

## Summaries of Articles

### Clinical Investigations

#### **Endothelin Levels in Patients with Cardiac Syndrome X at Rest and Exercise**

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We aimed to determine plasma endothelin levels in patients with cardiac syndrome X at rest and exercise, as compared to healthy subjects. Plasma endothelin-1 concentrations were measured in 30 patients with cardiac syndrome X (group A) at rest and after peak exercise, as compared to 14 healthy control subjects (group B) who were in a similar age group. ELISA method was used for the measurement of ET-1 levels. Coronary angiograms were normal in all patients and the control group. Symptom-limited maximal treadmill exercise tests with Bruce protocol were found positive in all patients with syndrome X. Exercise tests were normal in the control group.

**Results:** In patients with cardiac syndrome X, plasma endothelin-1 levels were found significantly elevated either during rest or after peak exercise when compared with the control group ( $2.52 \pm 1.6$  pg/ml,  $1.38 \pm 1.8$  pg/ml,  $p < 0.001$ ,  $3.68 \pm 1.1$  pg/ml,  $1.37 \pm 0.2$  pg/ml,  $p < 0.001$  respectively). In patients with cardiac syndrome X, plasma endothelin-1 levels after peak exercise were found significantly higher than at rest ( $3.68 \pm 1.1$  pg/ml  $2.52 \pm 1.6$  pg/ml,  $p < 0.001$ ). No significant difference ( $p = 0.17$ ) existed between plasma endothelin-1 levels during rest and after peak exercise in the control group.

It may be concluded that ET-1 increase has an important role in the pathogenesis of the cardiac syndrome X. ECG changes and exertional angina in these patients can be related to increase in plasma ET-1 levels.

**Key words:** Endothelin-1, cardiac syndrome X, microvascular dysfunction, rest, exercise

#### **Restoring Sinus Rhythm in Patients with Atrial Fibrillation Improves Excessive Cardiovascular Response to Isometric and Isotonic Exercises**

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The aim of our study was to compare the tolerance to isometric and isotonic exercises by determining if an improvement would exist, or not, in the cardiovascular response to these exercises after reverting to sinus rhythm in patients with atrial fibrillation.

Twenty seven cases with nonvalvular chronic (having periods ranging between 48 hrs and 1 year) atrial fibrillation, 14 female and 13 male (mean age  $63.10 \pm 11.85$  years) were included in the study. Sinus rhythm could not be restored in two cases. The investigation was carried on the remaining 25 cases. Isometric and isotonic exercise tests were performed with all of the patients before and 48 hours after the rhythm was reverted to sinus. Isometric exercise test was performed by handgrip test, and isotonic exercise test was performed immediately after the isometric exercise test by using modified Bruce protocol, limited by symptoms. The electrocardiograms were recorded, and heart rates and blood pressures were measured at rest, at each stage of the exercise, at maximum effort and at every minute of the recovery period. Repeated measures of ANOVA test and linear regression test were used for statistical evaluations.

Heart rate at rest was significantly low after reverting rhythm to sinus at isometric exercise ( $p = 0.0001$ ). This decrease continued to be significant at the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> minutes of the test ( $p = 0.0014$ ,  $p = 0.0002$  and  $p < 0.0001$ , respectively). Although there were no significant difference between pressure-heart rate products at rest, this value was significantly higher at the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> minutes before reverting rhythm to sinus ( $p = 0.049$ ,  $p = 0.048$  and  $p = 0.022$ , respectively). Also, no

significant difference was determined between systolic and diastolic arterial pressures neither at rest, nor during exercise.

In isotonic exercise, heart rate at rest ( $p=0.0015$ ), at 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> minutes of the 1<sup>st</sup> stage ( $p<0.0001$ , for all), at the end of exercise ( $p<0.0001$ ); the increase in heart rate at 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> minutes of the 1<sup>st</sup> stage and at the end of the exercise ( $p<0.0001$ , for all); pressure-heart rate products at rest, at 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> minutes of the 1<sup>st</sup> stage and at the end of the exercise ( $p<0.0001$ , for all) were all found to be significantly low after restoring sinus rhythm. The exercise periods and MET values of the patients increased significantly after sinus rhythm was restored ( $p=0.0014$  and  $p=0.0054$ , respectively).

Hence, restoring sinus rhythm by cardioversion in patients with atrial fibrillation improves excessive heart rate response to exercise, for both isometric and isotonic exercises. Effort capacities of the cases also increased significantly.

Key words: Atrial fibrillation, exercise, cardioversion

### **Clopidogrel Does Not Increase Bleeding and Allogenic Blood Transfusion Before Coronary Artery Surgery**

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Platelet dysfunction is one of the major reasons of postoperative bleeding following coronary artery surgery. The aim of this study was to evaluate the effects of clopidogrel, a specific and potent irreversible inhibitor of platelet aggregation, on bleeding and use of blood and blood products after coronary artery bypass surgery. We studied 1628 consecutive patients who underwent isolated coronary artery bypass grafting, and compared those with preoperative clopidogrel exposure prior to the operation ( $n=48$ ) to those without exposure ( $n=1580$ ). All operations were performed by the same surgical and anesthesia team. The clopidogrel group had higher prothrombin time level ( $12.6 \pm 1.6$ ;  $11.5 \pm 1.7$  sec,  $p=0.013$ ), however comparable APTT level ( $32.6 \pm 4.5$  vs.  $31.4 \pm 4.5$  sec), platelet

count ( $275.000 \pm 98.000$  vs.  $280.000 \pm 72.000$  /dL), number of distal anastomosis ( $2.6 \pm 1.1$  vs.  $2.8 \pm 1.1$ ), cardiopulmonary bypass time ( $55 \pm 26$  vs.  $63 \pm 25$  min), total chest tube output ( $719 \pm 265$  vs.  $612 \pm 350$  ml), reoperation for bleeding (%0 vs. %1); red blood cell transfusion ( $0.5 \pm 0.9$  vs.  $0.4 \pm 0.9$  U/patient), use of fresh frozen plasma ( $1.1 \pm 1.2$  vs.  $0.9 \pm 1.1$  U/patient), intensive care unit length of stay ( $20.1 \pm 2.9$  vs.  $21.9 \pm 13.5$  hr), and length of hospital stay ( $5.5 \pm 1.7$  vs.  $5.4 \pm 2.1$  days).

The results of this study suggest that preoperative use of clopidogrel is not associated with increased bleeding and need for surgical exploration as well as risk of blood and blood product transfusion after coronary artery bypass surgery.

Key words: Clopidogrel, coronary artery bypass graft, bleeding, bleeding revision

### **Evaluation of Patients with Artificial Aortic Valves by Cardiopulmonary Exercise Testing According to Valve Size**

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**Objective:** The aim of this study was to evaluate the effect of valve size on left ventricular function, functional status and exercise duration as assessed by cardiopulmonary exercise testing in patients with aortic valve replacement due to severe aortic stenosis.

**Methods:** We studied on 40 asymptomatic patients (8 women, 32 men, mean age  $46 \pm 12$ ) in whom aortic prostheses had been implanted. M-mode, 2-D and, cardiopulmonary exercise testing parameters were evaluated in all patients at a mean of  $5 \pm 4$  years after operation.

**Results:** Patients were classified in two groups; Group I consisted of 18 patients whose valve size was 21mm or smaller and Group II of 22 patients with a valve size greater than 21 mm. We did not observe any statistical difference between these two groups, according to age, left ventricular systolic and

diastolic function, thickness of interventricular and posterior walls and mean aortic gradient. On the other hand, the maximal pressure difference between Group I and Group II was significant ( $40 \pm 15$  mmHg,  $29 \pm 8$  mmHg, respectively;  $p < 0,03$ ). In addition, peak  $VO_2$  ( $p < 0,003$ ), anaerobic threshold  $VO_2$  ( $p < 0,001$ ), peak  $VO_2$  /kg ( $p < 0,03$ ), and peak  $PVO_2/HR$  ( $p < 0,001$ ) were significantly higher in Group II.

**Conclusion:** Cardiopulmonary exercise parameters such as peak  $VO_2$ , anaerobic threshold, peak  $VO_2$  /kg and peak  $PVO_2/HR$  were significantly higher in patients with greater valve size. Therefore, patients with greater valve size had a better functional capacity and higher peak stroke volume.

**Key words:** Aortic valve replacement, valve size, cardiopulmonary exercise testing

### Assessment by Tissue Doppler Imaging of Effect of Volume Reduction on Diastolic Function in Hemodialysis Patients

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Doppler tissue imaging (DTI) is a new echocardiographic application which allows non-invasive assessment of left ventricular systolic and diastolic performance. Our aim was to determine the DTI parameters of patients before and after hemodialysis and to evaluate if this method was preload dependent or not.

Our study included 40 chronic hemodialysis patients (17 female and 23 male) aged between 20 and 75 (mean  $48 \pm 14$ ) years. Doppler echocardiography and pulsed DTI echocardiography were performed by the same physician to patients before and 1 hour later after the same hemodialysis session. We measured standard Doppler parameters (early diastolic (E) velocity, late diastolic (A) velocity, E/A ratio, deceleration time and isovolumic relaxation time) and tissue Doppler parameters (mitral annular early diastolic (e) velocity, mitral annular late diastolic (a) velocity, e/a ratio).

**Results:** E and e waves decreased after hemodialysis in all patients ( $p < 0,001$  and  $p = 0,002$ ). In the patients

who were  $\leq 45$  years old, E wave decreased significantly ( $p = 0,003$ ) but e wave did not change significantly ( $p = 0,16$ ). In the patients who were  $> 45$  years old both E and e waves decreased significantly ( $p < 0,001$  and  $p = 0,007$ ). Deceleration time and isovolumic relaxation time did not change. E/A ratio decreased significantly in patients over 45 years old ( $p = 0,004$ ) but not in those under 45 years old ( $p = 0,08$ ). In both groups e/a ratio did not change significantly. There were no statistically significant differences between groups in regard to when diabetes mellitus, hypertension and gender ( $p > 0,05$ ).

In conclusion, both mitral inflow velocities and mitral annular velocities are volume-dependent in subjects over 45 years. However, in subjects under 45 years old, mitral annular velocity is independent of volume whereas mitral flow velocity is dependent. Diastolic functions may be evaluated with DTI in subjects under 45 years old.

**Key words:** Hemodialysis, tissue Doppler imaging, diastolic function

### Estimates of Coronary Morbidity and Mortality in the Risk Factor Survey of 2002

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With the aim of assessing, among others, the coronary morbidity and mortality in the past 26-month period the last survey of the Turkish Adult Risk Factor Study was conducted in August, 2002. Epidemiological methods applied were as previously described. In a total of 1545 individuals of the cohort residing in five regions of Turkey, 983 men and women were examined. Furthermore, information was obtained in 439 persons, and death was ascertained in 16 men and 14 women. Twelve new deaths of coronary origin were diagnosed at a follow-up exceeding 2850 person-years. Estimated annual all-cause mortality amounted to 10.5 per mille, coronary mortality to 4.2 per mille. In the age-bracket 45-74 years, total mortality was 9.8 and coronary mortality 4.6 per mille. A total of 35 cases of new fatal and nonfatal coronary heart disease

(CHD) corresponded to an annual rate of 14.1 per mille. Moreover, 287 men and women aged 36 to 66 years were randomly selected from 11 communities to be included in the survey's cohort for future follow-up.

Coronary and overall mortality appeared to be slightly less than anticipated since year 2000, an observation that might originate from greater difficulty in complete identification of death cases in the larger cities.

**Key words:** Coronary heart disease prevalence, coronary mortality, Turkish adults

### **The Effects of Mobile Phones on Pacemaker Functions**

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The negative effect of the electromagnetic field generated by different systems on the pacemaker functions is very well known. The aim of this study is to evaluate the effect of mobile phones on pacemaker functions. A total of 679 patients with permanent pacemakers enrolled in this study. The study was performed in two steps. Pacemaker lead polarity was unipolar in the first step and bipolar in the second step. Pacemaker sensitivity was first at nominal values, yet it was reduced to the minimal value for that pacemaker and then tested. Two mobile phones (power output 2W, GSM 900 MHz) were symmetrically located on either sides of the pacemaker pocket with the antenna being at distances of 50, 30, 20 and 10 cm and at close contact with the pocket. The tests were performed when both mobiles were opened, on stand-by, receiving a call, during the call and were closed. Thirty-seven patients with pacemakers were affected (5.5%). When the lead polarity was unipolar, the rate of being affected was higher when compared to the bipolar state (4.12% and 1.40%, respectively,  $p < 0.05$ ). The increase in sensitivity was not an independent factor on the rate of being affected

( $p > 0.05$ ). There was not any difference between the single and dual-chamber pacemakers in the rate of being affected. There was ventricular triggering in one DDD-R pacemaker, transition to asynchronous mode in 33 VVI(R) pacemakers and inhibition in 3 VVI pacemakers. The rate of being affected was increased as the pacemaker got age ( $p < 0.05$ ). All of these episodes were reversible.

In conclusion, mobile phones might have negative effects on pacemaker functions under certain conditions. This does not result in any symptoms other than the inhibition of pacemakers and returns to normal when the mobile phones are taken away.

**Key words:** Pacemaker, mobile telephone, electromagnetic interference

### Review

### **Treatment of Restenosis and Factors Predisposing Restenosis Following Coronary Angioplasty**

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Restenosis following coronary angioplasty still remains the major limitation of this procedure. A variety of factors can effect the rate of restenosis. With better understanding of the mechanism of restenosis, the success of trials to prevent will also improve. In spite of many past treatment failures and continued frustration by clinical consequences of restenosis, we have gained enormous insights and now have optimism regarding more definite future therapeutic strategies. Recent developments seem to prevent the restenosis. The aim of this paper is provide a review of therapeutic trials to decrease the rate of restenosis and management of patients with restenosis. Some pharmacologic agents, advances in angioplasty techniques, drug-eluting stents and new genetic treatment modalities, reported in this paper, are hopeful advancements. Prevention of the restenosis will give us an opportunity to perform these non-surgical revascularization procedures in more widespread fashion and effectively.

**Key words:** Restenosis, percutaneous transluminal coronary angioplasty, coated stents

### Case Reports

#### **Pulmonary Embolization of a Right Atrial Mass During Transesophageal Echocardiography - A case report**

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This report describes a rare case of right atrial thrombus (associated with spinal surgery) resulting in pulmonary embolization during transesophageal echocardiographic (TEE) examination. A 50-year-old female who had recently undergone spinal surgery was admitted because of syncope. Transthoracicechocardiography (TTE) revealed a mobile mass in the right atrium prolapsing into the right ventricle. During esophageal intubation of the TEE probe, the patient complained of sudden distress and TEE showed that mass in the right atrium had disappeared. Ventilation-perfusion lung scan confirmed the diagnosis of pulmonary embolism. She was treated successfully with intravenous heparin without any complication and recurrence.

**Key words:** Right atrial mobile thrombus, transesophageal echocardiography, pulmonary embolism

#### **Effects of Iloprost and Sildenafil Citrate in A Patient with Pulmonary Hypertension Secondary to Histiocytosis X**

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Pulmonary hypertension secondary to pulmonary histiocytosis X is a progressive disease and has a poor prognosis. Despite conventional treatments (immunosuppressive agents, calcium channel blockers and continuous O<sub>2</sub> therapies) symptomatic improvement may not be seen. We found that single dose iloprost inhalation and oral sildenafil citrate treatment decreased pulmonary artery pressure in a patient with pulmonary hypertension secondary to histiocytosis X whose functional capacity was NYHA class IV. After one week of treatment period, functional capacity and six minutes walking test were improved with this combination. Combination of iloprost inhalation and oral sildenafil citrate might be an effective treatment options in pulmonary hypertension secondary to histiocytosis X.

**Key words:** Histiocytosis X, pulmonary hypertension, iloprost, sildenafil