



Diagnostics

Electrocardiographic applications of lead aVR

Kelly Williamson^a, Amal Mattu MD^b, Claire U. Plautz MD^{c,d,e},
Allan Binder MD^c, William J. Brady MD^{c,d,e,*}

^a*School of Medicine, University of Virginia, Charlottesville, VA, USA*

^b*Department of Emergency Medicine, University of Maryland, Baltimore, MD, USA*

^c*Department of Internal Medicine (Cardiology), University of Virginia School of Medicine, Charlottesville, VA, USA*

^d*Department of Emergency Medicine, School of Medicine, University of Virginia, Charlottesville, VA, USA*

^e*Department of Internal Medicine, School of Medicine, University of Virginia, Charlottesville, VA, USA*

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Abstract Lead aVR, 1 of 12 electrocardiographic leads, is frequently ignored in clinical medicine. In fact, many clinicians refer to the 12-lead electrocardiogram (ECG) as the *11-lead ECG*, noting the commonly held belief that lead aVR rarely offers clinically useful information. In this report, we discuss the findings in lead aVR, which are potentially of value, including ST-segment elevation in the patient with acute coronary syndrome suggestive of left main coronary artery occlusion, PR-segment elevation in the patient with acute pericarditis, prominent R wave in the patient with significant tricyclic antidepressant poisoning, and ST-segment elevation in narrow complex tachycardia suggestive of Wolff-Parkinson-White syndrome.

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1. Introduction

Emergency physicians (EPs) encounter a multitude of patients in their daily practice; the EP is required to make urgent diagnoses with a limited amount of diagnostic information. The 12-lead electrocardiogram (ECG) is a widely available inexpensive bedside tool that the EP relies upon to make rapid diagnoses such as dysrhythmias, acute myocardial infarction (AMI), electrolyte disturbance, cardiotoxic ingestion, and conduction abnormality.

The electrical activity of the heart was first recorded by Augustus Waller in 1887, and then its development as a clinical tool was pioneered by the work of William Einthoven in the early 20th century. Electrocardiography is based upon

the principle that the depolarization and repolarization of the myocardium generates an electrical current, which is measurable on the surface of the body through the use of 6 precordial leads and 6 limb (both unipolar and bipolar) leads. Characteristic findings in varied leads are associated with different disease entities, and clinicians quickly become adept at knowing which leads to focus on when they suspect a certain pathophysiological process.

Although each lead relays information concerning a specific portion of the heart, lead aVR, an augmented unipolar limb lead placed on the lateral aspect of the right arm, is often overlooked. Although the tracing in this lead can be used by clinicians to obtain information from the right upper portion of the heart, including the outflow tract of the right ventricle and the basal portion of the septum, many practitioners instead view lead aVR as giving reciprocal information as to that which is derived from

* Corresponding author. Department of Emergency Medicine, School of Medicine, University of Virginia, Charlottesville, VA, USA.

E-mail address: wb4z@virginia.edu (W.J. Brady).

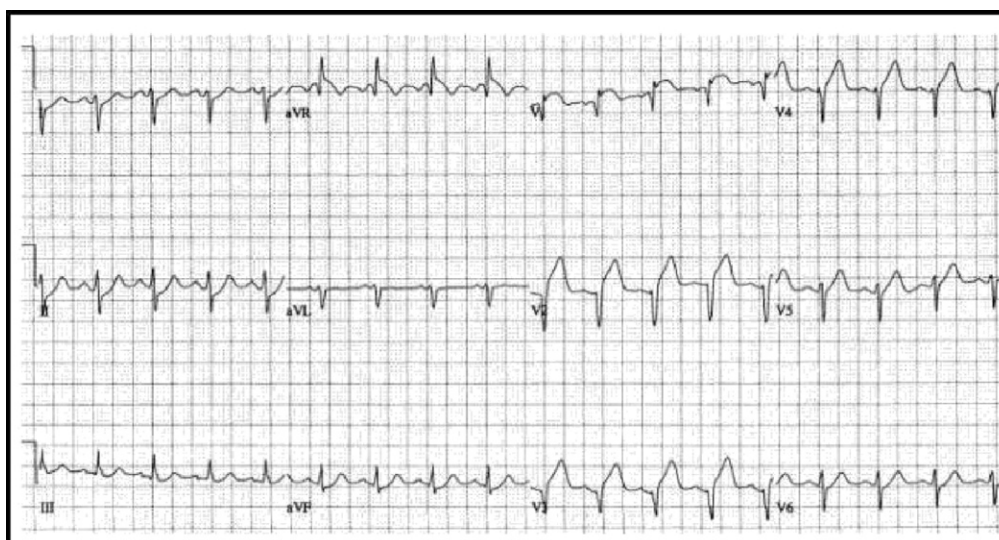


Fig. 1 Case 1 (anterior wall STEMI with LMCA obstruction)—12-lead ECG with ST-segment elevation in leads V₁ to V₄ and ST-segment depression in the inferior leads. Also note the ST-segment elevation in lead aVR, a finding that is strongly suggestive of LMCA obstruction as the cause of the anterior wall STEMI. Reprinted with permission from Mattu A, Brady WJ: ECGs for the Emergency Physician. BMJ Publishing, London, 2004, pg 101.

leads aVL, II, V₅, and V₆, choosing therefore to use it solely to ensure the correct placement of the other eleven leads [1]. It is important for clinicians to use lead aVR as a potentially important segment of the ECG in certain clinical presentations; lead aVR should not be considered the “forgotten” lead. Four specific findings in lead aVR especially worthy of discussion are ST-segment elevation as an indicator of significant left main coronary artery (LMCA) involvement in acute coronary syndromes, PR-segment elevation in acute cases of pericarditis, R’ wave in tricyclic antidepressant (TCA) poisoning, and ST-segment elevation suggestive of atrioventricular reciprocating tachycardia (AVRT) in preexcitation syndromes. This review will focus on the abnormalities in lead aVR as encountered in these clinical situations.

2. Case presentations

2.1. Case 1

A 44-year-old man with a history of myocardial infarction, hypertension, and diabetes mellitus presented to the emergency department (ED) with left shoulder pain. An ECG (Fig. 1) demonstrated sinus rhythm with ST-segment

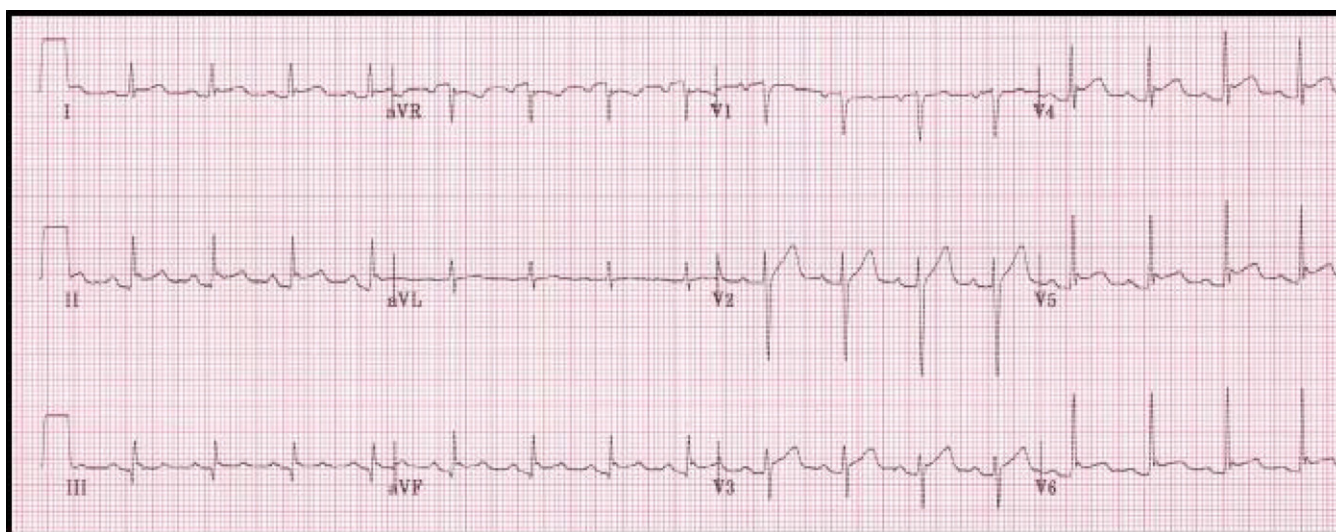


Fig. 2 Case 2 (acute pericarditis)—12-lead ECG with ST-segment elevation in leads V₁ to V₆ and leads II, III, and aVF. Also note the PR-segment depression in leads II, III, and aVF as well as leads V₄ to V₆. A review of lead aVR reveals easily seen PR-segment elevation, a finding strongly suggestive of acute pericarditis.

elevation in leads V_1 to V_4 with reciprocal ST-segment depression in the inferior leads; these findings were consistent with anterior wall ST-segment elevation AMI (STEMI). Also of note is the ST-segment elevation in lead aVR, a finding suggestive of LMCA obstruction. Because of the suspected left main lesion, the patient was transferred to a nearby hospital with interventional capability. The patient was taken to the catheterization laboratory where an LMCA occlusion with thrombus was noted. Urgent surgical consultation resulted in coronary artery bypass grafting (CABG).

2.2. Case 2

A 39-year-old man without medical history presented to the ED with pain in the left side of the chest. The pain had appeared approximately 2 days before arrival in the ED and was worsened upon inspiration, assuming the supine position, and with upper extremity movement; no associated symptoms were noted. The patient had recently experienced an upper respiratory tract infection. The physical examination was normal; no chest wall tenderness was found. A 12-lead ECG (Fig. 2) revealed diffuse ST-segment elevation in leads V_2 to V_6 , II, III, and aVF; PR-segment depression is also seen in anterior and inferior leads. PR-segment elevation is also seen in lead aVR. The patient's pain lessened considerably by treatment with a nonsteroidal antiinflammatory agent and morphine sulfate. The patient underwent echocardiographic examination, which revealed a small pericardial effusion. The patient was admitted to the Cardiology service for a 24-hour observation and discharged without incident. No etiology was discovered for the pericarditis; an infectious etiology was suspected based upon his recent upper respiratory tract infection symptoms.

Table 1 Electrocardiographic findings of potential clinical significance in lead aVR

<i>LMCA obstruction</i>
ST-segment elevation greater than 1.5 mV
<i>Acute pericarditis</i>
PR-segment elevation
<i>Acute TCA poisoning</i>
Prominent R' wave
<i>WPW-related narrow complex tachycardia</i>
ST-segment elevation

2.3. Case 3

A 37-year-old female patient was transported to the ED by emergency medical services. The patient was last seen approximately 4 hours before presentation; she was found unresponsive in her bed. On arrival in the ED, the patient was lethargic; the examination revealed an anticholinergic toxidrome. The 12-lead ECG (Fig. 3) revealed sinus tachycardia with minimal QRS complex widening; a large R' wave is also seen in lead aVR. Based on the patient's anticholinergic physical examination features and the electrocardiographic findings, the possibility of TCA ingestion was raised. The patient was orotracheally intubated; she received intravenous sodium bicarbonate and charcoal via the orogastric tube. Upon further review, her medical history was remarkable for depression complicated by previous suicide attempts; she was managed with amitriptyline. The patient was extubated on the third hospital day and discharged to a psychiatric facility with a diagnosis of TCA overdose.

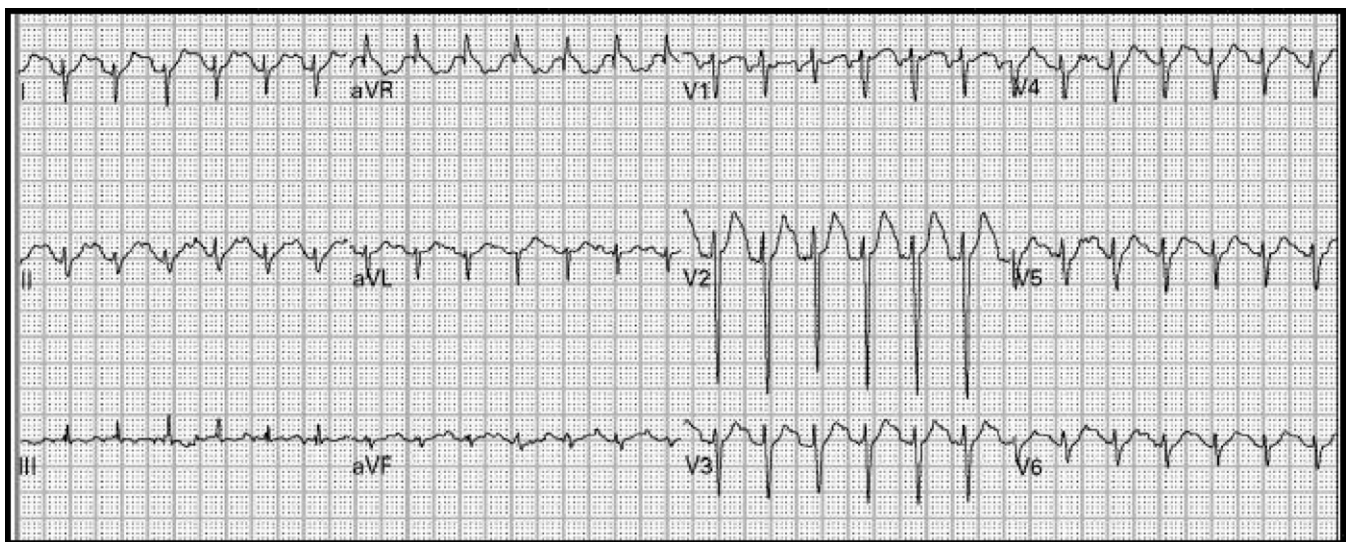


Fig. 3 Case 3 (TCA ingestion)—12-lead ECG with a sinus tachycardia characterized by a widened QRS complex, deep S wave in lead I, and prominent R wave in lead aVR. These findings are consistent with cardiotoxicity resulting from TCA ingestion. Reprinted with permission from Mattu A, Brady WJ: ECGs for the Emergency Physician. BMJ Publishing, London, 2004, pg 110.

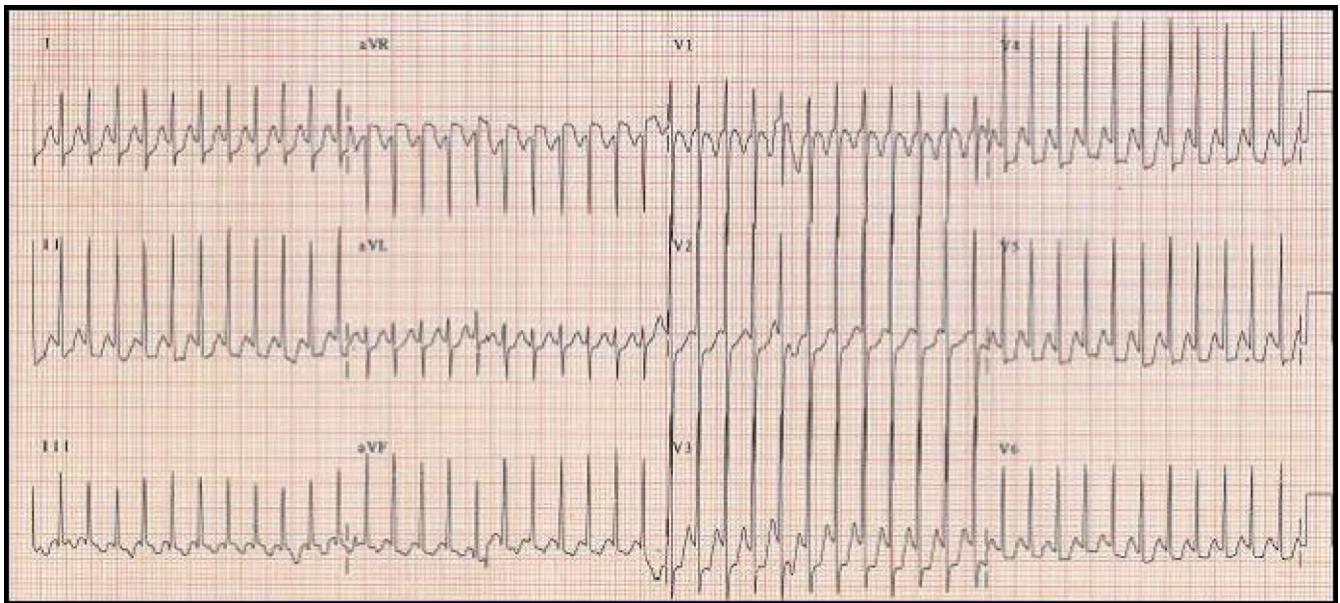


Fig. 4 Case 4 (WPW-related narrow complex tachycardia)—12-lead ECG with a rapid, regular, narrow QRS complex tachycardia. Certainly, the rapid ventricular rate suggests the possibility of a ventricular preexcitation syndrome. Also of note is the obvious ST-segment elevation in lead aVR—a finding also suggestive of a ventricular preexcitation-related narrow complex tachycardia.

2.4. Case 4

A 14-year-old adolescent boy presented to the ED with periods of dizziness. His medical history was unremarkable. Examination revealed a teenager in no apparent distress; cardiac examination demonstrated a rapid regular tachycardia. The 12-lead ECG (Fig. 4) revealed a narrow complex

tachycardia with a rate of 280/min; ST-segment elevation in lead aVR suggested AVRT. Intravenous adenosine was administered with conversion to sinus tachycardia with a reduction in heart rate to approximately 120/min and evidence of ventricular preexcitation consistent with Wolff-Parkinson-White syndrome (WPW).

Electrocardiographic Abnormalities in Lead aVR

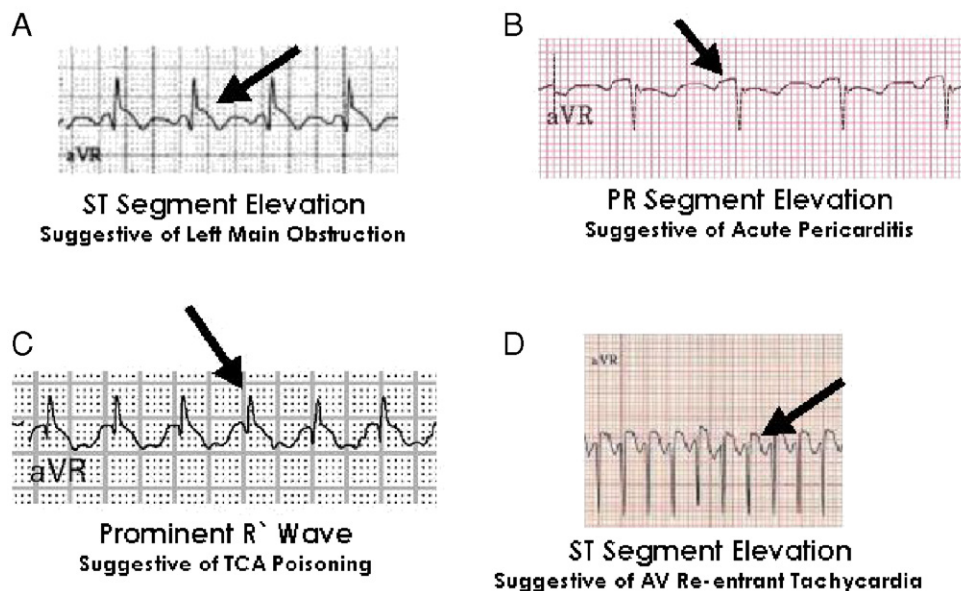


Fig. 5 Electrocardiographic findings in lead aVR. A, ST-segment elevation in lead aVR suggestive of LMCA occlusion. B, PR-segment elevation suggestive of acute pericarditis. C, Prominent R' wave suggestive of TCA poisoning. D, Rapid, regular, narrow QRS complex tachycardia with ST-segment elevation suggestive of WPW-related tachycardia.

3. Discussion

Lead aVR is an electrocardiographic lead that is frequently ignored. Many clinicians consider lead aVR as a “place holder” in the upper tier of electrocardiographic lead tracings on the 12-lead ECG; in fact, the *11-lead ECG* concept has been proposed. In this report, we discuss the findings in lead aVR, which are potentially of value (Fig. 5), including ST-segment elevation in the patient with acute coronary syndrome (ACS) suggestive of LMCA occlusion (Fig. 5A), PR-segment elevation in the patient with acute

pericarditis (Fig. 5B), prominent R wave in the patient with significant TCA poisoning (Fig. 5C), and ST-segment elevation in narrow complex tachycardia suggestive of Wolff-Parkinson-White syndrome (Fig. 5D; Table 1).

3.1. Acute coronary syndromes resulting from left main coronary obstruction

Acute myocardial infarction is diagnosed when patients experience 2 of the 3 following World Health Organization criteria: clinical history compatible with an ACS, electro-

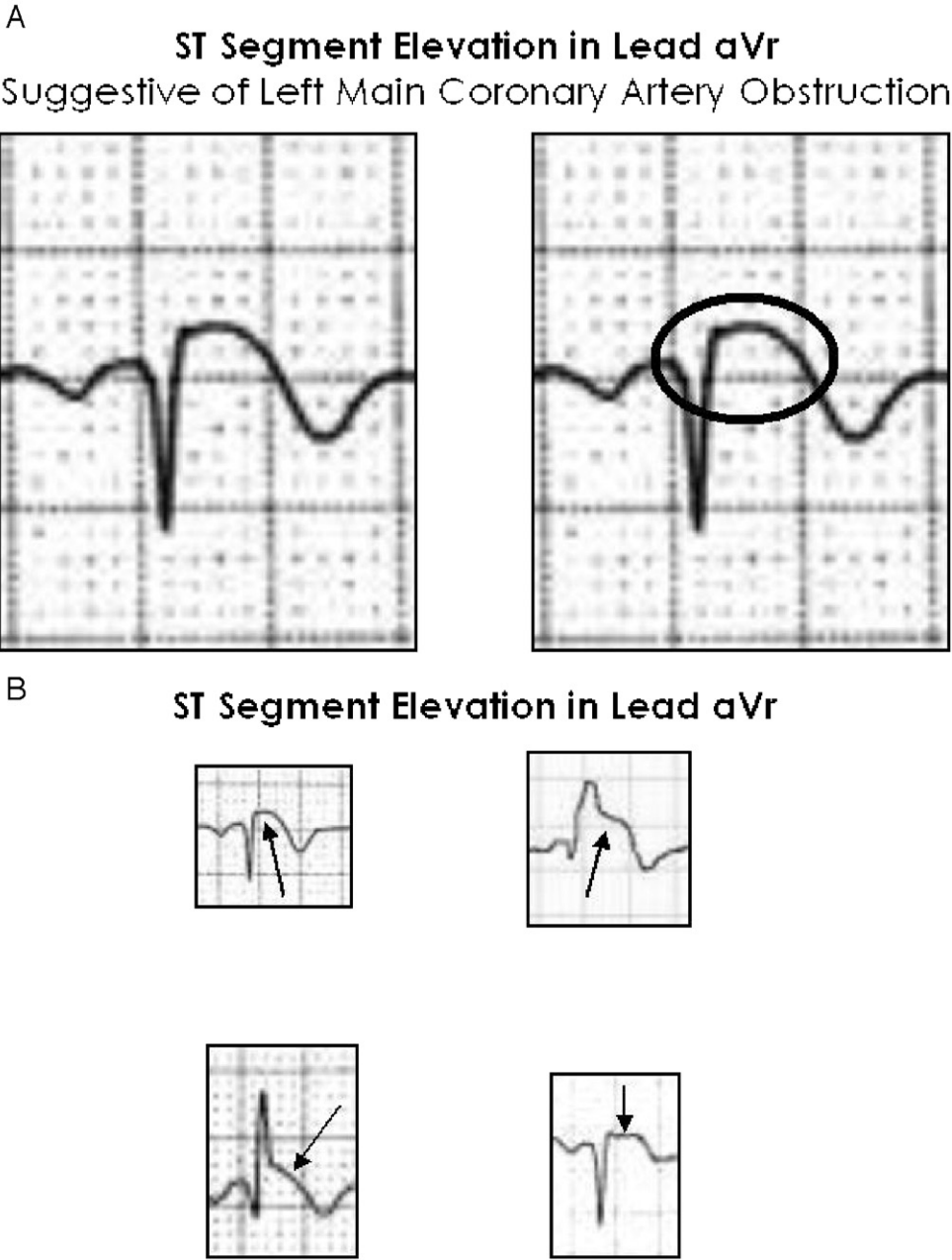


Fig. 6 ST-segment elevation in lead aVR in ACS due to LMCA obstruction. A, ST-segment elevation. B, Various examples of ST-segment elevation.

cardiographic abnormality suggestive of ACS, and positive myocardial serum changes [2]. The rapid diagnosis of such events is critical to guiding early intervention and appropriate disposition in many patients with ACS. Electrocardiography is an appropriate bedside tool used in the ED to make a rapid diagnosis of ACS, allowing physicians to select appropriate therapy and to predict potential cardiovascular complications. Patients with STEMI are potential candidates for fibrinolysis or percutaneous coronary intervention. Certain coronary artery obstruction patterns are more appropriately managed with mechanical reperfusion therapies, such as percutaneous coronary intervention or CABG; in particular, STEMI resulting from LMCA obstruction is associated with a very high mortality rate and is most appropriately managed with strategies other than fibrinolysis. In fact, STEMI resulting from an LMCA obstruction is associated with a significant morbidity rate if managed with fibrinolysis, because these patients often require CABG shortly after their presentation and already have received fibrinolysis that increases their surgery complication rate [3].

The ability to discriminate among the various coronary artery obstruction patterns may influence early management decisions; thus, the ability to identify left main STEMI presentations is important. One such electrocardiographic pattern involves ST-segment elevation in lead aVR (Figs 1, 5A, and 6)—it is theorized that this pattern of elevation is associated with LMCA obstruction. In pursuit of this goal, Yamaji et al [4] attempted to determine the ECG features of acute LMCA in the patient with ACS. The ECGs of 86 consecutive patients who experienced ACS were analyzed. Sixteen patients experienced LMCA obstruction, 46 patients experienced obstruction of the left anterior descending artery, and the final 24 patients were diagnosed with right coronary artery obstruction. In this study group, Yamaji noted the relationship between acute LMCA obstruction and ST-segment elevation greater than 0.05 mV in lead aVR. This electrocardiographic finding was present in 88% of patients with LMCA obstruction, as opposed to 43% of patients with left anterior descending obstruction, and 8% of patients with right coronary artery obstructions. From the study, the sensitivity of ST-segment elevation in lead aVR for predicting LMCA obstruction was determined to be 81% and the specificity to be 80%.

Rostoff et al [5] continued this line of investigation in a study that examined the relationship between ST-segment elevation in lead aVR and significant obstruction of the LMCA. The study population consisted of 150 consecutive patients who presented with ACS, of whom 46 were later determined to have LMCA involvement, whereas the other 104 patients experienced involvement of a different vessel. Upon retrospective analysis of their admitting ECG, Rostoff determined that the ST-segment elevation in lead aVR was 2 times more common in the patient population with LMCA involvement (69.6%), as opposed to those with involvement of a different vessel (34.6%).

Kosuge et al [6] undertook a similar study to identify an early, simple, and noninvasive predictor of LMCA or 3-vessel disease in patients presenting with ACS. He performed a retrospective analysis of the ECGs of 310 patients diagnosed with non-ST-segment elevation ACS who later underwent coronary angiography. Multivariate analysis of the ECG findings determined ST-segment elevation greater than 0.5 mm in lead aVR to be the strongest predictor of LMCA or 3-vessel disease, superior to the presence of ST-segment depression in other leads. Statistical analysis of this finding revealed a sensitivity of 78%, a specificity of 86%, a positive predictive value of 57%, and a negative predictive value of 95%. This reasonably high sensitivity allows the clinician to “rule-in” LMCA in the ACS patient with lead aVR abnormality.

In addition to aiding in the diagnosis of LMCA involvement in patients presenting with acute coronary syndromes, the finding of ST-segment elevation in lead aVR also has prognostic significance. In his second study on the topic, Kosuge et al [7] examined the admission ECGs and biochemical markers of 333 patients with diagnosed non-AMI acute coronary syndromes. Although Kosuge studied numerous ECG findings and a variety of biochemical markers, only ST-segment elevation greater than 0.5 mm in lead aVR on the admission ECG and elevated troponin T levels were determined to be independent predictors of adverse clinical events at 90 days, with an odds ratio of 13.8 and 7.9, respectively. Patients with ST-segment elevation in lead aVR and elevated troponin T levels were also determined to have the highest rates of both LMCA or 3-vessel disease and 90-day adverse outcome (62% and 47%, respectively). This conclusion that ST-segment elevation in lead aVR on admission ECG was the strongest predictor of adverse outcomes at 90 days in patients with non-AMI ACS, combined with its relation to LMCA or 3-vessel disease, highlights the diagnostic and prognostic significance of this electrocardiographic finding.

Additional prognostic information is obtained from lead aVR electrocardiographic presentations, as noted by the work of Barrabes et al [8]. Barrabes examined the prognostic significance of this finding by studying the initial ECG in 775 consecutive patients admitted with their first non-AMI ACS event. Barrabes found that in-hospital mortality increased in a stepwise fashion across increasing increments of ST-segment elevation in lead aVR. Of the study population of 775 patients, only 1.3% of the 525 patients without ST-segment elevation in lead aVR died, whereas 8.6% of the 116 patients with 0.05 to 0.1 mV of elevation died, and 19.4% of the 134 patients with greater than 0.1 mV elevation died. The odds ratio for death with the 2 varying degrees of ST-segment elevation was 4.2 and 6.6. Upon multivariate analysis, ST-segment elevation in lead aVR was the only variable from the initial ECG that was strongly associated with in-hospital recurrent ischemic events and heart failure, and was retained as an indepen-

dent predictor of death. Barrabes therefore concluded that the poorer outcomes in these patients should influence physicians to seek an early invasive approach in the treatment of patients with these ominous electrocardiographic findings.

Thus, ST-segment elevation in lead aVR in the patient with clinically suspected ACS suggests a strong possibility of LMCA obstruction. This finding is important in that such obstruction is associated with a markedly higher mortality rate and may be more amenable to mechanical

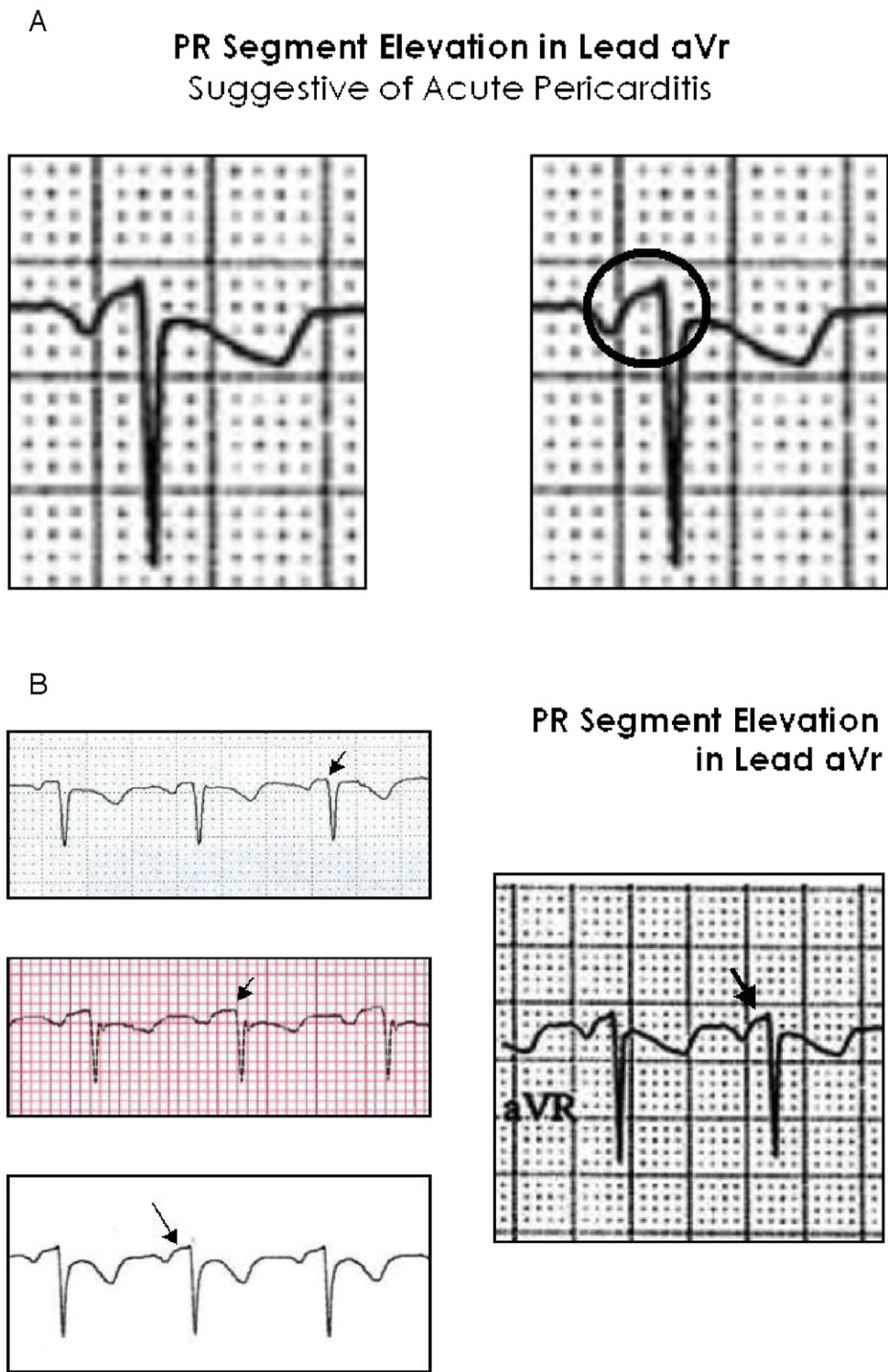


Fig. 7 PR-segment elevation in lead aVR suggestive of acute pericarditis. A, PR-segment elevation. B, Various examples of PR-segment elevation.

reperfusion strategies rather than fibrinolysis. Furthermore, such electrocardiographic finding is associated with significant risk of short-term adverse event.

3.2. Acute pericarditis

Lead aVR can also be used in the patient with suspected acute pericarditis. Two electrocardiographic findings in this lead are of diagnostic significance, including reciprocal ST-segment depression and PR-segment elevation. Acute pericarditis, a diffuse inflammation of the pericardial sac and superficial myocardium, has a number of underlying causes, including infection (primarily viral), immunologic disorders, uremia, trauma, malignancy, cardiac ischemia, and AMI. The ECG is a useful diagnostic study in the evaluation of the patient with suspected pericarditis, because it is abnormal in 90% of cases, with the changes reflecting superficial endomyocardial inflammation. Patients with acute pericarditis may manifest a range of electrocardiographic abnormalities, including ST-segment elevation and depression, T-wave inversion, and PR-segment changes, to name the most common findings. In particular, lead aVR can demonstrate 2 particular findings that can suggest the diagnosis, including ST-segment depression and PR-segment elevation (Figs. 2, 5B, and 7).

The commonly encountered electrocardiographic abnormalities in pericarditis are divided into 4 stages. Stage 1 is the most characteristic of the disease process and consists of ST-segment elevation of upward concavity in almost all leads plus corresponding ST depression in a concavity pattern in lead aVR. Stage 2 involves the return of ST segments to baseline and a decrease in the T-wave amplitude. PR-segment deviations are also common in this stage. In stage 3, the polarity of the T-wave changes with T-wave inversion was observed. Finally, stage 4 is the resolution of the abnormal electrocardiographic findings. Patients do not necessarily progress through these stages in an orderly fashion, nor does every patient have all, or even any, of these findings. In addition, an electrocardiographic finding of diagnostic significance that has not traditionally been included in the abovementioned stages is that of PR-segment elevation in lead aVR [9].

Abnormalities in lead aVR do not infrequently lead the clinician through the electrocardiographic evaluation, providing clinical information establishing the correct diagnosis. Numerous case histories illustrate this point well. For instance, Chew and Lim [10] discusses a case of a 25-year-old man with fever and chest pain; the 12-lead ECG revealed diffuse concave ST-segment elevation, along with PR-segment depression in leads II, V₅, and V₆, and

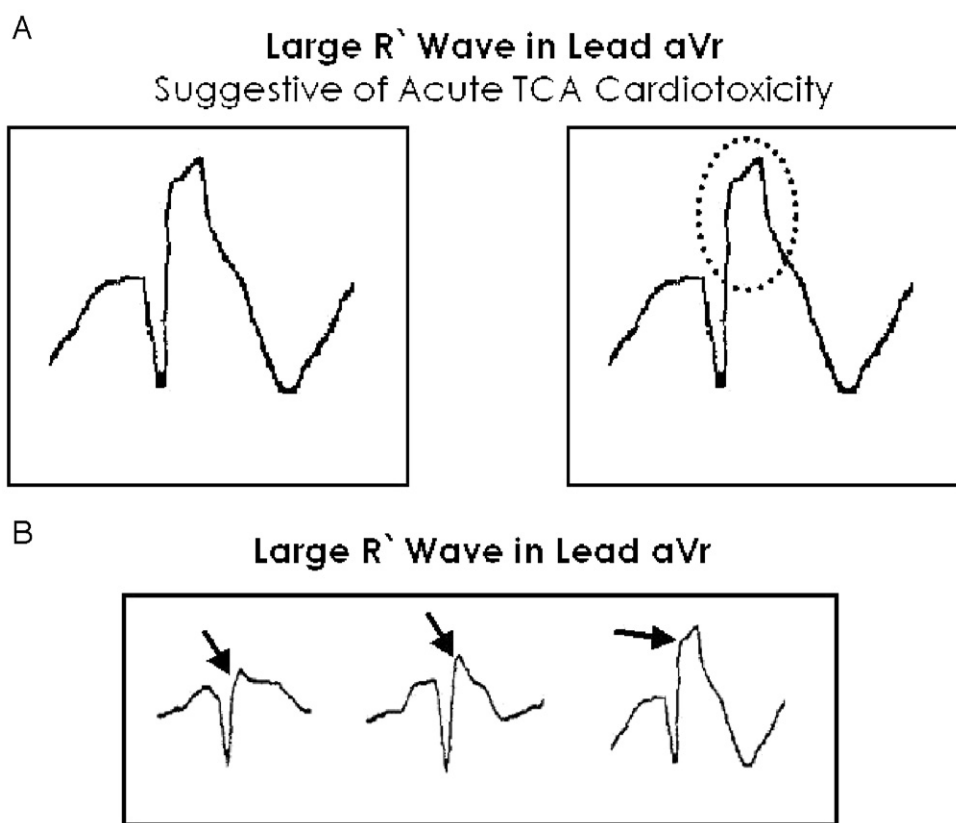


Fig. 8 Prominent R' wave in lead aVR suggestive of TCA cardiotoxicity. A, Prominent R' wave. B, Various examples of prominent R' wave.

PR-segment elevation in lead aVR. In another example, Sunkureddi et al [11] describes the case of a 39-year-old man with a history of transient ischemic attack, presenting with chest pressure. The ECG revealed ST-segment elevation in leads I, V₅, and V₆, concerning for a possible acute lateral wall myocardial infarction—yet, PR-segment elevation in lead aVR was also noted, which strongly suggested the correct diagnosis of acute myopericarditis. Finally, a report by Kristinsson et al [12] reviews the presentation of a 9-year-old child with chest pain. An ECG at that time revealed PR-segment depression in lead II with reciprocal PR-segment elevation in lead aVR as the only abnormalities; these findings suggested the correct diagnosis of pericarditis.

In a thorough review of the ECG in the patient suspected of myopericarditis, Spodick [9] studied the ECGs of 50 consecutive patients with unequivocal clinical evidence of acute pericarditis. Although ST-segment deviations have been considered to be characteristic of acute pericarditis, Spodick determined that transient deviations of PR segments occurred in 82% of patients, concluding that PR segment shifts are characteristic of the syndrome. Spodick noted that PR-segment elevation in lead aVR, likely representative of subepicardial atrial injury secondary to pericardial inflammation, is ubiquitous and characteristic of acute pericarditis, as are ST-segment deviations.

3.3. Tricyclic antidepressant ingestion

In addition to the utility of ST-segment elevation in lead aVR for diagnosing acute coronary syndromes and acute pericarditis, there are specific findings in lead aVR that suggest the diagnosis of TCA poisoning. The presentation of significant TCA ingestion is often nonspecific, with mental status abnormality as the primary initial finding; the ECG can reveal sinus tachycardia with QRS complex abnormality, including widening and changes in the terminal portion in leads I (deep S wave) and aVR (prominent R wave; Figs. 3, 5C, and 8). Although TCAs were previously the mainstay of pharmacotherapy for major depression, their use has now largely been replaced by that of selective serotonin reuptake inhibitors [13]. Yet, TCA poisoning remains a leading cause of morbidity and mortality involving pharmaceutical overdoses. In fact, TCAs were the second leading cause of medication overdose leading to death, as reported to the US poison centers in 1999 [14].

The ECG is an accessible, inexpensive, noninvasive bedside tool in the assessment of suspected TCA overdose, because electrocardiographic change typically precedes the development of clinically apparent neurologic and cardiac toxicity. Early electrocardiographic findings in tricyclic overdose include sinus tachycardia, QRS complex widening greater than 100 milliseconds, right axis deviation of 130° to 170°, and characteristic R-wave changes in lead aVR (Figs. 3, 5C, and 8). The R wave changes in lead aVR that

are indicative of tricyclic poisoning include an increased amplitude of the terminal R wave and an increased R wave to S wave ratio [15].

Individual case histories illustrate the use of the ECG in patients with significant TCA ingestion, including abnormalities in lead aVR. In one such presentation, Singh et al [15] reports a case in which electrocardiographic changes were used as a guide to determine the severity of TCA poisoning. The report describes a 63-year-old man with altered mental status who presented to the ED with physical findings indicative of anticholinergic toxicity. The initial ECG revealed a widened QRS complex of 140 milliseconds, a right axis deviation of 100°, and a prolonged QTc interval of 496 milliseconds. The ECG repeated 1 hour later revealed the additional finding of a prominent R wave in lead aVR, with an R wave to S wave ratio greater than 1.0. The ECG, interpreted within this presentation, strongly suggested TCA poisoning. A second history further illustrates the use of the ECG in these ill patients. McKinney and Rasmussen [14] present the case report of a 29-year-old woman who presented comatose to the ED 90 minutes after ingesting nortriptyline. The patient was hypotensive on presentation with an ECG showing a sinus tachycardia of 132 bpm, a QRS complex duration of 124 milliseconds, a prolonged QTc interval of 586 milliseconds, and a prominent R' wave in lead aVR. These ECG abnormalities were resolved within a day and the patient experienced a favorable outcome.

Liebelt et al [16] published a study in 1995 that compared QRS complex widening, a finding correlated to the diagnosis of TCA poisoning, with measurements of the R wave in lead aVR. Liebelt performed this investigation to determine which initial ECG findings most reliably identified the patient with significant cardiac (ventricular arrhythmias) and neurologic (seizures) toxicities. The study was a prospective cohort series of 79 patients who presented within 24 hours of TCA overdose; 16 patients ultimately experienced seizure, whereas 5 individuals had arrhythmia. On the initial ECG, Liebelt examined the maximal QRS complex width in a limb lead, along with the amplitude of the terminal R wave and the R wave to S wave ratio in lead aVR. Multiple logistic regression analysis demonstrated that R wave amplitude greater than 3 mm in lead aVR was the only electrocardiographic variable that could reliably be used to predict neurologic or cardiac toxicity. The R wave in lead aVR had an average measurement of 4.4 mm in patients who experienced either seizure or arrhythmia, as opposed to an average of 1.8 mm in those patients who did not experience these adverse events; the R wave to S wave ratio was 1.4 in significantly poisoned patients compared with those individuals without severe adverse effect with a ratio of 0.5. As a predictor of severe TCA poisoning, the sensitivity of the R wave greater than 3 mm in lead aVR was 81% and that of R/S wave ratio greater than 0.7 was 75%, compared with an 82% sensitivity for QRS complex width greater than 100 milliseconds. The positive predictive value

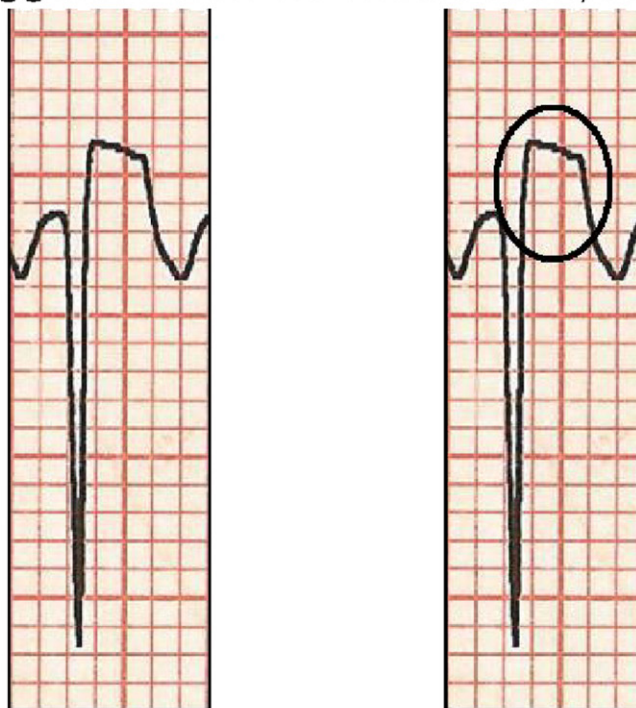
of the findings for significant toxicity in lead aVR was 43% and 46%, respectively, as opposed to 35% for a widened QRS complex.

Buckley et al [17] examined the relationship between electrocardiographic findings in psychotropic drug overdose

and the development of malignant arrhythmia. Buckley compared 39 patients with TCA overdose or the antipsychotic thioridazine with 117 control subjects who overdosed on another substance. Buckley concluded that the frequently recommended practice of using QRS complex widening

A

ST Segment Elevation Suggestive of AV Re-entrant Tachycardia



B

ST Segment Elevation in AV Re-entrant Tachycardia

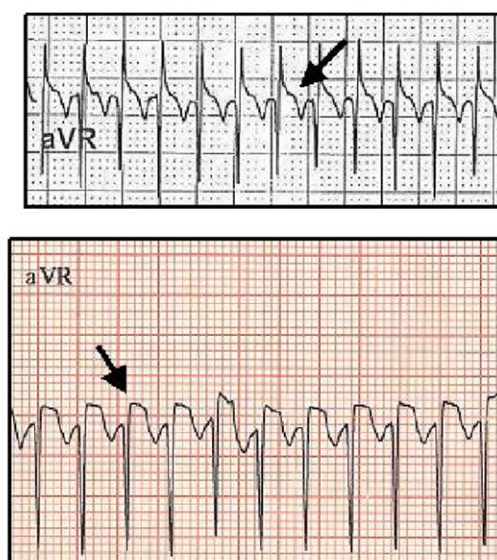


Fig. 9 Narrow QRS complex tachycardia with ST-segment elevation in lead aVR due to WPW-related tachycardia. A, ST-segment elevation. B, Various examples of ST-segment elevation in the setting of narrow complex tachycardia.

greater than 100 milliseconds as a predictor of adverse outcomes after TCA overdose was not supported by his data. The electrocardiographic finding most strongly related to the development of an arrhythmia was, in fact, an R wave to S wave ratio greater than 0.7 in lead aVR; this electrocardiographic finding was found to have positive and negative predictive values of 41% and 95%, respectively, for the prediction of significant toxicity.

3.4. Preexcitation syndrome-related narrow complex tachycardia

Perhaps one of the most widely accepted indications for obtaining an ECG is for the evaluation of active arrhythmia—the ECG not only provides the correct diagnosis of dysrhythmia but also yields information regarding the etiology or substrate of the arrhythmia. One particular dysrhythmia is the narrow complex tachycardia encountered in the WPW. The correct identification of this dysrhythmia—and its differentiation from other narrow complex tachycardias—certainly will impact not only the initial care of the patient but also his/her subsequent management. In a report, Ho et al [18] reported that ST-segment elevation in lead aVR (Figs. 4, 5D, and 9) assists in the ultimate identification of the mechanism of these narrow QRS complex tachycardias, including atrioventricular nodal reentrant tachycardia (AVNRT, ie, typical paroxysmal supraventricular tachycardia), AVRT (ie, WPW-related narrow complex tachycardia), and atrial tachycardia (AT). Ho studied 338 ECGs of patients presenting with narrow complex tachycardia, of which 71% were AVRT, 31% were AVNRT, and 16% were AT, and then analyzed ST-segment changes in various leads. Logistic regression analysis revealed that ST-segment elevation in lead aVR was the only factor that reliably could be used to differentiate among the various types of narrow complex tachycardia. Atrioventricular reciprocating tachycardia (WPW-related tachycardia) was differentiated from AVNRT and AT with a sensitivity of 71% and a specificity of 70%—ST-segment elevation in lead aVR was found to be strongly suggestive of WPW-related narrow complex tachycardia.

4. Conclusion

Since its advent in the late 19th century, the ECG has evolved into a clinical tool that provides valuable diagnostic information in a variety of settings. Although many physicians are attuned to the most characteristic electrocardiographic patterns for common illnesses, it is important that the subtleties of examining an ECG not be forgotten. It is especially important that lead aVR not be ignored as is common fashion, because it can provide essential diagnostic and prognostic information in a range of clinical presentations, as highlighted by the examples of LMCA disease, TCA poisoning, pericarditis, and WPW-related narrow complex tachycardia.

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