

심장의 수축 및 이완기능의 평가에 Doppler Tissue Image의 유용성

김 기 식

The Usefulness of Doppler Tissue Image in Evaluation of Left Ventricular Systolic and Diastolic Dysfunction

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ABSTRACT

Doppler tissue image (DTI) is a newly developed method for measuring myocardial velocity using pulse wave Doppler (P-DTI), or color Doppler (C-DTI) imaging. The major application of DTI is is quantifying systolic and diastolic heart function. DTI can be applied for the quantification of systolic myocardial velocity (Sm) during myocardial ischemia at rest and with pharmacologic or exercise testing. DTI can also detect myocardial dysfunction earlier than the conventional wall motion score system. It is also used for the discrimination of viable and non-viable myocardium. P-DTI is particularly useful in the detection and identification of left ventricular diastolic dysfunction. In particular, it can differentiate normal and pseudonormal patterns. One advantage of DTI is that it is less dependant to the preloading condition of the heart than the conventional method. Recently, DTI has also been applied in the early detection of graft rejection in a transplanted heart. This review summarizes the principles and clinical applications of DTI in the evaluation of left myocardial function. (**Korean Circulation J 2002;32(2):99-105**)

KEY WORDS : Ventricular function ; Echocardiography.

서 론

Doppler Tissue imaging(DTI) 1961 Yoshida ¹⁾
가 1970 Kostis ²⁾ 가 가
DTI .
가 가 1989 Isaz ³⁾ 가
Doppler 가
Doppler
McDicken ⁴⁾ Miyat -
ake ⁵⁾ Sutherland ⁶⁾ 가
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가

Doppler Tissue Image의 원리

8)

2가

Doppler

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20 cm/ (20 100 cm/) , (translation), (Table 1).

ppler signal amplitude Do - (rotation)

DTI

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DTI Doppler , color M -

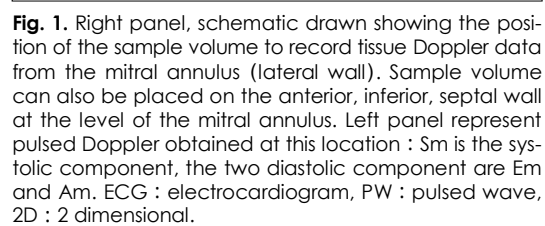
mode, color 2 - D echocardiography 4

Doppler

Table 1. Advantages and limitations of color tissue Doppler imaging (TDI) versus pulsed wave (PW) TDI

Advantages	
Color TDI	Spatial orientation of myocardial velocities can be seen superimposed on the real-time 2-dimensional image
	Myocardial velocities can be displayed in a manner similar to that of conventional color flow imaging
	Representation of mean myocardial velocity
PW TDI	Real-time velocity interrogation with improved temporal resolution
	Ability to quantitate peak rather than mean myocardial velocities
	Does not require off-line analysis
	Provides instantaneous temporal display of the Doppler spectral information
Objective assessment of regional function, which is especially useful in dobutamine stress Echocardiography	
Limitations	
Color TDI	Poor temporal resolution caused by longer processing time involved with autocorrelation analysis
	Typically requires off-line analysis for quantification of the myocardial velocity color maps
PW TDI	Only regional quantification of myocardial velocities can be done at selected sites reducing spatial resolution
	Sampling cannot be localized to the endocardial or epicardial layers
	Alignment of the beam parallel to the heart muscle movement may be difficult in some patients
	No correction for normal cardiac translation and rotation during sampling

S



	Sm	Em	Am	Em/Am velocity ratio
Lateral	10.6 ± 2.3	13.3 ± 3.3	11.3 ± 2.9	1.5 ± 0.6
Septal	9.9 ± 1.7	11.5 ± 2.6	9.5 ± 2.4	1.0 ± 0.7
Anterior	9.2 ± 1.8	11.7 ± 3.4	10.3 ± 2.9	1.2 ± 0.7
Posterior	10.4 ± 2.5	14.3 ± 3.6	11.6 ± 2.6	1.3 ± 0.7

SD : standard deviation, DTI : Doppler tissue image

Fig. 2. Normal range of Doppler tissue image values by segment of peak stress.

DTI 가 . Tsutsui²³⁾ dobutamine 가 가 가 가
¹²⁾ 가 4 , 2 가
Sm . ²⁴⁾ dobutamine 가 90%
¹³⁾¹⁴⁾ Sm 9 cm/sec 가 83%
¹⁵⁾ Gulati¹⁰⁾ 4 2 가가²⁵⁾²⁶⁾
Sm DTI 가
rcia¹⁶⁾ parasternal view Ga - 가
volumic contraction time) (iso -
relaxation time) biphasic velocity (isovolumic (normal),
(restriction abnormality), (pseudonormal),
restrictive pattern
¹⁷⁾ DTI
¹⁸⁾ dP/dT, ²⁷⁾ color M - mode,^{28 - 30)} DTI
DTI 가
Derumeaux¹⁹⁾²⁰⁾ Em Am
Sm 가 Em 20 cm/sec
Sm 가 ¹³⁾¹⁶⁾^{32 - 34)} 9 cm/sec
가 Em E
color DTI
가 E 가
가 Em ⁹⁾³⁴⁾³⁵⁾
ore wall motion sc - 가 Em ,
color m - mode DTI, Em/Am 가 가
color 2 - D DTI가²¹⁾ PW - DTI Em 가 Em/Am 1
가 ⁹⁾^{36 - 39)}
dobutamine
Gorscan²²⁾ 3 mcg/Kg/minute Em 가
가 Em/Am 1
(Sm)가 가 . Oki⁴⁰⁾

IVRT

Tau

가

DTI

Em

가

Tau

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peak - dP/dT

가

Em

plur

, elastic recoil

DTI

가

39)

Em

가

8.5 cm/sec

88%,

39)42)43)

67%

Em

가

Agmon

44)

Em

가 DTI

DTI

A>1

IVRT

DTI

Em/Am>1

가

Garcia

45)

Em

100%

DTI

47)

Em

가

Em

결

론

가

DTI

중심 단어 :

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