**THE UNFORGOTTEN LEWIS LEAD ECG FOR DETECTION OF VENTRICULOATRIAL CONDUCTION TYPE: A CASE SERIES**

Aznah Ahamed1 , Muhammad Khidir Mohd Kamil.1

*1Emergency and Trauma Department, Teluk Intan, Hospital, Perak*

**Introduction**

The Lewis lead electrocardiography (ECG) is an alternative bipolar chest lead to augment atrial activity and its relationship to ventricular activity. Historically, it was employed to discern between wide QRS tachyarrhythmia, visualise flutter or fibrillatory waves, and recognise various types of atrial arrhythmias.

**Case descriptions**

**Case 1**

A 52-year-old female presented with chest pain and diaphoresis. The patient was hemodynamically stable with a blood pressure of 120/60 mmHg and a heart rate of 140 beats/min. The ECG showed a narrow QRS complex tachycardia with widespread ST-segment depression and ST-segment elevation in lead aVR. From the tracing, p-wave was not readily apparent, suggesting a supraventricular origin. Repeated tracing of Lewis leads demonstrates P-wave always precedes the QRS wave, which indicates sinus tachycardia.

**Case 2**

A 64-year-old male complained of breathlessness at rest. The patient was hemodynamically stable with a blood pressure of 180/90 mmHg and a heart rate of 54 beats/min. The ECG demonstrated a junctional rhythm with right bundle branch block (RBBB). Repeated Lewis lead ECG showed the p-wave always appears before the QRS wave with a PR interval of 124 ms, which indicates sinus bradycardia.

**Discussion**

We demonstrate the usefulness of Lewis lead in differentiating supraventricular tachycardia versus sinus tachycardia and the junctional rhythm versus sinus bradycardia. Lewis lead ECG is performed by placing the right hand electrode on the second intercostal right parasternal, the left-hand electrode on the fourth intercostal right parasternal and the left leg electrode on the right lower costal margin. This will shift the cardiac vector, and the P-wave will be more apparent in lead I. Calibration can be set to 1 mV/20 mm and paper speed from 25 to 50 mm/s to improve visualisation of the P-wave. Aksu et al. demonstrated that the sensitivity of standard and Lewis lead ECG in determining the visible P-wave was 33.3% and 66.7%, respectively.

**Conclusion**

The Lewis lead configuration aids in better visualising P-wave and identifying particular types of ventriculoatrial conduction, which is necessary for accurate diagnosis and treatment of patients.

**Keywords**: Lewis lead, electrocardiography, tachycardia, ventricular tachycardia.

**References**:

[1] Yazaki Y, Satomi K, Chikamori T. The Utility of a Lewis Lead for Distinguishing Atrioventricular Reentrant Tachycardia from Typical Atrioventricular Nodal Reentrant Tachycardia. Intern Med. 2022 Jun 1;61(11):1645-1651. doi: 10.2169/internalmedicine.8470-21. Epub 2021 Nov 6. PMID: 34744113; PMCID: PMC9259309.

[2] Bakker AL, Nijkerk G, Groenemeijer BE, Waalewijn RA, Koomen EM, Braam RL, Wellens HJ. The Lewis lead: making recognition of P waves easy during wide QRS complex tachycardia. Circulation. 2009 Jun 23;119(24):e592-3. doi: 10.1161/CIRCULATIONAHA.109.852053. PMID: 19546393.