Hospital Practice

Transtelephonic electrocardiographic monitoring for detection and treatment of cardiac arrhythmia

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Summary: Published data on the use of transtelephonic electrocardiographic monitoring for evaluation of episodic symptoms suggestive of cardiac arrhythmia are sparse and conflicting. We have reviewed the use of one such device 'Cardiomemo' on our unit over an 18 month period. The study showed that transtelephonic electrocardiographic monitoring is useful in documentation of infrequent or sporadic episodes directly related to symptoms when 24-hour ambulatory electrocardiograph monitoring is normal.

Introduction

Transtelephonic electrocardiographic (ECG) monitoring systems have been used in the diagnosis and management of patients suspected of having cardiac arrhythmia for the last few years,¹ but there are few reports about their use. Looerwijk *et al.*² reviewed 100 patients with sporadically occurring symptoms suggesting cardiac arrhythmia and evaluated with the aid of 'Cardiomemo' a transtelephonic ECG device. In 83 patients 124 episodes with symptoms were documented and a correlation with electrocardiograph findings could be established. Forty of these patients (48%) had a cardiac arrhythmia and 43 (52%) had a normal heart rhythm. They concluded that for assessment of sporadically occurring symptoms 'Cardiomemo' is a valuable supplement to the 24-hour ambulatory electrocardiograph monitoring.

By contrast Thomas *et al.*³ compared the findings of 24-hour ambulatory electrocardiography and monitoring with 'Cardiomemo' during symptoms in 20 patients with symptoms suggestive of arrhythmia. Twenty four-hour ambulatory electrocardiography showed arrhythmia in 7 patients, extrasystoles in 6 and normal findings in 7. Nine patients failed to transmit any recordings. The 'Cardiomemo' did not show any appreciable arrhythmia in 7 patients with normal 24-hour electrocardiograms. They concluded that transtelephonic ECG monitoring does not offer any important advantage over 24-hour ambulatory electrocardiography, and its relative cheapness is outweighed by the limited number of patients who can use the device in one year.

The aim of our study was to assess the clinical usefulness of transtelephonic ECG monitoring for the evaluation of infrequent complaints, potentially caused by cardiac arrhythmia.

Patients and methods

We reviewed the use of 'Cardiomemo' on our unit between January 1987 to June 1988. Eighty-two patients used the device (31 males and 51 females aged between 17 and 76). Their resting electrocardiogram did not show any arrhythmia. Seventy-three patients complained of palpitations, 6 patients of dizziness and 3 patients of chest pain with palpitation. Of the 82 patients monitored, 80 had a normal 24-hour ambulatory electrocardiogram recording. 'Cardiomemo' was used alone in monitoring the other two patients. The patients were instructed how to use the 'Cardiomemo' on receiving it and a test rhythm strip was recorded. The device was left with the patient for a month with few exceptions when the period was extended as indicated.

The 'Cardiomemo' (Figure 1) (Instromedix, Hillsboro, OR, USA) is a small pocket size device (6" × 3" × 1") which can be carried by the patient for prolonged periods of time. Whenever symptoms occur the patient places it on the chest wall. After pressing the button it will record and store the electrocardiogram realtime in a digital memory of 32 seconds. This stored electrocardiogram can later, by means of a frequency modulated audio-signal be transmitted to the Coronary Care Unit via a telephone and decoded by a cardiotele receiver (Instromedix). The patients were requested to use the 'Cardiomemo' whenever symptoms developed.

Figure 1 'Cardiomemo'.

After the electrocardiogram was documented during a symptomatic episode, the patient was contacted and advised.

Results

Of the 82 patients 54 successfully transmitted a symptomatic episode and 27 made no transmission. Those who transmitted sent one to 22 recordings. Thirty-five of these patients had a normal heart rhythm and 19 had a cardiac arrhythmia. In 11 patients the diagnosis of cardiac arrhythmia was established by transtelephonic ECG monitoring and the appropriate treatment was commenced (Table I). Ten of these 11 patients had normal 24-hour ambulatory electrocardiograms and one had not had a 24-hour ambulatory electrocardiogram. Supraventricular tachycardia was the most frequent arrhythmia (Figure 2) while

atrial fibrillation and ventricular extrasystoles occurred less frequently.

Discussion

Our findings show that transtelephonic ECG monitoring is useful in documentation of infrequent or sporadic episodes related to symptoms. The information gained was useful in various aspects. In some patients the clinical history was suggestive of tachycardia but 'Cardiomemo' documented significant tachyarrhythmia which required treatment and was useful if choosing the appropriate anti-arrhythmic drug. The clinical history in patients nos. 4, 5 and 11 was not clear and 'Cardiomemo' documented significant arrhythmia. In patient no. 6 presenting with dizziness, symptomatic tachycardia was documented. There was no evidence of bradycardia during a 2-month period of monitoring and anti-arrhythmic therapy controlled his symptoms.

The device is useful in confirming the absence of arrhythmia during symptoms and this is helpful in reassuring anxious patients. Transtelephonic ECG monitoring is useful in assessing the anti-arrhythmic drug efficacy⁴ and can be used for testing pacemaker devices.⁵ It can provide important diagnostic information in patients with suspected coronary artery spasm particularly in cases with infrequent or unpredicted anginal pain.⁶ This issue was not addressed in our study.

The transtelephonic ECG monitoring system has several advantages, the most important being the unlimited period of surveillance as the patient can carry the device with them as long as necessary, which is useful for sporadic complaints. The device is small, light and pocket size. It is easy to use by the

Table I Eleven patients with the diagnosis of arrhythmia established by transtelephonic ECG monitoring ('Cardiomemo')

Case no.	Symptoms	Frequency	24 hour tape results	'Cardiomemo' result
1. 21 F	Palpitation	++	Normal	SVT
2. 59 F	Palpitation	++	Normal	SVT
3. 35 M	Palpitation and chest pain	++	Normal	SVT
4. 46 F	Palpitation	+	Normal twice	SVT (Figure 2)
5. 62 M	Palpitation	+	Not done	Ventricular bigemini
6. 72 F	Dizziness, fainting	+	Normal three times	SVT
7. 62 M	Palpitation	++	Normal	SVT
8. 38 F	Palpitation and fainting	++	Normal	SVT
9. 63 M	Palpitation	+	Normal	AF
10. 52 M	Palpitation	++	Normal	AF
11. 27 F	Palpitation	++	Normal	SVT

+ More than once a month; ++ more than once a week; +++ daily. SVT = Supraventricular tachycardia; AF = atrial fibrillation.

Figure 2 Transtelephonic electrocardiographic recording of a 46 year old woman. The test electrocardiogram showed sinus rhythm. During complaints of palpitation, supraventricular tachycardia was recorded.

patient and no adhesive electrodes are needed. In addition the system is relatively inexpensive requiring only a transmission unit (around £800) and a receiving station (around £1500). However, the devices are not without disadvantages as the onset and most often the end of arrhythmia will not be recorded. The patient must also be able to handle the system. Short lasting but symptomatic arrhythmia may be missed and a time delay between the onset of the arrhythmia and the occurrence of symptoms may lead to a false negative diagnosis.

The use of 'Cardiomemo' by the patients was very successful. We believe that this reflects the organization of the service based upon the coronary care

unit. Trained staff provided the initial patient instruction and were then available on a 24 hour basis to accept and advise on records received. Transtelephonic ECG monitoring can be very useful in the diagnosis of cardiac arrhythmias in rural areas where many patients are remote from the district general hospital and immediate access to hospital is not possible in many cases.

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References

1. Judson, P., Holmes, D.R. & Baker, W.P. Evaluation of outpatient arrhythmia utilizing transtelephonic monitoring. *Am Heart J* 1979, **97**: 759–761.
2. Looorwijk, P., Leenders, C.M. & Roelandt, J. Usefulness of transtelephonic documentation of the electrocardiogram during sporadic symptoms suggestive of cardiac arrhythmias. *Int J Cardiol* 1986, **13**: 155–161.
3. Thomas, L.E., Shapiro, L.M., Perrins, E.J. & Fox, K.M. Detection of arrhythmia: limited usefulness of patient activated recording devices. *Br Med J* 1984, **289**: 1106–1107.
4. Hasin, Y., David, D. & Rogel, S. Transtelephonic adjustment of anti-arrhythmic therapy in ambulatory patients. *Cardiology* 1978, **63**: 243–251.
5. Lyons, C., Schroeder, P., Shankar, K. & Brodine, W. Transtelephonic monitoring of a tachycardia terminating pacemaker. *Pace* 1984, **7**: 34–36.
6. Ginsburg, R., Lamb, I.H., Schoeder, J.S. & Harrison, D.C. Long term transtelephone electrocardiographic monitoring in the detection and evaluation of variant angina. *Am Heart J* 1981, **102**: 196–201.