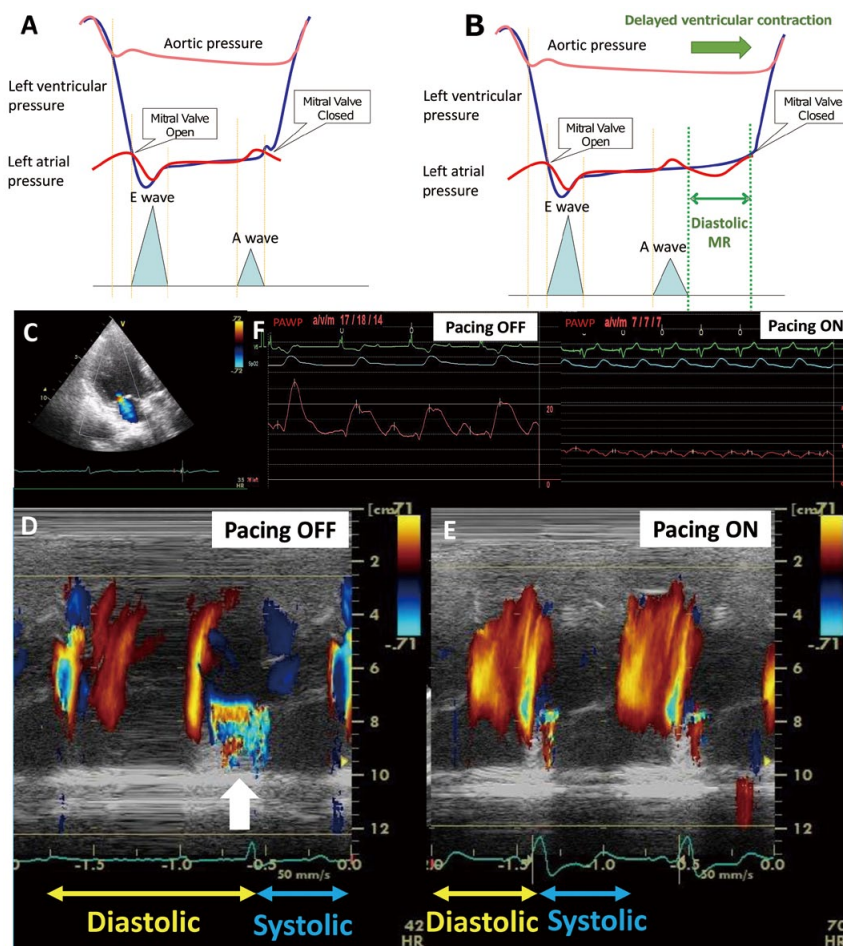


## Diastolic Mitral Regurgitation on Color M-Mode Echocardiography in a Patient With Complete Atrioventricular Block

Akihiro Tani, MD; Kenya Kusunose, MD, PhD; Kazuhisa Matsumoto, MD; Hirotsugu Yamada, MD, PhD; Masataka Sata, MD, PhD



**Figure.** Left ventricular, left atrial and aortic pressure with transmitral inflow in an (A) normal patient and (B) diastolic mitral regurgitation (MR) patient. (C) Color Doppler imaging with MR. (D,E) Color M-mode imaging (D) without and (E) with pacing. (F) Catheter data with and without pacing. PAWP, pulmonary artery wedge pressure.

Received January 19, 2020; accepted January 28, 2020; J-STAGE Advance Publication released online February 20, 2020 Time for primary review: 9 days

Department of Cardiovascular Medicine, Tokushima University Hospital, Tokushima, Japan

The Guest Editor for this article was Dr. Motoaki Sano.

K.K., M.S. are members of *Circulation Reports*' Editorial Team.

Mailing address: Kenya Kusunose, MD, PhD, Department of Cardiovascular Medicine, Tokushima University Hospital, 2-50-1 Kuramoto, Tokushima 770-8503, Japan. E-mail: kusunosek@tokushima-u.ac.jp

All rights are reserved to the Japanese Circulation Society. For permissions, please e-mail: cr@j-circ.or.jp

ISSN-2434-0790



**D**iaстolic mitral regurgitation (MR) can occur in patients with prolongation of the PR interval, for example complete atrioventricular (AV) block. Effective left ventricular (LV) contraction is necessary for complete closure of the mitral valve (**Figure A**). In patients with complete AV block, however, LV contraction is delayed and the reversed AV pressure gradient may induce diastolic MR (**Figure B**). AV sequential pacing can lead to optimal ventricular contraction and may eliminate diastolic MR.

A 69-year-old woman presented with shortness of breath on exertion. Electrocardiogram showed complete AV block, and echocardiography showed severe aortic valve stenosis and moderate MR (**Figure C**). We planned aortic valve replacement and mitral valve repair (MVR) before pacemaker implantation, given that the vital signs were stable and the pacemaker lead could be displaced by surgery. On color Doppler M-mode, however, MR was in the diastolic phase (**Figure D**, white arrow). On AV sequential pacing, diastolic MR had disappeared (**Figure E**) and pulmonary artery wedge pressure (PAWP) was decreased from 14 mmHg to 7 mmHg (**Figure F**). Thus, MVR was not

required. The patient underwent aortic valve replacement and dual-chamber pacemaker implantation, and her symptoms resolved.

Diastolic MR is usually mild and clinically insignificant, but sometimes echocardiography shows moderate, clinically significant MR.<sup>1</sup> In the present case, elevated PAWP normalized rapidly after AV sequential pacing. Simultaneous color M-mode echocardiography and catheterization was useful for the diagnosis and evaluation of the effects of treatment (e.g., pacemaker) in diastolic MR. This case illustrates the importance of evaluating not only regurgitation quantity but also regurgitation phase.

#### Disclosures

K.K., M.S. are members of *Circulation Reports*' Editorial Team. The other authors declare no conflicts of interest. All procedures were in accordance with the ethics standards on human experimentation and with the Helsinki Declaration.

#### Reference

1. Agmon Y, Freeman WK, Oh JK, Seward JB. Diastolic mitral regurgitation. *Circulation* 1999; **99**: e13.