# ROLE OF TISSUE DOPPLER TEI INDEX IN EVALUATING MYOCARDIAL PERFORMANCE AFTER CORONARY REVASCULARIZATION

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# Summary

Tei index is a simple and reproducible method for the assessment of overall cardiac function***(Tekten T. et al.,2003).*** Its value had been validated in many cardiac diseases as heart failure, pulmonary hypertension, pulmonary embolism,ischemic heart disease, cardiac amyloidosis, cardiotoxicity from chemotherapy and as early predictor of rejection of heart transplantation .

However, the conventional method of calculating the Tei index from pulsed wave Doppler has some limitations.The conventional echocardiographic methods for assessing cardiac function are unable to distinguish, in one single scan, the individual phases of the cardiac cycle. ***(Appleton C. et al.,1988)(Tekten T. et al.,2003).*** It is also highly dependent on preload. ***.( Gerede DM. et al., 2015)*** .

However, measuring Tei index using tissue Doppler imaging can avoid these obstacles. Also, tissue-Doppler imaging enables us to assess subclinical *long-axis myocardial dysfunction* that cannot be detected by conventional echocardiographic measurements. ***(Michele Correale. et al., 2012).*** The origin of TDI velocities is related to the myocardial architecture and fibers contraction and relaxation which can add valuable information to the assessment of myocardial dysfunction. ***(Waggoner AD. Et al., 2001).***So, we suggested thattissue Doppler Tei index (tdTei) would be helpful in assessment of myocardial function in IHD patients after coronary revascularization.

Our study was designed to investigate the value of tissue Doppler Tei index as an indicator of the improvement of myocardial function after elective coronary revascularization therapy in chronic ischemic heart disease patients with left ventricular dysfunction who were subjected to full revascularization with either CABG or PCI.

Our study initially included 78 chronic ischemic heart disease patients with LV dysfunction who were subjected to coronary revascularization with either CABG or PCI. All of them had to have echocardiographic assessment of the heart twice; including tdTei index; the first time before revascularization, and the second time 4 months after coronary revascularization at least.

However, 19 patients from our 78 patients were not reachable at follow up. From the remaining 59 patients, **12 patients** did not have the follow up evaluation as they had **MACE** (major adverse cardiac events) during the follow-up period(4 months at least); including death, heart failure, admission to ICU due to recurrence of angina or ventricular arrhythmia.

***The remaining 47 patients were divided into 2 groups according to echocardiographic response to the revascularization:***

***Group I***: Included 35 patients who had an increase ≥5% increase in LV EF at follow up (Good improvement group).

***Group II***: Included 12 patients who had an increase <5% increase in LV EF at follow up (Little improvement group).

## The results of our study were as follow:

** Regarding patients in group I (Good improvement group) ; *aftercoronary revascularization*, they had statistically significant lower value of *tdTei index* compared to its baseline value (60.73 ± 4.45 before vs 51.30 ± 4.30 after revascularization, $p<0.001$), while on the contrary, patients in group II (Little improvement group) had no statistically significant different results compared to baseline value of the tdTei index (82.44 ± 5.30 before and 81.56 ±5.27after revascularization, $p >0.05$).

**We found that tdTei index is a *good indicator of theimprovement of myocardial diastolic function* after coronary revascularization therapy with better values of diastolic echocardiographic parameters E`/A`($p<0.001$) and E/E`

($p<0.05$) in group I, While in groupII, there were no statistically significant differences of E`/A` and E/E` before and after revascularization ($p>0.05$ for both).

****Other parameters of improvement** of the myocardial function in group I included improvement of cardiac cycle phases of the tdTei index after revascularization (tdIVCT, tdET, tdIVRT; $P<0.05$ for each). Also parameters assessing LV volumes were improved (LVESV and LVEDV; $P<0.05$ for each), while in groupII, there were no statistically significant differences ($p>0.05$ for all).

**Also the improvement of the tdTei index in group I was associated with better myocardial *regional wall motion* assessed by WMSI ($1.77 \pm 0.29$ before, $1.26 \pm 0.31$ after revascularization with $p<0.05$ ),while in groupII, there were no statistically significant differences($p>0.05$).

** In our study, we found a strong correlation between the delta EF (the relative change in EF value before and after revascularization) and delta tdTei index (the relative change in tdTei index value before and after revascularization). *The more the improvement in the EF after revascularization, the more the improvement in tdTei index* ($r=0.67$, $p<0.001$).

**In the line of research in our study, using ROC curve, we found that the tdTei index value before revascularization i.e. *baseline tdTei index, can differentiate between patients* in little improvement group from good improvement group (group I and group II ) at cut-off point of Tei index= 72.9; with high sensitivity (83.3 %) and specifity (80 %). So, tdTei index can predict

patients who are expected to have ejection fraction improvement from coronary revascularization.

**We also found a significant relation between baseline tdTei index and *TIMI* flow before revascularization. The higher the baseline tdTei index, the worse the TIMI flow seen in pre-revascularization angiography.(In allover coronary vessels, Rho=-0.53,$p<0.05$)

** We found tdTei index value more than 69.48± 6.8 is a predictor of occurrence of major adverse cardiac events *(MACE)* in the first few months following coronary revascularization.