

Editorial



The Value of Prolonged QRS in Patients with Heart Failure and Cardiogenic Shock

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Conflict of Interest

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Cardiogenic shock (CS) is a condition of circulatory failure with a very high mortality rate. Previous clinical trials reported that the short-term mortality of CS reaches 50%.^{1,2)} Although the most common cause of CS is acute coronary syndrome, other heart diseases such as acute exacerbation of chronic heart failure, valvular heart disease, cardiomyopathy, and myocarditis can also cause the condition. Temporary circulatory support can play an important role in the complex process of managing the treatment of CS patients. However, even with the recent widespread use of temporary mechanical circulatory support, managing CS is still challenging and patient mortality remains high.^{3,4)}

CS usually complicates left ventricular dysfunction and heart failure. In a group of patients with acute heart failure (Korean Acute Heart Failure [KorAHF] registry), almost 4% had CS.^{5,6)} In this issue of the journal, the authors reported that prolonged QRS duration was significantly related to a higher 30-day in-hospital mortality in the CS patients from the KorAHF registry. The patients were divided into three groups according to the QRS duration with the cutoffs at 130 and 150 ms. The mortality of the patients with QRS \geq 150 ms was 43.7%, which was the highest among the 3 groups, followed by QRS values of 130–150 ms (33.1%) and <130 ms (24.9%). After adjusting the clinically relevant factors, the patients with prolonged QRS duration (\geq 150 ms) had 92% higher relative mortality compared to those with narrow QRS (<130 ms). The type of intraventricular conduction delay was not associated with prognosis.

Regarding chronic heart failure, the results of some previous clinical trials also suggest an association between prolonged QRS duration and poor prognosis.^{7,8)} In patients with acute myocardial infarction, after analyzing the Global Utilization of Streptokinase and t-PA for Occluded Coronary Arteries (GUSTO-I) clinical trial database, Hathaway et al. reported that prolonged QRS duration was associated with a poor outcome in patients with acute myocardial infarction. Most of the patients from GUSTO-I did not receive coronary revascularization.⁹⁾ White et al. reported that the correlation between prolonged QRS and poor prognosis was only present in patients who were medically treated, but not in patients with emergent revascularization in the CS setting (SHould we emergently revascularize Occluded Coronaries for cardiogenic shock trial; SHOCK trial).¹⁰⁾ In acute coronary syndrome, a higher QRS duration may reflect more severe and extensive damages to the myocardium and conduction system. Revascularization-related clinical factors may rapidly affect the condition of the patients in those circumstances and it seems plausible that initial QRS duration poorly correlates with prognosis in patients with acute myocardial infarction

and early revascularization. In CS other than acute coronary syndrome, the association between prolonged QRS duration and prognosis is not clearly determined.

Although the data from this journal issue was limited to a small population, the results focused on the prognostic impact of prolonged QRS duration in patients with CS complicating acute heart failure. The underlying pathophysiology linking QRS duration and poor prognosis in heart failure is not fully investigated, although possible hypotheses include mechanical dyssynchrony, and myocardial fibrosis. However, in the setting of CS, much more complex mechanisms such as ischemic insult in multiple organs, electrolyte imbalance, and the inappropriate loading condition of ventricles may explain the phenomenon.

When interpreting the trial results, the patient population should be considered. Previous clinical trials conducted in patients with CS generally had a very high incidence of acute coronary syndrome as an etiology. In the CardShock trial,¹¹⁾ almost 80% of the patients had the etiology of acute coronary syndrome. In this issue of the journal, 63.5% of the patients had the ischemic etiology of heart failure and the incidence of acute coronary syndrome may be lower, which is relatively lower than that of the contemporary shock trials. The difference may be attributable to the study population being based on the acute heart failure registry.

Early risk stratification is important for patients with CS because the condition is a medical emergency that still has a very high mortality rate. Although we have many scoring systems, the clinical yield may still be insufficient.¹²⁾ The standard 12-lead electrocardiogram is an essential test to detect an acute coronary event and fatal arrhythmias in patients presenting CS. Moreover, QRS duration from electrocardiogram may provide additional information to physicians in the busy setting of CS and heart failure.

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