The use of external event monitoring (web-loop) in the elucidation of symptoms associated with arrhythmias in a general population

Utilização do monitor de eventos externo (web-loop) na identificação de sintomas associados a arritmias cardíacas em uma população geral

Hindalis Ballesteros Epifanio¹, Marcelo Katz¹, Melania Aparecida Borges¹, Alessandra da Graça Corrêa¹, Fátima Dumas Cintra¹, Rodrigo Leandro Grinberg¹, Ana Cristina Pinotti Pedro Ludovice¹, Bruno Pereira Valdigem¹, Nilton José Carneiro da Silva², Guilherme Fenelon¹

1 Hospital Israelita Albert Einstein, São Paulo, SP, Brazil.
2 Escola Paulista de Medicina, Universidade Federal de São Paulo, São Paulo, SP, Brazil.

Corresponding author: Hindalis Ballesteros Epifanio – Avenida Albert Einstein, 627/701, building A1, 4th floor, room 418 – Morumbi – Zip code: 05651-901 – São Paulo, SP, Brazil – Phone: (55 11) 2151-9426
E-mail: hindalis.epifanio@einstein.br
Received on: Aug 13, 2013 – Accepted on: Apr 16, 2014
Conflicts of interest: none.
DOI: 10.1590/S1679-45082014AO2939

ABSTRACT

Objective: To correlate arrhythmic symptoms with the presence of significant arrhythmias through the external event monitoring (web-loop). Methods: Between January and December 2011, the web-loop was connected to 112 patients (46% of them were women, mean age 52±21 years old). Specific arrhythmic symptoms were defined as palpitations, pre-syncope and syncope observed during the monitoring. Supraventricular tachycardia, atrial flutter or fibrillation, ventricular tachycardia, pauses greater than 2 seconds or advanced atrioventricular block were classified as significant arrhythmia. The association between symptoms and significant arrhythmias were analyzed. Results: The web-loop recorded arrhythmic symptoms in 74 (66%) patients. Of these, in only 14 (19%) patients the association between symptoms and significant cardiac arrhythmia was detected. Moreover, significant arrhythmia was found in 11 (9.8%) asymptomatic patients. There was no association between presence of major symptoms and significant cardiac arrhythmia (OR=0.57, CI95%: 0.21-1.57; p=0.23). Conclusion: We found no association between major symptoms and significant cardiac arrhythmia in patients submitted to event recorder monitoring. Event loop recorder was useful to elucidate cases of palpitations and syncope in symptomatic patients.

Keywords: Monitoring, physiologic/instrumentation; Monitoring, physiologic/methods; Arrhythmias, cardiac/diagnosis; Syncope

RESUMO

Objetivo: Correlacionar sintomas arrítmicos com a presença de arritmias significativas por meio do monitor de eventos externo (web-loop). Métodos: Entre janeiro e dezembro de 2011, o web-loop foi instalado em 112 pacientes (46% mulheres, 52±21 anos). Sintomas específicos foram definidos como palpitação, pré-síncope e síncope, presentes durante a monitorização. Arritmia significativa foi definida como taquicardia paroxística supraventricular, flutter e fibrilação atrial, taquicardia ventricular, pausas superiores a 2 segundos ou bloqueio atrioventricular avançado. A associação entre presença de sintomas e arritmias significativas foi avaliada. Resultados: O monitor de eventos registrou sintomas específicos em 74 (66%) pacientes, entretanto a associação entre sintomas específicos e arritmia significativa foi observada em apenas 14 (19%) deles. Em 11 pacientes (9,8%), foi detectada arritmia significativa na ausência de sintomas. Não houve associação entre a presença de sintomas e a detecção de arritmia significativa (OR=0,57, IC95%: 0,21-1,57; p=0,23). Conclusão: Em pacientes monitorizados pelo web-loop, não houve associação entre a presença de sintomas específicos e a detecção de arritmias significativas. O monitor de eventos pode ter importância na elucidação de sintomas de palpitações e síncope dos pacientes.

Descritores: Monitorização fisiológica/instrumentação; Monitorização fisiológica/métodos; Arritmias cardíacas/diagnóstico; Síncope

INTRODUCTION

Palpitations, dizziness, pre-syncope and syncope are common complaints in physicians’ offices that might be related to cardiac arrhythmias. In some patients these symptoms can be triggered by stress and anxiety, but not associated with rhythmic disorders. The diagnosis of arrhythmias requires a comprehensive evaluation, including detailed patient history, physical examination, and diagnostic tests. The use of event recorders, such as the web-loop, has become a valuable tool in the diagnosis of arrhythmias. It allows for the continuous monitoring of patients, capturing episodes of palpitations, syncope, and other cardiac events. The data collected by these devices can be crucial in identifying the underlying arrhythmias and guiding appropriate treatment strategies. This study aimed to correlate arrhythmic symptoms with the presence of significant arrhythmias through the external event monitoring system (web-loop). The results indicate that while palpitations and syncope were common complaints, there was no strong association between these symptoms and significant cardiac arrhythmias. The web-loop was found to be useful in elucidating cases of palpitations and syncope, providing valuable insights for diagnosis and management of cardiac arrhythmias.
and adequate treatment depend on electrocardiographic record during symptoms occurrence. However, this record is not always easy and in case of sporadic symptoms, the continuous electrocardiogram (ECG) record for 24 hours (Holter) might not be efficient.\(^{(1)}\)

External event monitor is a device that records ECG intermittently when activated. It increases the accuracy of diagnosis when symptoms occur less frequently, i.e., weekly, monthly or yearly.\(^{(2)}\)

The correlation of arrhythmic symptoms and electrocardiographic record of significant arrhythmias using external events monitoring, which is known as web-loop, is still not determined in our population.

**OBJECTIVE**

To assess the association between specific symptoms (palpitations, pre-syncope and syncope) and identification of clinically significant arrhythmias through the web-loop, which is a specific type of external event monitor.

**METHODS**

Between January and December 2011 we revised exams of 112 patients who received an external event monitor at an arrhythmia center in Morumbi and Ibirapuera unit of the Hospital Israelita Albert Einstein. This study was approved by the ethical and Research Committee (CAAE: 14097413.3.0000.0071) and the consent form was waived because it was a retrospective study.

External event monitor used was the Web Loop CW-10 (CardioWEB, São Paulo, Brazil). The device was connected to patient’s chest using two cables to collect the electrocardiographic sign. Patients were advised to keep the device as much as possible, removing it only to shower.

Web-loop system collected and transmitted automatically the electrocardiographic sign for 15 seconds every each 60 minutes. When the patient had symptoms such as palpitations, pre-syncope and syncope he/she would press the record button located at the bottom of the device. Another electrocardiographic record was also transmitted but lasting for 45 seconds, and 15 of them were recorded immediate before the system activation. Tracings were transmitted automatically using a GSM system (mobile signal) and a provider made available parts of the ECG collected through an internet homepage (https://looper.ecgweb.com.br).

Tracings transmitted were checked daily by the nursing team whose always called the patient when an event was recorded voluntarily, and symptoms reported by the patient were documented. Medical team assessed tracings transmitted periodically and documented the electrocardiographic diagnosis. Standard duration of monitoring was 10 days, but when necessary it was stopped prematurely, and in case of significant arrhythmia record or if requested by the physician the monitoring was prolonged.

Specific symptoms were defined as palpitations, pre-syncope or syncope presented during monitoring. Significant arrhythmias were defined as paroxysmal supraventricular tachycardia, atrial flutter, atrial fibrillation, ventricular tachycardia, both supported (more than 30 seconds of length) and non-supported, besides pauses greater than 2 seconds or second and third degree atrioventricular block. Symptomatic arrhythmias were defined as any arrhythmia along with symptoms (significant, but also supraventricular and ventricular extrasystoles, isolated or matched).

Continuous variables were described in means ± standard deviations, and categorical variables were described in absolute and relative frequencies. The \(\chi^2\) test was used to assess association between presence of symptoms and significant arrhythmias. \(P<0.05\) was considered as statistically significant.

**RESULTS**

Of 112 patients who were assessed, 46% (n=51) were women. Patients’ mean age was 52±21 years with absolute values ranging between 13 days of life and 90 years (Table 1).

| Clinical characteristics | Results |
|--------------------------|---------|
| Age, years               | 52±21   |
| Women, n (%)             | 51 (46) |
| Systemic arterial hypertension, n (%) | 33 (29.5) |
| Diabetes mellitus, n (%) | 7 (6.2) |
| Previous myocardial infarction, n (%) | 0 |
| Previous stroke, n (%)   | 3 (2.7) |

The event monitor was activated to record 118 events (each patient had more than one symptomatic event). In these 118 events, more frequent symptoms were palpitations (49.1%), followed by dizziness, pre-syncope and syncope (24.6%). Non-arrhythmic symptoms such as chest pain and dyspnea were seen in 26.3% of cases.

Among rhythm alterations detected, arrhythmias found were ventricular extrasystoles (n=46; 63.9%), atrial flutter and atrial fibrillation (n=13; 18.1%), pauses and second and third degree atrioventricular blocks (n=9; 12.5%) and supraventricular paroxysmal tachycardia (n=4; 5.5%), as shown in figure 1.
The use of external event monitoring (web-loop) in the elucidation of symptoms associated with arrhythmias

Palpitation was the most frequent symptom along with supraventricular and ventricular ectopics (n=27; 47%). The most detected significant arrhythmias during complaints of “palpitations” were atrial flutter and atrial fibrillation (n=6; 10.3%), as shown in figure 2. Symptoms as syncope, pre-syncope and dizziness occurred both during ventricular and supraventricular extrasystoles records (n=7; 24.1%), as well as in sinus tachycardia (n=5; 17.2%). Significant arrhythmias was most commonly detected in patients with symptoms of syncope, pre-syncope and dizziness as well as atrial flutter and atrial fibrillation (n=3; 10.3%), as shown in figure 3.

In 11 patients (9.8%) when there was no symptoms, the significant arrhythmia was detected – atrial flutter and atrial fibrillation (n=5), pauses (n=4) and supraventricular paroxysmal tachycardia (n=2).

Specific symptoms (palpitations, pre-syncope and syncope) were seen in 74 (66%) of monitored patients. However, the association between specific symptoms and significant arrhythmia was observed in only 14 patients (19%) (Table 2). There was no association between presence of symptoms and detection of significant arrhythmia (OR=0.57, confidence interval of 95% - CI 95%: 0.21-1.57; p=0.23).

Palpitations are responsible for 16% of complaints in physicians’ offices.(3) The cardiac etiology is responsible for 43% of complaints, whereas psychiatric causes is responsible for 31% of cases.(4) The correlation between symptom and tracing is essential to understand etiology of symptoms, so that long-term electrocardiographic monitoring appears as a diagnostic option.

Among clinical disease that lead patients to seek immediate health care, syncope is responsible to about 3% of admission at emergency service and about 1% of hospital admissions.(5) Because mortality rate of syncope can reach up to 33% within one year in patients with structural heart disease, (6) the adequate diagnostic clarification is fundamental and for this reason, exams such as ECG, echocardiography, effort test and 24-hour electrocardiography record (Holter) are recommended as the first steps.(2)

However, palpitations, syncope and pre-syncope of sporadic occurrence can be difficult to diagnose and also can lead to the need of using prolonged electrocardiography monitoring so that increasing the diagnosis sensibility and specificity. For this reason, loop memory internal and external event monitors (loop recorders) had gained relevance.(7) Implantable monitors have a memory that can store electrocardiographic
tracing of up to 40 minutes before activations and 2 minutes after it. These monitors can be easily implanted in the under patients’ skin and its battery last for 15 to 18 months. Therefore, implantable monitor is the most precisely way to investigate patients with infrequent symptoms (intervals between events greater than 1 month), and also because it presents more accuracy in the diagnosis for its monitoring for longer time periods. However, implantable devices have a higher cost and need a surgical procedure for implantation. In addition, post-operatory period can cause pain, risk of infection, and negative aesthetic issues in the implanted site.

External monitor, however, has disadvantages such as the need of electrodes attached to the skin that might cause irritation and need of discontinuity monitoring. Unfortunately, these monitors still not able to detect events automatically and they need to be activated by the patient or his/her caregiver when symptoms occur. This type of monitor constitutes a non-invasive method, less expensive and can be a cost-effective option mainly in those patients with low frequency of symptoms (weekly or monthly intervals between episodes).

In our study population we observed in 66% of patients with external event monitor, web-loop type monitor, the device was able to clarify arrhythmic symptoms, which is a result similar to data found in the literature using other types of event monitors. For palpitations the accuracy of diagnosis ranged between 66% and 75%, which is higher than the efficacy of the 24-hours Holter. And, to clarify symptoms of syncope and pre-syncope, the accuracy of external event monitor is low—about 25%. However, implantable event monitor is able to clarify between 35% and 88% of inexplicable syncope. Data found in our study reinforce that web-loop type monitor is useful to clarify symptoms of palpitations, but to clarify medical pictures of syncope, especially, in case of no change in heart rhythm. External event monitoring constitutes a useful clinical tool to exclude the possible cause of arrhythmia as an etiology of symptoms, so that supporting the patient's clinical management. External event monitor is useful to record ECG during arrhythmic symptoms and, although there is no high detection of atrial, ventricular tachyarrhythmias or atrioventricular blocks, the fact of recording the absence of arrhythmia is relevant and helps to guide the patient concerning the benign of his/her symptoms, and in this way to avoid the use of antiarrhythmic drugs or the need of invasive procedures to elucidate diagnostic symptoms.

This study is limited by the use of a retrospective designed based on collection of information which were recorded during exams (electrocardiographic tracing obtained and simplified questionnaires completed by patients just before monitoring begins). For this reason, relevant clinical information, e.g., presence of structural hearth disease, use of antiarrhythmic drugs and history of psychiatric disease were not adequate documented. Therefore, to conduct a multivariate analysis adjusted to results was not possible. These information should be included in a future prospective study.

CONCLUSION
The use of external event monitor, web-loop type monitor, did not show association between presence of specific symptoms and detection of significant arrhythmias in the studied population. This method of diagnosis seems to be importance to elucidate symptoms, especially, in case of no change in heart rhythm. External event monitoring constitutes useful clinical tool to exclude possible arrhythmia as etiology.

REFERENCES
1. Rockx MA, Hoch JS, Klein GJ, Yeo R, Skanes AC, Gula LJ, et al. Is ambulatory monitoring for "community-acquired" syncope economically attractive? A cost-effectiveness analysis of a randomized trial of external loop recorders versus Holter monitoring. Am Heart J. 2005;150(5):1065.
2. Scanavacca MI, de Brito FS, Maia I, Hachul D, Gizzi J, Lorga A, Rassi A Jr, Filho MM, Mateos JC, D’Avila A, Sosa E; Sociedade Brasileira de Cardiologia. [Guidelines for the evaluation and treatment of patients with cardiac arrhythmias]. Arq Bras Cardiol. 2002;79 Suppl S:1-50.
3. Barsky AJ, Ahern DK, Bailey ED, Delamater BA. Predictors of persistent palpitations and continued medical utilization. J Fam Pract. 1996;42(5):465-72.
4. Weber BE, Kapoor WN. Evaluation and outcomes of patients with palpitations. Am J Med. 1996;100(2):138-48.
5. Heaven DJ, Sutton R. Syncope. Crit Care Med. 2000;28(10 Suppl):N116-20.
6. Kapoor WN, Karpf M, Wieand S, Peterson JR, Levey GS. A prospective evaluation and follow-up of patients with syncope. N Engl J Med. 1983;309(4):197-204.
7. Task Force for the Diagnosis and Management of Syncope; European Society of Cardiology (ESC); European Heart Rhythm Association (EHRA); Heart Failure Association (HFA); Heart Rhythm Society (HRS); Moya A, Sutton R, Ammirati F, Blanc JJ, Brignole M, Dahm JB, Deharo JC, Gajek J, Gjesdal K, Krahn A, Massin M, Pepi M, Pezawas T, Ruiz Granell R, Sarasin F, Ungar A, van Dijk JG, Walma EP, Wieling W. Guidelines for the diagnosis and management of syncope (version 2009). Eur Heart J. 2009;30(21):2631-71.
8. Cock CC. The implantable loop recorder: a tool that is “here to stay”. Indian Pacing Electrophysiol J. 2002;2(1):15-9.
9. Zimetbaum PJ, Kim KY, Josephson ME, Goldberger AL, Cohen DJ. Diagnostic yield and optimal duration of continuous-loop event monitoring for the diagnosis of palpitations. A cost-effectiveness analysis. Ann Intern Med. 1998;128(11):890-5.
10. Summerton N, Mann S, Rigby A, Petkar S, Dhawan J. New-onset palpitations in general practice: assessing the discriminant value of items within the clinical history. Family Pract. 2001;18(4):383-92.
11. Brignole M, Vardas P, Hoffman E, Huikuri H, Moya A, Ricci R, et al. Indications for the use of diagnostic implantable and external ECG loop recorders. Europace. 2009;11(5):671-87. Erratum: Europace. 2009;11(6):836.
12. Healey JS, Connolly SJ, Gold MR, Israel CW, Van Gelder IC, Capucci A, Lau CP, Fain E, Yang S, Bailleul C, Morillo CA, Carlson M, Themeles E, Kaufman ES, Hohnloser SH; ASSERT Investigators. Subclinical atrial fibrillation and the risk of stroke. New Engl J Med. 2012;366(2):120-9.