Topic 26 – Hypertension, remodeling, arterial stiffness – A

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0067
The effect of the fast of Ramadan on ambulatory blood pressure in treated hypertensives
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Introduction: Fasting of Ramadan is a religious obligation that is practiced by the Muslim population in the world. However, there is a lack of scientific literature regarding the effects on cardiovascular disorders such as hypertension.

Objective: This study was conducted to assess the impact of Ramadan fasting on blood pressure in treated hypertensive patients.

Materials and Methods: This prospective observational trial was conducted on 18 patients treated for hypertension, who were determined to end the fast of Ramadan. All subjects were on antihypertensive therapy. Measurements of blood pressure was performed by Holter blood pressure before and after the month of Ramadan.

Results: The mean age of subjects was 57.61±12.64 years; with a female predominance. There was a significant decrease in average diastolic 24-h ambulatory blood pressure, as well as average diastolic awake ambulatory blood pressure after Ramadan (70.72±24mmHg vs 65.06±23mmHg, P=0.01 et 73.72 ± 10.10mmHg vs 70.06 ± 9.43mmHg, P=0.01). Average systolic 24-h ambulatory blood pressure, as well as average awake systolic and average asleep systolic and diastolic ambulatory blood pressure was similar before and after Ramadan (125.50 ± 11.62mmHg vs 122.94 ± 10.09mmHg, P=0.08 ; 128.44 ± 12.19mmHg vs 126.11 ± 10.80mmHg, P=0.06 ; 120.67 ± 13.20mmHg vs 119.83 ± 13.76mmHg, P=0.73 ; 65.72 ± 8.84mmHg vs 65.72 ± 8.84mmHg, P=0.81).

Conclusion: We conclude that, according to our results, hypertensive patients can continue their treatment as the traditional fasting during Ramadan can be performed safely.

0124
Ambulatory blood pressure monitoring in the prognostic evaluation of diabetes
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Introduction: Hypertension is frequently associated with diabetes mellitus and is responsible for an increase in the cardiovascular risk in diabetic patients. Thus, early diagnosis and good control are of paramount importance.

Patients and Methods: This is a prospective study on 5 months of known and treated patients diabetics, collected in non-invasive investigation unit of the cardiology department of the CHU Ibn Rochd of Casablanca for an ABPM whether in the diagnosis of hypertension, either as part of the monitoring of therapeutic efficacy of known and treated hypertensive patients.

Results: The study was conducted in 75 patients (34 men and 41 women; sex ratio: 0.77) with a mean age of 69.0 ± 3.1 years (42-77 ans).

Of a total of 36 patients with hypertension: ABPM revealed hypertension well controlled in 52.8% of cases, uncontrolled hypertension in 38.9% of which 71.4% was masked hypertension. The discrepancy was found in 36.1% of cases. Subjects with poorly controlled hypertension were significantly older (p=0.01) and more likely to be male (p = 0.002).

Of a total of 39 patients unknown hypertension, ABPM was diagnosed with hypertension in 46.2% of which 50% was masked hypertension. 53.8% were normotensive. The discrepancy between the clinic BP measurement and ABPM was of 38.5%.

Night dysregulation of BP was statistically different between the both of groups (not hypertensive and hypertensive well controlled on one hand and hypertension, uncontrolled other) respectively (53.8% and 46.2%, p = 0.04, OR:2.6, CI: 1.07 to 6.8). The dippers patients have less micro-macroangiopathy with a p <0.05.

Conclusion: Hypertension of our patients is often poorly controlled. Through this work, the ABPM proves interesting in diabetics in the diagnostic, therapeutic adaptation and assessment of prognosis.

0223
Dual effect of resveratrol on flow-mediated outward hypertrophic remodeling in ovariectomized rat mesenteric resistance arteries
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Resistance arteries control local blood flow. Chronic increases in blood flow in RA occur in growth, pregnancy, exercising as well as to compensate ischemia and induce outward hypertrophic remodeling associated with improved endothelium dilation. As estrogens have a key role in flow-mediated remodeling, we hypothesized that resveratrol, suggested to act as phytoestrogen, may improve flow-mediated remodeling in ovariectomized rats.

Blood flow was increased in vivo in one mesenteric resistance artery without other changes in pressure or circulating factors in three-month old ovariectomized female rats treated with resveratrol (5 or 37.5mg/kg per day in osmotic minipumps: RESV5 or RESV37.5) or solvent (DMSO). After 2 weeks arterial structure and function were measured in vitro.

Arterial diameter increased in high flow (HF) arteries compared to normal flow (NF) arteries in ovariectomized rats treated with RESV5 or RESV37.5, not in control rats. Hypertrophy in HF arteries occurred in the 3 groups but was greater in RESV37.5-treated rats so that wall / lumen ratio was elevated in this group. ERK1/2 activation, involved in flow-mediated hypertrophy was greater in RESV37.5-treated rats than in RESV5 – and DMSO-treated rats. RESV5, not RESV37.5, improved L-NAME sensitive arterial relaxation. eNOS expression level was equivalent in HF and NF vessels in all groups animals. Markers of oxidative stress (p67phox, GP91phox) were greater in arteries of RESV37.5-treated rats than in RESV5 – and solvent-treated rats. They were also higher in HF arteries in RESV37.5-treated rats.

Thus, although resveratrol improved flow-mediated outward hypertrophic remodeling in OVX rats, the high dose induced oxidative stress and hypertrophy.

0242
Serum lipid profile in hypertensive patients in the University Hospital of Casablanca
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Introduction: Hypertension and dyslipidaemia are important components of metabolic syndrome and both are known to complicate each other. The multiplicative effect of these risk factors increases the risk of cardiovascular disease. The aim of this study was to determine the prevalence of dyslipidaemia in hypertensive patients.

Methods: This prospective study was done in the University hospital IBN ROCHD in Casablanca, comparing 90 hypertensive patients and 90 normotensive patients controls matched for age and sex, for a period of one year from January 2013 to January 2014. In both groups were measured the total blood levels of cholesterol (TC), high density lipoprotein (HDL), low density lipoprotein (LDL) and triglycerides (TG). The exclusion criteria were previous history of diabetes, cigarette smoking, regular alcohol use, nephropathy and hyperuricemia.

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Results: Hypertensive subjects compared to normotensive controls, have higher values of TC, LDL and TG (62.1% versus 22.5%, respectively, \( P = 0.02 \)), and lower HDL values (48.3% versus 8.5% respectively, \( P = 0.04 \)). Hypercholesterolemia was observed in 58% patients, hypertriglyceridemia in 11.5%, and mixed hyperlipidemia in 30.95% patients. TC values were significantly higher in women with unbalanced hypertension (\( P = 0.001 \)).

Conclusion: The prevalence of dyslipidemia in our study population increases with hypertension. Screening of these risk factors, promotion of healthy lifestyle, and the institution of therapy is desirable to reduce their multiplicative effects.

0368
Aortic impedance in older subjects: MR and application tonometry study by wave intensity analysis

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Introduction: Central pressure waveform can be decomposed into pressure transmission and reflection waves. Zc, characteristic impedance of aorta can be measured through the recording of pulse pressure and aortic flow signals and reflects structural and functional properties of elastic central and peripheral muscular arteries.

Methods: This study proposes a novel method using wave intensity analysis to assess reflected waves by decomposition of magnetic resonance imaging central aortic flow and central aortic pressure waveform measured by tonometry in 30 older subjects allowing to obtain the aortic characteristic impedance in the time domain and reflection index (IR) and reflection magnitude (MR).

Results: Elderly patients were mean aged of 75.25±5.85 years (14 female, 16 male). Mean Zc value was 424.34±94.41 DSC for the whole aging population. We found a strong negative association between Zc and LVET (\( r = –0.53, P = 0.004 \)). We found also a trend of negative association between Zc and aortic diameter, at the aortic root, (\( r = –0.36, P = 0.05 \)), and pressure augmentation (\( r = –0.36, P = 0.06 \)), and also with Aix (\( r = –0.32, P = 0.09 \)). Zc was positively associated with PPA (\( r = 0.41, P = 0.02 \)), and also strongly with HR (\( r = 0.54, P = 0.003 \)). Association between RM and IR were positively significant with aorta length measured by MRI, respectively (\( r = 0.41, P = 0.03 \)) for RM and (\( r = 0.42, P = 0.03 \)) for IR.

RM associated positively with thoracic aorta length (\( r = 0.15, P = 0.04 \)) after adjustment to age and height, IR also associated positively with thoracic aorta length (\( r = 0.16, P = 0.04 \)) after adjustment to age and height.

Conclusions: This automatic signal treatment of aortic flow and pulse pressure waveform is a good method for assessment of wave reflections in older subjects allowing obtaining reflection magnitude. Aortic characteristic impedance is inversely correlated to left ventricular ejection time and aortic diameter as new insights suggest.

0068
Protective role of nucleotidases against the development of hypertension

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Hypertension is characterized by a hypertrophic remodeling of big arteries, increased tone in smallest, endothelial dysfunction and accompanied by oxidative stress, inflammation and fibrosis. Extracellular nucleotides, which are released under cellular stress, promote deleterious pathological responses (vasoconstriction, inflammation, vascular permeability) through P2 receptors activation although the contribution of purinergic signaling to cardiovascular pathologies remains to be established. Hydrolysis of these molecules is provided by nucleoside triphosphohydrolases (NTPDases), especially NTPDase1 (CD39), highly expressed in the arterial wall. Together with ecto-5’ nucleotidase (CD73), these enzymes generate vasoprotective adenosine (ADO anti-inflammatory, vasodilatory). Using Apyrase (APY, soluble potato nucleotidase) treatment and CD39 deficient (Entpd1/-/-) mice, we evaluated the potential benefit of nucleotides hydrolysis in experimental hypertension. After 12 days of AngII (1mg/kg/day) infusion, with or without APY (45U sc, 15U i.v every 3 days), the increase in systolic blood pressure (SBP) and the hypertrophic aortic remodeling were significantly reduced in AngII/APY-treated mice compared to AngII-treated mice. Reversely, in Entpd1/-/- mice treated with intermediate dose of AngII (0.5mg/kg/day) the increase in SBP was greater than in Entpd1+/- mice. This was associated with exacerbated hypertrophic aortic remodeling. Interestingly, RT-qPCR revealed a decreased CD39 expression level in resistance arteries of AngII-treated mice and SHR rats, suggesting a role for the enzyme in hypertension. The role of CD39 as a regulator of arterial tone through the control of P2Y6 receptor activation is likely, although its contribution in the prevention of vascular inflammation remains to be investigated. Consequently, nucleotidases protect against high blood pressure and represent new therapeutic area in the treatment of hypertension.

0347
Diuretic, antihypertensive and antioxidant effect of olea europaea lea

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Introduction: Although, there are known the beneficial effects of the fruits and the olive oil, lately a special attention was given to extracts obtained from olive leaves. The studies have reported that oleuropein (the main active component of olive leaves) has antioxidant, vasodilator, anti-inflammatory properties.

Methods: 30 male Sprague-Dawley rats were randomized in 3 groups (n=10) that received orally for seven days: 1. distilled water (control group), 2. Furosemide (10mg/kg), and 3. Leaves extract of Olea europaea (OE). After the first and last dose of vegetal extract, the diuresis and saluresis (urinary Na+ and K+ concentration) were determined. At the end of the study the systolic blood pressure was recorded, by a non-invasive method. Human erythrocytes were subjected to an oxidative stress induced by 2,2’-azobis (2-aminopropane) hydrochloride (AAHP) in the presence or absence of increasing concentrations of OE, lipoic acid and trolox (the last two substances were used like reference antioxidants).

Results: Furosemide and OE leaves extract induced a significant (\( p < 0.05 \)) increase in rats diuresis and saluresis as compared to control group. For OE extract, the same effect intensity was recorded after the first and the last doses. Also after seven days of treatment, the rats’ systolic blood pressure was significantly reduced in OE group. In vitro conditions, in the presence of OE extract, extracellular potassium efflux, the signs of erythrocyte membranes early degradation by oxidative stress, was decreased significantly and dose-dependent manner.

Conclusions: In our experimental conditions it appears that, OE leaves extract presented diuretic and antihypertensive effects. Also erythrocyte membranes are very significantly protected by the antioxidant compound from OE. Our results could open new perspectives for the use of Olea europaea leaves extract like adjuvant therapy in diseases associated with hypertension and oxidative stress.