Sleep disordered breathing detected by a new automated ECG analysis in subjects with insomnia

Thomas Penzel, Carmen Garcia, Martin Glos, Christoph Schoebel, Martina Sebert, Ingo Fietze. Interdisciplinary Sleep Medicine Center, Department for Cardiology, Charité Universitätsmedizin Berlin, Berlin, Germany

Patients with severe complaints of insomnia are sometimes investigated in a sleep laboratory in order to test for other causes of their complaints such as sleep disordered breathing or other sleep disorders. We investigated 64 patients with primary insomnia with cardiorespiratory polysomnography. Sleep stages, arousal and respiratory events were scored according to AASM criteria. ECG was analyzed by a special software (Hypnocore) which can provide a sleep evaluation and a respiratory event score by a new automated analysis. All patients were analyzed in two steps. The second analysis was performed on 54 patients after removing those with bad signal quality, arrhythmias and a total sleep time below 3 hours.

The analysis of respiratory events based on ECG in the group of 64 subjects resulted in 52 subjects (48 true negative, 4 false negative) with an RDI < 5/h. 12 subjects (10 true positive, 2 false positive) were scored with an RDI > 5/h. Agreement was 0.91. For the second analysis agreement remained the same. Sleep stages in the second analysis were scored surprisingly good: 48.9% (ECG) vs. 48.7% (PSG) for light sleep, 15.7% (ECG) vs. 15.8% (PSG) for slow wave sleep, 14.0% (ECG) vs. 23.4% (PSG) for wake, and 19.9% (ECG) vs. 12.2% (PSG) for REM sleep. Not many respiratory events occur in insomnia patients. These events are detected with a sufficient accuracy using the new ECG based algorithms. Sleep stage analysis based on ECG did show a good ability to distinguish light sleep, slow wave sleep, and wake/REM sleep. To distinguish wake and REM sleep by ECG alone has a lower accuracy due to high sympathetic activity in both states.
P2204 Respiratory polygraphy versus polysomnography for the diagnosis of obstructive sleep apnoea in children
Lynda Hammoud1, Fawzia Heraut1, Florence Bourn1, Ha Trang1, 3 Paediatric Sleep Centre, Robert Debre Hospital, Paris, France; 2 Lab of Neurophysiology, Raymond Poincare Hospital, Garches, France; 3 Lab of Neurophysiology, Gonesse Hospital, Gonesse, France

Full attended polysomnography (PSG) is the gold standard for diagnosis of obstructive sleep apnoea syndromes (OSA). No consensus exists on the reliability of Respiratory Polygraphy (RP) for that purpose in children. This study aims to assess reliability between RP and PSG of determining sleep-related respiratory data in children. Twenty children with suspected OSA (10 yrs, 4-16) had full PSG performed in the Paediatric Sleep Centre, Robert Debre hospital, Paris, France. One investigator (LB) performed analysis using 2 modes in a random order: PSG mode (neurophysiologic and respiratory traces available) and RP mode (EEG, EOG, EMG not available). Sleep was scored in PSG mode using Rechtschaffen-Kales criteria, and in RP mode using those of Moss et al (2005) which are mainly based upon variation of cardiac rhythm. Respiration was scored in the same manner for both modes using commonly accepted paediatric criteria. Intra-class correlation coefficients (ICC) were calculated.

When using PSG mode, total sleep time was 517 min (360-633), obstructive apnoea-hypopnoea (OAH) index was 6.3 (2.0-66) and minimal SaO2 was 86% (71-95). Low ICC was found for sleep data. There was some reliability between RP and PSG of measuring OAH index and minimal SaO2, but not of measuring mean duration of events and sleep time in OAH. These results prompt further studies to be performed in a higher number of children before determining recommendations on routine use of RP in children with suspected OSA.

P2205 Overnight oximetry as a screening tool for diagnosing obstructive sleep apnea in high altitude residents
B.N.B. Malavazas, C.A. Takum. Medicine, Military Hospital Wellington, Wellington Barracks, The Ngilisir District, Tamindua, India

 Aim: To determine the value of overnight nocturnal oximetry in strongly suspected cases of obstructive sleep apnea (OSA) among residents of high altitude.

 Methods: This study is a retrospective analysis of prior overnight oximetry data of permanent residents staying at altitudes between 7000 to 8000 feet above the sea level who had a high pretest probability of OSA. The cases in this study were subsequently confirmed to have OSA by overnight sleep study (polysomnography). To determine the mean daytime and nocturnal oxygen saturation values for comparison with the study group, matched healthy non smokers residing in the area were studied by daytime and nocturnal oximetry.

 Results: There were 12 males and 9 females in the study who had confirmed OSA. They were in the age group between 36 to 48 years. All had severe OSA. Nocturnal oximetry in these cases revealed more than 15 events of oxygen desaturation per hour of sleep with oxygen saturation falling more than 10 percent below awake baseline values. The oxygen saturation of all these cases were normal and were matching with mean value of 92 percent observed among 20 controls. The nocturnal oxygen desaturation among control group was less than 4 percent of awake values and events of desaturation were less than 5 times per hour of sleep.

 Conclusion: Overnight oximetry is a useful screening tool in cases of OSA residing at high altitude areas. It can be used to confirm diagnosis of OSA in cases with a high pretest probability.

P2206 A new tool to help patients with obstructive sleep apnoea syndrome (OSAS) make informed therapeutic choices
Nathalie Fleury 1, Ahlam Guiné2, Nicolas Krakien1, Bernard Fleury1, 1 CERMES, CNRS UMR 8121 - INSERM U988 - EHESS - UPVD, Villeneuve, France; 2 Centre for Health Economics and Policy Analysis Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, ON, Canada; 3 Sleep Unit, Hôpital Saint-Antoine, Paris, France

There remains concern that patients may not be fully informed regarding their mechanical treatment options for OSAS: continuous positive airway pressure (CPAP) or oral appliance (OA).

Objective: To develop a tool to help clinicians inform patients about treatment options, and to assess its validity, reliability and acceptability.

Methods: We developed a decision board (DB), to present information regarding the potential benefits and side effects of the 2 treatment options, using the best available evidence. To test validity, we evaluated in 34 healthy volunteers the extent to which the respondents’ preferences for a treatment changed predictably when the rate of effectiveness and side-effects were modified. Reliability was tested by re-administering the DB 2 weeks after (kappa test). The DB acceptability was evaluated in 68 consecutive patients newly diagnosed with OSAS, AHI>30 (22).

Results: In healthy volunteers, 58.8% chose OA, 41.2% chose CPAP. In the former group, 85% switched preference when the rate of effectiveness was reduced from 6/10 to 3/10, and 90% when the occurrence of occlusal contacts modification increased from 4/10 to 8/10. In the CPAP group, 57% switched when effectiveness was reduced from 10/10 to 5/10, and 42% when non compliance due to adverse effects increased from 3/10 to 6/10. Reliability was excellent (k=0.94). Concerning acceptability, 90% of the patients were satisfied with the information provided in the DB and 88% indicated that it helped them make a decision. The average score of true/false test of comprehension was 7.9 of 10 (range, 4 to 8).

Conclusion: The DB is a valid, reliable and acceptable tool to assess OSAS patients’ preferences.

P2207 Comparing different flow rates (20 and 35 l/min) under high-nasal flow therapy for the obstructive sleep apnoea syndrome (OSAS)
Georg Nilius1, Ulrike Domanskie1, Karl-Josef Franke1, Karl-Heinz Ruhle1, Hartmut Schneider1, 1 Pulmonology, HELIOS-Klinik Hugen-Ambrook, Hamburg, Germany; 2 Pulmonology, John-Hopkins-University, Baltimore, United States

Introduction: We have demonstrated that 20 l/min nasal insufflation of airflow (HNF) can treat a subgroup of OSAS patients (Nilius G et al. Chest. 2010; 137:521-8). The aim of this study was to compare the effect of two flow rates (20 l/min (HNF20) and 35 l/min (HNF35)) on sleep disorders breathing.

Methods: 18 CPAP naïve patients (6 women, age 36±7 years, BMI 36±3.8 kg/m2, ESS 9.3±5.2) with more than 50% Hypopnoeas during a diagnostic night were recruited. During the treatment night both HNF20 and HNF35 were administered in a random order for a minimum of three hours each.

Results: The total event rate (HAI) in NREM/REM sleep was at baseline 25±13±7±3, at HFO 20 L/min 23.4±14±22±2 and at HFS 35 L/min 19.0±13±15±6 (P<0.05 for REM). There were significant improvement HI, but AI at 35 l/min versus 20 l/min in NREM and REM sleep. The lack of AHI responses was associated with a significant increase in central AI (baseline vs HNF20 vs HNF35; 1 vs 8 events/hour). Nevertheless Oxygenation (T90) improved considerably with HNF35 compared to HNF20 and baseline in both sleep states.

Conclusion: A flow rate of 35 LPM of nasal insufflation is more effective in lowering obstructive hypopnoeas and improving oxygenation than 20 LPM. Nasal insufflation, however, can increase the rate of central apneae, independently of the flow rate, which might offset therapeutic responses in some patients.

P2208 Variability in AHI and mean pressure over time in OSAS patients treated with APAP
Siriram Chandramoulis, Dorothy Price, Jennifer Furlong, Syed Huq, Justine Haderoth, Dept of Respiratory & Sleep Medicine, Liverpool Chest Hospital, Liverpool, Merseyside, United Kingdom

Background: In patients with obstructive sleep apnoea (OSA), studies have shown that automatic positive airway pressure (APAP) treatment is comparable to continuous positive airway pressure (CPAP) in its cost effectiveness and efficacy. Patients with OSA are treated with APAP devices in our hospital.

Aims: Monitor changes in APAP and apnoea hypopnoea index (AHI) over a period of 3 months Identify factors which affect changes in mean AHI and APAP.

Methods: Symptomatic OSA patients [Ewport sleep score (ESS) >10, AHI>10] were offered APAP therapy and monitored prospectively for 3 months.Data was downloaded at 2 weeks and 3 months and analyzed using paired t test and multiple regression.

Results: APAP therapy was initiated in 26 patients (22 men) with a mean (SD) age of 51 (11.7) years. Mean AHI was 44.5 (25.5) and mean Epworth score was 12 (4.7).

Changes in mean AHI and APAP are shown in the table.

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Mean AHI(SE)</td>
</tr>
<tr>
<td>Mean APAP</td>
</tr>
</tbody>
</table>

Multiple regression identified baseline AHI to be the only predictor of AHI change.
over 2 weeks and 3 months (p<0.0001) while a higher mean APAP at 3 months was also found to be significant (p<0.0003).

Age, sex or body mass index did not affect changes in mean AHI or APAP.

Conclusions: In our study, AHI was significantly reduced after 2 weeks’ treatment with APAP and continued to fall at 3 months even though mean pressure did not change noticeably. AHI change is greater in patients with a higher baseline AHI and a greater mean pressure at 3 months. This is probably due to the influence of other factors such as change in upper airway muscle dynamics. Larger studies are needed to elucidate this complex relationship.

P2209
Manual vs. automated analysis of polysomnographic recordings in patients with COPD
Gerben Stege1, Petra J.E. Vos1, P.N. Richard Dekhuisjien2, Pieter E.H. Hilken2, Marjo J.T. van de Veen3, Yvonne Heijdra1, Frank J.J. van den Elshout1, 1Department of Pulmonology, Rijnstate Hospital, Arnhem, Netherlands; 2Department of Neurology, St. Antonius Hospital, Nieuwegein, Netherlands; 3Department of Pulmonology, Radboud University Nijmegen Medical Centre, Nijmegen, Netherlands

Abstract: Manual analysis of polysomnography (PSG) is time-consuming and computer systems have been developed to automatically analyse PSGs. Studies on the reliability of automated analyses in healthy subjects show varying results. In patients with Chronic Obstructive Pulmonary Disease (COPD) these studies have not been performed, while sleep quality can severely be disturbed in these patients. It is unknown whether automated analysis of PSG in patients with COPD provides accurate outcomes.

Methods: In a retrospective study the full-night polysomnographic recordings of patients with COPD (N=50) were blindly scored by 3 PSG experts with manual and automatic analyses being performed in both groups by employing Bland-Altman plots, Students’ paired t-tests, and Pearson’s correlation coefficients.

Results: In 50 PSGs from patients with COPD and 57 PSGs from patients without COPD analysis was performed in both groups. Manual and automatic analyses were poor in nearly all sleep and respiratory parameters, like the total sleep time, sleep efficiency, sleep latency, amount of REM sleep, no. of arousals, and the apnoea-hypopnoea-index.

Conclusion: Automatic analysis of PSGs in COPD patients with poor agreement manual with manual analysis when looking at sleep and respiratory parameters and should therefore not replace the manual analysis of PSG recordings in patients with COPD.

P2210
Heart rate analysis using multiscale entropy in OSA patients under CPAP treatment – Pilot study
Jakub Kudlinski1, Waldemar Tomala1, Zbigniew Baran2, 1Dept of Pulpathophysiology of Respiratory System, Institute for TBC & Lung Diseases, Rabka Bruch, Rabka - Zdrój, Poland

Abstract: One of the common effects of hypopnea/apnea events during sleep are arousals associated with heart rate change. Methods of nonlinear dynamics which analyze not only variability but also the complexity of the signal are the effective and reliable tools to analyze heart rate variability. The aim of the study was to explore the possibility of detection of complexity changes of signal constructed from R-R intervals derived from ECG during full night PSG in OSA patients (in whom apnea/hypopnea events were eliminated by CPAP therapy) using informative entropy. 21 patients undergoing routine diagnostic in sleep lab were recruited for the study (15 male, 6 female; age 52.4±9 years; BMI 35.8±5.4 kg/m2; Epworth 13.4±5). The full-night diagnostic PSG and the titration night using auto-CPAP under PSG supervision (both according to AASM rules) were performed (diagnostic to titration time: 60±31 days). The CPAP therapy was well tolerated (the RDI change from 72±30 during diagnostic night to 5±4±6.9 during titration night. ODI from 61±31 to 3.6±4.1; AI from 50±26 to 6.5±4.3). The R-R intervals were detected in recorded ECG signal (250Hz), and the multiscale entropy (Goldberg’s MSE) was calculated for the scales 1-20.

In the low scales (up to 9) there were no significant difference between diagnostic and titration results. In the higher scales there were significant (p<0.05) differences. The elimination of respiratory events has no significant effect on beat-to-beat heart rate complexity. However, using MSE analysis the results of eliminating heart rhythm changes associated with arousals are clearly visible.

P2211
Validation of a new polygraphy device for the diagnosis of obstructive sleep apnoea (OSA)
Ulrike Domanski1, K.H. Ruhle1, Margaret Laurent2, Maria Stocca1, A. Hoghe1, M.P. D’Ortho1, Georg Nitou1, 1Klinik Ambrock, Universität Witten-Heerdeke, Hagen, Germany; 2Groupe Hospitalier Bichat-Claude Bernard Assistance Publique, Hopitaux de Paris, Université Denis Diderot, Paris, France

Abstract: Snoring and OSA are such common problems that there is the potential to overestimate the need for sleep laboratories. The goal of this study is to validate a new portable respiratory monitoring device (Alice PDX) against PSG during laboratory recordings, and to assess the devices ability to predict the presence of OSA in the home environment.

Methods: 45 suspected OSA patients (84.4% male, age 52±8.1±9 years, BMI 30.7±1.1 kg/m2, neck circumference 43.3±0.8 cm and an ESS 9±9±0±07) were randomized to receive the following diagnostic routines over 3 nights: 1 night with self applied Alice PDX, 1 night in simultaneous in Lab Polysomnography (PSG) and Alice PDX recording, and 1 in Lab PSG. The data were anonymised and then manually scored according to AASM criteria.

Four t-tests were used to compare each diagnostic modality to the reference in lab PSG, and correlation co-efficient calculated. Finally, the rate of diagnostic agreement was calculated.

Results: The Alice PDX was in diagnostic agreement with the simultaneously recorded reference PSG in 91.2% of studies. In 4.4% of studies the Alice PDX underestimated the AHI and on 4.4% of occasions the Alice PDX overestimated the AHI. Similar levels diagnostic agreement were observed when comparing PDX Home, and PSG Lab to the reference PSG recording.

Table 1

<table>
<thead>
<tr>
<th>AHI</th>
<th>P</th>
<th>c2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSG Lam Sim*</td>
<td>17.6±5.2</td>
<td>0.2</td>
</tr>
<tr>
<td>PSG Lab Sim</td>
<td>15.9±5.2</td>
<td>0.2</td>
</tr>
<tr>
<td>PSG Home</td>
<td>13.5±6.2</td>
<td>0.2</td>
</tr>
<tr>
<td>PSG Lab</td>
<td>17.6±5.2</td>
<td>0.9</td>
</tr>
</tbody>
</table>

*Reference PSG.

Conclusions: The Alice PDX shows a high level of diagnostic agreement against PSG when used simultaneously and on a separate occasion at home. When used at home, the level of agreement is similar to a PSG performed on a separate occasion.

P2212
CPAP setting prediction in OSAS patients
Nikolaos Chavounis, Katalin Fekete Passa, Afroditou Boutou, Chrysanthi Nakou, Asimina Psapala, Ioannis Stapanopoulos, Georgia Pitsou, Athanasia Patakia, Vasilios Bagalas, Paraskievgyorgiopoulou. Respiratory Failure Unit, Aristotle University of Thessaloniki, Thessaloniki, Greece

Abstract: The aim of this study is to validate a new portable respiratory monitoring device (Alice PDX) against the diagnostic PSG study, a diagnostic of OSA (Apnea-Hypopnea Index (AHI) = 5 and daytime somnolence) and a CPAP titration study were retrospectively analysed. Regression analysis was used to assess the predictive value of age, height, weight, neck and hip circumferences, systolic and diastolic blood pressure at rest and diagnostic PSG data AHI, desaturation index, minimum (min) saturation, average saturation, average apnea-hypopnoea duration for determining the required CPAP pressure setting. The regression analysis identified AHI, neck circumference and min saturation as predictive parameters for the CPAP parameter. Age and BMI were entered at Step 1 hierarchical regression, explaining 6.1% of the variance in CPAP setting. After entry of AHI, neck circumference and min saturation the explained variance increased to 19.6%. Step 2 the total variance explained by the model as a whole was 19.5%, F(5,697) = 35.08, p<0.0005. The three control variables explained an additional 13.8% of the variance in CPAP therapy pressure, after controlling for age and BMI (Fchange(3,697) = 40.06, p<0.0005). In the final model only the three control variables were statistically significant, with AHI achieving the highest beta value (beta=0.24, p<0.0005), then neck circumference (beta=0.17, p<0.0005) and finally min saturation (beta=0.14, p=0.001).

Conclusions: OSAS severity, neck circumference and overnight minimum saturation have a statistically significant contribution of 19.5% on the variance of the CPAP therapy pressure, independently of the age and the obesity of the subject.

P2213
Capsaicin-induced cough reflex is inhibited by deep inspiration in children with mild asthma
Renata Pesco1, Tatiana Michnovska1, Jaroslav Faby2, Tomas Zatka1, Martina Neuenschwiler1, Zoltan Tomori1, 1Dept of Pathophysiology, Jessensius Medical Faculty, Comenius University in Bratislava, Martin, 2Respiratory Diseases, Srobar’s Institute of Pudiatric Tuberculosis, Dolny Smokovec, 1Dept. of Physiology and Sleep Laboratory, Faculty of Medicine, University Pj Safarik, Kosice, Slovakia (Slovak Republic)

Abstract: Background: Asthma is characterized by bronchospasms accompanied with frequent coughing, the pathogenesis of which is not clear. In healthy adults deep inspirations (DI's) provide a protective effect against bronchoconstriction triggered by metacholin, which correlates with the number of accompanying cough efforts. In adult asthmatics DI's have some spasmyloxic effect, which decreases with age and severity of the disease. Our aim was to test the elicitation of cough reflex by capsaicin in children with mild asthma and their presupposed inhibition by DI's.

Methods: In 21 children (8 girls and 13 boys of median age 13.3 yr) with mild asthma (FEV 1<80%) the cough reaction to inhalation of increasing concentrations
of capsaicin from a compressed air-driven nebulizer manifesting with 2 and 5 or more cough efforts (C2 and C5) was tested. The effect of previous DIs was also examined.

Results: In control conditions 20.86 ± (14.58-29.58) umol/l of capsaicin provoked two cough reflexes (C2), but after 3-5 DIs similar reaction required significantly higher concentrations 29.02 ± (18.88-44.6) umol/l, P<0.01. Five or more cough efforts with repeated increasing doses inhaled repeatedly in 1 minute intervals, which were not significantly higher after DIs 161.49 ± (71.31-333.3) umol/l, than without DIs 141.52 ± (68.77-291). P=0.54

Conclusion: A series of 5 DIs decreased the sensitivity of cough reflex provoked by capsaicin in children with mild asthma, but such inhibitory effect of DIs disappeared after repeated applications of increasing doses of capsaicin, suggesting reflex character of protective effect of DIs.

Supported by a Grant of Ministry of Health of Slovak Republic 2007/50-UK-14.

P2214 How we treat central apneas?
Margarida Aguia, Susana Moreira, Richard Staats, Fatima Caetano, João Valença, António Bugalho de Almeida. Servico de Pneumologia 1, Hospital de Santa Maria - Centro Hospitalar Lisboa Norte, Lisboa, Portugal

In a time when sleep studies are progressively done out of sleep laboratories and the positive pressure devices have many automatic features that allow easy home titration, our sleep clinic thought it would be important to review the cases of central sleep apnea and their titration in the sleep laboratory. Between 2004 and 2010 patients with central sleep apneas were selected and prospectively followed in our sleep clinic. Demographics, anatomic features, clinical symptoms, initial and therapeutic standard polysomnography, associated pathologies and eventual improvements were described.

A total of eleven patients were selected, one female, mean age 64.5±13.3, mean body mass index 30.3±3.9 kg/m², all smokers, nine referring hypertension, four with heart failure and five with a disease of the central nervous system. All but one referred daytime sleepiness and scored more than 10 in the Epworth scale. The polysomnographies showed a mean apnea-hypopnea index (AHI) of 44.1±14.7 and a mean central apnea index of 21.3±8.9 representing 75±21.3% of all apneas. All patients initial treatment in our sleep laboratory, at first with continuous positive airway pressure (CPAP) at a fixed pressure but seven patients had the need for bilevel positive airway pressure (BiPAP) Auto SV. In five patients most respiratory events were corrected allowing a normal AHI and there was a significant improvement in the remaining (mean therapeutic AHI-14.3). All patients improved their daytime sleepiness, maximum ESE of 6.

In conclusion effective treatment is possible with CPAP allowing reduction of costs but this is only possible if the therapist is titrated and started in a sleep laboratory.

P2215 Evaluation of an ambulatory device for the diagnosis of sleep apnea in 2 to 5 year-old children
Antonio Foresti1, Androula Marinos1, Clementina Leone1, Giuseppe Ricciardi2
1U.O.C. Pneumologia, AO ICP, Sexto San Giovanni, Italy; 2U.O.C. Pediatría, AO ICP, Sexto San Giovanni, Italy

The Embletta portable diagnostic system is highly sensitive and specific in quantifying respiratory events during sleep (Respirology 15:336-2010). We tested this cardiosynchronous polygraphy for diagnostic purpose in children with clinical history of habitual snoring, sleep apnea, adenotonsillar hypertrophy. Recordings were performed overnight in hospital and attended by a parent who completed a detailed medical history of habitual snoring, sleep apnea, adenotonsillar hypertrophy. Recordings were performed overnight in hospital and attended by a parent who completed a detailed medical history of habitual snoring, sleep apnea, adenotonsillar hypertrophy. Recordings were performed overnight in hospital and attended by a parent who completed a detailed medical history of habitual snoring, sleep apnea, adenotonsillar hypertrophy. Recordings were performed overnight in hospital and attended by a parent who completed a detailed medical history of habitual snoring, sleep apnea, adenotonsillar hypertrophy.

A total of 21 children aged 2 to 5 years old (mean height=102 cm, range 125-70; ±14,8 years. In 42% of the pts sleep latency and in 63,8% sleep efficiency was reduced. Decreased slow wave sleep was found in 55%. In 61% a reduced REM sleep was found and all pts had a high arousal index (41.6±18.3/hr).

The pts followed in our clinic sleep 50% showed an increased epworth scale (12.6±5.5), 56% were hypersomnolent and in 75% (BMI=30±g/m²), 75% of the pts underwent a positive pressure therapy (pp) with improvement of symptoms (ESE<8) and good adherence. Contrary to other data we found a high% of males within the pts with mainly RERAs in Psgs.

As a conclusion, pts with RERAs should be evaluated for EDS for therapy with pp improves daytime symptoms and is reasonably well tolerated.

P2217 Efficacy of the “tennis ball technique” in patients with positional obstructive sleep apnoea syndrome
G.E. de Vries1, P.M. Meijer1, J.H. van der Hoeven2, R.A. Feijen3, B. Steegenga4, P.J. Wijkstra1
1U.O.C. Pneumologia, AO ICP, Sexto San Giovanni, Italy; 2U.O.C. Pediatria, AO ICP, Sexto San Giovanni, Italy

Introduction: In obstructive sleep apnea (OSA) collapsibility of the upper airway is increased in the supine sleeping position, resulting in an increase of apnea-hypopnea index (AHI) and severity of apneic events.

Aim: To assess whether the “tennis ball technique” (TBT) prevents positional OAS-patients from lying on their back and whether this therapy is effective in reducing AHI, severity of events and excessive daytime sleepiness (EDS).

Methods: Thirty patients with positional OSA, at baseline (14 male, 17 moderate, 2 severe) were treated with TBT. After at least 4 weeks a second sleep study under treatment was performed to assess differences between baseline and follow-up percentage in supine position, AHI, minimal oxygen saturation and EDS.

Treatment was considered successful when AHI reduced <50% or at least 50%.

Results: Supine sleeping position reduced from a median (IQR) of 33.2 (23.6-43.7)% to 6.6 (0.0-13.4)% p<.001. AHI decreased from a median (IQR) of 15.4 (12.1-19.9)/hour to 6.0 (3.4-10.0)hour, p<.001. Minimal saturation improved from a median (IQR) of 86.0 (83.3-87.8)% to 90.0 (84.3-89.0)%, p=0.047. The Epworth Sleepiness Scale decreased from a mean (SD) of 11.2 (5.3) to 9.2 (5.3), p=0.002.

TBT treatment was successful in 23 of the 33 patients.

P2218 Added value of a mandible movement automated analysis (MMA) to a type 3 portable monitoring (PM) in the diagnosis of obstructive sleep apnea (OSA)
Giselle Maury1, Robert Poirier1, Laurent Cambroin2, Frédéric Senn3
1Pneumologie, Cliniques Universitaires UCL de Mont Godinne, Yvoir, Belgium; 2Neurology, Faculty of Medicine, B35 ULg (Sart-Tilman), Liège, Belgium; 3Electronic Department, Montefiore Institute, B28 ULg (Sart-Tilman), Liège, Belgium

In-laboratory polysomnography (PSG) is the “gold standard” for diagnosing OSA but is time-consuming and costly with long waiting list in many sleep laborato-

Our aim was to detect the importance of this pathology within the overall sleep studies performed at our sleep laboratory.

Sleep and cardiopulmonary parameters were evaluated with standard polysomnography (PSG) according to the recommendations of AASM. RERAs were identified by a flattening of the airflow registered by nasal cannula and/or a visible increase in thoraco-abdominal effort leading to an arousal.

All PSGs recorded during a period of 6 month with an apnea/hypopnea index of less than 15/h were reanalyzed by a single sleep specialist. Patients (pts) demonstrating RERAs in more than 50% of all breathing events were included for further study.

Within 303 sleep studies a total of 45 pts were included (14.8%), mean respiratory disturbance index 17,4±10,4/h. 71% were male, with a mean age of 54,6±14,8 years. In 42% of the pts sleep latency and in 63,8% sleep efficiency (mean 78.5±12.6%) were reduced. Decreased slow wave sleep was found in 55%. In 61% a reduced REM sleep was found and all pts had a high arousal index (41.6±18.3/hr).

Of the pts followed in our clinic sleep 50% showed an increased epworth scale (12.6±5.5), 56% were hypersomnolent and in 75% (BMI=30±g/m²), 75% of the pts underwent a positive pressure therapy (pp) with improvement of symptoms (ESE<8) and good adherence. Contrary to other data we found a high% of males within the pts with mainly RERAs in PSGs.

As a conclusion, pts with RERAs should be evaluated for EDS for therapy with pp improves daytime symptoms and is reasonably well tolerated.
Effect of upper airway stimulation for quality of life and sleep architecture in patients with moderate-to-severe OSA
Johan Verbrugge1,2, Loan T. Maurer1, Lennart Knack1, Wilfried De Bacquer1,2,3
1Dept of Pulmonary Medicine, Antwerp University Hospital Antwerp, Belgium; 2HNO-Klinik, Universitaetsklinikum Mannheim, Mannheim, Germany; 3Sommubath Dortmend, Zentrum für Schlafmedizin, Dortmund, Germany

Background: Electrical stimulation of the hypoglossal nerve can improve obstructive sleep apnea syndrome (OSAS). It is however unknown whether the stimulation affects sleep architecture and quality of life.

Methods: Inspire systems were implanted in moderate-to-severe OSA patients who failed, or were intolerant for CPAP. Sleep architecture was evaluated using lab-based polysomnography at peri-implant and post-implant, at which times Epworth Sleepiness Scale (ESS) and Functional Outcomes of Sleep Questionnaire (FeSO) were also collected. Results are presented as Mean ± Std.

Results: Twenty eight subjects were implanted. The data collection is on-going and 18 have completed month 12 visit. Both ESS and FeSO improve significantly from the baseline to the last visit. There was a trend toward increased percent of slow wave sleep and REM sleep at the last visit post-implant, but no significant change in total sleep time, sleep efficiency, percent of slow wave sleep or REM sleep was detected.

Conclusion: Preliminary findings showed that upper airway stimulation improves quality of life without changing sleep architecture in patients with moderate-to-severe OSA.
to an intermediate PLATEAU \((p<0.001)\). Concurrently, mean EMG and SHORT of the PARA increased significantly from BASE to PEAK, then attenuated to PLATEAU \((p<0.01)\).

**Conclusion:** As minute ventilation “rolls off” during sustained isocapnic hypoxia, there is a concurrent decline in shortening and EMG activity of the chest wall muscle, the Parasternal Intercostal.