

Exaggerated amplitude and peak location of Ta wave in tachycardia as an indicator for atrial disorders

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Abstract

Background: In Standard Limb Lead (SLL) ECG for Sinus Rhythm (SR) volunteers, the atrial repolarization (Ta wave) as a possible indicator for atrial related diseases is undermined. The presence of Ta wave in exercise stress ECG has been noted previously. However, manifestation of Ta wave in SR is limited using SLL. Hence, the Ta wave characteristics of stress SLL ECG are normal or exaggerated in response to increased cardiac activity is not yet established. The modified Limb Lead (MLL) system used in this study helps witness the Ta wave features in SR, which may assist in the early determination of disease.

Objective: This study delineates the characteristics of the Ta wave in Sinus Tachycardia (ST) compared to the SR in terms of amplitude and Ta peak location using the MLL system.

Methods: MLL was recorded for eight SR and fifteen ST volunteers (mean age 24 years). P-R and S-T segment amplitudes were measured and analyzed.

Results: Ta wave related impact on P-R and S-T segment have been noted and found 41.60 % increase in $P-R_{ST}$ to $P-R_{SR}$ and 49.60% in $S-T_{ST}$ to $S-T_{SR}$ using absolute values of P-R and S-T. Moreover, the Ta wave peak can be predicted with the change in morphology and amplitude of the P-R and S-T segments.

Conclusion: Determination of Ta wave peak may help delineate atrial-related disease conditions. A detailed study on S-T segment depression and elevation helps decrease the false-negative detection of myocardial infarction.

Keywords: Atrial repolarization, Modified limb lead, Sinus rhythm, Sinus tachycardia, Standard limb lead, Myocardial infarction.

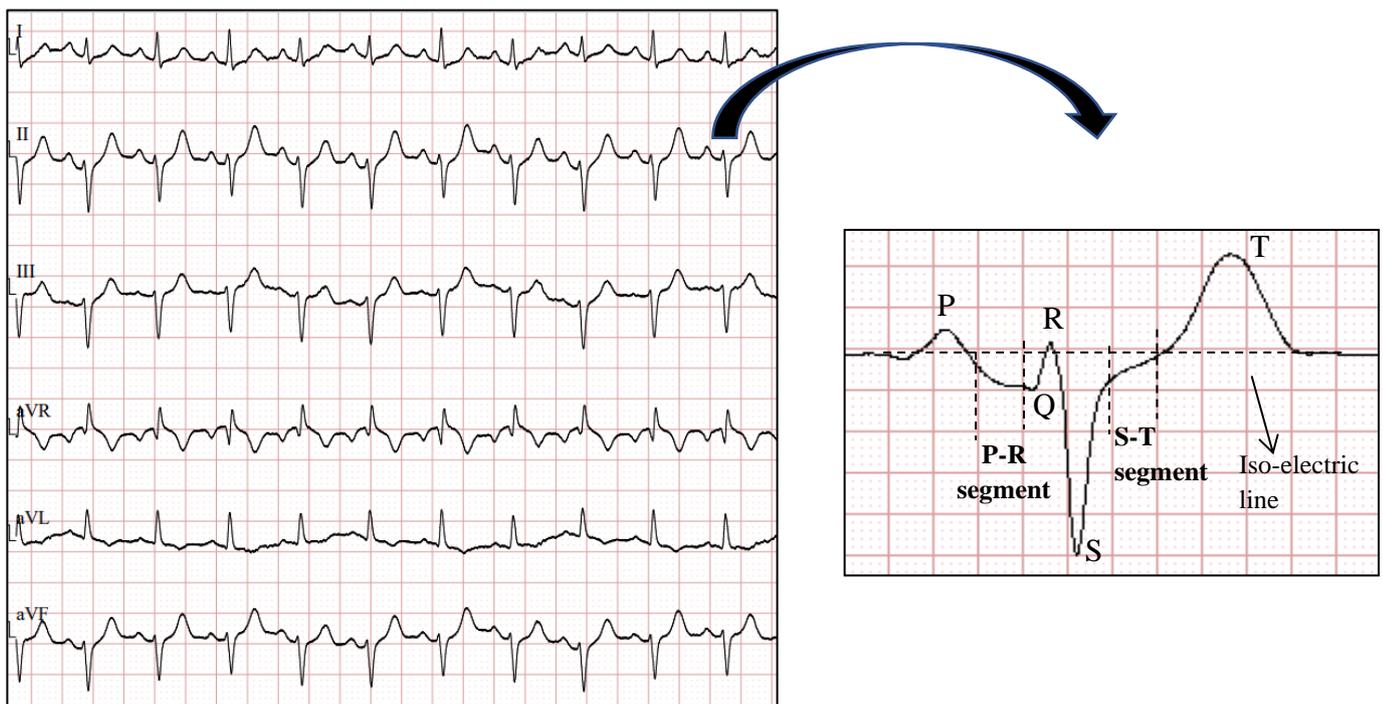


Figure 1. MLL frontal plane leads ECG of ST volunteer explaining the P-R and S-T segment depression.

Table I. PR and ST segment amplitudes for SR and ST

	Heart Rate (bpm)	P-R segment amplitude (μv)	S-T segment amplitude (μv)
SR	76 ± 11.08	22 ± 17	23 ± 14
ST	107 ± 7.48	31 ± 18.46	34 ± 12.45