

ECG Quiz

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A 74 years old gentleman with chronic obstructive pulmonary disease had a DDDR pacemaker (Marathon DR; Intermedics Inc.) implanted for

complete heart block. He complained of recent onset of irregular palpitation and he was seen in the pacemaker clinic. A rhythm strip (Figure 1) was recorded.

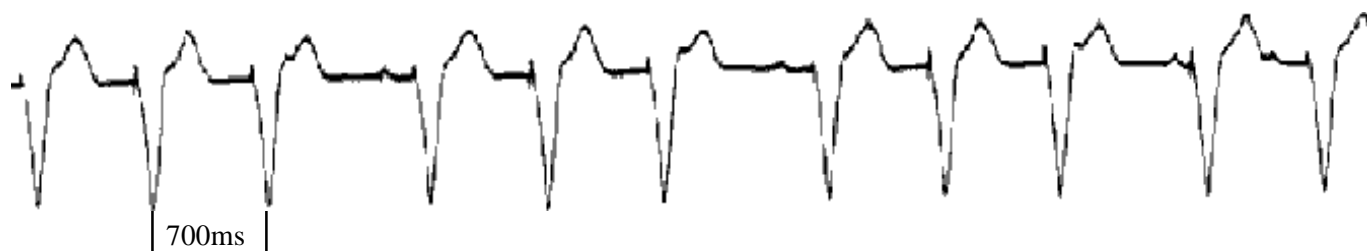


Figure 1.

Interrogation of the pacemaker showed the following setting:

Mode:	DDDR
Lower Rate:	60 bpm
Upper Rate:	120 bpm
A-V interval (pace):	200 msec
A-V interval (sense):	150 msec
Post Ventricular Atrial Refractory Period:	250 msec
Mode Switch:	On (185 bpm)
SmarTracking:	On

What was the rhythm diagnosis?

1. Atrial tachycardia with mode switch
2. Pacemaker malfunction
3. Atrial tachycardia with Wenkebach response at the upper limit of SmarTracking rate

Answer

3. Atrial tachycardia with Wenkebach response at the upper limit of SmarTracking rate.

Discussion

Figure 2 illustrated that p waves matched through the rhythm strip with regular p-p interval of 600 msec, this fell below the upper tracking rate of 120 bpm

(a cycle length of 500 msec) and the mode switching rate (185 bpm). Theoretically atrial activity at this rate should not trigger a pacemaker Wenkebach^{1,2} nor a mode switch response. However, the particular pacemaker of this patient has a feature called SmarTracking that limits the ventricular tracking of atrial rates in a dynamic fashion based on input from the accelerometer sensor. It benefits the patient with a smoother response to patient vigorous activity and when patient is resting it protects against inappropriate tracking of atrial tachycardias (Figure 3). 1:1 tracking will occur if atrial rate is between

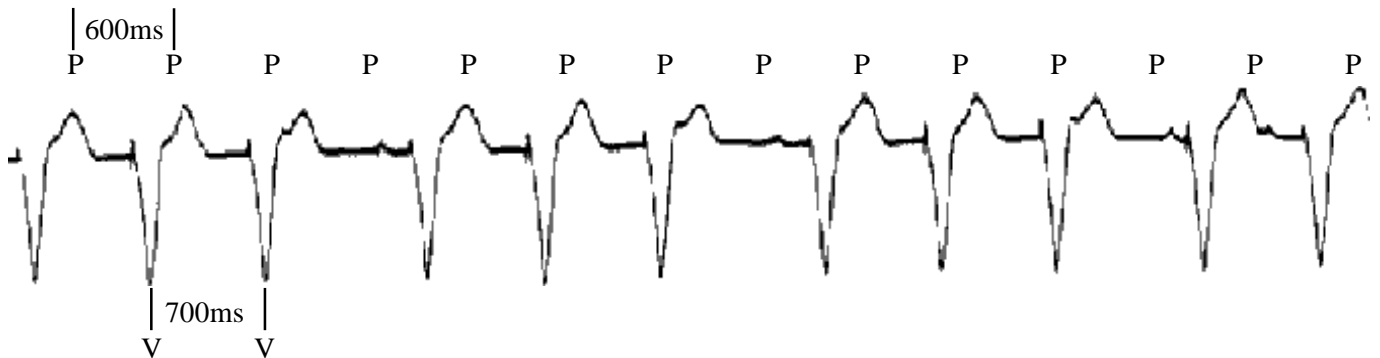


Figure 2.

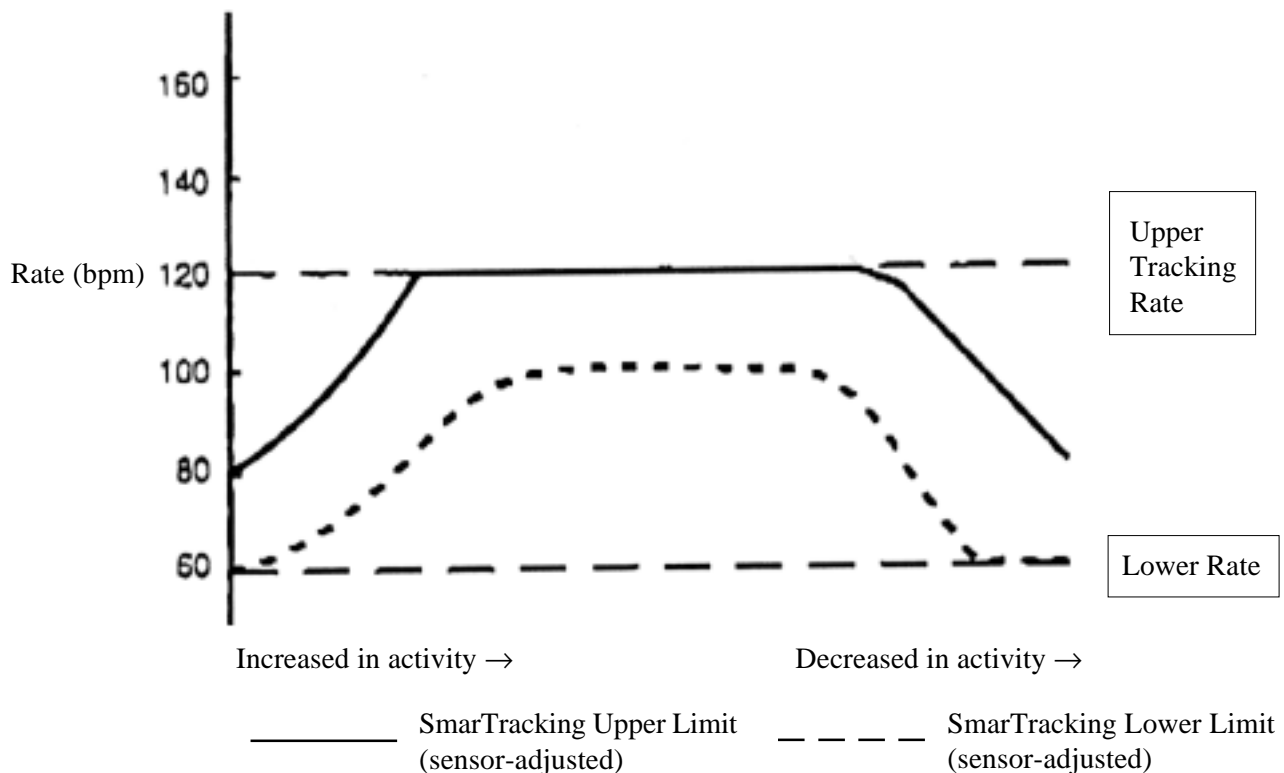


Figure 3.

the upper and the lower limit of SmarTracking, and when atrial rate is above the upper SmarTracking limit, there will be Wenkebach response.³

It can be noted that the p wave – ventricular pacing spike progressively prolonged and the third p wave was not tracked, and similar pattern was repeated. The p-p interval was 600 msec which was shorter than the ventricular pacing spike interval of 700 msec, approximately at 85 beats per minute which is the upper rate limit of SmarTracking when the activity sensor was at minimal activity. As a result the Wenkebach like rhythm was observed.

The patient was taking high dose of beta-agonist and theophylline for his lung condition and these caused him to have sinus tachycardia even at rest. His symptom of palpitation resulted mainly from irregular heart beats during Wenkebach response. Setting a longer post

ventricle atrial refractory period may result in 2:1 conduction and a more regular rhythm, however this will limit the upper tracking rate. A better option will be to decrease the dose of beta-agonist and increase the SmarTracking rate at minimal activity. This was performed and patient symptoms improved.

References

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2. Feuer, J, Shandling AH, Ellestad MH. Sensor-modulated dual chamber cardiac pacing: Too much of a good thing too fast? PACE 1990;13:816-8.
3. Lee MT, Adkins A, Woodson D, Vandegriff J. A new features for control of inappropriate high rate tracking in DDDR pacemakers. PACE 1990;13:1852-5.