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Original Article

Is accelerated idioventricular rhythm a good marker for reperfusion after streptokinase?



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ABSTRACT

Background: Accelerated idioventricular rhythm (AIVR) is a common arrhythmia observed in patients with ST segment elevation myocardial infarction (MI). It is not clear how much value AIVR has in predicting successful reperfusion, since there have been conflicting data regarding this in the past. Streptokinase (STK) even today is the commonest thrombolytic agent used in the public health care set-up in India.¹ Most data for the use of STK are from the 1990s, which had showed that at best it is effective in only 50% of patients in restoring adequate flow.² It is probable that with the current dual-antiplatelet loading dose regimen and other newer medications, this figure could be higher. Also, rescue angioplasty for failed thrombolysis is the standard of care now, unlike before. Hence, we need reliable non-invasive markers to judge successful reperfusion in the present era. While ST segment resolution is the standard marker for reperfusion used in thrombolytic trials, in several instances it is not definitive. An additional marker would thus be very useful, especially in such cases.

Methods: This was a prospective observational study carried out at a public teaching hospital. 200 consecutive patients with a diagnosis of acute MI who were given STK within 12 h of index pain were included. The STK dose was 1.5 million units, infused over 30 min; the ECG was again recorded after 90 min of completion of the infusion. Continuous ECG monitoring for the first 24 h of ICCU stay was performed and AIVRs during this period were documented. Early AIVR was defined as that occurring within 2 h of completing the STK infusion. Echocardiography was performed 24 h after presentation. The time course of AIVR was studied vis-a-vis the outcome of thrombolysis.

Results: AIVR was seen in 41% of the patients. Though AIVR was found to have low sensitivity (45%) and specificity (64%) as a predictor of successful thrombolysis, early AIVR was a reliable sign of successful thrombolysis ($p < 0.05$). The sensitivity (45%) of early AIVR was low; however, the specificity (94%) and positive predictive value (94%) were very good.

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Conclusion: AIVR is a common arrhythmia in the setting of STEMI receiving thrombolytic therapy. Early AIVR is more common with successful thrombolysis, with an excellent positive predictive value. Thus, early AIVR can be used as an additive criterion to ST segment resolution as a non-invasive marker of successful thrombolysis with STK.

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1. Introduction

AIVR was first described by Thomas Lewis in 1910. It is commonly observed in patients with ST segment elevation MI (STEMI), is generally a transient rhythm, mostly hemodynamically stable, and rarely requiring treatment. AIVR has been noted to be a marker of reperfusion, but conflicting data abound regarding the same.^{3–8} In the past, STK was the commonest thrombolytic agent used worldwide. Over the last two decades, newer thrombolytic agents and primary angioplasty (PAMI) have eclipsed STK in large parts of the world. As the cost of tissue plasminogen activator (t-PA) is manifold compared with STK, the latter continues to be the thrombolytic agent of choice in most public hospitals in India. Data pertaining to use of STK are mostly from trials done 2 decades ago. Older angiographic studies² have shown STK to be effective in only 50% of patients in restoring adequate coronary flow. In that era, loading with dual antiplatelets was not the norm, as it is now. Other medications often used currently such as nicorandil were not available then. Thus, there is a need to reassess the efficacy of STK in today's scenario. Moreover, for failed thrombolysis, rescue angioplasty is today the standard of care, while it was not so two decades ago. It is therefore crucial to noninvasively diagnose failed thrombolysis. This study therefore aimed at assessing whether AIVR is an indicator of successful reperfusion with STK.

2. Method

This study was carried out at a large teaching hospital in Mumbai. 200 patients admitted to the intensive care unit with acute STEMI who were administered STK were included. All patients were monitored by continuous ECG monitoring for 24 h. 12 lead ECGs were obtained on admission, 90 min after STK and on occurrence of AIVR. All patients were evaluated by echocardiography. The chi-square test of significance was applied for statistical analysis of AIVR in patients with successful and failed thrombolysis.

Exclusion criterion: Prior MI, bundle branch block.

Definitions: Successful thrombolysis – ST segment resolution to <50% from initial ST elevation in the lead showing maximum elevation initially (Fig. 1). AIVR – At least 3 consecutive ventricular complexes, which are faster than the sinus rhythm, but slower than 120/min (Fig. 2). Early AIVR: Occurring within 2 h of completion of STK infusion.

3. Results

Successful thrombolysis with STK was achieved in 113/200 patients (57%). Older STK trials have reported successful reperfusion varying from 59% to 82% in the past.² Overall, AIVR was observed in 82/200 (41%) patients. Demographic variables and cardiac risk factors are listed in Table 1. The patients with and without AIVR were comparable in terms of age, gender, MI location, and left ventricular ejection fraction (LVEF).

AIVR was seen in 31 patients (35%) with failed thrombolysis and 51 patients (45%) with successful thrombolysis ($p=0.17$) (Table 2). The sensitivity and specificity of AIVR for predicting successful reperfusion were found to be 45% and 64% respectively. Early AIVR was seen in 23 (28%) while late AIVR was seen in (72%) patients. Early AIVR was more common in successfully thrombolysed patients ($p < 0.05$) (Table 3). The sensitivity of early AIVR was low (45%); however, the specificity and the positive predictive value were excellent; of the 25 patients with early AIVR, 23 had successful thrombolysis.

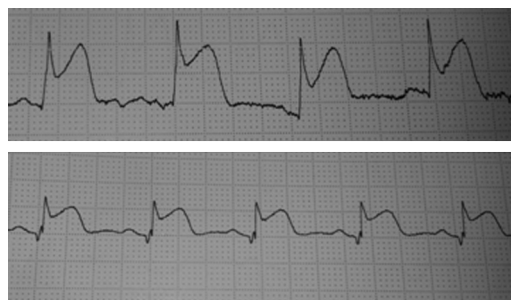


Fig. 1 – Successful reperfusion. Lead III from a patient with an inferior wall MI. Panel A shows ST elevation of 7 mm, measured 40 ms after J point. Panel B shows successful reperfusion with reduction of ST elevation to 3 mm.

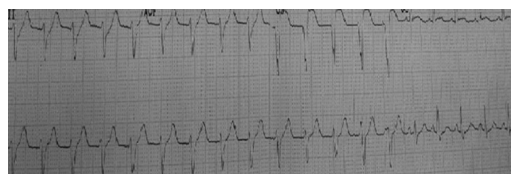


Fig. 2 – AIVR transitioning into sinus rhythm.

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