

Cardiology For The Trainee:

(Physicians in training in cardiology can have their questions addressed to in this section-Ed.)

Simple Control Of Implanted Patients*

What periodicity? What is the material required?

Interest of the different recorded parameters?

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The consultation of a paced patient with a cardiologist is part of the control procedure undertaken in collaboration with the practitioner and the implantation centre. Besides a usual cardiology consultation, some elements relative to the status of the implanted patient need to be added.

The questionnaire will look for the reappearance of symptoms preceding implantation, which could prove pacing efficacy or a bad choice in pacing. It will lead the patient to specify the circumstances in which symptoms occurred (certain specific movements, environment) in order to give the diagnosis an orientation, and the occurrence or persistence of certain symptoms like stress dyspnoea, palpitations or thoracic pain.

The inspection will check the state of the skin close to the pace-maker and the absence of inflammation signs in the pocket. Such abnormalities, if detected early may be treated efficiently with a simple surgical intervention, whereas their spontaneous evolutions may lead to the exteriorisation of the pacemaker and the need for a re-implantation in a different site. Muscle pacing may be looked for around the can (unipolar pacing), as well as diaphragmatic pacing, which may indicate lead perforation, or phrenic nerve pacing. The venous state of the upper limb needs to be checked, as a venous thrombosis may occur at a distance from the implantation site.

The electrocardiogram allows a check of the functioning of the pacemaker. The spikes delivered

by the pacemaker will be easily visible in unipolar mode, but it will be harder or even impossible to see them on certain leads in bipolar mode. Pacing and sensing functions of a **single chamber pacemaker** will be checked: each spike delivered must entail an efficient response (P wave in case of atrial pacing, QRS complex in case of ventricular pacing); any spontaneous activity of the cardiac chamber in question (atrium or ventricle) must inhibit the pacemaker; the pacing frequency must be stable and equal to the programmed frequency, except when there is a hysteresis. (A rate smoothing function employed to avoid sudden variations in cardiac rate between the spontaneous and paced rhythms).

The role of the magnet allows a check of the function of the pacemaker in case of inhibition by a spontaneous rhythm superior to the basic frequency. It causes a switch to asynchronous pacing mode at a frequency which is usually higher than the basic frequency. On certain models, pacing parameters (amplitude, spike duration) may be modified during the magnet test. Any interpretation will have to take this into account. Certain models are equipped with tests of pacing threshold measurement, triggered by a certain time to magnet application and causing the delivery of intensity spikes progressively decreasing, of a known value, which allows measurement of pacing thresholds (e.g., VARIO). The magnet frequency is also a parameter allowing the control of battery waste. For safety reasons, magnet application should only take place under control of a continuously recorded ECG.

The ECG will check the pacing and sensing in each chamber of **dual chamber pacemakers**. It will be useful to know the duration of programmed re-

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fractory periods in order to appreciate the reality of a possible defect in atrial sensing for accelerated spontaneous sinus frequencies.

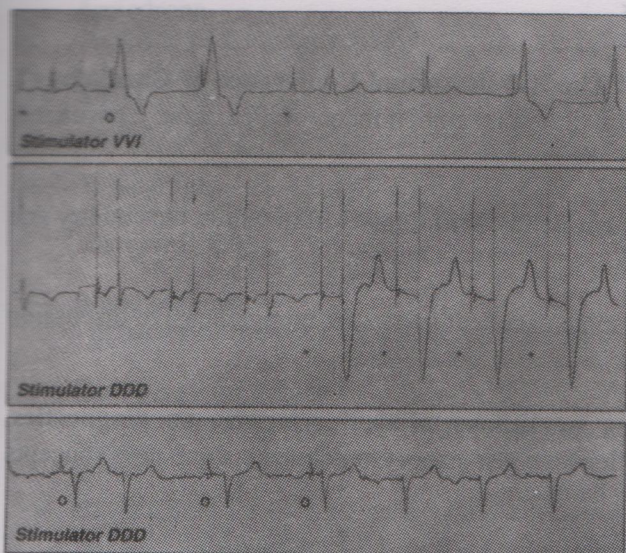


Fig. 1.
Whatever the type of pacemaker, the diagnostic reflection takes the analysis of pacing and sensing defects into account.

The AV delay should also be checked, as models and programmes vary (it may be fixed, variable according to frequency, or at different values during atrial pacing or sensing, or finally have a hysteresis). A shortened AV delay may be observed, proving the existence of what is called a 'safety window'; this mechanism causes the delivery of a ventricular spike after a shortened AV delay (of about 100 ms) in case of sensing of electrical activity by the ventricle at a specific time after P wave. This avoids inhibition of the ventricular pacing stage in case the ventricle senses the atrial spike.

With a magnet, the pacemaker switches to DOO. On most pacemakers, magnet application causes reversion to DOO mode (asynchronous) at a frequency generally faster than the basic frequency, for single chamber pacemakers. This allows assessment of the pacing function in case of spontaneous rhythm inhibiting the pacemaker. During the magnet test the value of pacing parameters may differ from the programmed values.

Whatever the type of pacemaker (Figure 1), the main functioning abnormality is the decrease in basic frequency. It may be caused by: battery exhaustion observed at the end of pacemaker life,

recycling of the pacemaker: on normal electrical events, for example recycling of a VVI pacemaker on T wave or an AAI pacemaker on R wave, or on abnormal electrical events, for example rupture current of a lead about to be fractured or already fractured, parasite current of a defective connection, on muscle artefacts in case of monopolar pacing.

An increase in basic frequency may be caused by: a pacemaker runaway (now unusual since modern pacemakers have numerous safety (devices); a particular programme: rate responsive function, rate smoothing function; an electronic re-entry tachycardia (with double chamber pacemakers) for patients having intact retrograde conduction (for example, a ventricular premature beat conducted retrograde will be sensed by the atrial stage, classed as a P wave, causing, after the AV delay, the delivery of a ventricular spike, the QRS then being transmitted retrograde perpetuating the phenomenon). Modern pacemakers have functions to detect and inhibit such phenomena.

Pacing and/or sensing defects may be due to lead dislodgement, or to a modification in heart/lead interface (the role of certain drugs in these modifications must be emphasized (Figure 1).

Dyspnoea in implanted patients may be due to the progression of a cardiomyopathy or to an arrhythmia which may have no relation to the pacemaker, or due to an inappropriate pacing mode, such as pacing at a fixed frequency for a patient suffering chronotropic insufficiency or VVI pacing for a patient having retrograde conduction with appearance of the 'pacemaker syndrome' (atrial contraction caused by a retrograde P wave occurring at the end of ventricular contraction on closed atrioventricular valves).

Holter monitoring may prove useful in cases where intermittent pacing dysfunction is suspected.

Alternatively exercise testing identifies pacing conditions modified by exercise and causing occurrence of sensing or pacing defects such as the appearance of atrial arrhythmias. Reprogramming can then be carried out immediately.

In summary, biannual cardiological consultation with the pacemaker patient, using the format of a detailed questionnaire, inspection and testing with ECG and magnet will detect most pacemaker dysfunction in the absence of a pacemaker programmer.

XIVth Annual Conference of Cardiology Pakistan Cardiac Society

Venue: Hotel Indus, Hyderabad - 19th-20th December 1996.

It is with a great sense of pleasure that we invite you to "The XIVth Annual Conference of Cardiology", from the prestigious estrade of Pakistan Cardiac Society, the sole embodiment of Pakistani Consultants practicing Cardiology & Cardiac Surgery.

The organizing committee expects a large congregation of eminent Cardiologists from within the country and abroad at Hyderabad from 19th - 20th December 1996.

These grand scientific moments are expected to produce some excellent papers, & comprehensive discussion on multidimensional topics in the field of Cardiology.

You shall witness a prolific amulgamation of papers, workshops, clinical symposia on diagnostics, interventional & clinical sciences. In fact with these interactions we also expect to delineate some new concepts & controversies in this discipline.

We shall endeavour to make your visit alongwith your spouses as the most pleasurable experience.

Hyderabad awaits your arrival..... !

Hyderabad is a beautiful mix of old and new and has a number of places to visit which include the relics of Pacca and Katcha forts and the tombs of the rulers of Sindh. It has a beautiful river side at Ghulam Mohammad Barrage and a Municipal garden, the RANI BAGH. The cultural heritage of the province could be seen at Sindh Museum in the city and Sindhology department of the University of Sindh at Jamshoro. This city is known for its cool breeze in summer evenings and has a gentle winter. The temperature during the month of December seldom falls below 15°C.

Other important places are:

1. Bhitshah 50 km.
2. Makli 100 km.
3. Sehwan Shareef 150 km.
4. MOEN-JO-DARO 250 km.

(a) About 50 km north to Hyderabad is the city of BHITSHAH which has the tomb of great poet of Sindh, Shah Abdul Latif Bhitai. Bhitshah is also known for the cottage Industry, Sindhi Handicrafts.

(b) Another historic near place is Makli which is famous for its huge graveyard.

(c) Sehwan Shareef is about 150 km away from Hyderabad, this is famous for the tomb of 'Qalandar Shahbaz'. Recently tourism has been boosted by the new Airport.

(d) Moen-Jo-Daro, the oldest civilization on earth is at the outskirts of Larkana City, which happens to be home city of our former Prime Minister.

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