Abstract

Introduction: Cigarette smoking increases the risk of sudden cardiac death. Smoking may predispose to ventricular fibrillation and sudden cardiac death by altering ventricular repolarization and enhancing sympathetic nervous system activity. We aimed to study the effects of smoking on ventricular repolarization.

Methods: We studied 47 healthy subjects. 24 long-term heavy smokers (10 women, mean age: 40±5 years) constituted the study group. 23 non-smokers (10 women, mean age: 42±10 years) constituted the control group. ECG was obtained from all subjects. Tp-e interval, Tp-e/QT ratio, Tp-e/QTc ratio were measured. These parameters were compared between the groups.

Results: There was no significant difference at the basic clinical and echocardiographic variables (p> .05). QT interval and QTc interval were similar between smokers and nonsmokers. Tp-e interval (p=.001) and Tp-e/QT (p=.003) ratio were higher in heavy smokers compared to non-smokers whereas Tp-e/QTc ratio (p=.13) was marginally higher in smokers. Other ECG parameters were similar between smokers and nonsmokers groups.

Conclusion: Tp-e interval and Tp-e/QT ratio are prolonged in heavy smokers.

<table>
<thead>
<tr>
<th></th>
<th>Group I Non-smokers</th>
<th>Group II Smokers</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR</td>
<td>157.8 ± 21.1</td>
<td>148.8 ± 19.9</td>
<td>0.025</td>
</tr>
<tr>
<td>QT</td>
<td>381.6 ± 24.1</td>
<td>341.3 ± 22.5</td>
<td>0.554</td>
</tr>
<tr>
<td>QTc</td>
<td>389.8 ± 22.3</td>
<td>379.8 ± 35.2</td>
<td>0.535</td>
</tr>
<tr>
<td>TPe</td>
<td>78.9 ± 7.3</td>
<td>85.3 ± 10.7</td>
<td>0.001*</td>
</tr>
<tr>
<td>TPe/QT</td>
<td>0.21 ± 0.02</td>
<td>0.26 ± 0.03</td>
<td>0.003*</td>
</tr>
<tr>
<td>TPe/QTc</td>
<td>0.20 ± 0.02</td>
<td>0.23 ± 0.03</td>
<td>0.136</td>
</tr>
</tbody>
</table>
Abstract

Introduction: Is known that the QT interval duration depends on the heart rate (HR) and is related with the autonomic nervous system regulation. Patients with Long QT Syndrome (LQTS) due to mutation of the potassium channels have an abnormal response to abrupt changes in HR and to the sympathetic stimulation that occurs with the brisk standing. Electrocardiograms (ECGs) performed immediately after standing could be a diagnostic tool for this syndrome.

Objectives: To describe the presence of QT interval changes provoked by standing in patients with genetic confirmation of LQTS, and compare the results with a group of family members of patients with LQTS not carrying the familial mutation.

Methods: We performed an ECG in the supine position and another immediately after getting up in 27 patients with LQTS and 22 unaffected relatives. We measured the corrected QT interval (QTc) (Bazett’s Formula) in supine position and immediately after standing in DII and V5. The increase in the QTc interval (QTc in standing-QTc in supine) was also evaluated.

Results: LQTS patients had a mean age of 39 ± 18 years (mean±SD), and 40% were male. Among these, 8 (30%) had LQTS1, 16 (59%) LQTS2, and 3 (11%) LQTS7. In the control group the mean age was 42 ± 19 years, 50% males. QTc values in supine and in standing positions for both groups are shown in Table 1.

Patients with LQTS mutations showed statistically significant differences between the mean QTc interval in supine and after brisk standing (p = 0.003 DII, P <0.001 V5). In contrast, the control group showed no differences (p = 0.928 DII, p = 0.432 V5).

We also noted significant differences when compared the mean increase in the QTc interval between both groups (p = 0.001 DII, P = 0.015 V5). In the subgroup analysis, the increase in the mean QTc interval was 53 ± 51ms in DII and 31 ± 35ms in V5 for LQTS1; and 34 ± 34ms in DII and 29 ± 26ms in V5 for LQTS2, evidencing no significant differences between both subtypes of LQTS (p = 0.65).

Conclusions: Our population of patients with congenital LQTS had an abnormal QTc interval adaptation with the standing, showing a significant increase of this measure. Since our controls did not show this behavior, the performance of this test could be a useful tool in the diagnosis of individuals with baseline QTc interval at the upper limit of normal.

<table>
<thead>
<tr>
<th></th>
<th>QTc DII in supine</th>
<th>QTc DII in standing</th>
<th>QTc DII increment</th>
<th>QTc V5 in supine</th>
<th>QTc V5 in standing</th>
<th>QTc V5 increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>LQTS</td>
<td>477±66</td>
<td>516±50</td>
<td>45±47</td>
<td>472±33</td>
<td>510±45</td>
<td>36±39</td>
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<tr>
<td>Controls</td>
<td>423±33</td>
<td>417±42</td>
<td>0±31</td>
<td>425±34</td>
<td>425±40</td>
<td>6±33</td>
</tr>
</tbody>
</table>
Abstract

Introduction: Increased P-wave dispersion is well known to be the predictor of recurrences after cardioversion in patients with atrial fibrillation. However, there is little data about relation between recurrence of atrial fibrillation and increased P-wave dispersion in normal LA sized patients after electrical cardioversion.

Methods: We reviewed the electrocardiograms taken within a day in atrial fibrillation patients with successful cardioversion. All patients received antiarrhythmic drug after cardioversion. We compared P wave dispersion and maximum P-wave duration between recurrent group and non-recurrent group.

Results: In 27 patients with persistent atrial fibrillation with normal LA size, 14 patients (51.8%) recurred atrial fibrillation after cardioversion. There were no difference in baseline characteristics including sex, age, hypertension and diabetes between two groups. P wave dispersions were significantly higher in the recurrent group than the nonrecurrent group (44.5±20 vs 30±12 ms, P<0.038). Furthermore, recurrent group showed significantly prolonged maximum P wave compared with that of nonrecurrent group (134±16 vs. 118±19, p=0.035).

Conclusions: Increased P wave dispersion and prolonged maximum P-wave duration were associated with the recurrence of atrial fibrillation in patients with normal LA size after electrical cardioversion.
Abstract

Introduction: Patients who undergo pulmonary vein isolation for atrial fibrillation can develop recurrent atrial fibrillation (AF) and/or atrial tachycardia (AT). We hypothesized that analyzing AF and AT surface waves on electrocardiograms using spectral analysis techniques would offer insights into the differences between post-ablation AF versus AT.

Methods: We performed a retrospective study of 70 patients who had undergone pulmonary vein isolation and returned for a second ablation due to recurrent AF or AT. Surface electrocardiograms were analyzed using waveform spectral analysis to calculate the following atrial parameters: dominant frequency, dominant amplitude (the amplitude of the dominant frequency), and mean spectral profile (average amplitude of the normalized spectrum) and standard deviation.

Results: Surface electrocardiogram analyses revealed that AF patients manifested the following features when compared to AT patients: higher dominant frequencies (5.80 vs. 4.30 Hz, p≤0.0001), lower dominant amplitudes (2.44 vs. 3.68, p<0.0001), higher mean spectral profiles (0.31 vs. 0.19, p<0.0001), and higher standard deviations of mean spectral profiles (0.173 vs. 0.156, p=0.0015).

Conclusions: Non-invasive, electrocardiogram-based signal analyses can be used to measure the degree of differences between atrial frequency as well as spectral organization in patients with AF vs. AT. Further analyses are required to assess whether these techniques can help to differentiate among various types of post-ablation ATs.
Abstract

Introduction: It is known that some antipsychotics are associated with increased risk of sudden death from the potentially fatal ventricular arrhythmia. The aim of present work was to reveal electrocardiographic changes in patients with schizophrenia.

Methods: 71 patients with the diagnosis of schizophrenia were investigated, among them 30 females and 50 males.

Results: It was detected such kind of changes by Electrocardiography: Sinus tachycardia 8.45%; sinus bradycardia 11.26%; QTc was prolonged in 21.4 %, p= 0.047., post infarction scarring Q wave and QS complex was detected in 19.71%. Extrasystolic arhythmia revealed in 45%, Conduction block was detected in 5.63 %. There was high correlation between QTc prolongation and Haloperidol dosage p<0,001. Totally electrocardiographic changes were manifested in 44.3 % of the patients.

Conclusions: As the results have shown, ECG changes occurred in quite high rate among the patients with schizophrenia. Use of electrocardiograms (ECGs) to monitor the safety of pharmacotherapy is the best way in psychiatric clinics. Because neuroleptics affect cardiac repolarization, QTc has been found to be an accurate indicator of their effect on the heart.
Abstract

Introduction: Hypothermia is a therapeutic procedure which is used in seriously ill asphyctic and post CPR children with the aim of stabilisation patient’s general condition. The aim of this study was to evaluate hypothermia effects, especially on cardiac rhythm.

Methods: During 1.1.2010-1.1.2013 at Paediatric clinic, group of 14 sick paediatric and neonatal patients were conducted for therapeutic hypothermia.

Results: First Neonatal Group /10 pts/ with diagnosis of asphyxia perinatalis; 40% had sepsis, raised CRP, cardiac enzymes /95%. All pts pre procedures had: metabolic acidosis, normal ECG, during procedure sinus bradycardia /100%, post procedure: normal ECG. BP pre procedure 39.2mmHg, post: 52.8mmHg. Second Paediatric Group /4 pts/: 50% were post CPR, 25% had vasculitis, 25% epi suprarefractorius; pre procedure: CRP 62, post CRP 38; cardiac enzymes: 2/4 raised, post: normal, pre procedure: metabolic acidosis, post: normal; ECG in ¾ myocardial insuffiienty, post: ECG normal. BP pre: 50mmHg post 64mmHg. Statistically significant myocardial response obtained in: ECG, BP p=0.001, pH p=0.007, EB p=0.003.

Conclusions: Therapeutic hypothermia as additional curative tool is very useful in treatment of sick paediatric patients with good cardiac cell response.
Abstract

Introduction: Corrected QT interval (QTc) has been demonstrated as a marker of sudden cardiac death (SCD). Cardiac magnetic resonance (CMR) has unique property to demonstrate myocardial fibrosis. The relationship of QTc with myocardial fibrosis and its territories has not been explored.

Methods: 450 patients referring for delayed enhancement CMR were consecutively enrolled. Patients were categorized according to the presence of fibrosis. Electrocardiogram (ECG) was performed on the same day and QTc was analyzed.

Results: Mean age was 67±12 years and 58% were male. Myocardial fibrosis was present in 33.1%. The QTc was significantly longer in patients with fibrosis, compared to those without fibrosis (456 ms vs. 447 ms, p 0.02). Furthermore, QTc was significantly increased in the scar of RCA territory, but not in LAD or LCX territories. The association between each territory QTc and fibrosis was established.

Conclusions: This is the first to establish the correlation between QTc and myocardial fibrosis, particularly RCA territory. These findings may emphasis myocardial fibrosis using CMR as a potential risk of repolarization abnormally. The association between fibrosis and arrhythmia outcomes warrants further study.
Increased Short-Term Variability in the Peak-To-End of the T Wave in Heart Disease

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Abstract

Introduction: Previous studies have shown that the interval between the peak-to-end of the T wave (Tpe) is a predictive factor for ventricular arrhythmias. We hypothesized that the short-term variability of the Tpe interval (TpeV) also indicates ventricular instability. The aim of this study was to establish TpeV measurement, and evaluate the association between the TpeV and heart disease.

Methods: Bipolar electrocardiograms were recorded for 30 minutes in 26 patients with heart disease, 19 aged controls, and 22 young controls. We calculated the standard deviation of Tpe (SD-Tpe), with and without normalization with QT or RR intervals. We also analyzed the QT interval variability (QTV) and heart rate variability (SDNN).

Results: A 15 minute ECG recording was sufficient to obtain a reproducible SD-Tpe. There was no difference in SD-Tpe between the aged and young controls, but it was significantly increased in the patients with heart disease. The normalized SD-Tpe had the same results as SD-Tpe. QTV and SDNN did not correlate with SD-Tpe.

Conclusion: TpeV was calculated from a 15-minute ECG recording. TpeV was not affected by age, but increased with heart disease.
Abstract

Introduction and objectives: Palpitations and syncope are complaints that are often worrisome for patients and cardiologists alike. Although mostly benign, these symptoms may be the prodrome of significant cardiac events. The purpose of this study was to formulate an association between such symptoms and the frequencies of arrhythmias, in different age groups, as identified by a 24 hour holter monitor recording.

Methods: The data was analyzed through SPSS version 18.0. 844 Patients from various age groups, of either gender, referred for Holter monitoring with symptoms of palpitations and syncope were evaluated for arrhythmias. Descriptive statistics were used to summarize the categorical variables in frequencies and percentages while the continuous variables were reported as mean and standard deviation. Proportion difference was observed between categorical variables using Chi-square independent test. P-value <0.05 was considered as significant.

Results: The majority of patients belonged to the 57-75 age group (35.2 %). 41.7 % of patients were females. We identified 59 subjects with VT and an equal percentage with wide QRS tachycardia. 33 patients were identified to have CHB. 45 % of patients with syncope had an underlying arrhythmia. The most common arrhythmia amongst these patients was PSVT (27.7%). More patients complained of palpations as a symptom but only 34.8% had an underlying arrhythmia. The most common arrhythmia amongst these patients was paroxysmal supra-ventricular tachycardia (21.8%) and Paroxysmal AF (8.0 %). Patients with palpitations more commonly had a sustained arrhythmia as compared to patients with syncope. Sinus arrhythmia, AF, VT and wide QRS tachycardia were more common in patients with palpitations, whereas heart blocks and sinus bradycardia were more common in patients with syncope. Wide QRS tachycardia, AV blocks, sustained and non sustained supraventricular arrhythmias were more common in the elderly population (75 +) whereas sinus arrhythmia was most common in patients younger than 19. The most common arrhythmia in the elderly population was AF

Conclusions: 21.2 % of patients had symptoms during the recording period, out of which only 9.4 % correlated with the underlying arrhythmia. Ambulatory ECG monitoring can provide diagnostic, prognostic and therapeutic information only in some situations. Not all patients with an underlying rhythm abnormality had symptoms during the recording period.
Abstract

Introduction: Irritable bowel syndrome (IBS) is a chronic functional gastrointestinal disorder. Impaired autonomic regulation is common in patients with IBS. Heart rate variability (HRV) and heart rate recovery (HRR) are used for assessing autonomic function. The aim of this study is to evaluate autonomic nerve system activity in IBS patients using HRV and HRR.

Methods: The study group consisted of 25 consecutive patients (13 women, mean age: 39±10 years) who were diagnosed with IBS using the Rome III criteria. 25 healthy subjects (12 women, mean age: 41±10 years) were used as the control group. Time domain and frequency domain parameters of HRV and HRR were compared between the groups.

Results: SDNN, RMSSD, LF/HF ratio were similar in study and control groups (78±12 ms vs 81±18 ms, p=.511; 41±17 ms vs 43±16 ms, p=.701; 0.7±0.2 vs 0.6±0.2 , p=.104; respectively). Also the other HRV parameters were not different between groups. IBS patients had significantly lower HRR values compared to the control group (15±5 bpm; 20±5 bpm; respectively; p=.009).

Conclusion: Although HRV indices were similar HRR was significantly lower in patients with IBS compared with healthy controls.

<table>
<thead>
<tr>
<th>Variables</th>
<th>IBS (-) (n=25)</th>
<th>IBS (+) (n=25)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDNN (ms)</td>
<td>81±18</td>
<td>78±17</td>
<td>.511</td>
</tr>
<tr>
<td>RMSSD (ms)</td>
<td>43±16</td>
<td>41±17</td>
<td>.701</td>
</tr>
<tr>
<td>LF (ms²)</td>
<td>160±30</td>
<td>178±49</td>
<td>.114</td>
</tr>
<tr>
<td>HF (ms²)</td>
<td>266±62</td>
<td>252±58</td>
<td>.393</td>
</tr>
<tr>
<td>LF/HF</td>
<td>0.6±0.2</td>
<td>0.7±0.2</td>
<td>.104</td>
</tr>
<tr>
<td>HRR (bpm)</td>
<td>20±5</td>
<td>15±5</td>
<td>.009</td>
</tr>
</tbody>
</table>

Values are presented as mean ± SD
Remote Monitoring in the Province of Modena (Experience of Sassuolo Cardiology)

F. Melandri, G. Lolli, P. Bellesi, S. Merighi, A. Guerra, M. Scapinelli, S. Martano

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Abstract

Background: The PM, ICD, and loop recorders (devices) can record and store a large amount of information regarding the operation of the implanted system, the functional capacity and heart rate.

The data can be remotely controlled (“Remote Monitoring”). The control system sends remote technical and clinical data from the pacemaker / defibrillator / loop recorder device to the patient.

This information can be transmitted both periodically in special circumstances decided by your doctor. The telephone network used and the type and frequency of transmissions vary depending on the system utilizzato. Tali data, in turn, are sent to a service center where they are processed, decrypted and made available in a readable format on a secure website dedicated to which can access the medical and clinical staff, with an ID and a password through the Internet.

In cases of critical events pre-determined for each patient the doctor will be informed by e-mail, SMS or fax. The information sent through the System Remote Monitoring shall ensure that the doctor can better monitor the heart rhythm and the operation of the device without having to wait for the next ambulatory monitoring, which could be expected after weeks or months.

The doctor uses the information obtained as a support to medical therapy, to optimize device programming and better clinical management of the patient.

The system does not replace the regular outpatient visits, although it is possible to reduce the frequency or run them in a more focused manner.

The system is an information system for emergency and the patient should activate the 118 cases of serious symptoms and disorders.

Personal experience: Since November 2011 we follow more than 70 patients with implantable cardiac devices with Remote Monitoring quattro of the five companies that have now also choose between the system. The flow of information is to send monthly or quarterly or as needed data.

Our organization integrates with HM ambulatory monitoring, so that all the devices are also seen at least once a year nell’ambulatorio. The service sees integration of the members of the team arrhythmology and colleagues who deal with heart failure in an outpatient clinic dedicated.

We operate under a corporate procedure validated by the Quality Management and Health of our hospital. The patient signs an informed consent to the privacy and informed consent on the system.

In the case of the red or yellow alarm that we receive via email or sms, technical staff contact the patient and calls for extraordinary visit, if necessary, after you have shared with the doctor in charge for that period the evaluation of the alarm. In the case of periodic inspection the technician checks the cases and then the doctor valid transmissions carte a copy of the control is kept in the department.

Conclusion: From our initial experience we can draw some considerations:

- High rating by patients who see the reduced number of accesses hospital
- Reliability and security of the system as regards the follow-up electronic data and for hemodynamic monitoring
- Reduced compliance by patients for manual transmissions.
Decentralization of Pacemaker Follow-Up Visit to Local Specialty Care Centers Using Remote Transmission


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Abstract

Introduction: we analyze our initial experience with the decentralization of pacemaker follow-up visit (PFV) from the hospital to local Specialized Care Centers (SCCs) by remote monitoring transmission.

Methods: 58 patients with pacemakers and internal loop recorder Medtronic™ with parameters autochecking and remote transmission capacities. We collected clinical and pacemaker characteristics and performed an initial consultation for programming and inclusion in the monitoring transmission system. Later we performed the first remote PFV at the local SCCs by nurse with real time hospital assessment by the electrophysiologist. All patients passed two evaluation questionnaires.

Results: In relation to the PFV in the local SCCs, 42 patients (82%) considered it better, 8 (16%) equal and 1 (2%) worse. However, most of patients (48 -94%) preferred it. 5 patients (10%) had to be r in the hospital (4 for our incorrect programming and 1 for patient preference). The rest of variables are shown in tables.

Conclusions: PFV decentralization to the local SCCs by remote transmission is technically feasible, reliable and quick to make with clear benefits for patients.

| Mean age (years) | 72 ± 14 |
| Male Gender | 55% (32) |
| Patients included/transmitted | 58 / 51 |
| Device type | Pacemakers: 48 (83%): 40 Dual chambers 8 One chamber Internal Loop Recorder: 10 (17%) |
| 100% ventricular pacing-dependent patients | 14 (29%) |

| Total Time (hours) | Hospital Consultation | 3.3 ± 0.9 | 1.47 ± 0.6 |
| Mean Distance from residence (km) | 33 ± 11 | 8 ± 5 |
| Predominant travel mode | Particular (74%) | Particular (69%) |
| Patient preference for control | 3 (6%) | 48 (94%) |
| Estimated consultation cost (euros) | 14 ± 11 | 6 ± 5 |