The Relation between Cardiac T2 Value and the Presence of Fragmented QRS in Patients with β-thalassemia Major, who Received Iron Chelation Therapy

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Objectives: T2 * values, measured by cardiac MRI are recommended for the identification of patients at high risk for development of heart failure and arrhythmia in beta thalassemia major (TM) patients. Conditions that lead to non-homogeneous activation like myocardial fibrosis, lead to the development of fragmented QRS (fQRS) on ECG. Purpose of this study, to evaluate the impact of iron-chelation treatments on cardiac T2 * values and the presence of fQRS in the surface ECG.

Methods: In this study, patients between the ages of 15-40 with a diagnosis of thalassemia major were enrolled. All patients were receiving the same iron chelator (deferoxamine, deferripirox, deferasirox or deferoxamine + deferripirox combination) at least two years. In these patients, cardiac MRI T2 * values and EFs, were evaluated annually. Cardiac T2 * value of less than 20, was considered cardiac iron overload. fQRS were investigated on 12-lead surface ECGs of patients. The relation between iron chelators and cardiac T2 value and the presence of fragmented QRS was investigated.

Results: This study included a total of 103 patients (46 males, 57 females) follow up with diagnosis of beta thalassemia major in our center.. For patients with coronary artery disease, no had risk factors other than smoking. All of the patients were receiving regular blood transfusions and iron chelator. Deferoxamine in 43 patients, 37 patients were receiving deferripirox and deferoxamine in 45 patients. Twenty-two patients participating in this study administered deferoxamine and deferoxamine. According to use of deferoxamine, deferripirox, deferasirox, the combination of deferoxamine and deferoxamine, low T2 * ratio of 55.8%, 51.4%, 28.9% and 59.1%, respectively. According to use of deferoxamine, deferripirox, deferasirox, the combination of deferoxamine and deferoxamine, frequency of fragmented QRS on surface ECG, 68.8%, 59.5%, 26.7% and 63.6%, respectively. Deferasirox users, compared with non-users, to be statistically significant, the presence of fQRS on ECG was more rare, low T2 * values were encountered less (p=0.05).

Conclusions: In TM patients, to determine cardiac iron overload and evaluate the effectiveness of iron chelators, T2 * value of cardiac monitoring is recommended. However, especially in patients with cardiac MRI that cannot performed, fQRS on surface ECG can help in predicting the presence of cardiac iron burden. According to our study, deferasirox is superior to other agents with lower cardiac T2 * and rarely of fQRS presence.

Fragmented QRS Predicts the Arrhythmic Events in Patients with Heart Failure Undergoing ICD Implantation for Primary Prophylaxis: More Fragments More Appropriate ICD Shots

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Background: Fragmented QRS complex (fQRS) is associated with cardiovascular outcomes in various patient populations. Although there were clinical studies investigating the association of fQRS with arrhythmic events in patients with left ventricular systolic heart failure, the results were conflicting regarding the association of implantable cardioverter defibrillator (ICD) shocks and fQRS. In this study, we aimed to evaluate the association between the presence and extent of fQRS and standard electrocardiography with appropriate ICD shocks.

Methods: A total of 215 patients (age: 58.2±11.6 years, 72.5% male) with the diagnosis of left ventricular systolic heart failure in whom ICD had been implanted for primary prophylaxis were enrolled. Standard ECG evaluation revealed frQRS complex in 123 patients (57.2%). The phenomenon of fQRS was defined as deflections at the beginning of the QRS complex, on top of the R-wave, or in the nadir of the S-wave similar to the definition in CAD.

Results: At mean 23.5±12.1 months follow-up, 111 (51.6%) patients experienced appropriate ICD shocks. Median number of ECG leads with frQRS were higher in patients with appropriate ICD shocks [3 (2-6) vs 1 (0-2), p<0.001, respectively]. The presence of fQRS (OR: 6.64, 95% CI: 3.54-12.4, p<0.001) and the number of leads with fQRS (OR: 1.35, 95% CI: 1.22-1.67) were found as independent predictors of appropriate ICD shocks. Additionally, there was a negative correlation between left ventricular ejection fraction and the number of leads with fQRS (r=-0.434, p<0.001).

Conclusion: In conclusion, presence and extent of fQRS complex on standard 12-lead ECG can predict appropriate ICD shocks in patients with left ventricular systolic heart failure who underwent ICD implantation for primary prophylaxis. So, large-scale and prospective studies are needed to confirm those findings.

The Importance of Fragmented QRS in Systemic Sclerosis Patient’s Early Diagnosis of Cardiac Involvement

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Objective: Systemic sclerosis (SSc) is autoimmune connective tissue disease that characterized with fibrosis and diffuse vascular lesions. Even though cardiac involvement is rarely in clinical, myocardial fibrosis is to be expressed in proportion of %50-80. When clinical symptomatic cardiac dysfunction emerge, prognosis of the disease is bad. For this reason early diagnosis of cardiac dysfunction in SSc patients is important. The aim of this study is seek the sequence of fragmented QRS (fQRS) that recommended utilization of myocardial fibrosis in SSc patients and correlation with pulmonary artery pressure.

Methods: Thirty one SSc patient (23 woman,40.4±12.9 year) that asymptomatic as cardiac and 41 healthy volunteer (31 woman,38.2±11.8 year) was received to study. 12 derivation surface ECG and transthoracic echocardiography of patients was performed. Approximately systolic pulmonary artery pressure (sPAB) was detected by using TY jet in echocardiography. Presence of fragmented QRS was investigated in surface ECG.

Results: Standard echocardiographic parameters and presence of fQRS in surface ECG was compared in every two groups. Value of sPAB was to be determined high in SSc group according to control group (28.8±11.3 mmHg vs 21.3±5.0 mmHg, p=0.001). Presence of fQRS presented further in SSc group than control group (59.8 vs 9.3%, p=0.001). Significant difference was found about sPAB value between groups that fQRS is positive and negative (34.2±13.4 mmHg vs 22.1±4.4 mmHg, p=0.001). Also in SSc patients whose value of sPAB was more than 25 mmHg, frequency of fQRS was detected more.

Conclusion: Studying fQRS in surface ECG is cheap and simple procedure that showing cardiac dysfunction before manifestation of clinical findings. Also outstanding cause of mortality in SSc patients is pulmonary hypertension, relation between fQRS and sPAB must be considered.

The Comparison of Heart Rate Variability Parameters between Type 2b Vasovagal Syncope and Other Types of Vasovagal Syncope

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Background: Measurement of Heart Rate Variability (HRV) is a noninvasive approach based on ECG monitoring that allows an indirect evaluation of cardiovascular autonomic control. In this study, we aimed to compare HRV parameters between type 2B and other types of vasovagal syncope (VVS) to find parameters for predicting prolonged asystole risk before Tilt testing.

Methods: By examining past records, we scanned patients between 1 January 2009 - 1 December 2012 who applied our hospital with complaining syncope. We included one hundred patients with a diagnosis of VVS who examined by echocardiography and Holter ECG before Tilt table testing. Patient with type 2B VVS was called group 1 (n:43), VVS other than type 2B (type 1, type 2A, type 3 and POTS) were called group 2 (n:57).

Results: In group 1 patients, starting asystole time was observed at 16.2±10.4 minute from beginning the test and duration asystole period was found 5.2±1.2 seconds during the test. Between two groups, HRV parameters (SDNN, SDANN, SDNN indexes) were significantly lower in group 1 patients than group 2 patients (p<0.01). Conclusion: Patients diagnosed with type 2B VVS were found prolonged HRV parameters. It considered these type of patients are more sensitive to the effects of autonomic nervous system than other types of VVS. The highest heart rate value in type 2B VVS was lower than the other group. It suggested that sinus node parasympathetic dominance inhibits reaching maximum heart rate values in those patients than other types of VVS patients. Our study is important to show predicting risk of asystole before Tilt testing by examining HRV parameters and the maximum heart rate value.

Impact of Continuous Positive Airway Pressure Treatment on Atrial Electromechanical Delay and P Wave Dispersion with Obstructive Sleep Apnea

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Objectives: Obstructive sleep apnea (OSA) is a common medical condition that is affecting approximately 5% to 15% of the population. Atrial fibrillation (AF) is the most common arrhythmia encountered in clinical practice. OSA has been shown to be associated with AF. Electrophysiological and electromechanical abnormalities...
resulting from intra and intertrial conduction disorders present a high risk as regards the generation of AF. Nasal continuous positive airway pressure (CPAP) is an effective and widely used method in the treatment of OSA. The purpose of the present study is to evaluate the short-term effects of nasal continuous positive airway pressure (CPAP) treatment on atrial electromechanical delay and p wave dispersion (PD) in patients with obstructive sleep apnea (OSA).

Methods: A total of 24 OSA patients diagnosed with polysomnography who were planned to undergo CPAP therapy and 18 healthy subjects were included in the study. The basal intra and intertrial electromechanical delays prior to onset of the therapy were measured using Tissue Doppler Imaging (TDI); PD was calculated on the basis of 12 lead ECG. In order to evaluate the effects of CPAP therapy, the patients underwent a re-evaluation on the basis of TDIs and 12-lead ECGs 6 months after the initiation of the therapy.

Results: Interaltrial, left intratrial and right intratrial electromechanical delays prior to the therapy were found to be significantly greater in OSA group compared with the therapy group (20.2±2.8 vs. 21.1±2.8, p=0.001; 20.5±2.2 vs. 11.1±2.2, p=0.003; 20.7±11.1 vs. 10.2±2.6, p<0.001, respectively). PD was found to be increased in OSA group compared with the healthy controls (44.7±7 ms vs. 28.5±4 ms, p<0.001). Compared with the basal values, intertrial, left intratrial and right intratrial electromechanical delays measured with TDI during the re-evaluation 6 months after the CPAP therapy were found to decrease (39.2±8 vs. 28.7±6.5 p<0.001; 20.5±7.2 vs. 15.6±5.1, p<0.002; 20.7±11 vs. 13.1±7.3, p<0.001, respectively). Such decreases were also valid for the post-therapy PD values, compared with the basal values (44.7±7 ms vs. 37±7, p<0.001).

Conclusions: With the help of CPAP therapy, by improving the electromechanical delay and P wave dispersion in patients with OSA.

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Comparison of Five QT Correction Methods in Patients with Hypoxic Brain Injury

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Background: There has been increasing interest in developing non-invasive methods to investigate ventricular arrhythmias and the risk of sudden cardiac arrest. Certain electrocardiographic repolarization indexes are valuable in determining prognosis of healthy individuals. Increases in the heart rate shortens the QT interval. Thus, many methods have been developed to correct the QT interval to account for changes in the heart rate in this study, we evaluated five different heart rate QT correction formulas in patients with ischemic-hypoxic brain injury.

Methods: Forty patients with ischemic-hypoxic encephalopathy (21 male, 19 female; mean age 60±18 years) were enrolled in the study. While hypoxia was caused by cardio-pulmonary resuscitation (CPR) in thirty-seven patients (92.5%), three patients (7.5%) experienced hypoxia from other causes. Coronary revascularization had been given to 11 patients (27.5%) previously. QT, JT, JT, TaTe intervals were measured over 24 hours by ambulatory ECG monitoring measuring the slowest and fastest heart rates (Table 1). These measured repolarization parameters were adjusted using 5 different correction formulas and distinctions between these correction formulas were evaluated (Table 2).

Results: The Fredericia method was least affected by heart rate in particular the QT (419±51 msec, 451±49 msec) and TaTe (103±33 msec, 115±23 msec) during the fastest and slowest heart rates. For the parameters JT (292±50 msec, 309±38 msec) and JT (198±33 msec, 201±53 msec), the Framingham method gave the most accurate results. What should be the upper limit of the QT interval? This question remains important because, the 450 msec limit for males and 470 msec limit for females has been calculated using the Bazett's formula. While it is now clear that the Bazet's formula does not correct the QT interval safely. For example, in our study, the number out of 40 patients with long QT interval was 20 patients by the Bazet's formula and 35 patients by the Nomogram formula during fastest heart rate (longer than 450 msec for male, longer than 470 msec for female). Whereas according to the Fredericia method, the number of patients with long QT interval was nine. We found that at high heart rates, the Bazet's and Nomogram methods were inadequate for determining long QT intervals. Incorrect long QT interval diagnoses are made according to QT intervals calculated using the Bazett's and Nomogram methods and basing on this, medical decisions are chosen. Hence, caution should be used with QT intervals calculated using these two methods especially in higher heart rates.

Conclusions: In this study, the Bazett’s formula, which is the most commonly used correction method, was insufficient to correct the ventricular repolarization parameters. The Fredericia formula was the least affected by heart rate and gave more accurate results than Bazett’s formula in determining the QT and TaTe intervals.

ECG measurements (mean±SD) (msec)

| RR slowest | 957±344 |
| QT fastest | 341±63  |
| QT slowest | 443±72  |
| JT fastost | 214±50  |
| JT slowest | 304±54  |
| JTa fastest | 127±33  |
| JTa slowest | 188±43  |
| TaTe fastest | 82±20   |
| TaTe slowest | 111±28  |

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The Importance of Fragmented QRS in Evaluation of Cardiac Iron Burden, in Patients with β-Thalassemia Major

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Objectives: Beta thalassemia major, which causes chronic hemolytic anemia, is an inherited hemoglobin disorder. The treatment with chelating agents are shown improvement, but repeated blood transfusions, continue to lead to iron overload and dysfunction of organs. In these patients, the leading causes of death are heart failure and arrhythmias, so cardiac iron overload monitoring is essential. Cardiac MRI T2 * values, recommended for the evaluation of iron overload in the heart, this is a technique that can be trusted, but the high cost and difficult. The objective in this study, is investigation of the importance of fragmented QRS (fQRS) and the relationship between cardiac T2 * values in assessment of cardiac iron overload.

Methods: In this study, patients between the ages of 15-40 with a diagnosis of thalassemia major were enrolled. In these patients, cardiac MRI T2 * values and ECGs, were evaluated annually. Cardiac T2 * value of less than 20, was considered as cardiac iron overload. Initial studies reported of fQRS, can be used for the evaluation of scaring and fibrosis, fragmented QRS was defined as an additional spike of QRS complexes without bundle branch block. The relationship was investigated, between cardiac T2 * values and the presence of fragmented QRS in ECG.

Results: This study included a total of 103 patients (46 males, 57 females) follow up of scarring and cardiac iron overload. Initial studies reported of fQRS, can be used for the evaluation of scaring and fibrosis, fragmented QRS was defined as an additional spike of QRS complexes without bundle branch block. The relationship was investigated, between cardiac T2 * values and the presence of fragmented QRS in ECG.

Conclusions: Cardiac involvement is the main cause of mortality, early diagnosis of cardiac dysfunction is vital in patients with beta thalassemia major. In these patients, researching the presence of QRS on surface ECG, especially in cardiac T2 * value that cannot follow-up in patients, regulation of treatment, due to cheap and easy method, must be considered.

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Evaluation of Left Atrial Mechanical Functions and Atrial Conduction Abnormalities in Maras Powder (Smokeless Tobacco) Users and Smokers

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Aim: Smokeless tobacco can be found in preparations for chewing or for being absorbed by nasal and oral mucosa. In Turkey a type of smokeless tobacco called Maras Powder (MP) is widely used in the southeastern region. The purpose of this study was to investigate whether MP damages intra- and intertrial conduction delay and left atrial (LA) mechanical functions as much as cigarette smoking.