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ABSTARCTS

WHITE COAT HYPERTENSION IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA-HYPOPNEA SYNDROME*

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Background: The strength of the association between obstructive sleep apnea-hypopnea syndrome (OSAHS) and systemic hypertension could be affected by methodologic problems in the definition of hypertension.

Study objectives: To determine the frequency of white coat hypertension (WCH) in patients with OSAHS, and to analyze the characteristics of patients with OSASH and WCH.

Patients and interventions: Ninety-nine consecutive patients with OSAHS and 20 healthy control subjects were included into the study. Twenty-four-hour ambulatory BP monitoring (ABPM) and urinary catecholamines were determined simultaneously with the polysomnographic study. Arterial blood gases and lung volumes were also measured.

Results: Office hypertension was diagnosed in 45 patients, while the control group included 54 normotensive patients with OSAHS. After ABPM, hypertension was confirmed in 30 patients with OSAHS and office hypertension. WCH was diagnosed in the remaining 15 patients (33%). Patients with WCH presented higher values of sleep onset latency and wake after sleep onset than normotensive and sustained hypertensive patients. No other differences in sleep parameters, function tests, or urinary catecholamines were found between the OSAHS groups.

Conclusion: The results indicate that WCH is a frequent phenomenon in-patient with OSAHS, and that it is not predictable by clinical variables.
Key Words: ambulatory BP monitoring • hypertension • sleep apnea • white coat hypertension
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VOLUMETRIC CAPNOGRAPHY AS A SCREENING TEST FOR PULMONARY EMBOLISM IN THE EMERGENCY DEPARTMENT*

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Study objective: To compare the diagnostic performance of volumetric capnography (VCap), which is the plot of the expired CO_2 partial pressure against the expired volume during a single breath, with the $PaCO_2$ to end-tidal CO_2 ($EtCO_2$) gradient, in the case of suspected pulmonary embolism (PE).

Design: Single-center, prospective study.
Setting: Emergency department of a teaching hospital.

Patients: A total of 45 outpatients with positive enzyme-linked immunosorbent assay d-dimer levels of > 500 ng/mL. The diagnosis of PE was confirmed in 18 outpatients according to a validated procedure based on the ventilation-perfusion lung scan and/or spiral CT scanning.

Interventions: Curves of VCap were obtained from a compact monitor connected to a computer. A sequence of four to six stable breaths allowed the calculation of the following several variables: alveolar dead space fraction; the ratio of alveolar dead space (VDalv) to airway dead space (VDaw); the VDalv to physiologic dead space (VDphys) fraction; the slope of phase 3; and the late dead space fraction (Fdlate) corresponding to the extrapolation of the capnographic curve to a volume of 15% of the predicted total lung capacity.

Results: The mean (± SD) $PaCO_2$-$EtCO_2$ gradient was 5.3 ± 0.7 mm Hg in the PE-positive group and 2.8 ± 0.7 mm Hg in the PE-negative group (p = 0.019). Four variables of the VCap exhibited a statistical difference between both groups, as follows: the VDalv/VDaw fraction, the slope of phase 3; the VDalv/VDphys fraction; and the Fdlate, which was 8.2 ± 3.3% vs -7.7 ± 2.8%, respectively (p = 0.000011). The diagnostic performance expressed as the mean area under a receiver operating characteristic curve comparison was 75.9 ± 7.4% for the $PaCO_2$-$EtCO_2$ gradient and 87.6 ± 4.9% for the Fdlate (p = 0.02).

Conclusion: Fdlate, a variable of VCap, had a statistically better diagnostic performance in suspected PE than the $PaCO_2$-$EtCO_2$ gradient. VCap is a promising computer-assisted bedside application of pulmonary pathophysiology. Future research should define the place of this technique in the diagnostic workup of PE, especially in the presence of positive d-dimers.

Key Words: CO_2 • emergency department • pulmonary embolism • volumetric capnography
Chest. 2004; 125:841-850

SPHINCTER PHARYNGOPLASTY AS A TREATMENT OF VELOPHARYNGEAL INCOMPETENCE IN YOUNG PEOPLE*

A PROSPECTIVE EVALUATION OF EFFECTS ON SLEEP STRUCTURE AND SLEEP RESPIRATORY DISTURBANCES

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Background: Sphincter pharyngoplasty (SP) appears to be the more "physiologic" surgical technique to treat velopharyngeal incompetence (VPI). This procedure creates a dynamic sphincter of variable diameter and keeps the flexibility of the soft palate. SP also induces velopharyngeal size reduction, mainly in the transverse diameter, which may cause upper airway (UA) occlusions during sleep.

Aim: To prospectively evaluate the effects of SP by a modified Orticochea procedure on sleep structure and sleep respiratory disturbances.

Methods: Polysomnographic studies before and after surgery in 17 consecutive patients treated by a modified Orticochea procedure SP for VPI.

Results: For the whole group, SP did not induce significant impairment of apnea-hypopnea index or nocturnal oxygen saturation. Slow-wave sleep (SWS) was significantly reduced after surgery (25 ± 9% of total sleep time [TST] vs. 28 ± 9% of TST before SP [$p = 0.04$]). Following surgery, there was a trend for an increase in the microarousal index) ($p = 0.09$) and more specifically in respiratory-related microarousals.

Conclusion: SP, although creating a clinically obvious reduction of velopharyngeal diameter, generally did not lead to the occurrence of an obstructive sleep apnea syndrome. However, we found a significant reduction of SWS quantity and a trend toward an increase in the number of cortical microarousals. These findings suggest that the reduction of UA diameter associated with the surgical technique leads to increases in respiratory effort sufficient to induce sleep fragmentation and SWS reduction, even in the absence of apneas or hypopneas.

Key Words: cleft palate • dynamic sphincter pharyngoplasty • sleep apnea • velopharyngeal insufficiency
Chest. 2004;125:864-871

NORMAL POLYSOMNOGRAPHIC RESPIRATORY VALUES IN CHILDREN AND ADOLESCENTS*

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Study objectives: Polysomnography is important in the evaluation of children and adolescents with sleep-disordered breathing. Adult criteria for obstructive sleep apnea have been shown to be inapplicable to children. Nevertheless, very little data are available regarding normal respiratory parameters during sleep in healthy children and adolescents. The purpose of the study was to characterize normal polysomnography values in healthy children and adolescents and to establish respiratory reference values for pediatric polysomnography.

Design, setting and participants: Seventy healthy, normal children and adolescents were studied. Age ranged from 1 to 15 years (mean ± SD, 8.02 ± 4.57 years). All children underwent overnight polysomnography including EEG, electromyography, electrooculography, ECG, pulse oximetry arterial oxygen saturation (SpO_2), chest wall and abdomen motion, oral and nasal airflow, and end-tidal PCO_2 ($PETCO_2$).

Results: Three children (4%) had a mean of 0.37 obstructive apneas (OAs) per hour of sleep (1 to 5 OAs per child per study), with mean apnea duration of 10.3 ± 2.1 s. This was not accompanied with oxygen desaturation. Twenty-six children had one to seven central apneas (CAs) per child, resulting in a mean of 0.4 CAs per hour of sleep (median, 0.33; 97.5 percentile, 0.9). Eleven of the 58 events of CA in six children coincided with oxygen desaturation to a minimum of 88% (nadir apnea desaturation range, 88 to 93%). The mean SpO_2 was 97.2 ± 0.8% with SpO_2 nadir of 94.6 ± 2.2%. $PETCO_2$ > 45 mm Hg occurred for 1.6 ± 3.8% of total sleep time (TST) in 21 of 70 children (30%), with a distribution of 1.3 ± 3.03% in the range of 46 to 47 mm Hg; < 0.7% were within the range of 48 to 50 mm Hg; and in 0.29 ± 0.24% of TST, $PETCO_2$ values were > 50 mm Hg.

Conclusions: Based on these data, the recommended limits for normal values are as follows: OA index, 1; CA index, 0.9; oxygen desaturation, 89%; baseline saturation, 92%; and $PETCO_2$ > 45 mm Hg for < 10% of TST.

Key Words: central sleep apnea • children • end-tidal CO_2 • hemoglobin saturation • hypopnea • obstructive sleep apnea • polysomnography • sleep
Chest. 2004; 125:872-878.)

CLINICAL UTILITY OF D-DIMER IN PATIENTS WITH SUSPECTED PULMONARY EMBOLISM AND NONDIAGNOSTIC LUNG SCANS OR NEGATIVE CT FINDINGS*

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Background: The diagnosis of pulmonary embolism is difficult because the clinical diagnosis is nonspecific and all of the objective tests have limitations. The assay for plasma d-dimer may be useful as an exclusion test if results are negative. We conducted a prospective cohort study that evaluated the clinical utility (usefulness) of an automated quantitative d-dimer test in the diagnosis of patients with suspected pulmonary embolism.
Methods: Consecutive eligible patients who had clinically suspected PE with nondiagnostic lung scans or negative helical CT scan of the chest results underwent d-dimer testing.

Results: The d-dimer results were negative in 11 of 103 inpatients (10.6%, 95% confidence interval [CI], 5.5 to 18.3%) and 7 of 22 outpatients (31.8%, 95% CI, 13.9 to 54.9%; p = 0.02).
Conclusions: Measurement of plasma d-dimer is of limited clinical utility for inpatients with clinically suspected pulmonary embolism and nondiagnostic lung scans or negative helical CT results at a US academic health center.

Key Words: d-dimer • diagnosis • pulmonary embolism • venous thromboembolism
Chest. 2004;125:851-855

PREVALENCE OF SLEEP APNEA SYNDROME IN LONE ATRIAL FIBRILLATION*

A CASE-CONTROL STUDY

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Background: According to several studies, obstructive sleep apnea predisposes to cardiac arrhythmias, but the prevalence of sleep apnea in specific arrhythmias has not been determined. Our case-control study assesses prevalence of sleep apnea syndrome (SAS) in lone atrial fibrillation (AF).

Methods: Patients with AF (n = 59; 48 men and 11 women; mean age, 59 years; age range, 25 to 84 years) without evident cardiovascular diseases, and their 56 gender-matched, age-matched, and cardiovascular morbidity-matched community control subjects underwent an overnight sleep study.

Results: Prevalence of SAS in the AF group was 32%, which did not differ from that in control subjects (29%, $p = 0.67$). In men, mean neck circumference was higher in the AF group (40.9 cm vs 39.5 cm, $p = 0.01$) than in control subjects. In men, after adjusting for body mass index and waist circumference, neck circumference was independently related to AF, with an odds ratio (OR) of 1.8 (95% confidence interval, 1.3 to 2.5) per 1-cm increase, and an OR of 5.2 (95% confidence interval, 1.6 to 17.0) for values > 40 cm. Compared to control subjects, the AF group reported more daily/almost-daily tiredness (29% vs 4%, $p < 0.001$), daily/almost-daily sleepiness (27% vs 7%, $p = 0.005$), and nightly/almost-nightly breathing pauses during sleep (12% vs 2%, $p = 0.03$).

Conclusions: SAS seems to be common in lone AF. Nevertheless, we could not show SAS to be more common in patients with AF than in gender-matched, age-matched, and cardiovascular morbidity-matched community control subjects. Compared to control subjects, men with AF seem to have thicker necks, and patients with lone AF report more daytime tiredness, daytime sleepiness, and breathing pauses during sleep.

Key Words: atrial fibrillation • case-control studies • sleep apnea syndromes
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ANALYSIS OF TIDAL BREATHING PROFILES IN CYSTIC FIBROSIS AND COPD*

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Study objectives: To explore the flow and time domain characteristics of resting tidal airflow profiles in the presence of obstructive airway disease.

Methods: Spirometry was performed on 81 adults and 46 juveniles in the lung function laboratory. All the juveniles had cystic fibrosis (CF), as did some of the adults (n = 25), with the remainder having either healthy lungs or COPD. Resting breathing profiles were recorded using a pneumotachograph. Thirteen flow and time domain parameters were extracted from each profile. Two new indexes were derived that are influenced by the shape of the post-peak expiratory flow portion of the expirogram. In this expirogram, the first index (change in post-peak expiratory flow at time 20% [$TPPEF_{20}$]) describes early changes in post-peak flow, while the second index (change in post-peak expiratory flow at time 80% [$TPPEF_{80}$]) describes later changes in flow. Multiple linear regression techniques were used to define the relationship between body size, flow and time domain parameters, and FEV_1, a measure of obstructive airway disease.

Results: In juvenile subjects with CF, body weight and the time to reach peak expiratory flow are the main correlates with FEV_1 (adjusted $r^2 = 0.74$). The adult CF group are different with the expiratory flow index ($TPPEF_{20}$) being the major correlate with FEV_1 (adjusted $r^2 = 0.77$). In the COPD group, the second expiratory flow index ($TPPEF_{80}$) is the major correlate instead (adjusted $r^2 = 0.6$).

Conclusions: Using multiple linear regression techniques has allowed the description of the interrelationships between body size, age, and tidal breathing profile in obstructive airway disease. The relationship between the flow indexes $TPPEF_{20}$ and $TPPEF_{80}$ show that in adults with CF, the loss of expiratory flow braking is an important adaptation to disease, while in COPD pulmonary hyperinflation is the predominant factor.

Key Words: expiratory flow braking • FEV_1 • lung function • pulmonary hyperinflation
Chest. 2004; 125:901-908

PREVALENCE OF COPD IN GREECE*

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Objectives: The prevalence of COPD in Greece is unknown. The aim of this study was to determine the prevalence and trends of COPD among adults in Greece.

Methods: This study involved 888 randomly identified adults (475 men and 413 women) aged > 35 years, and smokers of at least 100 cigarettes, in a population-based, multiregional, cross-sectional descriptive design. The selected individuals reflected the urban/rural population distribution in Greece and, within each study region, the age group and gender of the community setting. The diagnosis of COPD was based on clinical and spirometric data including reversibility test (Delta FEV_1 < 15%).

Results: The overall prevalence of COPD in the population aged > 35 years with a smoking history of > 100 cigarettes per lifetime was 8.4%. The gender-standardized COPD prevalence was 11.6% for men and 4.8% for women. The COPD prevalence by community setting was as follows: Athens, 6%; other urban areas, 10.1%; semiurban areas, 8.5%; and rural areas, 9.1%. Smoking intensity and age were significantly associated with higher COPD prevalence in both men and women.

Conclusions: COPD is a substantial health problem in Greece, although prevalence rates are lower than expected when the high smoking rates are taken into account. The high proportion of the patients with mild COPD who were unaware of their illness highlights the need to increase public awareness of COPD.

Key Words: chronic bronchitis • COPD • emphysema • epidemiology • prevalence • smoking
Chest. 2004; 125:892-900

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FIELD EXERCISE VS LABORATORY EUCAPNIC VOLUNTARY HYPERVENTILATION TO IDENTIFY AIRWAY HYPERRESPONSIVENESS IN ELITE COLD WEATHER ATHLETES*

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Study objective: For the 2002 Winter Olympic Games, athletes were required to submit objective evidence of asthma or exercise-induced bronchoconstriction (EIB) for approval to inhale a $ß_2$-agonist. Eucapnic voluntary hyperventilation (EVH) was recommended as a laboratory challenge that would identify airway hyperresponsiveness (AHR) consistent with EIB. The objective was to compare the change in FEV_1 provoked by EVH with that provoked by exercise in cold weather athletes.

Design: Spirometry was measured before and for 15 min after challenges. The two challenges were performed in random order at least 24 h apart.
Setting: EVH was performed in the laboratory at 19°C, and exercise took place in the field in the cold (2°C, 45% relative humidity).

Participants: Thirty-eight athletes (25 female subjects; median age, 16 years).
Interventions: For the EVH, athletes inhaled dry air containing 5% carbon dioxide for 6 min at a target ventilation equivalent to 30 times baseline FEV_1. Exercise was performed by cross-country skiing, ice skating, or running for 6 to 8 min.

Measurements and results: AHR consistent with EIB was defined as =" border=0 src="/math/ge.gif" 10% fall in FEV_1 from baseline after challenge. Eleven athletes were exercise positive (EX+) [FEV_1 fall, 20.5 ± 7.3%], and 17 athletes were EVH positive (FEV_1 fall, 14.5 ± 4.5%) [mean ± SD]. Of 19 subjects with AHR, 58% were identified by exercise and 89% were identified by EVH. EVH identified 9 of 11 subjects who were EX+ and a further 8 subjects with potential for EIB. The average ventilation during EVH was 28 times FEV_1.

Conclusion: Performing EVH for 6 min in the laboratory had a greater chance of identifying AHR in these athletes compared with 6 to 8 min of field exercise in the cold. The EVH test will be useful to evaluate elite summer sports athletes whose widely different forms of exercise provide an "equipment" challenge to any laboratory.

Key Words: airway hyperresponsiveness • dry air • exercise • exercise-induced bronchoconstriction • eucapnic voluntary hyperpnea
Chest. 2004; 125:909-915

ASTHMA TREATMENT PREFERENCE STUDY*

A CONJOINT ANALYSIS OF PREFERRED DRUG TREATMENTS

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Objective: Assessment of patient preferences for attributes of asthma treatments

Methods: Two hundred ninety-eight patients (age range, 18 to 60 years) from 15 centers in Sweden completed a questionnaire concerning their asthma, and ranked 18 alternative treatments using conjoint analysis. Patients were receiving treatment with either inhaled corticosteroids (ICS) and short-acting bronchodilator (n = 123) or ICS and long-acting bronchodilator (separate inhalers, n = 87; combination inhaler, n = 88). Attributes analyzed were maintenance treatment, additional reliever, time to onset and duration of reliever, number of symptom-free days (SFDs) per month, and out-of-pocket cost per month.

Results: Conjoint analysis showed that the most important aspect of treatment was SFD. Forty percent of the patients had 15 SFDs per month. Eighty-five percent of the patients preferred another treatment to their current treatment. Treatment preferences were heterogeneous, and in 78% were not covered by current treatment guidelines. A total of 148 patients (50%) preferred a combination inhaler to separate inhalers, and 233 patients (78%) preferred a reliever that is both rapid and long acting. The most preferred treatment was a combination inhaler for maintenance and reliever use. On average, the patients were willing to pay an additional 328 Swedish krona [US $36] per month for the change to the preferred treatment.

Conclusion: SFDs were the most important attribute in asthma treatment. Patients were willing to pay for a switch to their preferred treatment. The most favored treatments were a reliever therapy that is both rapid and long acting and a combination inhaler for both maintenance and as-needed use.

Key Words: asthma treatment • conjoint analysis • treatment preferences
Chest. 2004; 125:916-923.)

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A SCHOOL-BASED CASE IDENTIFICATION PROCESS FOR IDENTIFYING INNER CITY CHILDREN WITH ASTHMA*

THE BREATHMOBILE PROGRAM

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Background: Striking increases in the prevalence and morbidity of asthma among inner city children have been documented.

Objective: To establish and evaluate a large-scale, school-based case-detection process designed to efficiently and reliably identify inner city children with asthma.

Methods: A bilingual, seven-question, self-administered, parental asthma screening survey was developed. Clinical validation was achieved in a sample of 675 consecutive parents bringing a child to the school-based Breathmobile Program for initial evaluation, using a comprehensive evaluation by a physician specialist (ie, allergist) as the standard. Survey response patterns were used to construct a novel seven-model, tiered scoring algorithm and an abbreviated algorithm that predict the probability of a child being clinically classified as "yes asthma" or "no asthma." A systematic survey distribution process administered by a single coordinator was developed, and the impact of a classroom-oriented incentive offering a $25 school supply gift certificate for survey return rates of =" border=0 src="/math/ge.gif" 80% was evaluated.

Results: A total of 636 parents provided one or more survey responses and information sufficient for clinical classification. The scoring algorithm correctly identified children with asthma (=" border=0 src="/math/ge.gif" 80% probability) with a sensitivity of 86.5%, a specificity of 83.6%, and a misclassification rate of 14.3% (91 of 636 children). The sensitivity for identifying persistent asthma was 91.3%. Asthma prevalence estimates derived using survey results from a larger sampling of the general population were similar to rates previously reported for comparable populations. The inclusion of an inexpensive incentive increased the median survey return rates from 35.3 to 65% ($z = -11.9$; $p < .001$). The screening process has been used to conduct 27,526 surveys at inner city schools.

Conclusions: The Breathmobile case-detection process offers a validated, comprehensive, large-scale method with which to identify children with asthma at their school sites.

Key Words: asthma • children • inner city • screening • urban • validation
Chest. 2004; 125:924-934

PROSPECTIVE ANALYSIS OF CLINICAL CHARACTERISTICS AND RISK FACTORS OF POSTBRONCHOSCOPY FEVER*

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Study objectives: To assess the clinical characteristics of fever after fiberoptic bronchoscopy (FOB) and to identify the independent risk factors of postbronchoscopy fever.

Study design: Prospective study.

Setting: Tertiary care university hospital.

Study subjects: Immunocompetent adults undergoing FOB between July 2001 and April 2002. Measurements and results: Five hundred eighteen adults were included in this study. The incidence of postbronchoscopy fever was 5%, and the mean onset time of the fever was 8.7 ± 1.1 h after FOB (mean ± SEM). In most cases, the fever subsided spontaneously within a day, with a mean fever duration of 14.0 ± 3.1 h. No organisms were isolated from blood culture specimens drawn at the time of fever, although significant increases in total leukocytes and neutrophil counts were observed in the peripheral blood at the time of fever compared to levels prior to FOB. Univariate analysis showed that fever was related to multiple factors, such as the radiologic extent of involvement, consolidation, abnormal bronchoscopic findings, biopsy, lavage, the amount of saline solution or drug administered, the duration of the procedure, the severity of bleeding, and a final diagnosis of pulmonary tuberculosis. However, after multivariate analysis, the final diagnosis of pulmonary tuberculosis and the severity of bleeding were identified as independent risk factors.

Conclusions: Fever after FOB occurs relatively frequently but transiently in immunocompetent adults. Independent risk factors for the development of this complication seem to be related to the diagnosis of pulmonary tuberculosis and the severity of bleeding during FOB.

Key Words: bacteremia • bleeding • bronchoscopy • fever • tuberculosis
Chest. 2004; 125:945-952