

# Pacemaker-Mediated Tachycardia 3례의 임상적 고찰

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## Three Cases of Pacemaker-Mediated Tachycardia

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### ABSTRACT

Pacemaker-mediated tachycardia (PMT) is a well-known complication of dual-chamber pacemaker with atrioventricular sensing and pacing (DDD) or atrial synchronous, ventricular demand pacemaker (VDD). PMT usually starts with sensing a retrograde P waves linked to ventricular extrasystole with retrograde ventriculoatrial conduction and forms reentrant or circus movement tachycardia with the pacemaker itself as an antegrade limb and the conducting tissue of the heart as a retrograde limb. Recently, a number of pacemaker manufactures have incorporated in their devices a variety of relatively complex algorithms to prevent PMT. Despite these measures, PMT may still occur because of inappropriate programming or unpredictable variations of ventri-culoatrial conduction. We report two cases of PMT in 78 year-old man and 60 year-old man who received DDD type pacemakers due to sick sinus syndrome, and a case of PMT in 69 year-old man who had suffered complete heart block and received a VDD type pacemaker. In these cases, we investigate symptoms, mechanism of PMT, programed parameters of pacemaker and treatments of PMT. (Korean Circulation J 2000;30(3):334-338)

**KEY WORD** : Pacemaker-mediated tachycardia.

### 서 론

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 E - mail : cwchoue@khmc.or.kr  
 pacemaker - mediated tachycardia  
 (PMT) (dual chamber pacemaker)  
 가 ,  
 (rate adaptive pacemaker)

가 PMT , 2 1 , 3 4

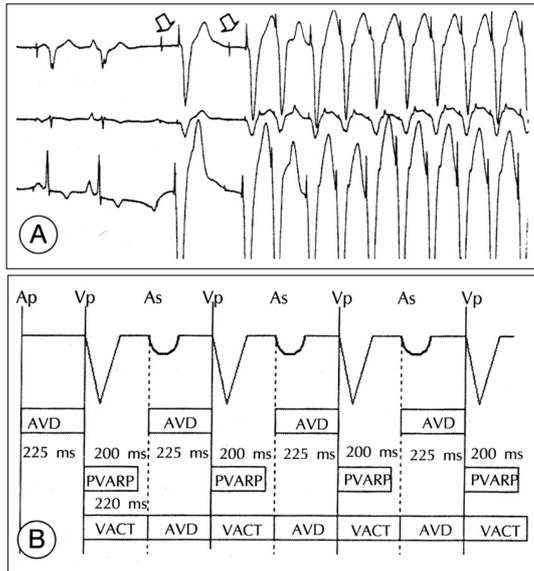
PMT 가 PMT Biotronik , PMT postventricular atrial refractory period(PVARP) DDD , dynamic AV delay atrial refractory period VDD PMT , Medtronics PMT upper rate limit 9 ventricular event PVARP cycle atrial tracking PMT DDD 1 2 가

PMT가 3 , 1 (atrioventricular delay ; AVD) 225 ms PVARP 1 24 200 ms, 2 175 ms 가 가 PMT가 (Figs. 1 and 2). VDD , 24 3 (AVD) 120 ms, PVARP 270 ms, upper rate limit 150 bpm (Table 2, Fig. 3). PMT 1 (atrial oversensing) 2 3 PMT 24 가 (ventriculoatrial conduction time) upper rate limit VDD (Thera VDD 8968i, Medtronic, Inc.) mit PMT upper rate limit (Table 1). 3 1 5 PMT , 1 2

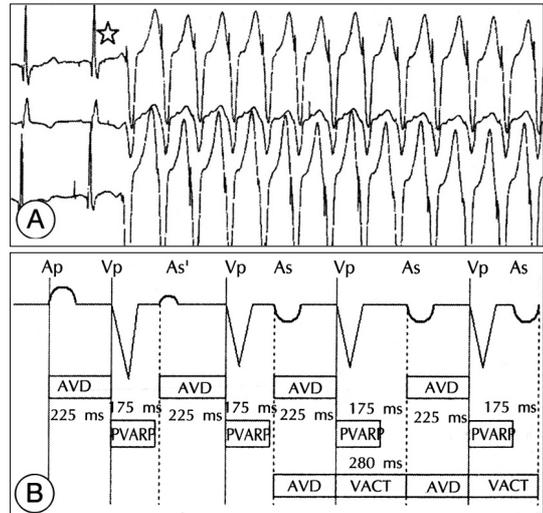
**Table 1.** Characteristics of study patients

Pt.	Age/sex	Diagnosis	Pacemaker	Mode
1	78/M	SND	BIOTRONIK PHYSIOS TC 01	DDD
2	60/M	SND	BIOTRONIK PHYSIOS TC 01	DDD
3	69/M	CHB	MEDTRONIC THERA 8968i	VDD

SND : sinus node dysfunction, CHB : complete heart block



**Fig. 1.** PMT of case 1. 24 hour Holter monitoring (A) and its schematic diagram (B) show atrial capture failure (arrow) and initiation of PMT. BIOTRONIK PHYSIONS TC 01, DDD, URL : 140 bpm, LRL : 60 bpm, AVD : 225 msec, PVARP : 200 msec, PMT rate : 136 bpm, PMT intervention : On, AVD : atrioventricular delay, LRL : lower rate limit, URL : upper rate limit, PVARP : post-ventricular atrial refractory period, As : atrial sensed, Ap : atrial paced, Vp : ventricular paced, VACT : ventriculoatrial conduction time.



**Fig. 2.** PMT of case 2. 24 hour Holter monitoring (A) and its schematic diagram (B) show atrial oversensing (star) and initiation of PMT. BIOTRONIK PHYSIONS TC 01, DDD, URL : 130 bpm, LRL : 60 bpm, AVD : 225 msec, PVARP : 175 msec, PMT rate : 120 bpm, PMT intervention : Off, AVD : atrioventricular delay, LRL : lower rate limit, URL : upper rate limit, PVARP : postventricular atrial refractory period, As : atrial sensed, Ap : atrial paced, Vp : ventricular paced, VACT : ventriculoatrial conduction time, As' : atrial oversensing.

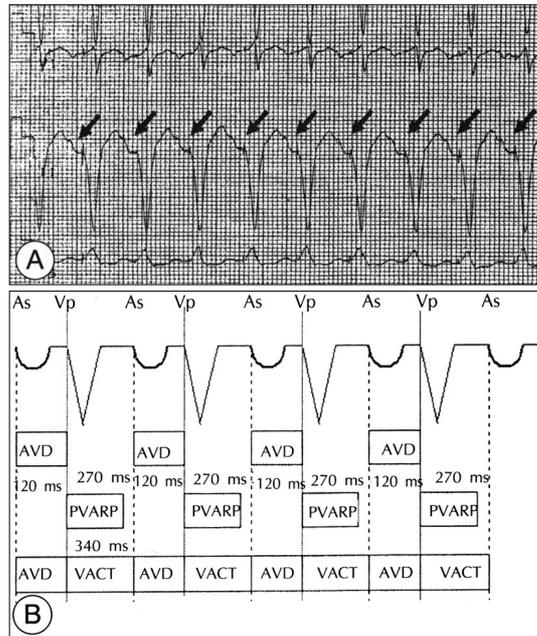
가  
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 PMT가 (Fig. 3).  
 PMT  
 1 , PMT 가 upper rate limit  
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 magnet PMT  
 PMT PVARP  
 PMT protection algorithm

고 안  
 Pacemaker - mediated tachycardia(PMT)  
 (6)8 - (11) PMT 가  
 endless loop tachycardia  
 가  
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 가 ELT가  
 PMT ELT

**Table 2.** Pacemaker settings and PMT data

pt.	AVD (ms)	PVARP (ms)	VACT (ms)	URL		PMT	
				CL (ms)	Rate (bpm)	CL (ms)	Rate (bpm)
1	225	200	220	428	140	440	136
2	225	175	280	461	130	500	120
3	120	270	340	400	150	460	130

AVD : atrioventricular delay, CL : cycle length, PMT : pacemaker-mediated tachycardia, PVARP : postventricular atrial refractory period, URL : upper rate limit, VACT : ventriculoatrial conduction time



**Fig. 3.** PMT of case 3. ECG during PMT attack (A) and its schematic diagram (B) show endless-loop tachycardia which was initiated by retrograde conduction (arrow) to atria. MEDTRONIC THERA 8968i VDD, URL : 150 bpm, LRL : 60 bpm, AVD : 120 msec, PVARP : 270 msec, Atrial sensing : 0.5 mV, PMT rate : 130 bpm, AVD : atrioventricular delay, LRL : lower rate limit, URL : upper rate limit, PVARP : postventricular atrial refractory period, As : atrial sensed, Ap : atrial paced, Vp : ventricular paced, VACT : ventriculoatrial conduction time.

pseudoendless loop tachycardia<sup>16)</sup>

(rate adaptive pacing) (sensor feedback tachycardia)

(voltage dip)

PMT (differential AV delay) (adaptive AV delay),

가 (1), (2) (ventricular escape beat), (3) (4) magnet

DOO PMT가 가

가 P, P PMT

가

PMT 24

6)

PMT 가

magnet

non tracking mode<sup>15)18)</sup>

PMT (AV delay) PVARP 가

(differential AV delay) (adaptive AV delay),

P P

DDD<sup>18)</sup>

PMT가<sup>9)</sup>

PVARP, upper rate limit  
가<sup>7)19)20)</sup> upper rate limit

PMT<sup>16)</sup>

PMT<sup>17)</sup>

1 2

PMT가, 3 PVARP  
PMT 가

결 론

가 PMT

PVARP, PMT

PMT 3

중심 단어 : (PMT).

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