

The Value of Holter Monitoring in the Assessment of Non-Specific Symptoms

Shokry Faaz Nassir

Babylon University/ College of Madsen

Shokry.faaz@yahoo.com

Abstract

Background: To assess the importance of Holter monitoring in evaluation of non-specific symptoms (like presyncope, dizziness, palpitations, syncope, etc.).

Patients and Methods: This is an observational , prospective descriptive study which was conducted at Shaheed Al-Mihrab cardiac centre at Babylon City - Iraq in which 100 patients referred from the consultation department for the assessment of non-specific complaints were included in this study . Holter monitoring was done for all patients after initial evaluation. Holter monitoring was accomplished using GE Holter system with two channels and five leads, attached to the anterior chest wall. The recorder was attached to a strap, which was attached to the patient shoulder. The recording was started in the morning at hospital working hours and the patient was allowed to go home and to resume his normal activities. He was advised to maintain his activity and asked to return back at the same time next day.

Results: 87% of patients have less than 10% premature ventricular ectopics as an isolated event while 90% of the patients have Supraventricular arrhythmias less than 10% as isolated events. The mean minimum heart rate was 47 , mean maximum heart rate was 117 and mean average heart rate was 65 . 18 % of patients have ST segment Shift in which 4% were ST-segment elevation and 14% were ST segment depressions.

Conclusion: Holter monitoring was found to have no important role for the early diagnosis of arrhythmias or ischaemia as a cause of complaint in patients with non-specific symptoms

Key Words: Ischaemia, Palpitations, Holter monitoring

الخلاصة:

الخلفية: لتقييم أهمية مراقبة هولتر في تقييم الأعراض غير المحددة (مثل أختلال الوعي، الدوار، والخفقان، والأغماء، وما إلى ذلك). **المرضى والطرق:** هذه هي دراسة رصدية وصفية أجريت في مركز شهيد المحراب لأمراض القلب في مدينة بابل - العراق حيث تم إحالة 100 مريض من قسم الاستشارات تم تضمين تقييم للأعراض غير المحددة في هذه الدراسة. وقد تم رصد هولتر لجميع المرضى بعد التقييم المبدئي. وقد تم إنجاز مراقبة هولتر باستخدام نظام هولتر من شركة GE مع قناتين وخمسة مجسات ، تعلق على جدار الصدر الأمامي. تم إرفاق المسجل إلى حزام، والتي تعلق على الكتف المريض. يبدأ التسجيل في الصباح في ساعات عمل المستشفى وتم السماح للمريض بالعودة إلى المنزل واستئنافه الأنشطة العادية. ينصح المريض بأن يحافظ على نشاطه ويطلب منه العودة في نفس الوقت في اليوم التالي.

النتائج: 87% من المرضى لديهم أقل من 10% من ضربات البطين سابق لأوانه كحدث معزول في حين أن 90% من المرضى يكون عدم انتظام ضربات القلب فوق البطيني أقل من 10% كأحداث معزولة. كان متوسط معدل ضربات القلب الأدنى 47، وكان متوسط معدل ضربات القلب القصوى 117 ومتوسط معدل ضربات القلب كان 65. وجد أن 18% من المرضى لديهم تغييرات في تخطيط القلب (ST segment shift) حيث وجد أن 4% كانت ارتفاع ST segment و 14% كانت انخفاضات ST segment. **الاستنتاج:** وجد أن رصد هولتر ليس لها دور هام للتشخيص المبكر لعدم انتظام ضربات القلب أو نقص التروية كسبب لمطابقة أعراض المرضى الذين يعانون من أعراض غير محددة.

الكلمات المفتاحية: نقص التروية، والخفقان، ورصد هولتر.

Introduction

Ambulatory Holter monitoring is commonly used to assess patients with different complaints, including dizziness, lightheadedness, palpitations, syncope and chest discomfort (Crawford *et al.*, 1999). Holter monitoring is a valuable non-invasive tool for the detection and quantification of cardiac arrhythmias and to assess the correlation of these arrhythmias to patients symptoms (Miller and Zipes, 2004). Its use has been expanded recently to be used in the diagnosis of arrhythmias, assessment of

antiarrhythmic drugs therapy, diagnosis of pacemaker malfunction, prognosis of arrhythmias and heart rate variability. It is also used for the diagnosis of silent ischaemia and for the assessment of non-specific symptoms such as blackout, palpitation, lightheadedness and fall attacks (Ruby *et al.*, 1993).

Typical symptoms may occur with simultaneous documentation of a cardiac arrhythmia capable of producing such symptoms; this finding is most useful and may help to direct therapy.

Holter monitor may show no documented arrhythmias despite the presence of symptoms. This means that symptoms are not due to arrhythmias. The symptoms might be absent despite the presence of arrhythmias on Holter monitoring and this has equivocal value. The patient may have symptoms despite the absence of arrhythmias and this finding is not important (Huikuri *et al.*, 2003).

Patients and Methods

This is a cross sectional prospective descriptive study conducted at Shaheed Al-Mihrab Cardiac center at Babylon city in which one hundred patients were collected. Exclusion criteria include any definitive evidence of ischaemia or arrhythmias on resting electrocardiography. General investigation including complete blood count, renal function tests, thyroid function tests, lipid profile chest X-ray, transthoracic echocardiography and treadmill test were done for all patients. Abnormal findings on Holter monitoring include infrequent ventricular premature beats, atrial premature beats and junctional escape beats which were included in the study but not considered as definitive evidence of arrhythmias.

For Holter monitoring MARS™ Holter analysis workstation software version 7 from GE Healthcare was used for 24 hours recording and analysis of data. Two channels, via five leads placed over the anterior chest wall of the patients were recorded. The disc was attached to a strap, which the patient wore on his shoulder. The minimum, maximal and average heart rate with sinus pauses were recorded on Holter monitoring and evidence of cardiac arrhythmias include supraventricular arrhythmias including atrial premature beats and nodal escape beats (isolated, pairs, and runs) and ventricular ectopic beats (isolated, pairs, bigeminy, trigeminy and runs). Insignificant arrhythmias include isolated ventricular premature beats less than 10% and supraventricular arrhythmias less than 10%. ST segment depression or elevation of 1mm was considered as ischaemia on Holter monitoring.

Results

During the study period one hundred patients were enrolled including 38% male and 62% female and the mean age was 38 (16-76). History of palpitation was present in 62% of patients, chest pain was present in 15%, while dizziness was present in 12% of patients and 11% of the patients had other non-specific symptoms. 33% of the patients had a history of coronary artery disease. 23% had a history of hypertension while 27% had history of Diabetes mellitus. Smoking was found in 24% while 14% was found to have elevated lipid profile. 73% of the patients had normal resting ECG while 27% had abnormal resting ECG with non-specific Q-wave and ST-T changes were the most common abnormality. Most of the patients (98%) had a normal chest X-ray. 85% of the patients were found to have a normal transthoracic echocardiography, while 96% were found to have a normal treadmill test.

The results of Holter monitoring showed that supraventricular arrhythmias > 10% was absent in 97% and presented as isolated event in 2% and as supraventricular runs in 1%. While supraventricular arrhythmias < 10% was found as an isolated event

in 91% and as runs in 2% and it was absent in 7 % (table-1). While the Holter results showed that ventricular ectopics > 10% were found as an isolated event in 4% and it was absent in 91% and it was found in form of bigeminy in 3% and in form of couplet in 2%. While ventricular ectopics < 10% was absent in 18% and it was found as an isolated event in 80% and in form of bigeminy in 1% and in form of couplets in 1% (table-2).

The Mean average heart rate 63 bpm, mean maximum heart rate was 111 bpm and the Mean minimum heart rate was 47bpm . Sinus pauses were found in 2% . ST-segment displacement was found in 17 % of the patients of which 15% were ST-segment depression and 2% were ST- segment elevation (Table -3).

Table-1 Supraventricular arrhythmias

| | Isolated | Runs | Absent |
|--------|-----------------|-------------|---------------|
| >10% | 2 % | 1% | 97 % |
| < 10 % | 91% | 2 % | 7 % |

Table-2 Ventricular Arrhythmias

| | Isolated | Bigeminy | Couplet | Absent |
|--------|-----------------|-----------------|----------------|---------------|
| >10 % | 4 % | 3 % | 2 % | 91 % |
| < 10 % | 80 % | 1 % | 1 % | 18 % |

Table-3 Coronary artery disease

| | ST-segment displacement | No ST-segment displacement |
|------------------------------|--------------------------------|-----------------------------------|
| History of CAD absent (67%) | 13 % | 87 % |
| History of CAD present (33%) | 57.5 % | 42.5 % |

Discussion

To the best of our knowledge this is the first study in our country to characterize patients with non-specific symptoms according to Holter monitoring findings. It was designed to evaluate the importance of Holter monitoring in the assessment of nonspecific symptoms.

The current study showed that the chance of diagnosing myocardial ischemia was very low with Holter monitoring in patients with nonspecific symptoms. It has been found that out of 14 patients with positive history of coronary artery disease 19 patients had ST segment displacement. These finding are similar to other researches which show that silent electrocardiographic changes are the most common finding on Holter monitoring in patients with ischaemic heart disease and it has been found in 70-80 % of ischemic episodes (Langer *et al.*, 1995; Zakharava *et al.*, 1999). However in patients without a history of ischemic heart disease the probability of finding silent coronary artery disease is low. According to the guidelines of ACC/AHA, there is low evidence that Holter monitoring provides an important information concerning coronary artery disease in asymptomatic patients without known ischemic heart disease (ACC/AHA Guidelines, 1999).

On assessment the incidence of significant arrhythmias (ventricular and supraventricular arrhythmias more than 10 %) with other symptoms, it has been found that in patients with syncope, chest pain ,and dizziness, no attacks of ventricular or supraventricular arrhythmias more than 10 % were found. On the other hand patients who presents with palpitation which constitute the major part of the patients (n=62),

ventricular arrhythmias >10% was found as isolated event in 4, bigeminy in 3 and as couplet in 2, and hence 14.5% of patients with palpitation have been found to have significant ventricular arrhythmias while significant supraventricular arrhythmias was absent in the majority of the patients (97%) making a statistically significant difference with a P value of 0.009. on the other hand significant supraventricular arrhythmias (> 10 %) in patients who presents with palpitation, were found as isolated event in 2% and as run in 1% while it has been found in 7 % of patients who have no palpitation. So the incidence of significant arrhythmias in patients screened by Holter monitoring is very low and this indicates that palpitation might be from noncardiac source. It has also been found that in patients who presents with palpitation only significant ventricular arrhythmias were found in the majority of these patients indicating that ventricular arrhythmias are more readily felt by the patient, probably because of the compensatory pause that follows the ventricular ectopics. Patients with palpitation remain functionally decapacitated and symptomatic with multiple visits to the hospital and physician following Holter monitoring (Barsky *et al.*, 1995). The finding of significant arrhythmias might be improved by increasing the duration of Holter monitoring (Dagres *et al.*, 2010).

Shifting of ST segment can occur as a result of conditions other than ischaemia, these include left ventricular hypertrophy, preexcitation syndrome, hypertension, postural changes drugs including digitalis and electrolyte abnormalities. In this study it has been found that 21.3% of diabetic patients had ST segment changes indicating silent myocardial ischemia. In hypertensive patients, left ventricular hypertrophy may increase the risk of ischemia due to the increased oxygen demand and insufficient oxygen supply (Schroeder *et al.*, 1995; Boon *et al.*, 2003).

In this study, it has been found that no evidence of arrhythmias was observed in the 12 patients who have dizziness or syncope. This is consistent with the ACC/AHA guidelines which state that although the diagnostic yield of Holter in syncope and related symptoms is very low but because of the severity of these symptoms, evaluation with Holter is usually warranted (ACC/AHA Guidelines, 1999). In other study conducted on paediatric patients, an alternative diagnosis other than epilepsy was observed in 57% of epileptic children when they underwent cardiac evaluation including Holter monitoring.

The incidence of frequent ventricular ectopic beats and complex ventricular arrhythmias has been found to be low in Patients with hypertension even with left ventricular hypertrophy. Holter

monitoring may have a value in the assessment of asymptomatic older adults at risk of sudden cardiac death due to arrhythmias (Mayet *et al.*, 1995; Stein *et al.*, 2010). The mean average heart rate in this study was 63 beat per minute and it was higher in diabetic patients (78) than in non-diabetics (65) which is probably due to diabetic autonomic neuropathy which influences the effects of the autonomic nervous system on the heart. It was also found that the mean average heart rate was higher in those patients with no history of coronary artery disease (73) than those patients with history of coronary artery disease (67). It was also higher in non-smokers (69) than in smokers (58)

References

- ACC/AHA Guidelines For Ambulatory Electrocardiography. JACC, 1999; 34(3); 912-48.
- Barsky, A.J., Cleary, P.D., Coccytaux, R.R., 1995, The clinical course of palpitations in medical out patients : Arch Intern Med, 155(16) : 1782-88.

- Boon, D., Van Goudoever, J., Piek, J. J., 2003, ST segment depression criteria and the prevalence of silent cardiac ischemia in hypertensives: *Hypertension*;41(3): 476-81.
- Crawford, M. H., Bunstein, S. J., Dedwania, P. C., DiMarco, J. P., Ferrik. K. J., Garson, A., Jr, *et al.*, 1999, ACC/AHA guidelines for ambulatory electrocardiography: executive summary and recommendations. A report of American College of Cardiology/American Heart Association Task Force on practice guidelines (committee to revise the guidelines for ambulatory electrocardiography). *Circulation*; **100**:886-93.
- Dagres, N., Kottkamp, H., Piorkowski, C., 2010, Influence of the duration of Holter monitoring on the detection of arrhythmia recurrences after catheter ablation of atrial fibrillation. *Int J Cardiol*;39(3):305-06.
- Huikuri, H. V., Makikallio, T. H., Raatikainen, M., J., Perkiomaki, J., Castellanos, A., Myerburg, R. J., 2003, Prediction of sudden cardiac death: appraisal of the studies and methods assessing the risk of sudden arrhythmic death. *Circulation*; **108**:110-5.
- Langer, A., Singh, N., Freeman, M. R., 1995, Detection of silent ischemia adds to the prognostic value of coronary anatomy and left ventricular function in predicting outcome in unstable angina patients: *Can J Cardiol*; 11(2); 117-22.
- Mayet, J., Shahi, M., Paulter, N. R., 1995, Ventricular arrhythmias in hypertension: in which patients do they occur : *J-Hypertens*; 13(2) : 269-76.
- Miller, J.M., Zipes, D.P., 2004, Diagnosis of cardiac arrhythmia. In: Braunwald E, Zipes DP, Libby P, Bonow R, editors. Braunwald's heart disease: a textbook of cardiovascular medicine. 7th ed. Philadelphia: *Elsevier Sanders*; p. 697- 712.
- Ruby, K. E, Barry, J., Treasure, C., B., 1993, Usefulness of Holter monitoring for detecting myocardial ischemia in patients with nondiagnostic exercise treadmill test: *Am J Cardiol*; 72(12): 889 93.
- Schroeder, A. P., Brysting, B., Soagard, P., 1995, Silent myocardial ischemia in untreated essential hypertensive: *Blood-* 4(2); 97-104.
- Stein, P. K., Sanghavi, D., Sotoodehnia N., 2010, Association of Holter-based measures including T wave alternans with risk of sudden cardiac death.: the Cardiovascular Health Study;43(3):251-59.
- Zakharava, S. A, Naucheva, N. N., 2009, Gurevich MA.Holter monitoring for short term prognostification in patients with myocardial infarction: *Klin Med*: 87(12):28-32.