Telecardiology for atrial fibrillation. Overview of the international literature and implementation of telemedicine technologies for AF Chinese patients

Changsheng Ma MD.
Department of Cardiology, Beijing AnZhen Hospital, Capital Medical University, Beijing, China. Tel: 86-10-83020442,86-10-64456412, FAX 86-10-64456078
E-mail: chshma@vip.sina.com
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History and clinical application of Telecardiology

The concept of telemedicine was introduced more than 30 years ago. However, the enabling technology has grown considerably in the past decade. Although, telemedicine could potentially affect all medical specialties, the greatest current applications are found in radiology, pathology, cardiology and medical education. The term telecardiology, in short refers to the utilization of telecommunication technology for cardiac disease diagnosis, treatment and patient care[1]. The common telecardiologic devices include ambulatory Holter monitor, event-triggered monitor, ECG telemeter monitor and loop event recorder, etc[2]. Recently, continuous mobile cardiac outpatient telemetry has become availableas an alternative to conventional ambulatory monitoring[3]. It is a promising telecardiologic device which featured as continuous, real-time outpatient electrocardiographic monitoring for extended time periods and autodetect asymptomatic arrhythmias.

Telecardiology enables a cardiologist at one site to diagnose patients, deliver health care, provide therapy, or consult with another physician or paramedical personnel at a remote site. Perhaps the greatest impact of telemedicine may be in fulfilling its promise to improve the quality, increase the efficiency, and expand the access of the healthcare delivery system to the rural population and developing countries[4, 5]. Now wireless cellular systems will offer video telephony that can facilitate the transfer of real-time images, such as ECG strips or echocardiograms, to help with communications between a patient or a caregiver and a health-care professional. It is superior for detecting and definition some suspected cardiac ischemia events or transient arrhythmic episodes, i.e. tachycardia, fibrillation or

flutter, which are difficult to find out with routine ECG or ambulatory 24-hour monitoring.

Many studies with telecardiology have been employed on coronary heart disease, heart failure and syncope with unknown cause[6-10]. The priority of it has been documented in contrast to common follow-up methodology, such as ECG and ambulatory 24-hour ECG monitoring. Furthermore, telecardiology is eligible for some special cohort, such as elderly and pediatric patients who will inconvenient or reluctant to visit physician[11, 12]. But more promise aspect lies in diagnosis arrhythmia specialty, for instance atrial fibrillation and syncope without cause.

Telecardiology in AF

For many patients with AF, the concise type of AF episode is vaguer or confused only based the symptomatic description. By application of telecardiologic device, the frequency and duration of AF episode will be defined and the diagnosis is also determined. Some researches have identified asymptomatic AF episode with Holter or other automatic cardiac event recorders.

With the advance of radiofrequency ablation of AF, there is a key issue that how to evaluate the actual efficacy of intervention therapy. The routine monitoring periablation can mainly detect possible arrhythmia according to palpitation symptoms of patients. As the existence of asymptomatic recurrence, the current follow-up methodology will overestimate the success rate of ablation. Event-trigger monitor or implanted loop recorder can automatically detect any arrhythmic episode and estimate the real effect of ablation.

Application a self-monitoring event-recorder system, some authors[13, 14] revealed that the frequency of asymptomatic AF was much higher than results detected by routine device, i.e. Patten et al[15] proved that symptoms in patients with AF are not directly associated with the number and duration of AF episodes. Because AF was only identified in 37% of symptom-triggered ECG recordings, whereas the majority was sinus rhythm. ECG. Using transtelephonic ECG,. In another study[16] which compared different follow-up methods of catheter ablation for AF, the author demonstrated that the success rate of AF ablation will decrease 20% (from 70% to 50%) when transtelephonic ECG was applied.

However, the observation of others show a close relationship between symptoms and AF episode documented by ECG[17, 18]. Bhandari[18] observed that in patients with symptomatic PAF, symptoms correlated with the presence of transtelephonic ECG-documented attacks of PAF. Oral[17] identified asymptomatic recurrence of AF in patients with success catheter ablation procedure was infrequent (1%) and implied that intensive monitoring is unnecessary.

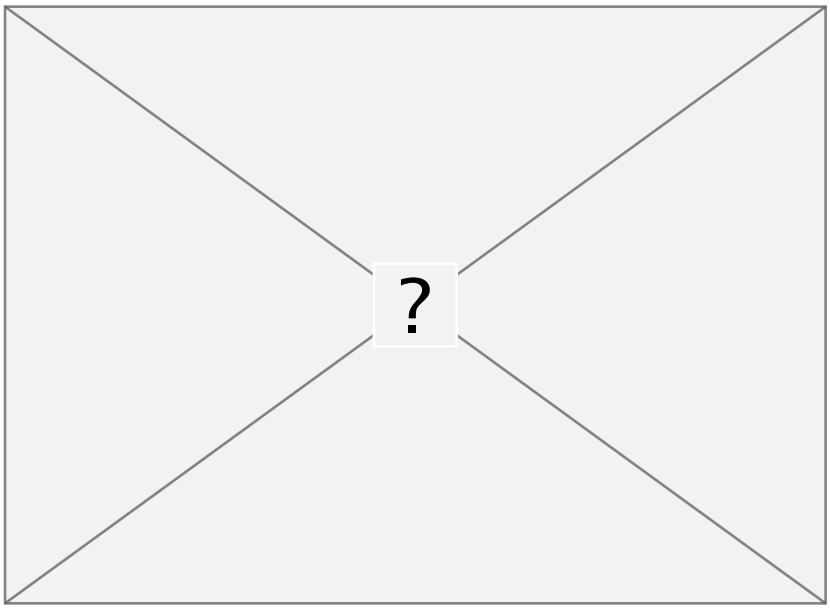

Figure 1. Estimated correlation between follow-up strategy and the rate atrial fibrillation detection after RF ablation. (modified from Arya. A et.al. Clinical implications of various follow up strategies after catheter ablation of atrial fibrillation. Pacing Clin Electrophysiol, 2007, 30: 458-62.)

Based on those different results observed with telecardiologic method, the real value of telecardiology for follow-up of AF is underdetermined. But it is clear that the more intensively a patients is monitored and the longer phase of monitoring, the more likely AF recurrence is detected, no matter symptomatic or a symptomatic[19, 20] (Figure1.). Thus, for the sake of assessment the real efficacy of ablation, the implement of telecardiology is of actual value. Whatever, intensive telecardiologic monitor for patients after AF ablation has another clinical value: (1) to detect the uncovered stroke risk of patients who presents asymptomatic AF for longer than 48 hours; and (2) to reasonably discontinue anticoagulation in patients whose heart rhythm is effectively restored to sinus rhythm based on symptoms.

Telecardiology in china

As for China, the application of telecardiology is still a young and growing

discipline. Since the extra cost and relative low diagnostic yield, telecardiology is defined in some urbanized cities featured with high income and mature welfare. Whereas for suspected arrhythmia, presyncope or syncope, Holter (24 /48 hours) has been widely implemented as a routine screening examination in most Chinese hospitals. Fu[21] et al reported trantelephone monitoring can provide detailed ECG information of cardiac ischemia event and the diagnosis of it is coincided with that from coronary artery angiogram. In another study, authors[7] evaluate the clinical efficacy of transtelephonic ECG in patients with arrhythmia or coronary artery disease and demonstrated that the detecting rate of cardiac event by transtelephonic ECG is higher than those of Holter. Transtelephonic ECG had also been proved to detect arrhythmia among outpatients after acute myocardial infarction. Hua[22] et al found the tele-ECG recorder is useful to detect transient arrhythmia than common Holter.

For the follow-up of patients with AF ablation, ambulatory 24-hour monitor is administered as a routine measure for 1, 2 and 3 months postoperation. But event-triggered monitor is only implemented in selected patients and advanced hospitals. In Anzhen AF medical center, with the longest history of AF ablation in China, a research of event-triggered transtelephonic monitor in detection of arrhythmia within patients postablation is in pilot phase.

Cheerfully, some domestic industries have developed portable telecardiologic monitoring devices[23] and are distributing them in clinical practice. Thus，more patients can be intensively monitored and investigated after AF ablation with telecardiologic monitors. Chinese telecardiologic specialty will develop dramatically and also make more contribution in the future.

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