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BODY MASS INDEX PREDICTS QTc VALUE IN OBESE PATIENTS

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Background. An increase of QTc length corrected by heart rate (QTc) represents a risk factor for sudden death and life-threatening arrhythmias. The QTc is increased in obese patients.

Aim. To verify whether the QTc increase in obesity follows a linear or non linear progress as a function of BMI by defining the equation for its prediction.

Materials and methods. We enrolled 144 individuals classified as a function of BMI. Anthropometric parameters, QTc and subdivision in subgroups of obese patients are reported in Table I.

Statistical analysis. First step: to verify whether there was a significant effect of BMI on the distribution of QTc values as stratified by groups. Such a statistical control has been performed by means of Tukey's one-way ANOVA. Second step: to detect whether there was a linear or non linear trend fitting model that was reliable in predicting QTc value as a function of BMI. Data are expressed mean \pm SD.

Results. We found, as expected, an increased QTc, sign of bioelectrical instability, in obese patients as compared with normoponderal subjects. However, the QTc increase was found not to be proportional to BMI, vanishing all the linear fitting methods. The trend of QTc as function of BMI was found to be not linear and described by the polynomialum:

$$Y=a+(a1*x)+(a2*x^2)+(a3*x^2)+(a4*x4). \text{ (Fig.1)}$$

Conclusion. This study confirms an increased risk for arrhythmias in obese patients because of a significant increase in their QTc values. However, the relationship which links QTc to BMI is not linear. The equation that describes such relation is a non linear fourth order polynomialum that can be used to predict QTc via BMI before performing the ECG. Such a formula however has to be validated via a Bayesian study on obese population.

Groups	A control	B Class I obesity	C Class II obesity	D Class III obesity	E Class III obesity	F Class III obesity
BMI (kg/m ²)	22 \pm 2	33 \pm 1	38 \pm 1,5	44 \pm 3	54 \pm 3	63 \pm 4
Sex (F/M)	15/9	17/7	17/7	15/9	17/7	14/10
Smokers (n)	10	10	12	10	10	6
Age (yr)	39 \pm 14	45 \pm 15	41 \pm 13	43 \pm 3	47 \pm 14	39 \pm 11
SBP (mmHg)	110 \pm 5	123 \pm 13	129 \pm 22	134 \pm 15	130 \pm 10	131 \pm 11
DBP (mmHg)	60 \pm 7	78 \pm 7	82 \pm 12	87 \pm 13	80 \pm 8	83 \pm 8
HR (bpm)	67 \pm 10	74 \pm 10	73 \pm 9	74 \pm 9	80 \pm 13	81 \pm 12
QTc (msec)	392 \pm 15	402 \pm 14	402 \pm 18	404 \pm 21	424 \pm 17	413 \pm 18

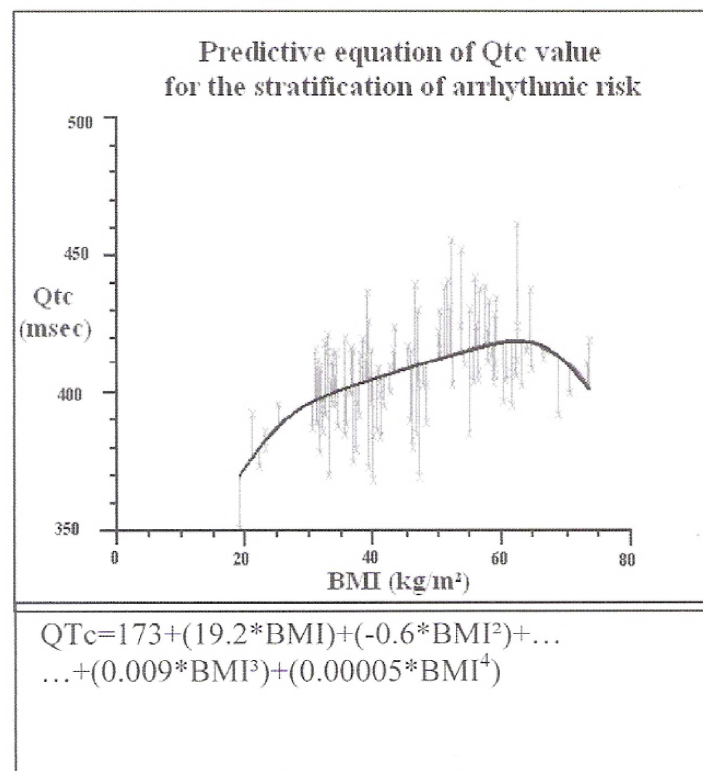


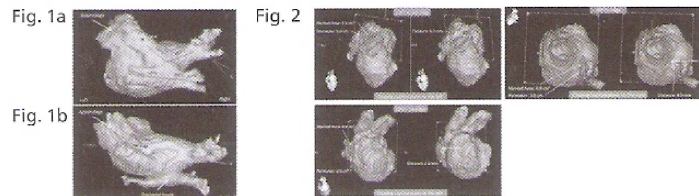
Fig. 1

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COMMON TRUNK OF THE INFERIOR PULMONARY VEINS DETECTED BY MRI: USEFULNESS OF ANATOMICAL LEFT ATRIAL MEASURES PERFORMED ON CARTOMERGE WORKSTATION BEFORE ABLATION

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Knowledge of individual pulmonary vein (PV) anatomy is a prerequisite for effective and safe catheter ablation of atrial fibrillation (AF). In larger series, the incidence of the common inferior PV trunk ranges from 0 to 0.9% in patients with AF and the presence of this anomaly poses a problem for an ablation procedure of AF. We describe the case of this highly unusual anatomic variant of a 63-year-old man with drug refractory paroxysmal AF, referred for pulmonary vein isolation. The procedure was performed under the guidance of the CARTO-MERGE electroanatomical mapping system (Biosense Webster, Inc., Diamond Bar, Calif.). After creation of a 3-dimensional (3D) anatomic construct from a contrast-enhanced magnetic cardiac imaging, the cardiac structures were segmented obtaining the left atrial chamber (LA) with PVs and appendage (LAA). This demonstrated 2 large superior PVs (LSPV and RSPV) and a posterior common trunk with early division of the right and left posterior veins (RIPV and LIPV) (Figure 1a). The superior PVs had got a sloping direction while the right and left posterior veins an horizontal one (Figure 1b). There was also a voluminous pluri-lobate appendage (Figures 1a, 1b). Before the procedure we study the possible tailored ablation approach supported by anatomical measures of PV ostium, LAA ostium, mitral annulus ostium and the LA critical ridges of this case (right PV ridge, LSPV-LAA ridge, and the LIPV-LA ridge) (Figure 2) in relation of the Navistar Thermocool tip. Integration of the magnetic resonance images with real-time intraprocedural electroanatomical mapping was performed by registration of the corresponding anatomic points using as landmark the junction between LSPV and LA (violet flag in figures 1 and 2). Electrical PV isolation was successfully performed without complications. Off antiarrhythmic medication, the patient has remained free of AF during 12-month follow-up. Reliable recognition of this anomaly was facilitated by 3D imaging, based on preprocedural MRI scan. The resulting image recognized beforehand and anatomical left atrial measures performed on CartoMerge workstation before ablation allowed reliable virtual navigation of the ablation catheter inside 3D accurate anatomic LA chamber and a tailored ablation approach. Probably without these implements the procedure could have been prolonged and possibly compromised in efficacy and safety.



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HEART RATE TURBULENCE IS INDEPENDENT BY CRITERIA EVALUATING SIMPATHO-VAGAL IMBALANCE TO DETECT THE ARRHYTHMIC RISK OF ISCHEMIC PATIENTS?

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Background. Ischemic patients present an elevated risk of arrhythmias and sudden cardiac death. In order to prevent the aforementioned complications several clinical, electrocardiographic and echocardiographic parameters, are available to detect high risk patients. Recently heart rate turbulence (HRT) has been indicated, as index of sympatho-vagal imbalance, useful to detect and stratify patients with high arrhythmic risk.

Aim. To assess the independence of HRT criteria in risk stratification of ischemic patients, from each others criteria widely employed in clinical practice.

Material and methods. 51 ischemic patients (62.7 \pm 9.7 years old) were studied. 24h Holter ECG and echocardiogram were performed. Variables listed on Table I (Panel A) usually utilized in clinical practice, have been employed for stratifications of patients in Low, Intermediate and High arrhythmic risk. Statistical Chi-Square (χ^2) test was run to evaluate the independence of HRT (Panel B) from all other variables (Panel A).

Results. HRT shows independence from all other criteria (for each χ^2 result, see Table I), except for heart rate ($\chi^2 = 0.022$).

Conclusion. Our study reveals independence of HRT from other parameters commonly used for arrhythmic risk stratification in ischemic

patients. The independence of HRT from SDNN and LF/HF ratio, considered as index of sympatho-vagal imbalance, makes us to assume that probably the mechanisms that affect HRT are more complex or partially different by ones affecting SDNN and LF/HF ratio. The dependence observed between HRT and HR is referring to fact that HRT is computed by the R-R interval length and therefore by heart rate. More studies are needed to verify the independence of HRT by HRV indices (SDNN, LF/HF), and clarify which electrophysiopathological mechanisms are involved.

Table I. Panel A reports variables utilized to classify ischemic patients into arrhythmic risk categories. Panel B shows the arrhythmic risk categories by HRT parameter classification.

	Low Risk N. pt	(cut-off)	Intermediate Risk N. pt	(cut-off)	High Risk N. pt	(cut-off)	Chi-Square (χ^2) ⁴
Panel A							
HR (bpm)	44	(<83)	-	-	7	(≥ 83)	0.022
QTC.med ¹ (msec)	24	(M<430; F<450)	11	(430<M<450; 450<F<460)	16	(M>450; F>460)	0.292
SDNN ² (msec)	22	(141±39)	21	(<102 , >70)	8	(≤ 70)	0.835
LF/HF ²	13	(1.5-2)	6	(<1.5)	32	(>2)	0.99
EF (%)	30	(≥ 50)	11	(<50 , >35)	10	(≤ 35)	0.559
Wall mobility	17	(No Alteration)	-	-	34	(Alteration)	0.417
Panel B							
HRT	20	(TO ³ & TS ³ Normal)	18	(TO or TS Abnormal)	13	(TO & TS Abnormal)	-

Heart Rate (HR). Ejection Fraction (EF). Number of patients (N° pt). 1) QTC.med is the QTC at the mean heart rate. 2) Heart Rate Variability parameters considered. 3) Turbulence Onset (TO) and Turbulence Slope (TS) cut off are TO $>0\%$, TS <2.5 ms/RR. 4) χ^2 significant for $p < 0.05$.

Funzione endoteliale e microcircolo

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ENDOTHELIAL DYSFUNCTION AND CORONARY MICROCIRCULATION IN RENAL TRANSPLANT RECIPIENTS

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Background. The diagnosis of subclinical cardiovascular involvement is important for adequate long-term management of young renal transplant recipients (RTR). Chronic kidney disease is a well recognized cardiovascular risk factor. End-stage renal disease and dialysis are associated with chronic inflammation and endothelial dysfunction which promote enhanced atherosclerosis. Renal transplantation partially improves renal function but, on the other hand, immunosuppressive therapy represents an additional cardiovascular risk factor. The aim of this study is to investigate endothelial function and coronary microcirculation in young RTR.

Methods. 15 RTR (7M and 8F; mean age 25 ± 5 years) in absence of clinical history and any sign or symptoms of cardiac disease underwent high dose dipyridamole echo-stress with coronary flow reserve (CFR) evaluation and determination of plasma asymmetric dimethylarginine (ADMA) levels at baseline and after 18 months of follow up.

Results. At the end of follow-up, we observed improvement of CFR (2.72 ± 0.42 vs 3.18 ± 0.62 ; $p < 0.01$) and decreased plasma ADMA levels (3.76 ± 1.3 vs 0.7 ± 0.14 ; $p < 0.001$) compared to baseline. Moreover, plasma ADMA levels negatively correlate with CFR ($p < 0.05$; $r = -0.51$).

Conclusions. Our data demonstrated that endothelial function improved after renal transplantation and positively influences coronary microcirculation. This suggests that drugs positively affecting endothelial function could preserve coronary function in RTR.

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EFFECT OF BARIATRIC SURGERY ON FLOW MEDIATED DILATION AND CORONARY MICROVASCULAR FUNCTION

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Background. Obesity is typically associated with an enhanced cardiovascular risk. Previous studies showed that bariatric surgery is able to improve peripheral endothelial function in obese patients. However, no study assessed the effects of bariatric surgery on coronary vasodilator microvascular function.

Methods. We studied 25 consecutive obese patients (age 37 ± 9 , 7 men) with no overt cardiovascular disease, who underwent bariatric surgery at our hospital. Main clinical and anthropometric variables were measured in all patients before the surgical intervention. Systemic vascular function was assessed by measuring brachial artery dilation during post-ischemic forearm hyperemia (flow mediated dilation, FMD) and in response to administration of $25 \mu\text{g}$ of sublingual glyceryl trinitrate (nitrate-mediated dilation, NMD). Coronary microvascular

vasodilator function was assessed in the left anterior descending (LAD) coronary artery, using transthoracic Doppler echocardiography, as the ratio of coronary blood flow (CBF) velocity at peak intravenous adenosine administration and during cold pressor test (CPT) to the respective basal CBF velocity values. The same tests were repeated 3 months after bariatric surgery.

Results. Data are summarized in the table. At 3-month follow-up, body mass index (BMI) and waist-to-hip ratio (WHR) had decreased significantly. At the same time, a significant improvement of FMD and of coronary flow response (CFR) to adenosine and to CPT was observed. In contrast, no significant change in NMD was found at follow-up.

Conclusions. Our results confirm that bariatric surgery significantly improves peripheral endothelial function in obese patients. Moreover, they show that this surgical intervention is also associated with a consistent improvement of coronary microvascular function. Both findings might contribute to reduce cardiovascular risk in these patients.

	Before surgery	After surgery	p
BMI	45±5	35±5	0.003
WHR	0.93±0.1	0.86±0.13	<0.001
FMD	6.4±3.1	9.8±3.1	<0.001
NMD	12.7±3.3	12.9±2.9	0.53
CFR to adenosine	1.6±0.5	2.5±0.6	<0.001
CFR to CPT	1.4±0.3	2.2±0.4	<0.001

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EFFECT OF ADJUNCTIVE CATHETER THROMBUS ASPIRATION IN MICROVASCULAR FUNCTION IN ACUTE MYOCARDIAL INFARCTION

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Background. During acute myocardial infarction (AMI) early myocardial reperfusion is the target therapy to salvage ischemic myocardium and today, primary percutaneous coronary intervention (PPCI) is the recommended therapy in patients with ST-segment elevation myocardial infarction. The optimal reperfusion therapy should restore not only epicardial patency and flow (TIMI 3 grade), but also myocardial tissue perfusion (reflow). PPCI can cause microembolization resulting in microvascular damage. Previous studies demonstrated that there is a close relationship between coronary flow reserve (CFR), and microvascular integrity after reperfused AMI. The aim of this study was to evaluate the effect of thrombus aspiration in microvascular function assessed with non invasive CFR.

Methods. Sixty-seven patients (47 male, mean age 67 ± 12.2) affected by first anterior AMI with single coronary disease on left anterior descending artery (LAD) were retrospectively enrolled in the study. Thirty-four patients performed standard PPCI and 33 had manual thrombus aspiration during PPCI. All patients had reperfusion therapy within 12 hours of symptom onset (mean time-to-treatment interval 210.3 ± 107.3 minutes). Corrected TIMI frame count (CTFC), the rate of 90-minutes ST segment resolution $>70\%$ and CFR by transthoracic-echo-Doppler to assess microvascular function were assessed. Non-invasive CFR was performed before discharge and at 6-month follow-up.

Results. There were no differences in CTFC (16.2 ± 7.9 vs 18.8 ± 1 , $p = \text{NS}$) and ST-segment resolution (15 vs 29% , $p = \text{NS}$) between standard PPCI and thrombus aspiration. Non-invasive CFR was 2.3 ± 0.54 in standard PPCI and 2.13 ± 0.8 in thrombus aspiration group ($p = \text{NS}$). After 6 months CFR increased from 2.3 ± 0.54 to 2.81 ± 1 ($p < 0.05$) in standard PPCI and from 2.13 ± 0.8 to 2.8 ± 0.79 ($p < 0.01$) in thrombus aspiration group, but there was no difference in CFR at 6 months in the two groups (2.86 ± 1 vs 2.81 ± 0.79 , $p = \text{NS}$).

Conclusions. Our study shows that catheter thrombus aspiration during PPCI in patients with first anterior AMI appears to have a neutral effect in microvascular function assessed with non invasive CFR.

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THE OMEGA-3 FATTY ACID DOCOSAHEXAENOATE ATTENUATES INSULIN-INDUCED CD36 EXPRESSION IN HUMAN MICROVASCULAR ENDOTHELIAL CELLS

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Background. Microvascular dysfunction characterizes insulin resistance and/or hyperinsulinaemia and may also contribute to diabetic microvasculopathy by compromising the blood supply to large vessels. Enhanced uptake of free fatty acids (FFA) and oxidized low density lipoproteins in the microcirculation may lead to oxidative stress and microvascular dysfunction via interaction with the scavenger receptor and long-chain FFA transporter CD36. We hypothesized that in