397. Metabolic and cardiovascular consequences of OSA I

P3804

Positive effect of CPAP therapy in OSA patients on A-FABP, CRP and triacylglycerols levels and diastolic blood pressure

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Objectives: Obstructive sleep apnea (OSA) can be associated with metabolic syndrome and cardiovascular disease (CVD). Adipocyte fatty acid-binding protein (A-FABP) may play a role in OSA. C-reactive protein (CRP) is a marker of inflammation and a risk factor for CVD. The study aimed to find whether continuous positive airway pressure (CPAP) treatment results in decreased serum A-FABP and CRP levels and their possible association.
Subjects and methods: Eighty-one patients (70 males, a mean age of 53.9±10.3 years) diagnosed with OSA and indicated for CPAP treatment. Anthropometric, clinical and laboratory investigations were carried out and repeated after 1 year of CPAP treatment.
Results: Patients had significantly decreased A-FABP levels (34.4 ng/mL; 24.8ng/mL; p=0.001), CRP levels (6.08±7.74; 4.29±4.9; p=0.007), triacylglycerols (2.24±0.88; 2.13±1.32; p=0.01), diastolic blood pressure (82±11; 79±7; p= 0.006) and improved OSA parameters: AHI (53.9; 5.6; p<0.0001), mean nocturnal oxygen saturation (91%; 94%, p<0.0001), ODI (55; 8, p<0.0001), t90 (28.2; 0; p<0.0001). BMI, waist, neck circumference, systolic blood pressure, total cholesterol, HDL cholesterol, LDL cholesterol, glucose and insulin did not change significantly. The decreases in A-FABP and CRP did not correlate significantly.
Conclusion: CPAP therapy of OSA patients has a positive effect on A-FABP and CRP levels. Given the fact that changes in A-FABP and CRP do not correlate with each other, they may reflect the effect of various pathological events in the development of CVD. Decreased A-FABP and CRP levels may contribute to fewer cardiovascular complications of OSA after CPAP therapy.

P3805

Evaluation of renal function in a cohort of patients affected by obstructive sleep apnea

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Introduction: Obstructive sleep apnea (OSA) has been linked to chronic kidney disease (CKD). We investigated the renal function (GFR) of a cohort of non-CKD patients admitted to our Sleep Medicine Unit for suspected OSA.
Materials and methods: 374 subjects underwent a cardiorespiratory polysomnography (PSG) and a blood collection for GFR. Oronasal airflow, respiratory efforts and oxyhaemoglobin saturation were recorded. PSG was scored according to AASM rules. GFR was calculated trough the MDRD equation. Descriptive statistic, analysis of variance (ANOVA), linear regressions were performed. A p value < 0.05 was considered significant.
Results: Patients were 53.1±12 years old, with a mean BMI >30. Estimated GFR was 95.1±19 mL/min/1.73 m^2. The population was suffering from severe OSA (AHI=45.8±19.7; min spO2=72.2±10.9%; T<90% =28±26.6%). No differences were seen in baseline GFR according to AHI and ODI. A significant difference in GFR according to T<90% (p=0.005) and min spO2 (p=0.017) was observed. These results were attributable to higher levels of GFR in more hypoxemic patients. GFR showed no correlation with AHI, ODI or T<90%, but it was related to min spO2. These results were confirmed in univariate linear regressions, but not in multivariate regression analisys. However, when mild to moderate OSA cases were excluded, spO2 turned out to be the first independent predictor of GFR.
Conclusion: In severe OSA cases, GFR seems to be inversely related to the severity of oxygen desaturation, but not to the common OSA's indexes. These findings may be due to nephropulmonary compensatory mechanisms against chronic hypoxia that need to be studied in a longitudinal way.

P3806

Treatment of central sleep apnea in patients with heart failure: A retrospective observational study

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Introduction: In patients with heart failure (HF) and central sleep apnea syndrome (CSAS) different therapeutic options, such as continuous positive airway pressure (CPAP), bi-level PAP (BiPAP) and adaptive servoventilation (ASV) are available. All are potentially effective in improving heart function and in reducing apnea-hypopnea index (AHI), while ASV is generally considered to be most effective.
Aim: To assess how HF-patients with CSAS (AHI ≥15) respond to the different treatments in terms of AHI.
Methods: CPAP was given first, and when ineffective or when patients still experienced SAS related complaints, followed by BiPAP and/or ASV. Efficacy was assessed by a sleep study under treatment. Treatment was considered effective when AHI reduced <15/hour or reduced at least 50% from the baseline AHI to a value <20/hour.
Results: 14 males (70 y) were assessed.

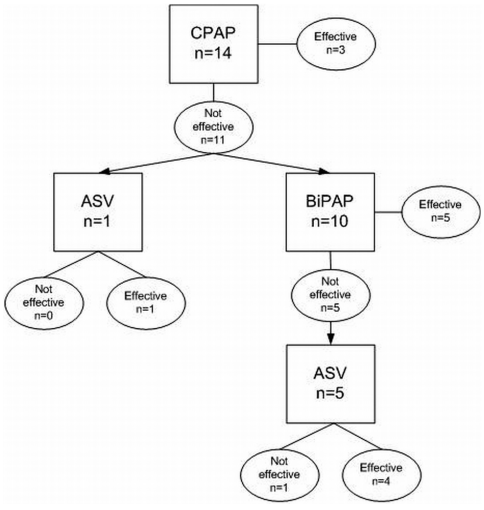

Figure 1. Overview of the efficacy of the treatments.

Conclusions: Although ASV seems to prove to be most effective in HF-patients with CSAS, CPAP and BiPAP together are still effective in 57% of the patients.

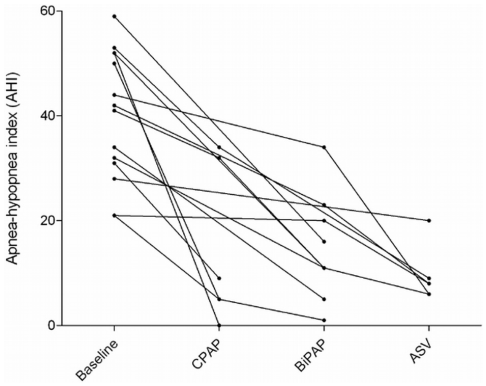

Figure 2. AHI without treatment and under treatment.

Given the lower costs of CPAP and BiPAP, algorithms and guidelines are needed for initial treatment mode selection in patients with both HF and CSAS.

P3807

Obstructive sleep apnea in patients with typical atrial flutter: Clinical, prognostic and therapeutic implications

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Background: The clinical yield of successful cavo-tricuspid isthmus (CTI) radiofrequency ablation for the treatment of atrial flutter (AF) is limited by a high incidence of atrial fibrillation (AFib) in the long term. The association of obstructive sleep apnea (OSA) could favor an incomplete arrhythmia control in this setting. We assessed the impact of continuous positive airway pressure (CPAP) therapy in reducing the occurrence of AFib after CTI ablation.
Methods: A cohort of consecutive patients undergoing successful CTI ablation for typical AF was screened for OSA and followed-up during 12 months. Upon diagnosis of severe OSA, CPAP therapy was initiated. Relationship of the following variables with the occurrence of AFib during follow-up was investigated: CPAP therapy initiation, hypertension, body mass index, underlying structural heart disease, left atrial diameter and previous AFib documentation prior to CTI ablation.
Results: We included 56 patients (age 66±11 years, 12 female), 27 of whom (48%) were diagnosed from severe OSA. Twenty-one patients (38%) had AFib during follow-up. Freedom from AFib prior to ablation was associated with a lower incidence of AFib after this procedure (from 67% to 34% of cases; p = 0.019). Additionally, CPAP therapy initiation in those patients never being diagnosed from AFib resulted in a reduction of AFib episodes during follow-up (from 46% to 6% of cases; p = 0.025).
Conclusions: Severe OSA is a prevalent condition in patients with typical AF, and its treatment by means of CPAP therapy results in a lower incidence of new-onset AFib after CTI ablation.

P3808

Serum levels of insulin-like growth factor binding protein-3 and vascular endothelial growth factor in obstructivesleep apnea patients. Effect of CPAP treatment

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Background: Intermittent hypoxia in obstructive sleep apnea (OSA) is associated with increased cardiovascular risk, via activation of inflammatory pathways. Hypoxia modifies Vascular Endothelial Growth Factor (VEGF) and Insulin-like Growth Factor Binding Protein-3 (IGFBP-3) levels, which could contribute to atherogenesis and predict future cardiovascular events. Aim of the study was to compare serum levels of VEGF and IGFBP-3 in OSA patients vs. controls, to explore associations with anthropometric and sleep parameters and to study the effect of CPAP treatment on these levels.
Materials and methods: In 65 patients with OSA (AHI 59.9±26.8/h) and in 31 age and BMI matched controls (AHI<15/h) (AHI 6.5±4.4/h), serum levels of VEGF and IGFBP-3 were measured. The measurement was repeated after 6 months to OSA patients under CPAP therapy. All participants were non-smokers, without any cardiovascular comorbidities.
Results: At baseline, serum VEGF levels in OSA patients were significantly higher compared to controls (398.4±229 vs. 229.9±149.8 pg/ml, p<0.001), while IGFBP-3 levels were lower (1.41±0.56 vs. 1.61±0.38 μg/ml, p=0.039). VEGF levels were correlated with AHI (r=0.336, p=0.001) and ODI (r=0.282, p=0.007). At the 6-month follow-up, VEGF levels decreased in patients under CPAP treatment (341±206, p<0.001), while IGFBP-3 levels increased (1.94±0.6, p<0.001).
Conclusion: In OSA patients, serum levels of VEGF are elevated, while IGFBP-3 levels are low. Six months of CPAP treatment modify these levels, indicating an augmented cardiovascular risk in untreated OSA patients, which is ameliorated after CPAP therapy.

P3809

Relationship between upper airway inflammation and systemic inflammation in obstructive sleep apnoea

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Introduction: Systemic inflammation is considered an intermediary mechanism to explain the increase risk of cardiovascular outcomes in patients with obstructive sleep apnoea (OSA).
Aims: To determine the relationship between upper airway inflammation and systemic inflammation in OSA.
Methods: From a sleep clinic we recruited subjects with suspected OSA. Exclusion criteria included: past or present smoking history, anatomic abnormalities at the upper airway and medical comorbidities. Severity of OSA was defined according with the number of apnoeas and hypopnoeas per hour of sleep (apnoea-hypopnoea index –AHI-). Local inflammation was evaluated by flow cytometry from pharyngeal lavage.
Results: Compared to 22 healthy subjects (AHI <5), among a group of 23 patients with mild to moderate OSA (AHI: 5 to 30), and 22 patients with severe OSA (AHI > 30), total white cell and % lymphocytes was not different. However, in severe OSA, % of CD4 and CD4/CD8 ratio increased significantly compared to healthy (p=0.02 and p<0.01 respectively) and p=0.02 and p<0.01 respectively) to mild-moderate OSA (p=0.008 and p <0.001 respectively) groups. There was a mild relationship with CD4/CD8 ratio and high sensitivity PCR levels (r=0.32, p=0.03) for the whole cohort.
Conclusions: This preliminary data suggests the presence of an specific type of upper airway inflammation which appears to be related with systemic inflammation.
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P3810

Osteoprotegerin, body composition and cardiovascular risk in sleep apnea syndrome

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Obstructive sleep apnea syndrome (OSAS) is a frequent disease associated with increased risk of cardiovascular disorders. The aim of this study was the evaluation of changes in osteoprotegerin serum levels and in body composition parameters in patients with sleep apnea syndrome.
We examinated 47 patients with OSAS (mean age 55,42±7,91, mean AHI 32,76±19,98) and 29 persons from control group (mean age 49,48±13,68). All subjects underwent bioelectrical impedance analysis with a single-frequency bioimpedance analyzer (Model BIA 101 Akern) and polysomnography Grass Aura Lite. The osteoprotegerin serum level was measured using a ELISA kit: Human Osteoprotegerin (R&D Systems).
We didn't showed either differences in osteprotegerin serum levels between OSAS patients and control group (4,696 vs 4,631 pmol/l, p=0,680) nor correlations between osteoprotegerin and AHI (p=0,484, R=0,08). Moreover we didn't find changes in osteprotegerin levels in OSAS patients with diabetes (p=0,251), with hypertension (0,911) or ischemic heart disease (0,876).
We observed higher BMI in OSAS patients (p=0,009),but from all body composition parameters we revealed only lower phase angle in OSAS patients (5,65, vs 5,87,p=0,047). We evaluated the relationships between osteoprotegerin and body composition parameters and we found only tendency, that osteoprotegerin level correlated negative with muscle mass percentage (MM%) (p=0,069, R=-0,209) and positive with fat mass percentage FM%. CRP was significant higher in OSAS than in control group (6,59 vs 3,85 p=0,006).R=0,198,p=0,08), but we didn't find correlations between osteoprotegerin and CRP (p=0,929, R=0,010).
Our study didn't show changes in osteoprotegerin in OSAS patients.

P3811

Clinical parameters and biomarkers for the early detection of impaired glucose tolerance in OSA patients

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The role of different clinical parameters regarding inflammation and oxidative stress has largely been debated in the etiology of impaired glucose tolerance in OSA patients.
To determine the plasma levels of free fatty acids (FFA) and resistin in patients with OSA and impaired glucose tolerance (IGT) and compare them to those with normal blood glucose (NBG).
30 patients with newly diagnosed OSA have participated in the study. OSA was

defined using a full polysomnography study. The glucose metabolism was investigated by oral glucose tolerant test. Blood glucose and IRI were determined on the 0, 60th, 120th, 180th min. 18 patients were with newly diagnosed IGT. 12 patients had NBG. Resistin (RayBio) and FFA (Wako) were determined in both groups.
IRI was 25,29 mU/l in IGT patients. In patients with NBG, IRI was 21,3mU/l. BMI did not differ significantly between patients with IGT and NBG. BMI was 40,42 in patients with IGT and 41,7 in those with NBG. AHI (60,8) was higher in patients with NBG compared to those with IGT – 50,6. Patients with NBG had also higher plasma levels of FFA – 0,360mmol/l/compared to patients with IGT – 0,305mmol/l. Only resistin was higher - 4,46ng/ml in IGT patients compared to NBG – 3,98 ng/ml. IRI in IGT patients was 25,29mU/l and correlated best to the levels of resistin ($p<0,05$).
The commonly used clinical parameters – BMI, AHI, FFA were higher in patients with OSA and NBG. They are not reliable clinical markers for the early detection of impaired blood glucose metabolism in OSA patients. Only resistin correlated to the levels of IRI and could be applied as a predictor and early detection marker of impaired blood glucose metabolism in OSA patients.

P3812
The need of higher CPAP pressure in a population with obstructive sleep apnea (OSA) and refractory hypertension (RHT) versus controlled hypertension-a retrospective study
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Rationale: RHT is common in obese patients, refractoriness among them is frequently caused by OSA. A previous study held in our clinic showed that patients with RHT had higher CPAP failure rate.
Method: After exclusion criteria (central/mixed SAS, obesity-hypoventilation/overlap syndrome, obstructive/restrictive respiratory dysfunction, CPAP failure) applied to 214 SAS patients with HT, we studied 34 patients with controlled HT and RHT(demographics, anthropometrics, symptoms, comorbidities, sleep study's: Chi test,T-test,Pearson). The 2 groups were similar in terms of smoking habit and antihypertensive treatment.
Results: Controlled HT-27 patients(79.4%): 19 men(70.4%), 8 women(29.6%); RHT-7 patients(20.6%): 4 men(57.1%), 3 women(42.9%).RHT patients were younger(49.6±8.8 vs 58.4±12.1years,$p<0.04$), morbidly obese(45.5% vs 7.4%,$p<0.01$), had higher Epworth score(12.6±5.1 vs 8.6±4.2,$p<0.005$) and more comorbidities (ischemic heart disease: 33.3% vs 7.6%,$p<0.02$, dyslipidemia: 83.3% vs 28.6%,$p<0.02$). Also RHT patients needed higher pressure to correct respiratory events(11.7±1.2 vs 8.9±1.7cm H2O),even if they had mild OSA in a higher rate(57.1% vs 22.2%,$p<0.05$).There was no linear dependence between BMI and CPAP pressure, variables after CPAP(AHI, minimum SaO2) and BP values(Pearson,p=NS).
Conclusions: After CPAP failure exclusion, patients with OSA and RHT still need higher CPAP values, which does not correlate with obesity. RHT patients will cost more the health system due to their cardiovascular comorbidities, young age and sleepiness. Further studies have to elucidate the need of higher CPAP pressures in RTH patients.

P3813
Left ventricular function assessment in patients with obstructive sleep apnea syndrome
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Background: There are conflicting data on the effect of obstructive sleep apnea syndrome (OSAS) on the cardiac structure and function in human subjects.
Aim: To assess the left ventricular functions in patients with OSAS.
Patients and methods: Forty patients with OSAS, diagnosed by complete polysomnography, underwent ECG and echocardiography using conventional mode and doppler tissue imaging to assess the function of the left ventricle.
Results: 11 patients had mild OSAS, 11 patients had moderate OSAS and 18 patients had severe OSAS. The three groups were matched in age, gender, BMI and incidence of systemic hypertension. Severe OSAS had significantly higher AHI, lowest oxygen saturation, average oxygen saturation, and desaturation time % of total sleep time (<90%). Pulmonary hypertension and left ventricular diastolic dysfunction were significantly higher in moderate and severe OSAS groups. No difference between groups was found in LV systolic function. Diastolic dysfunction parameters were better correlated with AHI and lowest oxygen saturation during sleep.
Conclusion: Assessment of left ventricular function is mandatory in OSAS patients even if they have no cardiac symptoms. Severer obstructive sleep apnoea syndrome may result in left ventricular diastolic dysfunction. Doppler tissue imaging is a better echocardiographic tool for assessment of left ventricular diastolic dysfunction. Severity of left ventricular diastolic dysfunction is correlated with AHI and lowest O2 saturation during sleep.

P3814
Serum aminotransferase levels in patients with severe obstructive sleep apnea
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Background: Obstructive sleep apnea (OSA) is one of the most common sleep disorders with a plethora of consequences. Currently the impact of hypoxia due to OSA on liver function is targeted growing attention. This study evaluated the association between serum aminotransferase levels as accepted predictive factor for liver injury and factors connected with OSA severity (apnea hypopnea index (AHI), lowest oxygen saturation level, oxygen desaturation index (DI), percent of time below 90% saturation [T<90%]).
Materials and methods: 66 patients with BMI≥30, who their OSA was confirmed by PSG, were divided equally into two groups based on AHI. 33 patients in control group with 5<AHI<15, and 33 patients in case group with AHI≥30 events/hours were enrolled. We compared serum level of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) with OSA severity factors in each group.
Result: Mean DI was (56.33±26.97) (14.00±10.46) in case and control group respectively (P-value <0.001). T<90% was (33)100%and (14)42.4% in case and control group respectively (P-value <0.001). A significant different in mean DI level and T<90% were observed.In case and control group,respectively,mean levels of AST (21.33±8.62), (21.15±9.39) and ALT (24.24±14.07), (19.82±9.74) were not significantly different{(P-value=0.935) (P-value = 0.142)}. Pearson correlation test showed there is a weak relation between mean DI,T<90%,AST (0.969) and ALT (P=0.837).
Conclusions: This study showed there is no significant correlation between serum aminotransferase levels and OSA severity.

P3815
The correlation of echocardiographic findings with BNP, blood uric acid and CPR in OSAS patients with manifest right cardiac pathologies
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Purpose: BNP can increase in various disease states including left cardiac disorders and many others out of the former. We aimed in the present study to evaluate, possible relationship between B-type Brain Natriuretic Peptide (BNP) and some other non-invasive indicators of hypoxia, such as blood uric acid and C-reactive protein CRP, and the right cardiac pathologies.
Method: A total of 98 subjects, 31 (31.6%) normal, 33 mild-moderate OSAS (33.7%) and 34 (34.7%) severe OSAS, with mean age 48.5±12.3 were included in the study. All the cases underwent the PSG and TDE examinations. BNP, CRP and blood uric acid levels were measured in all the cases.
Results: Upon evaluating the relationship between BNP and TDE-related parameters, BNP level is found to be positively correlated with such TDE-related parameters as pulmonary artery pressure (PAP) and left atrium dimension. Moreover, uric acid was found to be statistically correlated positively with the left ventricle end diastole volume, right atrium dimension (RA), interventricular septum (IVS) thickness, but a negative correlation with mitral deceleration time (DT) and ratio of early and lately mitral flow velocity (E/A). Upon adjustment of all the findings for age and body mass index (BMI), three parameters were detected to have statistically significant relationship with PAP, RV, RA and IVS thickness.
Conclusion: In conclusion BNP, CRP and blood uric acid levels can be used as adjunctive parameters in the diagnosis and follow-up of right heart pathologies in patients with severe OSAS.

P3816
Visceral fat in non-to-moderate and severe obstructive sleep apnoea
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Introduction: Visceral obesity and obstructive sleep apnoea (OSA), especially apnoea-hypopnoea index (AHI)≥30, are said to induce cardiovascular diseases (CVD) and mortality.
Aims and objectives: We hypothesized that there were significant differences in visceral fat area (VFA) and other factors between severe and non-to-moderate OSA and findings could provide information leading to reduce CVD in OSA.

Methods: We compared age and body mass index (BMI) matched non-to-moderate and severe OSA in the 239 male subjects hospitalized for examination of OSA. We analyzed the relationships between fat areas by computed tomography, comorbidity, polysomnographic data, arterial and venous blood data.
Results: Of the 239, 52, 67 and 94 had mild, moderate and severe OSA. We compared all the 94 severe OSA with 85 of the 145 non-to-moderate OSA matched with age and BMI. While waist circumference was the same, severe OSA had a significantly larger VFA. Between the 2 groups, arterial oxygen partial pressure (PaO_2), HbA1c and fibrinogen differed significantly. Multivariate modeling of those determinants revealed that both VFA and AHI independently determined PaO_2 (contribution rate (R^2)=6.5% and 6.7%) and fibrinogen (R^2=7.5% and 4.4%), while HbA1c associated independently with AHI (R^2=3.7%), not VFA.
Conclusions: Severe OSA had a significantly larger VFA, lower PaO_2, higher HbA1c and fibrinogen than non-to-moderate OSA. Larger VFA in severe OSA suspect that VFA increase would be a key factor related to body composition in OSA becoming severe. PaO_2, HbA1c and fibrinogen were independently predicted by VFA and AHI. Thus, control of OSA would decrease VFA, and in turn, a decrease in VFA and OSA might improve HbA1c and fibrinogen.

P3817
The inflammation and insulin resistance in obstructive sleep apnea
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Objectives: The association between obstructive sleep apnea (OSA) and insulin resistance (IR) remains controversial. Sleep apnea and obesity may increase IR and inflammation by different mechanisms. This study investigated the relationship between sleep apnea and obesity with IR, and pro-inflammatory state.
Method: A total of 133 consecutive subjects who were referred for polysomnography. 112 were documented to have OSA defined as apnea-hypopnea index (AHI) >5 and 21 control subjects with AHI <5/h were selected upon polysomnography. Control group has been accepted as A group. In addition, patients with OSA were devided into the following two groups based on the body mass index (BMI) as non-obese (B group) (BMI <30) and obese (C group) (BMI>30).
Result: IR was higher in the obese patients with OSA than in the non-obese patients with OSA and control group. However, AHI and BMI were the determinants of IR as independent of each other in all subjects according to multivariable linear regression analyses.

Table 1. The Predictors of insulin resitance in all subjects

	IR	
	β values	p values
Sex	0.12	0.1
Age	0.007	0.9
AHI	0.17	0.05
BMI	0.27	0.002
CRP	-0.10	0.2
hsCRP	0.002	0.9
IL-6	0.04	0.6
TNF-α	0.04	0.6

Statistical significance p<0.05. AHI: Apnea hypopnea index, BMI: Body mass index, IR: Insulin resitance.

All of inflamatory cytokines (CRP, hs CRP, TNF-α, IL-6) were significantly higher in the obese patients with sleep apnea than in the control group. All of inflammatory cytokines showed significant associations with BMI while did not AHI, AI, ESS.
Conclusion: It may be considered that the impairment in glucose homeostasis is associated with both sleep disorders and obesity. Obesity in patients with OSA cases aggravate of IR and inflammation.

P3818
Glucose metabolism abnormalities in obstructive sleep apnoea (OSA) patients
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Obstructive sleep apnoea may be recognized a risk factor of diabetes type 2. The aim of this study was to assess an oral glucose tolerance test (OGTT) in OSA subjects. We studied 305 OSA pts [234 males (76.7%) and 71 females (23.3%)], mean age = 56.4±10.9 years, AHI = 42.2±20.9, BMI = 33.1±5.5 kg/m^2). Impaired glucose tolerance (IGT) (plasma level ≥ 140 mg% after 2 hours of administration 75 g glucose) was found in 81 subjects (26.6%). Among them in 13 patients (4.3%) OGTT allowed to diagnose diabetes (glucose ≥ 200 mg%). Comparison of OSA patients with- and without IGT is shown in the table.

Variable	Normal OGTT N=224 (73.4%)	IGT N=81 (26.6%)	p
Age (years)	55.4±11.3	59.2±9.1	p=0.03
AHI (n/h)	41.1±20.6	45.1±21.6	NS
Epworth Sleepiness Scale	10.7±6	9.8±5.9	NS
mean SaO2 (%)	92.1±4.4	91.2±4.5	NS
minSaO2 (%)	75.5±11.7	73.5±11.6	NS
BMI (kg/m^2)	32.7±5.8	34.2±4.6	NS
fasting glucose (mg%)	88.7±9.4	100.7±17.4	p<0.0001
HbA1c (%)	5.9±0.6	6.3±0.85	p=0.0006
Coronary artery disease (n/% of pts)	37 (16.5%)	12 (14.8%)	NS
Arterial hypertension (n/% of pts)	154 (68.7%)	70 (86.4%)	p=0.002

Multiple linear regression analysis confirmed significant correlation between AHI (β=0.13, p=0.04), age (β=0.21, p=0.0002), min SaO2 (β= -0.18, p=0.035) and IGT. Logistic regression revealed significant correlation between abnormal results of OGTT and arterial hypertension.
Conclusions: Impaired glucose tolerance was frequent in OSA subjects (near 30%). OSA patients with IGT were older and had higher prevalence of arterial hypertension. HBA1C is a good parameter of glucose metabolism in OSA patients.

P3819
Correlations between cardiovascular diseases and diabetes in obstructive sleep apnoea (OSA)
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Obstructive sleep apnoea is associated with disturbances in glucose metabolism and increased risk of type 2 diabetes. The aim of this study was to assess relations between OSA and diabetes. We studied 1164 OSA pts (876 males and 298 females), mean age = 56.4±10.4 years, AHI = 39.6±21.7, BMI = 34.2±6.4, mean SaO_2= 90.8±5.8%. Diabetes was found in 249 pts (21.4%). Comparison of OSA groups with- and without diabetes is shown in the table.

Table 1

Variable	OSA (n=915)	OSA & Diabetes (n=249)	p
Age (years)	55.7±10.8	58.7±8.4	p=0.001
AHI (n/h)	38.6±21.4	43.6±22.4	p=0.009
Mean SaO2 (%)	91.3±4.6	89.3±8.3	p=0.0002
BMI (kg/m^2)	33.4±6.2	37.2±6.3	p<0.0001
Epworth score (points)	11.2±5.7	11.7±6	NS
Coronary artery disease (n/% of pts)	174 (19%)	88 (35.3%)	p<0.001
Heart failure (n/% of pts)	77 (8.4%)	54 (21.7%)	p<0.0001
Arterial hypertension (n/% of pts)	633 (69.2%)	224 (90%)	p<0.0001
Atrial Fibrillation (n/% of pts)	75 (8.2%)	21 (8.4%)	NS
Stroke (n/% of pts)	26 (2.8%)	18 (7.2%)	p=0.001

Logistic regression analysis revealed significant correlations between diabetes and cardiovascular diseases and obesity (BMI > 30 vs ≤ 30 kg/m^2).
Conclusions: Diabetes was frequent (>20% of subjects) in moderate and severe OSA patients. Cardiovascular diseases and obesity were the independent predictors of diabetes in this group.

P3820
Left and right ventricular function in obstructive sleep apnea patients: Echocardiographic speckle tracking strain analysis of CPAP therapy effects
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Introduction: Obstructive sleep apnea is associated with right ventricular dysfunction including preload and afterload abnormalities. Right ventricular contractility remains difficult to assess due to the complex RV geometry. Echocardiographic speckle tracking strain provides a better understanding of regional contractility. We tested the hypothesis that RV dyssynchrony exists in OSA patients and can be reversed by CPAP therapy.
Methods: Prospective study including patients with a confirmed OSA diagnosis.

Abstract P3819 – Table 2

Risk of Diabetes	Arterial Hypertension	BMI >30 kg/m^2	Heart Failure	Coronary artery disease	Stroke
OR (95% CI)*	2.96 (1.86–4.69)	2.28 (1.46–3.57)	1.8 (1.14–2.82)	1.64 (1.15–2.34)	2.33 (1.17–4.63)
p	p<0.0001	p=0.003	p=0.01	p=0.005	p=0.01

*Adjusted for AHI (>30 vs ≤30), COPD, atrial fibrillation, hyperuricaemia, T90 (>30 vs ≤ 30%).

Echocardiographic (TTE) measurements were obtained at baseline and after one month of CPAP therapy. We measured usual TTE parameters: left ventricular ejection fraction (LVEF), transmitral pulsed Doppler including E and A waves velocities, mitral Doppler tissue imaging. The speckle tracking analysis was used to generate 6 segmental RV strain curves. Time to peak strain was determined with dyssynchrony defined as the difference between earliest and latest segments. Global radial strain was calculated.
Results: 36 patients (M: 69%,mean (SD) age 56(11) yrs, body mass index 35.11(7.38) kg/m-2, respiratory disturbance index 46(18)/h) were included. At baseline, 56% had high blood pressure, 22% had a chronic heart disease, with a normal LVEF: 61(8) %. Speckle tracking strain analysis showed RV dysfunction with a decreased RV global strain: 13.8(5.8) % and RV dyssynchrony: 174 (89) ms. After one month of CPAP, RV function was significantly improved and dyssynchrony was reversed: 125 (82) ms, p=0.03.
Conclusion: We observed RV dyssynchrony at baseline in OSA patients. RV dyssynchrony was improved after one month of CPAP therapy.

P3821
Neutrophil ROS production in obese and non-obese men with different severity of obstructive sleep apnoea
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Obstructive sleep apnoea (OSA) is characterized by pauses of breathing during sleep followed by hypoxia/re-oxygenation circles that increase production of reactive oxygen species (ROS). Literature data are controversial regarding obesity impact on generation of ROS in OSA. The aim was to evaluate neutrophil ROS production in obese and non-obese men with different severity of OSA.
Methods: 40 newly diagnosed men with OSA having no actively treated comorbidities were included. OSA was confirmed by whole-night polysomnography (PSG), when apnoea/hypopnea index (AHI) was >5/h. Body mass index (BMI) was calculated. Blood samples were taken in the morning after PSG. Neutrophils were isolated by high density centrifugation. DHR-123 was used for detection of generated ROS. ROS production was measured by mean fluorescence intensity (MFL) using flow cytometer. All subjects were divided into 4 groups: AHI<30 and BMI<30; AHI<30 and BMI≥30; AHI≥30 and BMI<30; AHI≥30 and BMI≥30. Differences were evaluated using nonparametric tests.
Results: All groups were age matched. There was no difference in BMI among AHI<30 and AHI≥30 groups. Neutrophil ROS production was higher in AHI≥30 and BMI<30 group than AHI<30 and BMI<30 (MFI 143.3±39.9 vs 31.8±8.37, p<0.05) and in AHI≥30 and BMI≥30 group than AHI<30 and BMI≥30 (MFI 88.7±18.9 vs 21.3±6.0, p<0.05), but did not differ in the groups with different BMI and the same severity of OSA.
Conclusion: Neutrophil ROS production was higher in severe OSA groups compared to mild-to-moderate OSA, but did not differ in obese and non-obese patient groups with the same severity of OSA. Increased neutrophil ROS production probably is related to intermittent hypoxia.

P3822
Relationship between sleep apnea syndrome, plasma myeloperoxidase levels and cardiovascular risk
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Background: In Sleep Apnea Syndrome (SAS) the episodes of hypoxia/reoxygenation results in the generation of reactive oxygen or nitrogen species by alternative pathways that involve the catalytic activity of myeloperoxidase (MPO) and promote oxidative stress.
Aims and objectives: To assess the relationship between obstructive sleep apnea and plasma MPO levels, in SAS patients, comparing to a control group.
Methods: Two Romanian groups, consisting of 40 patients diagnosed with SAS and 26 healthy controls, were recruited. All subjects underwent cardiorespiratory poligraphy. Plasma levels of MPO, total cholesterol (TC), triglycerides, low density lipoprotein cholesterol (LDL-c), high density lipoprotein cholesterol (HDL-c), apolipoprotein B100 (apoB100), fibrinogen and uric acid were assessed. Statistical analysis was performed using Pearson correlations tests, two tailed *t*-test and one-way ANOVA test.
Results: In the SAS group, correlations were found as follows: MPO-apoB100 (r=-0.37; *p*=0.04); MPO-TC (r=-0.37; *p*=0.04); MPO-fibrinogen (r=0.36; *p*=0.04); apnea/hypopnea index (AHI)-uric acid (r=0.36; *p*=0.02) while in the control group between oxygen desaturation index (ODI)-LDL-c (r=0.58; *p*=0.001); ODI-TC (r=0.59; p=0.001); AHI-triglycerides (r=0.47; *p*=0.01). With regard to the smoking status, hypopneas number and the TC/HDL-c ratio were statistically significant higher in smokers than in nonsmokers (*p*=0.01; respectively, *p*=0.02).
Conclusions: Plasma MPO levels may be used as marker risk of inflammation and cardiovascular disease in SAS patients and possibly, as a candidate for clinical application.

P3823
Relations between cystatin C plasma concentration and cardiovascular complications in patients with obstructive sleep apnoea (OSA)
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Cystatin C (Cys C) is a protease inhibitor synthetized in all nucleated cells. Lately it has been proposed as an indicator of early dysfunction in glomerular filtration rate. NT-proBNP is a hormone secreted by ventricles in response to heart overload. The aim of this study was to assess Cys C plasma level in patients with OSA and its relationships with OSA-associated cardiovascular diseases. Cys C and NT-proBNP were also compared as predictors of cardiac abnormalities.
We studied 238 consecutive patients with OSA: mean age=56.87±9.97yrs, BMI=33.5±5.84kg/m^2, mean AHI=38.97±21.71, mean ODI= 44.85±27.85. Elevated level of cystatin C (under 50yrs: CysC<0.92mg/L, over 50yrs: CysC<1.02mg/L) was found in 97 pts (40.7%). Comparison of pts with normal and elevated level of Cys C is shown in a table below.

Variable	Elevated Cys C	Normal Cys C	p
Arterial Hypertension (n/%)	77 (79%)	104 (74%)	NS
Coronary Artery Disease (n/%)	34 (35%)	22 (15.6%)	P=0.0005
Heart Failure (n/%)	17 (17.5%)	4 (2.8%)	p=0.00009
Microalbuminuria (n/%)	9 (16.36%)	19 (22.35%)	NS
Elevated NT-proBNP (n/%)	28 (35.9%)	21 (18.3%)	NS
AHI>30/h (n/%)	61 (62.9%)	79 (56.4%)	0.01

Logistic regression analysis (LRA) revealed that CAD (OR=2.56; 95%CI=1.31-4.98, p=0.005) and HF (OR=6.2; 95%CI=1.9-19.9, p=0.001) were associated with increased CysC level. Association of increased NT-proBNP level with cardiac disorders in OSA pts was also confirmed (for CAD OR=2.5, 95%CI=1.1-5.3, p=0.01, for HF OR=4.9, 95%CI=1.6-14.9, p=0.004).
Conclusions: Increased Cys C level is strongly assosiated with cardiac diseases in pts with OSA. Cys C seems to be a better indicator of HF than NT-proBNP in OSA pts.