RESULTS:

We performed a systematic review of literature by searching for prospective observational studies enrolling consecutive patients presenting to the Emergency Department because of syncope. The outcomes considered were syncope recurrence and short- and long-term mortality. Morbidity and a composite of morbidity and mortality were also assessed. Pooled event rates and 95% confidence intervals (CI) were calculated for each outcome using the random effects model. Twenty-five studies (11 158 patients) were included. The incidence of syncope relapse linearly increased from 0.3% at 30 days to 22% at 2 years follow-up. One-year mortality rate varied between 5.7 and 15.5%; the pooled estimate was 8.4% (95% CI: 6.7-10.2%). The incidence of adverse events (morbidity) varied between 6.1 and 25.2% at 10 days and 2 years, respectively. The
short-term (10 days) pooled incidence of the composite of morbidity and mortality was 9.1% (95% CI: 6.6-12.5%). We found a high statistical heterogeneity between studies.

CONCLUSION:

This meta-analysis of prospective observational studies shows that the chance of being asymptomatic linearly progressively decreased over time after the first syncope. Short-term (10-30 days) mortality after syncope was <2% and that the overall 10-day rate of the composite endpoint of death and major events was ~9%. The knowledge of syncope prognosis could help clinicians to understand syncope patients' prognosis and researchers to design future studies.


Diagnostic and Prognostic Value of High-sensitivity Cardiac Troponin T in Patients with Syncope.

Christ M1, Geier F2, Popp S2, Singler K3, Smolarsky A4, Bertsch T5, Müller C6, Greve Y2.

Abstract

OBJECTIVE:

We examined the diagnostic and predictive value of high-sensitivity cardiac troponin T (cTnThs) in patients with syncope.

METHODS:

We performed an analysis of consecutive patients with syncope presenting to the emergency department. The primary end point was the accuracy to diagnose a cardiac syncope. In addition, the study explored the prognostic relevance of cTnThs in patients with cardiac and noncardiac syncope.

RESULTS:

A total of 360 patients were enrolled (median age, 70.5 years; male, 55.8%; 23.9% aged >80 years). Cardiac syncope was present in 22% of patients, reflex syncope was present in 40% of patients, syncope due to orthostatic hypotension was present in 20% of patients, and unexplained syncope was present in 17.5% of patients. A total of 148 patients (41%) had cTnThs levels above the 99% confidence interval (CI) (cutoff point). The diagnostic accuracy for cTnThs levels to determine the diagnosis of cardiac syncope was quantified by the area under the curve (0.77; CI, 0.72-0.83; P < .001). A comparable area under the curve (0.78; CI, 0.73-0.83; P < .001) was obtained for the predictive value of cTnThs levels within 30 days: Patients with increased cTnThs levels had a 52% likelihood for adverse events, patients with cTnThs levels below the cutoff point had a low risk (negative predictive value, 83.5%). Increased cTnThs levels indicate adverse prognosis in patients with noncardiac causes of syncope, but not in patients with cardiac syncope being a risk factor for adverse outcome by itself.

CONCLUSIONS:
Patients with syncope presenting to the emergency department have a high proportion of life-threatening conditions. cTnThs levels show a limited diagnostic and predictive accuracy for the identification of patients with syncope at high risk.


Near-infrared Spectroscopy to Assess Cerebral Perfusion during Head-up Tilt-table Test in Patients with Syncope.

Ayers MD¹, Lawrence DK.

Abstract

OBJECTIVE:

Neurocardiogenic syncope (NCS) is the most common cause of syncope in children and adolescents. Neurocardiogenic syncope occurs secondary to cerebral hypotension because of bradycardia, hypotension, or both. Head-up tilt-table test (HUTT) is the primary diagnostic test. Near-infrared spectroscopy (NIRS) is a noninvasive technology that directly monitors trends in regional tissue oxygen saturations over a specific body region. Placing an NIRS probe over the temporal region allows an indirect measurement of cerebral perfusion. Our hypothesis is that regional tissue oxygen saturation will decrease during an NCS episode and will remain stable in patients without syncope.

PATIENTS AND DESIGN:

The investigators conducted a retrospective review of all HUTT utilizing cephalic NIRS performed at our institution from August 2012 to January 2013. Tests were classified as positive, negative, or psychogenic reactions. Paired t-test was used to determine statistical significance of NIRS changes and one-way analysis of variance was used to analyze baseline characteristics among the three groups.

RESULTS:

Twelve patients were included in the study (female = 10). The average age was 14.4 years (range: 12-17). Five tests were positive for NCS, four were negative, and three demonstrated psychogenic reactions. Patients with a positive test had a sudden, significant decrease in regional tissue oxygen saturations (P = .009) by an average of 11.3 ± 5.2% compared with baseline. The decrease in regional tissue oxygen saturation preceded symptoms, hypotension, and bradycardia in all patients. Regional tissue oxygen saturation levels remained stable in patients with a negative test or psychogenic syncope.

CONCLUSIONS:

NIRS monitoring during HUTT produces a reliable, positive result that precedes clinical signs and symptoms. Further, it helps distinguish NCS from psychogenic syncope.
Venepuncture during head-up tilt testing in patients with suspected vasovagal syncope – implications for the test protocol.

Humm AM¹, Z'Graggen WJ.

Abstract

BACKGROUND AND PURPOSE:

Head-up tilt (HUT) testing is a widely used diagnostic tool in patients with suspected vasovagal syncope (VVS). However, no gold standard exists for this examination and the various protocols used have a limited sensitivity and specificity. Our aim was to determine the sensitivity of a sequential HUT testing protocol including venepuncture (VP) and sublingual nitroglycerin application.

METHODS:

This was a retrospective analysis of the diagnostic gain of a sequential HUT testing protocol including VP applied 10 min after the start of HUT testing and sublingual application of nitroglycerin 20 min after the start of the test protocol in 106 patients with a final diagnosis of VVS. The sensitivity of the test protocol was compared between patients with positive and negative history for VP induced VVS.

RESULTS:

Overall, pre-syncope or syncope occurred in 68 patients (64.2%). Only 17% of all patients fainted spontaneously within 10 min of passive HUT. Another 39.6% fainted within 20 min. Application of nitroglycerin after 20 min of HUT evoked syncope in another 7.5% until the end of 45 min of HUT. The sensitivity of the test protocol for evoking (pre-)syncope was 94.4% in patients with a positive history for VP associated VVS and 58% in patients with a negative history (P < 0.01**); 85.7% of patients with a positive history and 42.9% of patients with a negative history fainted within 20 min of HUT testing (P < 0.01**).

CONCLUSIONS:

Implementation of VP in sequential HUT testing protocols allows the sensitivity of HUT testing to be increased, especially in patients with a positive history for VP associated VVS.

Syncope in Brugada syndrome: Prevalence, clinical significance, and clues from history taking to distinguish arrhythmic from nonarrhythmic causes.

Olde Nordkamp LR¹, Vink AS¹, Wilde AA¹, de Lange FJ¹, de Jong JS¹, Wieling W², van Dijk N³, Tan HL⁴.
Abstract

BACKGROUND:

Syncope in Brugada syndrome (BrS) patients is a sign of increased risk for sudden cardiac death and usually is ascribed to cardiac arrhythmias. However, syncope often occurs in the general population, mostly from nonarrhythmic causes (eg, reflex syncope).

OBJECTIVE:

The purpose of this study was to distinguish arrhythmic events from nonarrhythmic syncope in BrS and to establish the clinical relevance of nonarrhythmic syncope.

METHODS:

We reviewed the patient records of 342 consecutively included BrS patients and conducted systematic interviews in 141 patients with aborted cardiac arrest (ACA) or syncope.

RESULTS:

In total, 23 patients (7%) experienced ECG-documented ACA and 118 (34%) syncope; of these 118, 67 (57%) were diagnosed with suspected nonarrhythmic syncope. Compared to suspected nonarrhythmic syncope patients, ACA patients were older at first event (45 vs 20 years), were more likely to be male (relative risk 2.1) and to have urinary incontinence (relative risk 4.6), and were less likely to report prodromes. ACA was never triggered by hot/crowded surroundings, pain or other emotional stress, seeing blood, or prolonged standing. During follow-up (median 54 months), ACA rate was 8.7% per year among ACA patients and 0% per year among suspected nonarrhythmic syncope patients.

CONCLUSION:

Syncope, especially nonarrhythmic syncope, often occurs in BrS. The high incidence of nonarrhythmic syncope must be taken into account during risk stratification. Arrhythmic events and nonarrhythmic syncope may be distinguished by clinical characteristics (absence of prodromes and, particularly, specific triggers), demonstrating the importance of systematic history taking.

J Physiol. 2014 Dec 1

Impact of hypocapnia and cerebral perfusion on orthostatic tolerance.

Lewis NC1, Bain AR2, MacLeod DB3, Wildfong KW2, Smith KJ2, Willie CK2, Sanders ML4, Numan T4, Morrison SA5, Foster GE2, Stewart JM6, Ainslie PN2.

Abstract

We examined two novel hypotheses: (1) that orthostatic tolerance (OT) would be prolonged when hyperventilatory-induced hypocapnia (and hence cerebral hypoperfusion) was prevented; and (2)
that pharmacological reductions in cerebral blood flow (CBF) at baseline would lower the 'CBF reserve', and ultimately reduce OT. In study 1 (n = 24; aged 25 ± 4 years) participants underwent progressive lower-body negative pressure (LBNP) until pre-syncope; end-tidal carbon dioxide (P ET\textsubscript{CO\textsubscript{2}}) was clamped at baseline levels (isocapnic trial) or uncontrolled. In study 2 (n = 10; aged 25 ± 4 years), CBF was pharmacologically reduced by administration of indomethacin (INDO; 1.2 mg kg\textsuperscript{-1}) or unaltered (placebo) followed by LBNP to pre-syncope. Beat-by-beat measurements of middle cerebral artery blood flow velocity (MCA\textsubscript{v}; transcranial Doppler), heart rate (ECG), blood pressure (BP; Finometer) and end-tidal gases were obtained continuously. In a subset of subjects' arterial-to-jugular venous differences were obtained to examine the independent impact of hypocapnia or cerebral hypoperfusion (following INDO) on cerebral oxygen delivery and extraction. In study 1, during the isocapnic trial, P ET\textsubscript{CO\textsubscript{2}} was successfully clamped at baseline levels at pre-syncope (38.3 ± 2.7 vs. 38.5 ± 2.5 mmHg respectively; P = 0.50). In the uncontrolled trial, P ET\textsubscript{CO\textsubscript{2}} at pre-syncope was reduced by 10.9 ± 3.9 mmHg (P ≤ 0.001). Compared to the isocapnic trial, the decline in mean MCA\textsubscript{v} was 15 ± 4 cm s\textsuperscript{-1} (35%; P ≤ 0.001) greater in the uncontrolled trial, yet the time to pre-syncope was comparable between trials (544 ± 130 vs. 572 ± 180 s; P = 0.30). In study 2, compared to placebo, INDO reduced resting MCA\textsubscript{v} by 19 ± 4 cm s\textsuperscript{-1} (31%; P ≤ 0.001), but time to pre-syncope remained similar between trials (placebo: 1123 ± 138 s vs. INDO: 1175 ± 212 s; P = 0.53). The brain extracted more oxygen in face of hypocapnia (34% to 53%) or cerebral hypoperfusion (34% to 57%) to compensate for reductions in delivery. In summary, cerebral hypoperfusion either at rest or induced by hypocapnia at pre-syncope does not impact OT, probably due to a compensatory increase in oxygen extraction.


**Efficacy of atomoxetine versus midodrine for the treatment of orthostatic hypotension in autonomic failure.**

Ramirez CE\textsuperscript{1}, Okamoto LE\textsuperscript{1}, Arnold AC\textsuperscript{1}, Gamboa A\textsuperscript{1}, Diedrich A\textsuperscript{1}, Choi L\textsuperscript{1}, Raj SR\textsuperscript{1}, Robertson D\textsuperscript{1}, Biaggioni I\textsuperscript{1}, Shibao CA\textsuperscript{2}.

**Abstract**

The clinical presentation of autonomic failure is orthostatic hypotension. Severely affected patients require pharmacological treatment to prevent presyncopal symptoms or frank syncope. We previously reported in a proof of concept study that pediatric doses of the norepinephrine transporter blockade, atomoxetine, increases blood pressure in autonomic failure patients with residual sympathetic activity compared with placebo. Given that the sympathetic nervous system is maximally activated in the upright position, we hypothesized that atomoxetine would be superior to midodrine, a direct vasoconstrictor, in improving upright blood pressure and orthostatic hypotension-related symptoms. To test this hypothesis, we compared the effect of acute atomoxetine versus midodrine on upright systolic blood pressure and orthostatic symptom scores in 65 patients with severe autonomic failure. There were no differences in seated systolic blood pressure (means difference=-0.3 mm Hg; 95% confidence [CI], -7.3 to 7.9; P=0.94). In contrast, atomoxetine produced a greater pressor response in upright systolic blood pressure (means difference=7.5 mm Hg; 95% CI, 0.6 to 15; P=0.03) compared with midodrine. Furthermore, atomoxetine (means difference=0.4; 95% CI, 0.1 to 0.8; P=0.02), but not midodrine (means difference=0.5; 95% CI, -0.1 to 1.0; P=0.08), improved orthostatic hypotension-related symptoms as compared with placebo. The results of our study suggest that atomoxetine could be a superior
therapeutic option than midodrine for the treatment of orthostatic hypotension in autonomic failure.

Pacing Clin Electrophysiol. 2014 Dec;37(12):1694-701

Cardiac autonomic dysfunction in patients with head-up tilt test-induced vasovagal syncope.

Shinohara T1, Ebata Y, Ayabe R, Fukui A, Okada N, Yufu K, Nakagawa M, Takahashi N.

Abstract

BACKGROUND:

Vasovagal syncope (VVS) is the result of an autonomic reflex that has a final effect of reducing sympathetic drive and increasing vagal activity. However, whether syncopal symptoms are associated with pathological cardiac autonomic modulation is not fully known. We tested the hypothesis that cardiac autonomic function is impaired in patients with VVS.

METHODS:

Eighty-four consecutive patients (59 males; 48.8 ± 20.9 years) with recurrent unexplained syncope were enrolled. The head-up tilt test (HUTT) was positive in 38 patients and negative in 46 patients. Cardiac autonomic function was assessed by baroreflex sensitivity (BRS), heart rate variability, plasma concentrations of norepinephrine, and (123)I-metaiodobenzylguanidine (MIBG) scintigraphy.

RESULTS:

BRS indices were significantly lower in the HUTT-positive group than in the HUTT-negative group (6.1 ± 5.5 mm Hg/s vs 9.8 ± 7.6 mm Hg/s, P = 0.02). With regard to cardiac (123)I-MIBG scintigraphy, the mean heart-to-mediastinum ratio at the delayed phase tended to be lower in HUTT-positive than in HUTT-negative individuals, but this difference was not significant (2.75 ± 0.55 vs 3.02 ± 0.49, P = 0.08). The percent washout rate of (123)I-MIBG was significantly higher in the positive group compared with the negative group (40.7 ± 13.1% vs 31.5 ± 13.3%, P = 0.02). Multivariate logistic analysis revealed that the appearance of HUTT-induced VVS was predicted independently by a high percent washout rate of (123)I-MIBG (odds ratio, 0.954; 95% confidence interval, 0.903-0.998; P = 0.048).

CONCLUSIONS:

Our results suggest that pathological autonomic cardiac modulation may play a role in the appearance of syncope in VVS patients.

Pediatr Cardiol. 2015 Jan;36(1):140-5

Cardiac asystole during head up tilt (HUTT) in children and adolescents: is this benign physiology?
Abstract

Cardiac asystole during HUTT has been described by some investigators as a benign finding with no major sequelae. Our aim in this study is to correlate the severity of clinical symptoms and physiologic findings prior and during the asystole occurrence. This is a retrospective study review of 536 patients who underwent HUTT for dysautonomia symptoms for the last 3 years. HUTT in our institution consists of 10 min in supine, 30 min of head up at 70°, and recline to supine for 10 min. Physiologic parameters recorded include continuous heart rate, BP, cardiac stroke volume, brain blood flow by near-infra red spectroscopy, sympathetic and parasympathetic tones. Patients' complaints and signs during HUTT were recorded. Follow-up was conducted up to 34 months. Cardiac asystole was defined as the absence of ventricular activity for ≥3 s with cessation of BP signal for the same period on the monitor. Of the 536 patients studied, 25 patients developed cardiac asystole (4.7%). The asystolic group age was 15.1 ± 3.8 years and weighed 56.7 ± 21 kg. All the patients fainted and were not able to complete the test with average head up time of 13.8 ± 7.1 min. The cardiac asystole duration was 9.2 ± 5.8 s. Sixteen patients developed convulsions during the asystole. There was sudden intense vagal tone prior to and during the asystole. Brain perfusion was significantly decreased in all the patients after head up and sharply dropped by 20-35% in patients who developed convulsions. All patients completely recovered their consciousness after reposition to supine. During recovery, there was overshoot of the brain perfusion above the baseline for several minutes and the HR returned to baseline. Follow-up of these patients: only one patient had a single lead pacemaker, otherwise the 24 patients had no cardiac pacing and were treated by medical therapy. During mean follow-up of 19 ± 10 months, five patients developed syncope which resolved after optimizing medical therapy. Cardiac asystole due to neurocardiogenic syncope and dysautonomia has high association with brain anoxia that can lead to convulsions. Such patients require intense medical therapy and close observation with possible intervention by cardiac pacing if prolonged asystole occurs. There is a concern of consequence future brain function.


Priorities for emergency department syncope research.


Abstract

STUDY OBJECTIVES:

There is limited evidence to guide the emergency department (ED) evaluation and management of syncope. The First International Workshop on Syncope Risk Stratification in the Emergency Department identified key research questions and methodological standards essential to advancing the science of ED-based syncope research.
METHODS:

We recruited a multinational panel of syncope experts. A preconference survey identified research priorities, which were refined during and after the conference through an iterative review process.

RESULTS:

There were 31 participants from 7 countries who represented 10 clinical and methodological specialties. High-priority research recommendations were organized around a conceptual model of ED decisionmaking for syncope, and they address definition, cohort selection, risk stratification, and management.

CONCLUSION:

We convened a multispecialty group of syncope experts to identify the most pressing knowledge gaps and defined a high-priority research agenda to improve the care of patients with syncope in the ED.

Cardiol Young. 2015 Feb;25(2):267-73

Cerebral blood flow of children with vasovagal syncope.


Abstract

INTRODUCTION:

We aimed to evaluate changes in the cerebral blood supply in children during vasovagal syncope and to clarify the diagnostic value of transcranial Doppler for vasovagal syncope.

MATERIALS AND METHODS:

Patients were divided into three groups. Group 1 consisted of 31 patients who were symptomatic and whose head-up tilt test was positive. Group 2 comprised 21 patients who were symptomatic but whose tilt test was negative. Group 3 included 22 healthy children. For the diagnosis of vasovagal syncope, the tilt test was applied. For the subjects of the patient and control groups, the tilt test was repeated. The flow rates of bilateral middle cerebral arteries were continuously and simultaneously recorded with temporal window transcranial Doppler.

RESULTS:

There were no statistically significant differences between the three groups with respect to age and gender distribution (p>0.05). When the bed was at an upright position, the maximum blood flow rate of the right middle cerebral artery was lower in Group 1 than in Group 2, although the decrease was more significant in comparison to the healthy control group (p<0.05). The minimum blood flow rate of the right middle cerebral artery was lower in Group 1 than the Group 2, although the decrease was more significant in comparison with the healthy control group.
The maximum blood flow rate of the left middle cerebral artery was significantly lower in Group 1 than in the control group (p<0.05).

CONCLUSION:

Minimum and maximum blood flow rates are significantly decreased in patients tilt test (+) patients with vasovagal syncope during orthostatic stress.

Cardiol Young. 2015 Jan;25(1):76-80

Tilt angles and positive response of head-up tilt test in children with orthostatic intolerance.

Lin J1, Wang Y1, Ochs T2, Tang C3, Du J1, Jin H1.

Abstract

This study aimed at examining three tilt angle-based positive responses and the time to positive response in a head-up tilt test for children with orthostatic intolerance, and the psychological fear experienced at the three angles during head-up tilt test. A total of 174 children, including 76 boys and 98 girls, aged from 4 to 18 years old (mean 11.3±2.8 years old), with unexplained syncope, were randomly divided into three groups, to undergo head-up tilt test at the angles of 60°, 70° and 80°, respectively. The diagnostic rates and times were analysed, and Wong-Baker face pain rating scale was used to access the children's psychological fear. There were no significant differences in diagnostic rates of postural orthostatic tachycardia syndrome and vasovagal syncope at different tilt angles during the head-up tilt test (p>0.05). There was a significant difference, however, in the psychological fear at different tilt angles utilising the Kruskal-Wallis test ($\chi^2=36.398$, p<0.01). It was mildest at tilt angle 60° utilising the Kolmogorov-Smirnov test (p<0.01). A positive rank correlation was found between the psychological fear and the degree of tilt angle ($r(s)=0.445$, p<0.01). Positive response appearance time was 15.1±14.0 minutes at 60° for vasovagal syncope children. There was no significant difference in the time to positive response, at different tilt angles during the head-up tilt test for vasovagal syncope or for postural orthostatic tachycardia syndrome. Hence, it is suggested that a tilt angle of 60° and head-up tilt test time of 45 minutes should be suitable for children with vasovagal syncope.

Intern Emerg Med. 2015 Apr 28

Emergency department management of syncope: need for standardization and improved risk stratification.

Thiruganasambandamoorthy V1, Taljaard M, Stiell IG, Sivilotti ML, Murray H, Vaidyanathan A, Rowe BH, Calder LA, Lang E, McRae A, Sheldon R, Wells GA.

Abstract

Variations in emergency department (ED) syncope management have not been well studied. The goals of this study were to assess variations in management, and emergency physicians' risk perception and disposition decision making. We conducted a prospective study of adults with
syncope in six EDs in four cities over 32 months. We collected patient characteristics, ED management, disposition, physicians' prediction probabilities at index presentation and followed patients for 30 days for serious outcomes: death, myocardial infarction (MI), arrhythmia, structural heart disease, pulmonary embolism, significant hemorrhage, or procedural interventions. We used descriptive statistics, ROC curves, and regression analyses. We enrolled 3662 patients: mean age 54.3 years, and 12.9 % were hospitalized. Follow-up data were available for 3365 patients (91.9 %) and 345 patients (10.3 %) suffered serious outcomes: 120 (3.6 %) after ED disposition including 48 patients outside the hospital. After accounting for differences in patient case mix, the rates of ED investigations and disposition were significantly different (p < 0.0001) across the four study cities; as were the rates of 30-day serious outcomes (p < 0.0001) and serious outcomes after ED disposition (p = 0.0227). There was poor agreement between physician risk perception and both observed event rates and referral patterns (p < 0.0001). Only 76.7 % (95 % CI 68.1-83.6) of patients with serious outcomes were appropriately referred. There are large and unexplained differences in ED syncope management. Moreover, there is poor agreement between physician risk perception, disposition decision making, and serious outcomes after ED disposition. A valid risk-stratification tool might help standardize ED management and improve disposition decision making.

JAMA Intern Med. 2015 Apr 20

Unnecessary Hospitalization and Related Harm for Patients With Low-Risk Syncope.

Canzoniero JV1, Afshar E2, Hedian H2, Koch C2, Morgan DJ3.

J Interv Card Electrophysiol. 2015 Apr 12. [Epub ahead of print]

Role of yoga as an adjunctive therapy in patients with neurocardiogenic syncope: a pilot study.

Gunda S1, Kanmanthareddy A, Atkins D, Bommana S, Pimentel R, Drisko J, Dibiase L, Beheiry S, Hao S, Natale A, Lakkireddy D.

Abstract

BACKGROUND:

Neurocardiogenic syncope (NCS) is a common clinical condition characterized by abrupt cardiovascular autonomic changes resulting in syncope. This is a recurring condition with mixed results from current strategies of treatment.

METHODS:

Subjects with a diagnosis of NCS were screened and enrolled. All the participants were given a DVD containing yoga videos and were instructed to practice yoga therapy for 60 min, three times a week for 3 consecutive months. Syncope functional status questionnaire score (SFSQS) was administered at the beginning and the end of the study. The subjects were followed for 3 months and underwent repeat tilt table testing at the end of the study.
RESULTS:

Of the 60 patients screened, 44 subjects were enrolled, 21 in the intervention group and 23 in the control group. Most of the participants were females, and the mean age was 21 ± 3 years. In the intervention group, who finished the yoga regimen, there was a statistically significant improvement from control phase to the intervention phase, in number of episodes of syncope (4 ± 1 vs 1.3 ± 0.7, p < 0.001) and presyncope (4.7 ± 1.5 vs 1.5 ± 0.5, p < 0.001). The mean SFSQS also decreased from 67 ± 7.8 to 29.8 ± 4.6 (p < 0.001). All subjects had positive head up tilt table (HUTT) study at the time of enrollment compared to only six patients at the completion of intervention phase (10/100 vs 6/28 %, p < 0.0001).

CONCLUSION:

Yoga therapy can potentially improve the symptoms of presyncope and syncope in young female patients with NCS.


What is The Utility of Electrophysiological Study in Elderly Patients with Syncope and Heart Disease?

Aslam R1, Girerd N2, Brembilla-Perrot B1.

Abstract

BACKGROUND:

Syncope in elderly patients with heart disease is a growing problem. Its aetiological diagnosis is often difficult. We intended to investigate the value of the electrophysiological study (EPS) in old patients with syncope and heart disease.

METHODS:

EPS was performed in 182 consecutive patients with syncope and heart disease, among whom 62 patients were ≥75 years old and 120 patients <75.

RESULTS:

Left ventricular ejection fraction was 43.9±11.7% in patients ≥75 and 41.1±12.6% in patients <75. During EPS, induced sustained ventricular arrhythmias were as frequent in both groups (27.4% in patients ≥75 versus 27.5% in patients <75, p=0.99) whereas AV conduction abnormalities were more frequent in older patients (37.1% in patients ≥75 versus 18.3% in patients <75, p<0.005). Syncope remained unexplained in 35.5% of patients ≥75 and in 51.7% of patients <75 (p>0.04). ICD was more likely to be implanted in younger patients than in patients ≥75 years (37.5% vs 21% respectively, p<0.009). During a mean follow-up period of 3.3±3 years, the 4-year-survival rate was 66.9±6.8 % in patients ≥75 and 75.9±6.2 % in patients <75 years. The main cause of death was heart failure in both groups. The factors related to a worse outcome in a multivariate analysis were low LVEF and higher age.
CONCLUSION:

Complete EPS allows the identification of treatable causes in a high proportion of elderly patients with syncope and heart disease. Yet, the prognosis of these patients is mainly related to LVEF and age.


Assessment of a standardized algorithm for cardiac pacing in older patients affected by severe unpredictable reflex syncopes.

Brignole M1, Ammirati F2, Arabia F3, Quartieri F4, Tomaino M5, Ungar A6, Lunati M7, Russo V8, Del Rosso A9, Gaggioli G10; Syncope Unit Project (SUP) Two Investigators; Syncope Unit Project SUP Two Investigators.

Abstract

AIMS:

Opinions differ regarding the effectiveness of cardiac pacing in patients affected by reflex syncope. We assessed a standardized guideline-based algorithm in different forms of reflex syncope.

METHODS AND RESULTS:

In this prospective, multi-centre, observational study, patients aged >40 years, affected by severe unpredictable recurrent reflex syncopes, underwent carotid sinus massage (CSM), followed by tilt testing (TT) if CSM was negative, followed by implantation of an implantable loop recorder (ILR) if TT was negative. Those who had an asystolic response to one of these tests received a dual-chamber pacemaker.

POPULATION:

253 patients, mean age 70 ± 12 years, median 4 (3-6) syncopes, 89% without or with short prodromes. Of these patients, 120 (47%) received a pacemaker and 106 were followed up for a mean of 13 ± 7 months: syncope recurred in 10 (9%). The recurrence rate was similar in 61 CSM+ (11%), 30 TT+ (7%), and 15 ILR+ (7%) patients. The actuarial total syncope recurrence rate was 9% (95% confidence interval (CI), 6-12) at 1 year and 15% (95% CI, 10-20) at 2 years and was significantly lower than that observed in the group of 124 patients with non-diagnostic tests who had received an ILR: i.e. 22% (95% CI, 18-26) at 1 year and 37% (95% CI, 30-43) at 2 years (P = 0.004).

CONCLUSION:

About half of older patients with severe recurrent syncopes without prodromes have an asystolic reflex for which cardiac pacing goes along with a low recurrence rate. The study supports the clinical utility of the algorithm for the selection of candidates to cardiac pacing in everyday clinical practice.
The "syncope and dementia" study: a prospective, observational, multicenter study of elderly patients with dementia and episodes of "suspected" transient loss of consciousness.


Abstract

BACKGROUND AND AIM:

Syncope and related falls are one of the main causes and the predominant cause of hospitalization in elderly patients with dementia. However, the diagnostic protocol for syncope is difficult to apply to patients with dementia. Thus, we developed a "simplified" protocol to be used in a prospective, observational, and multicenter study in elderly patients with dementia and transient loss of consciousness suspected for syncope or unexplained falls. Here, we describe the protocol, its feasibility and the characteristics of the patients enrolled in the study.

METHODS:

Patients aged ≥65 years with a diagnosis of dementia and one or more episodes of transient loss of consciousness during the previous 3 months, subsequently referred to a Geriatric Department in different regions of Italy, from February 2012 to May 2014, were enrolled. A simplified protocol was applied in all patients. Selected patients underwent a second-level evaluation.

RESULTS:

Three hundred and three patients were enrolled; 52.6 % presented with episodes suspected to be syncope, 44.5 % for unexplained fall and 2.9 % both. Vascular dementia had been previously diagnosed in 53.6 % of participants, Alzheimer's disease in 23.5 % and mixed forms in 12.6 %. Patients presented with high comorbidity (CIRS score = 3.6 ± 2), severe functional impairment, (BADL lost = 3 ± 2), and polypharmacy (6 ± 3 drugs).

CONCLUSION:

Elderly patients with dementia enrolled for suspected syncope and unexplained falls have high comorbidity and disability. The clinical presentation is often atypical and the presence of unexplained falls is particularly frequent.
BACKGROUND:

The American Heart Association recommends a "meticulous history" when evaluating patients with an initial episode of syncope. However, little is known about which historical features are most helpful in identifying children with undiagnosed cardiac syncope.

OBJECTIVES:

Our objectives were 1) to describe the cardiac disease burden in Emergency Department (ED) syncope presentations, and 2) to identify which historical features are associated with a cardiac diagnosis.

METHODS:

Using syncope presentations in our ED between May 1, 2009 and February 28, 2013, we 1) performed a cross-sectional study describing the burden of cardiac syncope, and 2) determined the sensitivity and specificity of four historical features identifying cardiac syncope.

RESULTS:

Of 3445 patients, 44.5% were male presenting at 11.5 ± 4.5 years of age. Of patients with a cardiac diagnosis (68, ~2%), only 3 (0.09%) were noted to have a previously undiagnosed cardiac cause of syncope: 2 with supraventricular tachycardia and 1 with myocarditis. Among the three cases and 100 randomly selected controls, the respective sensitivity and specificity of the historical features were 67% and 100% for syncope with exercise, 100% and 98% for syncope preceded by palpitations, and 67% and 70% for syncope without prodrome. The presence of at least two features yielded a sensitivity of 100% and specificity of 100%.

CONCLUSIONS:

Our study, which represents the largest published series of pediatric syncope presenting to the ED, confirms that newly diagnosed cardiac causes of syncope are rare. Using a few specific historical features on initial interview can help guide further work-up more precisely.

Physiol Meas. 2015 Apr;36(4):633-41

Cardiovascular parameters and neural sympathetic discharge variability before orthostatic syncope: role of sympathetic baroreflex control to the vessels.


Abstract

We tested the hypothesis that altered sympathetic baroreceptor control to the vessels (svBRS) and disrupted coupling between blood pressure (BP) fluctuations and muscle sympathetic activity (MSNA) discharge pattern in the low frequency band (LF, around 0.1 Hz) precede vasovagal syncope. Seven healthy males underwent ECG, BP, respiratory, and MSNA recordings at baseline (REST) and during a 15 min 80° head-up tilt, followed by a -10 mmHg step wise increase of lower
body negative pressure up to presyncope. Spectral and coherence analyses of systolic arterial pressure (SAP) and MSNA variability provided the indexes of vascular sympathetic modulation, LFSAP, and of the linear coupling between MSNA and SAP in the low frequency band (around 0.1 Hz), K(2)MSNA-SAP(LF). svBRS was assessed as the slope of the regression line between MSNA and diastolic arterial pressure (DAP). Data were analyzed at REST, during asymptomatic and presyncope periods of tilt. svBRS declined during presyncope period compared to REST and asymptomatic tilt. The presyncope period was characterized by a decrease of RR interval, LFMSNA, LFSAP, and K(2)MSNA-SAP(LF) values compared to the asymptomatic one, whereas MSNA burst rate was unchanged. The reduction of svBRS producing an altered coupling between MSNA and SAP variability at 0.1 Hz, may provoke circulatory changes leading to presyncope.


Costs of unstructured investigation of unexplained syncope: insights from a micro-costing analysis of the observational PICTURE registry.

Edvardsson N1, Wolff C2, Tsintzos S3, Rieger G4, Linker NJ5.

Abstract

AIMS:

The observational PICTURE (Place of Reveal In the Care pathway and Treatment of patients with Unexplained Recurrent Syncope) registry enrolled 570 patients with unexplained syncope, documented their care pathway and the various tests they underwent before the insertion of an implantable loop recorder (ILR). The aims were to describe the extent and cost of diagnostic tests performed before the implant.

METHODS AND RESULTS:

Actual costs of 17 predefined diagnostic tests were characterized based on a combination of data from PICTURE and a micro-costing study performed at a medium-sized UK university hospital in the UK. The median cost of diagnostic tests per patient was £1114 (95% CI £995-£1233). As many patients received more than the median number of tests, the mean expenditure per patient was higher with £1613 (95% CI £1494-£1732), and for 10% of the patients the cost exceeded £3539.

Tests were frequently repeated, and early use of specific and expensive tests was common. In the 12% of patients with types of tests entirely within the recommendations for an initial evaluation before ILR implant, the mean cost was £710.

CONCLUSION:

Important opportunities to reduce test-related costs before an ILR implant were identified, e.g. by more appropriate use of tests recommended in the initial evaluation, by decreasing repetition of tests, and by avoiding early use of specialized and expensive tests. A structured multidisciplinary approach would be the best model to achieve an optimal outcome.
Erythrocytic hydrogen sulfide production is increased in children with vasovagal syncope.

Yang J1, Li H1, Ochs T2, Zhao J1, Zhang Q1, Du S3, Chen Y1, Liu P1, Wang Y1, Feng X1, Zhang C1, Tang C4, Du J5, Jin H6.

Abstract

OBJECTIVES:

To explore the differences in erythrocyte hydrogen sulfide (H2S) production in children with vasovagal syncope (VVS).

STUDY DESIGN:

A total of 54 children including 27 with VVS, aged 6-16 years (mean age 11.3 ± 3.3 years), and 27 healthy children, aged 3-17 years (mean age 10.4 ± 1.8 years) were included in the study. Children with VVS had symptoms of dizziness, pallor, blurred vision, nausea, and some had syncope. Erythrocyte H2S production was measured by a sulphur-sensitive electrode. Flow-mediated dilation (FMD) of brachial artery was measured for each patient by vascular ultrasound.

RESULTS:

H2S production from erythrocytes was significantly increased in the children with VVS compared with controls (P < .01). The erythrocytic H2S production in the VVS-vasoinhibitory subgroup was obviously higher than that in VVS-cardioinhibitory (P < .05) and VVS-mixed inhibitory subgroups (P < .05). FMD in the VVS-vasoinhibitory subgroup was greater than that in the VVS-cardioinhibitory (P < .05) and the VVS-mixed subgroups (P < .05). The erythrocytic H2S production had a positive linear correlation with FMD in children with VVS (P < .05).

CONCLUSIONS:

Increased erythrocyte H2S production may be involved in the pathogenesis of VVS in children.


Chu W1, Wang C, Wu L, Lin P, Li F, Zou R.

Abstract

To explore whether oral rehydration salts (ORS) is effective in the treatment of children with vasovagal syncope (VVS). One hundred and sixty-six consecutive patients with recurrent syncope and positive head-up tilt testing (HUTT) were recruited, randomly divided to conventional therapy (health education and tilt training) plus ORS (with 500 ml of water) group (Group I, 87 patients) and conventional therapy group (Group II, 79 patients). Therapeutic effect was evaluated by
changes of syncopal episode and reperformed HUTT response. At the end of 6-month follow-up, syncopal episode did not reoccur in 49 (56.3 %) patients, decreased in 34 (39.1 %) patients, and had no obvious change or increased in four (4.6 %) patients in Group I, and the results were 31 (39.2 %), 37 (46.8 %), and 11 (14 %) in Group II, respectively. The difference was significant ($\chi^2 = 7.074, P < 0.05$). When HUTT was reperformed, 57 (65.5 %) and 28 (35.4 %) patients had negative response and 30 (34.5 %) and 51 (64.6 %) patients had positive response, respectively, in Group I and Group II. The difference was also significant ($\chi^2 = 13.808, P < 0.01$). In Group I, the two aspects had no difference between vasodepressor type and mixed type; however, syncopal episode had a significant difference between children aged $\leq 12$ and $>12$ years ($\chi^2 = 6.371, P < 0.05$); there was no difference in reperformed HUTT response. ORS with 500 ml of water is an effective therapy for VVS. It can be recommended as one of non-pharmacological treatment measures in children with VVS.

Anatol J Cardiol. 2015 Mar;15(3):213-7

Predicting the outcome in patients with unexplained syncope and suspected cardiac cause: Role of electrophysiologic studies.

Assadian Rad M1, Farahani M, Emkanjoo Z, Moladoust H, Alizadeh A.

Abstract

OBJECTIVE:

Unexplained syncope is a challenge facing electrophysiologists. The prognosis varies widely depending on underlying causes, specially, cardiac ones. We sought to determine the abnormal electrophysiologic (EP) study results as predictors of prognosis in syncope patients with suspected cardiac cause and risk factors associated with mortality.

METHODS:

A total of 227 consecutive patients with unexplained syncope were prospectively enrolled in this study. EP study was performed in 177 patients in base of inclusion criteria. These patients, in whom a cardiac cause of syncope was suspected, underwent EP study and if negative, head-up tilts test (HUTT). Complete follow-up was obtained for 132 patients for 20.0±10.8 months.

RESULTS:

A cardiac cause of syncope was established in 35%, a neurally mediated syncope in 35.6%, and in the rest 29.4% the cause of syncope remained unexplained despite a throughout neurologic and cardiologic evaluation. Logistic analysis revealed that the significant predictors of a cardiac cause of syncope were the absence of prodromal symptoms, left bundle branch block (LBBB), sever left ventricle (LV) dysfunction and male gender. At logistic analysis, the presence of LBBB (OR=6.63; 95% CI: 1.09-40) was significantly associated with outcome of death.

CONCLUSION:
The present study provides evidence that presence of LBBB, abnormal EP study result and structural heart disease (SHD) have prognostic value in patients with suspected cardiac cause of syncope. The patients with SHD and unexplained syncope who had a negative EP study have a good long-term prognosis even in the presence of LV dysfunction.

Cardiol Young. 2015 Apr;25(4):647-54

An insight into the autonomic and haemodynamic mechanisms underlying reflex syncope in children and adolescents: a multiparametric analysis.

Laranjo S1, Tavares C1, Oliveira M1, Trigo C2, Pinto F2, Rocha I1.

Abstract

Around 15% of children and adolescents experience at least one episode of syncope until adulthood. Excluding cardiac disease, the majority of syncopes are of reflex origin and benign in nature. In this situation, a tilt test is conducted to reproduce symptoms and to evaluate cardiovascular adaptations to orthostatism, but its mechanisms are not yet well defined. Here, we investigated haemodynamics and autonomic activity during tilt in young patients. Patients (n=113) with unexplained syncope were enrolled. Tilt followed a standard protocol without provocative agents. A positive response (fainters) was defined as a sudden development of syncope or presyncope associated with hypotension, bradycardia, or both. Haemodynamic parameters, autonomic activity, and baroreflex sensibility were evaluated. Data were analysed on baseline; immediately after tilting; on tilt adaptation; before fainting or before tilt-down for non-fainters; and on tilt-down. A total of 45 patients experienced syncope after a mean time of 18 minutes. During tilting up, fainters showed lower blood pressure and peripheral resistance values, which decreased progressively with time together with baroreflex sensibility. Sympathetic tone increased massively along time till syncope. No changes in cardiac output and heart rate were observed. Results show a strong effort of the autonomic nervous system to adapt to orthostatic stress through different magnitudes of sympathetic output, which was maximal before syncope without apparent modifications of parasympathetic tone. These changes suggest an imbalance between both branches of the autonomic nervous system, not enabling a time-progressive adaptation and leading the subject to faint.

Europace. 2015 Jun 24

Syncope Unit: rationale and requirement - the European Heart Rhythm Association position statement endorsed by the Heart Rhythm Society.

Postprandial hypotension in the elderly: Findings in a Mexican population.

Asensio E1, Alvarez JB2, Lara S3, Alvarez de la Cadena JE4, Juárez D5.

Abstract

OBJECTIVE:

Postprandial hypotension is a known cause of syncope in the elderly. Its prevalence is unknown in our country.

METHODS:

A prospective cross-sectional study was performed to determine PPH's Prevalence in elderly adults of both an urban and a rural Community in the State of Queretaro. Blood pressure measurements included a basal pre-prandial record, minute 0 recording at the moment they finished the meal and every 10min until a 90min record was complete. We included a medical history, a mental state test for cognitive evaluation (Minimental) and Minnesota Quality of life score and a food macronutrient composition analysis.

RESULTS:

We included 256 subjects, 78.1±8.8 years old, 195 (76.2%) female. Two-hundred and five subjects (80.1%) had Postprandial hypotension after one or both analyzed meals, with non-significant differences in the studied items. Sixty-six (26.2%) patients had "significant postprandial hypotension". Patients living in a special care facility had more postprandial hypotension than people at the family home (87-3% vs 69.8% respectively, p<0.0001).

CONCLUSIONS:

Post-prandial hypotension is a common finding in this elderly population. We did not find distinctive conditions or markers that allow identification of subjects at risk for postprandial hypotension and its complications. This should prompt for routine screenings in specialized facilities to prevent complications.


Paroxysmal nonepileptic events in pediatric patients.

Park EG1, Lee J1, Lee BL2, Lee M1, Lee J3.

Abstract

OBJECTIVES:
Paroxysmal nonepileptic events (PNEs) are frequently encountered phenomena in children. Although frequencies and types of PNEs have been extensively studied in adult populations, the data available for children and adolescents are limited, especially in patients without underlying neurologic disorders. In this study, we evaluated and compared the characteristics of PNEs between age groups and according to the presence of neurologic deficits to improve early detection and diagnosis of PNEs.

METHODS:

We retrospectively reviewed 887 pediatric patients who were admitted to the epilepsy monitoring unit at the Samsung Medical Center between December 2001 and July 2014. One hundred and forty-one patients (15.9%) were diagnosed as having PNEs on the basis of their clinical history and long-term video-electroencephalography (EEG) monitoring (VEM).

RESULTS:

Children with PNEs were divided into three groups by age: 1) the infant, toddler, and preschool group (<6 years, N=50, 35.5%); 2) the school-age group (6-<12 years, N=30, 21.3%); and 3) the adolescent group (12-<18 years, N=61, 43.3%). Physiologic disorders, such as normal infant behavior, sleep movement, and staring, were more common in patients younger than 6 years of age, whereas psychogenic nonepileptic seizures were predominant in patients older than 6 years. Vasogenic syncope was also frequently observed in the adolescent group and was confirmed by the head-up tilt test. There was no significant difference in specific PNE types between the groups of patients with or without neurologic deficits.

CONCLUSIONS:

Physiologic symptoms were predominant in the younger age group, whereas psychogenic nonepileptic seizures were observed in older age groups more often. Clinical pattern recognition by age plays an important role in clinical practice, because pediatric patients present various types of PNEs with age-specific patterns. Considering various and inconsistent presentations and the importance of correct diagnosis, long-term VEM can be helpful in diagnosing normal infant behavior and psychogenic nonepileptic seizures.

Am J Med. 2015 Jun 4

Summer Syncope Syndrome Redux.

Huang JJ, Desai C, Singh N, Sharda N, Fernandes A, Riaz IB, Alpert JS.

BACKGROUND:

While antihypertensive therapy is known to reduce the risk for heart failure, myocardial infarction, and stroke, it can often cause orthostatic hypotension and syncope, especially in the setting of polypharmacy and possibly a hot and dry climate. The objective of the present study was to investigate whether the results of our prior study involving continued use of antihypertensive drugs at the same dosage in the summer as in the winter months for patients living in the Sonoran desert resulted in an increase in syncopal episodes during the hot summer months.
METHODS:

All hypertensive patients who were treated with medications and admitted with International Classification of Diseases, 9th Revision code diagnosis of syncope were included. This is a 3 year retrospective chart review study. They were defined as "cases" if they presented during the summer months (May to September and "controls" if they presented during the winter months (November to March). The primary outcome measure was the presence of clinical dehydration. The statistical significance was determined using the 2-sided Fisher exact test.

RESULTS:

A total of 834 patients with an International Classification of Diseases, 9th Revision code diagnosis of syncope were screened, 477 in the summer months and 357 in the winter months. In patients taking antihypertensive medications, there were a significantly higher number of cases of syncope secondary to dehydration during the summer months (40.5%) compared with the winter months (29%) (p=0.04). No difference was observed in the type of antihypertensive medication used and syncope rate. The number of antihypertensive used did not increase the cases of syncope in both summer or winter.

CONCLUSIONS:

An increased number of syncope were observed in the summer months among people who reside in a dry desert climate and who are taking antihypertensive medications. The data confirm our earlier observations that demonstrated a greater number of cases of syncope among people who reside in a dry desert climate who are taking antihypertensive medications during summer months. We recommend judicious reduction of antihypertensive therapy in patients residing in a hot and dry climate, particularly during the summer months.
High hospitalization rates (39-58% in the literature) of patients admitted to Emergency Department (ED) for transient loss of consciousness (T-LOC) suspected for syncope are still an unresolved issue. The presence of an Observation Unit has reduced hospital admissions and the duration of hospitalization in controlled studies, and a Syncope Unit (SU) in the hospital may reduce hospitalization and increase the number of diagnoses in patients with T-LOC. We assessed the effect of a structured organization on hospitalization rate and outcome.

METHODS AND RESULTS:

Consecutive patients referred to the ED for a T-LOC of a suspected syncopal nature as the main diagnosis were included. The ED physician was trained to choose between: hospital admission (directly or after short observation); discharge after short (<48-h) observation; discharge on a fast track to the SU; and direct discharge without any further diagnostics. From January to June 2010, 362 patients were evaluated in the ED: 29% were admitted, 20% underwent short observation in the ED, 20% were referred to the SU, and 31% were directly discharged. Follow-up data were available on 295 patients who were discharged alive: of these, 1 (0.3%) previously hospitalized patient died within 30 days and 16 (5.4%) died within 1 year. Death rates were 12.9, 3.3, 0, and 2.5% among admitted, observation, SU, and ED-discharged patients, respectively. No death could be directly attributed to T-LOC. Re-admission within 1 year for any cause occurred in 72 (24%) patients; re-admission rates were 45.9, 19.3, 11.5, and 18.0% among admitted, observation, SU, and ED-discharged patients, respectively.

CONCLUSIONS:

The availability of short observation and a SU seems to reduce the hospitalization rate compared with previous reported historical reports from our and other centres. Most deaths during follow-up occurred in patients who had been hospitalized. High rates of re-admission to the ED within 1 year are still an issue.

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Clinical Predictors of Pacemaker Implantation in Patients with Syncope Receiving Implantable Loop Recorder with or without ECG Conduction Abnormalities.

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Abstract

BACKGROUND:

Implantable loop recorders (ILR) allow prolonged cardiac rhythm monitoring and improved diagnostic yield in syncope patients. Predictive factors for pacemaker (PM) implantation in the ILR population with unexplained syncope have not been adequately investigated. In this single center, retrospective, observational study we investigated factors that predict PM implantation in this population.

METHODS:
We retrospectively analyzed our ILR database of patients aged over 18 years who underwent ILR implantation for unexplained syncope between January 2009 and June 2013. Patient case notes were examined for demographics, history, electrocardiogram (ECG) abnormalities, investigations, and events during follow-up. The primary end-point was the detection of a symptomatic or asymptomatic bradycardia requiring PM implantation.

RESULTS:

During a period of 4.5 years, 200 patients were implanted with ILR for unexplained syncope, of who n = 33 (16.5%) had clinically significant bradycardia requiring PM implantation. After multivariable analysis, history of injury secondary to syncope was found to be the strongest independent predictor for PM implantation (odds ratio [OR]: 9.1; P < 0.001; 95% confidence interval [CI]: (3.26-26.81). Other significant predictors included female sex, PR interval > 200msec, and age >75 years. In patients without conduction abnormalities on the ECG, history of injury secondary to syncope was found to be the strongest independent predictor for PM implantation (OR: 8.16; P = 0.00027; 95% [CI]: (2.67-26.27).

CONCLUSIONS:

A history of injury secondary to syncope and female sex were independent predictive factors for bradycardia necessitating PM implantation in patients receiving an ILR for syncope with or without ECG conduction abnormalities.

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Prognostic Value of a Very Prolonged Asystole during Head-Up Tilt Test.

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Abstract

BACKGROUND:

Clinical significance and prognosis of a cardioinhibitory response to head-up tilt (HUT) test with a very prolonged asystole (≥30 seconds) is poorly studied. Our aim was to evaluate the treatment (including pacemaker implantation) and prognosis (syncope recurrence, syncope-related trauma, and overall mortality) of patients with a very prolonged asystole on a HUT test.

METHODS AND RESULTS:

A retrospective study was conducted in two centers between January 2003 and December 2013 and included a total of 2,263 consecutive HUT tests (sensitized with isosorbide dinitrate) performed in 2,247 patients with syncope of unknown etiology. Cardioinhibitory response with asystole was observed in 149 (6.6%) of these tests (44.3% women, mean age 37 ± 18 years old, 16.1% in the nonpharmacological phase), with a median duration of asystole of 10 (6-19) seconds. Very prolonged asystole (≥30 seconds) was documented in 11 (0.5%) patients (45% women; mean age 40 ± 19 years; only one in the nonpharmacological phase, 9 minutes after HUT). The longest pause lasted 63 seconds. In all patients, avoidance of triggering factors and physical counterpressure
maneuvers were recommended. Telephone follow-up was performed: in one patient, fludrocortisone was started; tilt training was conducted in one patient and none received a pacemaker. After a median follow-up of 42 (30-76) months, four patients (36%) had syncopal recurrences, one patient had a syncope-related injury (scalp laceration), and no patient died.


Detecting initial orthostatic hypotension: a novel approach.

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Abstract

Our purpose, by modification of standard bedside tilt-testing, was to search for lesser known but important initial orthostatic hypotension (IOH), occurring transiently within the first 30 seconds of standing, heretofore only detectable with sophisticated continuous photoplethysmographic monitoring systems, not readily available in most medical facilities. In screened outpatients over 60 years of age, supine blood pressure (BP) parameters were recorded. To achieve readiness for immediate BP after standing, the cuff was re-inflated prior to standing, rather than after. Immediate, 1-, and 3-minute standing BPs were recorded. One hundred fifteen patients were studied (mean age, 71.1 years; 50.5% male). Eighteen (15.6%) had OH, of whom 14 (12.1%) had classical OH, and four (3.5%) had IOH. Early standing BP detection time was 20.1 ± 5.3 seconds. Immediate transient physiologic systolic BP decline was detected in non-OH (-8.8 ± 9.9 mm Hg; P < .0001). In contrast to classical OH (with lesser but persistent orthostatic BP decrements), IOH patients had immediate mean orthostatic systolic/diastolic BP change of -32.8 (±13.8) mm Hg/-14.0 (±8.5) mm Hg (P < .02), with recovery back to baseline by 1 minute. Two of the four IOH patients had pre-syncopal symptoms. For the first time, using standard inflation-deflation BP equipment, immediate transient standing physiologic BP decrement and IOH were demonstrated. This preliminary study confirms proof of principle that manual BP cuff inflation prior to standing may be useful and practical in diagnosing IOH, and may stimulate direct comparative studies with continuous monitoring systems.


Diagnostic utility of carotid artery duplex ultrasonography in the evaluation of syncope: a good test ordered for the wrong reason.

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Abstract

AIMS:

Syncope refers to a transient loss of consciousness and postural tone secondary to cerebral hypoperfusion. Guidelines recommend against neurovascular testing in cases of syncope without neurologic symptoms; however, many pursue carotid artery duplex ultrasonography (CUS) due to the prognostic implications of identified cerebrovascular disease. Our objective was to determine
the diagnostic utility of CUS in the evaluation of syncope and the identification of new or severe atherosclerosis with the potential to change patient management.

METHODS AND RESULTS:

We reviewed records of 569 patients with CUS ordered for the primary indication of syncope through an accredited vascular laboratory at an academic, urban medical centre. Findings on CUS, patient demographic, clinical and laboratory information, and medications within 6 months of the CUS exam were reviewed. Bivariate relationships between key medical history characteristics and atherosclerosis status (known vs. new disease) were examined. Among 495 patients with complete information, cerebrovascular findings could potentially explain syncope in 2% (10 patients). Optimization of cardiovascular risk factors would benefit patients with known (56.6%) and new atherosclerosis (33.5%) with suboptimal lipid control, (LDL > 70 in 42.2 and 34.9% respectively; LDL > 100 in 15.7 and 20.4%), and those not on high-intensity statin therapy (80 and 87.5%) or antiplatelet medications (13.2 and 50.6%).

CONCLUSION:

CUS is a low-yield diagnostic test in the evaluation of syncope, but it is useful in the diagnosis of atherosclerosis and identification of subjects who would benefit from optimal medical therapy.