UAMS Journal Club Summary
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Procainamide Compared to Amiodarone for Treatment of Stable Ventricular Tachycardia

Clinical Bottom Line

The evidence regarding the superiority of either Amiodarone or Procainamide for the termination of stable ventricular tachycardia is sparse and largely of poor quality. To date, the PROCAMIO trial remains the only randomized control trial comparing the two medications. With the currently available data, it is difficult to conclude if either medication is superior. Until further studies of better quality are conducted, clinicians should use the medication with which they are most comfortable, but also be aware of other options should their first choice of therapy fail to successfully terminate a patient's ventricular tachycardia.

PICO Question

Is Procainamide superior to Amiodarone in the treatment of stable ventricular tachycardia.

P – Patients presenting to the ED with stable ventricular tachycardia
I – Administration of Procainamide
C – Administration of Amiodarone
O – Successful termination of ventricular tachycardia

Background

Ventricular tachycardia is an uncommon, but potentially fatal, arrhythmia with an extremely variable presentation. Patients can present anywhere along the spectrum of asymptomatic to cardiac arrest. When patients present hemodynamically stable and without signs of acute heart failure, this condition is typically referred to as stable ventricular tachycardia. While they may appear stable, these patients still require rapid intervention due to the high risk of rapid deterioration. Procainamide and amiodarone are two options for medications that can be used to terminate this arrhythmia, but the guidelines that dictate the use of these medications in this situation do not provide any recommendation as to which should be used as a first line choice.

Trial 1

Ortiz M, Martín A, Arribas F, Coll-Vinent B, Del Arco C, Peinado R, Almendral J; PROCAMIO Study Investigators. Randomized comparison of intravenous procainamide vs. intravenous amiodarone for the acute treatment of tolerated wide QRS tachycardia: the PROCAMIO study. Eur Heart J. 2017 May

Link:

https://pubmed.ncbi.nlm.nih.gov/27354046/

Validity Rating: Flawed study characteristics, minimal bias, moderate validity given poor sample size.

The Basics:
Investigators endeavored to perform the first multicenter randomized, prospective, open label study comparing 10mg/kg Procainamide vs 5mg/kg Amiodarone for treatment of stable ventricular tachycardia. This study was conducted over six years at 26 centers with a 74 patient study group.

Inclusion Criteria:
1. Regular rhythm with a HR > 120
2. Tachycardia with QRS > 120ms
3. Hemodynamic tolerance; Systolic > 90 , absence of dyspnea at rest, absence of peripheral hypoperfusion, no angina
4. > 18yo

Exclusion Criteria:
1. Poor Hemodynamics
2. Irregular rhythm
3. SVT or response to vagal maneuvers
4. Drug contraindications or allergies
5. Refusal for consent

Primary Outcomes:
1. Major Cardiac events with in 40 min of medication administration
    a. Signs of peripheral hypoperfusion
    b. CHF signs
    c. Hypotension
    d. Increased Tachycardia >20BPM
    e. Polymorphic V tach

Secondary Outcomes:
1. Acute termination of tachycardia
2. Total Adverse events with in 24 hours

Results:

Comparing the primary outcome of major cardiac events, Amiodarone caused 41% compared to 9% of patients receiving Procainamide (OR of 0.1 with a CI of [0.03-0.6]. Procainamide was found to terminate tachycardia at 40 minutes more often than Amiodarone 67% compared to 38% with an OR of 3.3 CI[1.2-9.3]. They had also found that there were more 24 hour adverse

events in the Amiodarone group compared to Procainamide 31% vs 18% with an OR 0.49 CI [0.15-1.61]. Investigators also performed a sub-group analysis in those patients with known structural heart disease. They found a 32% decrease in 24hour adverse events with an OR 0.17 CI[0.04-0.73]. Also in the sub group analysis they found higher termination rates in the procainamide treatment arms with a 26% improvement over amiodarone with an OR 2.94 CI[0.92-9.4].

Limitations/Bias:

While this study is the first of its kind on the topic, there were multiple issues. Blinding would improve the quality of the study however authors addressed the inherent difficulty of this. Despite the large number of affiliated institutions, there was minimal patient recruitment which ultimately ended in recruitment being halted for futility with less than 80 patients recruited over 6 years. Given the poor sample size, this lead to a low fragility index. Some of the study characteristics such as Amiodarone dosing of 5mg/kg compared to our dosing at UAMS is quite large and may have been a confounding factor in the increased rates of major cardiac events such as hypotension. Conversely the argument can be made that while decreasing the dose of amiodarone may mitigate some unwanted cardiovascular compromise it may also worsen the rates of arrythmia termination, further favoring Procainamide. Also they limited their study by failing to include more patient centered outcomes, which should be addressed in future studies.

Trial 2

Marill KA, deSouza IS, Nishijima DK, et al. Amiodarone or procainamide for the termination of sustained stable ventricular tachycardia: an historical multicenter comparison. Acad Emerg Med. 2010 Mar;17(3):297-306. doi: 10.1111/j.1553-2712.2010.00680.x.

Link: https://pubmed.ncbi.nlm.nih.gov/20370763/

Validity Rating:

High risk of bias, poor validity

The Basics:

This was a retrospective cohort study of patients with stable sustained ventricular tachycardia treated with amiodarone or procainamide. The study aimed to compare the effectiveness of these two medications in the termination of stable ventricular tachycardia. To do this, medical records of patients admitted to 4 hospitals in the northeast United States from 1993 to 2008 were reviewed to identify the diagnosis of sustained stable ventricular tachycardia and the medication used to treat this arrhythmia.

Inclusion Criteria:

All patients older than 16 years of age diagnosed with spontaneous stable sustained ventricular tachycardia were eligible for inclusion. The rhythm had to be proven as ventricular tachycardia using a specified hierarchy of evidence, and the patients had to have an order for amiodarone or procainamide listed in their chart.

Exclusion Criteria:
Patients with other wide complex tachycardias and those who developed ventricular tachycardia while in cardiac arrest or were receiving vasopressors were excluded from this study.

Primary Outcomes:
Termination of ventricular tachycardia within 20 minutes of the initiation of the infusion of either procainamide or amiodarone.

Secondary Outcomes:
Secondary outcomes of this study centered around medication safety and included decrease in BP to less than 90mmHg, decrease in heart rate to less than 50 beats/min, development of any new dysrhythmia, or change in patient status requiring new intervention or cessation of study medication infusion.

Results:
Response to treatment was known in 83 of 97 study medication infusions. Ventricular tachycardia was terminated in 13 of 53 amiodarone infusions (25%, 95% CI: 0.14 to 0.38) and 9 of 30 procainamide infusions (30%, 95% CI: 0.15 to 0.49). Almost half, 47/97 (48%), received another antidysrhythmic prior to the study medication. In patients who received the study medication first, 8 of 34 amiodarone infusions (24%, 95% CI: 0.11 to 0.41) and 4 of 7 procainamide infusions (57%, 95% CI: 0.18 to 0.9) resulted in successful termination of ventricular tachycardia. From this data the authors concluded that procainamide was not significantly more effective than amiodarone for the termination of spontaneous sustained ventricular tachycardia

Limitations/Bias:
The major limitation of this study is its retrospective nature and the bias that can be introduced in the analysis of the data. Other limitations included potential for bias in the medication that the physician treating the patient chose to use, the long time period over which the study included patients that spanned large changes in medical practice, and the study medication frequently not being the first medicine used to treat the patient's ventricular tachycardia.