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Review Article

Amiodarone versus Lidocaine Therapy in the Adult Cardiac Arrest Algorithm for VF/pVT/PEA/Asystole

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Abstract

Out-of-hospital cardiac arrests claim more than 300,000 lives each year in North America. The time of arrest plays a crucial role in the success of resuscitative efforts, as survival rates with favorable neurologic outcomes rapidly declines after about 16 minutes of cardiopulmonary resuscitation (CPR) [1].

Keywords: cardiac; algorithm; amiodarone; lidocaine

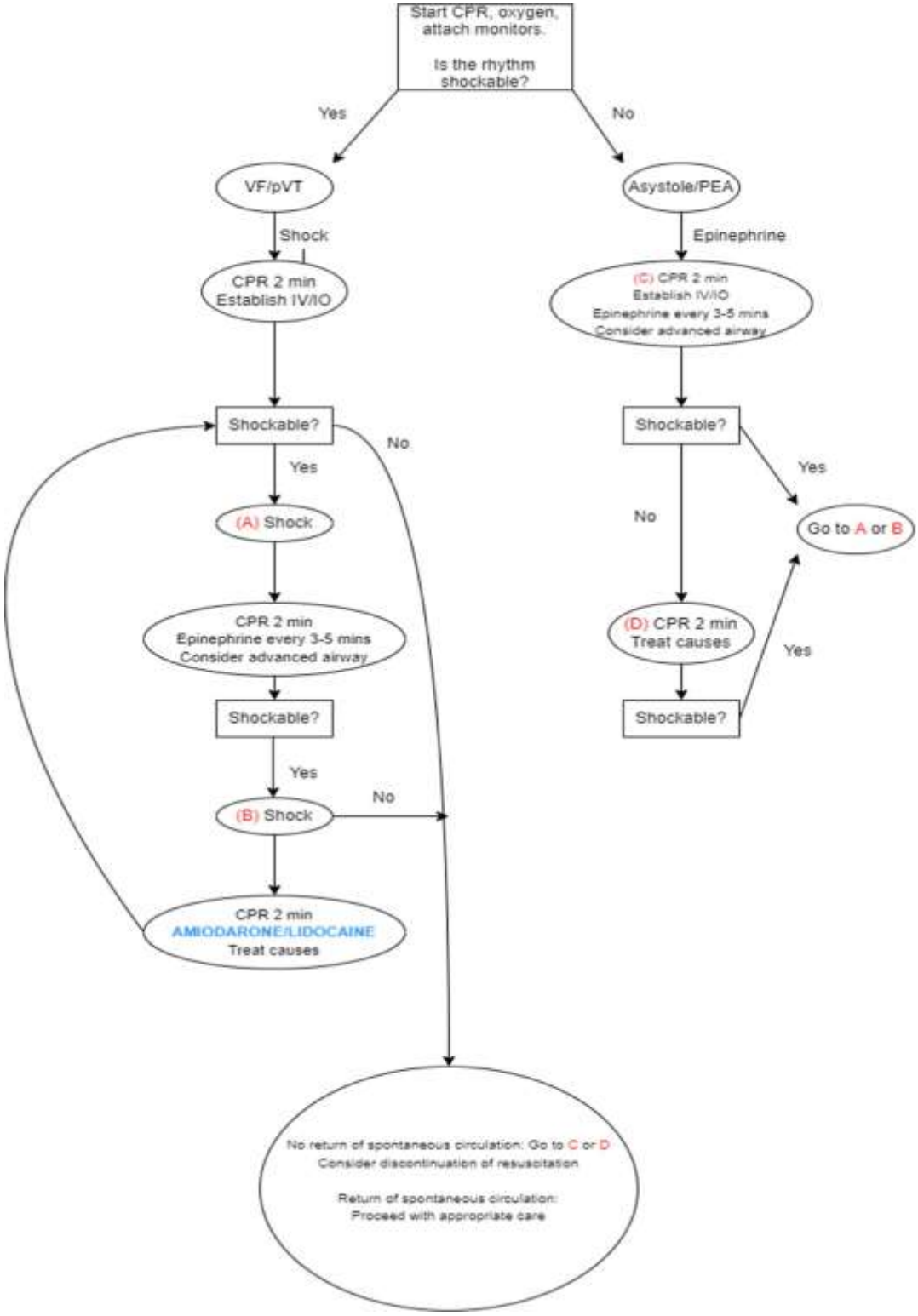
Antiarrhythmic agents are widely used in out-of-hospital cardiac arrests for shock-refractory pulseless electrical activity or ventricular fibrillation, but current data fails to show any proven benefits to survival in these patient groups. In 2015, the American Heart Association updated the Advanced Cardiac Life Support (ACLS) algorithm to include class III antiarrhythmic IV amiodarone 300 mg bolus first dose with subsequent 150 mg doses or the alternative class IB antiarrhythmic IV lidocaine 1.0 to 1.5 mg/kg first dose with subsequent 0.50 to 0.75 mg/kg doses for sustained ventricular fibrillation (VF) or ventricular tachycardia (VT) fractious to CPR, vasopressors, and defibrillation in the out-of-hospital setting. In the absence of contraindications and other factors in a patient's history (allergies, adverse reactions, etc.), itmay be difficult for a healthcare provider to decide which treatment may be more beneficial for any given patient during an emergent situation, whether in-hospital or out-of-hospital. Given that increasing number of shocks is associated with a decreased likelihood of survival [2], it stands to reason that it is paramount for a provider to promptly administer the most effective treatment in these critical moments. Many studies have been published since then comparing the two treatments, with several in 2016 raising the question of whether or not these treatments are even effective to begin with. This article will serve as a mini review of current literature comparing the efficacy of amiodarone and lidocaine as used in the ACLS algorithm since the 2015update.

The most oft-cited study when it comes to this conundrum is the Amiodarone, Lidocaine, or Placebo (ALPS) study of 3,026 patients, published by the Resuscitation Outcomes Consortium in 2016, which assessed the efficacy of amiodarone (974), lidocaine (993), or saline placebo (1059) administration by paramedics in non-traumatic out-of-hospital cardiac arrests with focus on proportion of those who survive to hospital discharge. In short, neither amiodarone nor lidocaine resulted in statistically significant improvements in hospital to discharge survival compared to placebo, citing 24.4% versus 23.7% versus 21.0% respectively [3]. Amiodarone recipients more frequently required temporary cardiac pacing compared to lidocaine or placebo. Neurologic outcomes post-discharge were similar amongst all 3 groups. Although these treatments yielded significantly higher survival rates before hospital admission in bystander-witnessed arrest, there was no clear benefit in unwitnessed arrests, reinforcing the urgency for prompt antiarrhythmic therapy. In emergency professional-witnessed cardiac arrest, survival rates to discharge with amiodarone more than doubled compared to placebo. For amiodarone, the difference in survival rate vs placebo was 3.2% (P=0.08), while for lidocaine, the difference was 2.6% (P=0.16). For amiodarone versus lidocaine, an even smaller difference was noted, sitting at 0.7% (P=0.70).

These findings were touched upon in Sugiyama's subsequent discussion on the necessity of amiodarone/lidocaine in August of 2016 [4], raising the question of whether these medications are truly effective. The study also found the rate of return of spontaneous circulation (ROSC) to be significantly higher with lidocaine than placebo, 39.9% versus 34.6%, with amiodarone showing less efficacy than lidocaine at 35.9%.

Several additional small studies have since been published, which may shed further light on the topic. In the United States, IV amiodarone is available in 2 approved formulations; one containing the vasoactive solvent polysorbate that has potential to cause hypotension, and the other including non-vasoactive captisol. In 2 distinct out-of-hospital, randomized controlled studies exploring adults with shock-refractory VF/pVT who received at least 3 shocks and epinephrine, amiodarone championed both lidocaine and the placebo [5]. The first study compared 246 patients who received amiodarone to a 258 patient placebo group and revealed the 300 mg bolus of polysorbate amalgam improved survival to

hospital admission compared to placebo, with an odds ratio (OR) of 1.6 and 44% survival versus 34% respectively (P=0.03) [6]. The other study analyzed 347 patients treated by paramedics within 25 + 8 minutes since cardiac arrest and found amiodarone yielded 22.8% of 180 patients surviving to hospital admission versus 12.0% of 167 patients given lidocaine (P=0.009; OR 2.17, 95% CI 1.21 to 3.83). If these patients were treated equal to or less than the 24 minute median medical intervention time, amiodarone still showed consistently higher survival rates at 27.7% versus lidocaine at 15.3% (P=0.05) [7]. While these studies both show promising efficacy for amiodarone, they were both conducted nearly 2 decades ago and may be unreliable given the rather long EMS response time, sparking necessity for a more current and expansive study to elucidate the preference for this drug over lidocaine.



ACLS Cardiac Arrest Algorithm 2020 derived from the American Heart Association ©.

In 2020, a retrospective study on 130 patients compared the efficacy of an amiodarone-first strategy vs lidocaine-first strategy, ultimately noting that the amiodarone-first group had a higher likelihood of terminating the aberrant rhythm within 3 shocks [8]. There were no differences, however, between the two treatments in 24h survival, ROSC, or favorable neurological outcomes. Additionally, this study was fairly limited in its statistical power given the small sample size, as well as the fact that 113 patients were used for the amiodarone-first strategy compared to 17 for lidocaine.

Conclusion

Though additional information is available, the consensus on this topic has changed minimally. The studies cited can also be interpreted in a variety of ways, in both the acute and post-discharge setting. Procedure bias may exist in the large-scale 2016 analysis of 3,026 patients, as this study did not standardize hospital care, suggesting possible treatment imbalances between therapy groups, however the trial was blinded, randomized, and the frequencies of coronary catheterization, therapeutic hypothermia, and discontinuation of life-sustaining regimens did not substantially differ between these groups. Because amiodarone and lidocaine are both noted to improve survival rate to the hospital, the updated ACLS protocols certifies readily improved survival rates by allowing emergency medical personnel administration of amiodarone or lidocaine in witnessed cardiac arrests [3]. However, there still appears to be no significant impact on overall outcome to hospital discharge and beyond, as supported by a 2017 meta-analysis of 8 RCTs involving 4,464 patients [10] as well as 2018 systematic review 14 RCTs and 17 observational studies [9], warranting further larger-scale studies on the topic.

References

1. Reynolds JC, Frisch A, Rittenberger JC, et al.(2013) Duration of resuscitation efforts and functional outcome after out-of-hospital cardiac arrest: when should we change to novel therapies? Circulation;128:2488-94. 10.1161/CIRCULATIONAHA.113.002408
2. Holmén J, Hollenberg J, Claesson A, Herrera MJ, Azeli Y, Herlitz J, Axelsson C. (2017) Survival in ventricular fibrillation with emphasis on the number of defibrillations in relation to other factors at resuscitation. Resuscitation. Apr;113:33-38. doi: 10.1016/j.resuscitation.2017.01.006. Epub 2017 Jan 18. PMID: 28109996.
3. Kudenchuk PJ, Brown SP, Daya M, Rea T, Nichol G (2016) Amiodarone, Lidocaine, or Placebo in Out-of-Hospital Cardiac Arrest. Resuscitation Outcomes Consortium Investigators. N Engl J Med. 374(18):1711. Epub 2016 Apr 4.
4. Sugiyama K, Kashiura M, Hamabe Y. (2016) Amiodarone and lidocaine for shock refractory ventricular fibrillation or ventricular tachycardia in out-of-hospital cardiac arrest: are they really effective? J Thorac Dis. Aug;8(8):E791-3. doi: 10.21037/jtd.2016.06.59. PMID: 27620170; PMCID: PMC4999737.
5. Ashish R. Panchal, Katherine M. Berg, Peter J. Kudenchuk, Marina Del Rios, Karen G. Hirsch (2018) American Heart Association Focused Update on Advanced Cardiovascular Life Support Use of Antiarrhythmic Drugs During and Immediately After Cardiac Arrest: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. 5 Nov 2018
6. Kudenchuk PJ, Cobb LA, Copass MK, Cummins RO, Doherty AM (1999) Amiodarone for resuscitation after out-of- hospital cardiac arrest due to ventricular fibrillation. N Engl J Med. 341:871–878. doi: 10.1056/NEJM199909163411203
7. Dorian P, Cass D, Schwartz B, Cooper R, Gelaznikas R, Barr A. (2002) Amiodarone as compared with lidocaine for shock-resistant ventricular fibrillation.N Engl J Med.; 346:884–890. doi: 10.1056/NEJMoa013029
8. Chih-Hung Wang, Wei-Tien Chang, Chien-Hua Huang, Min-Shan Tsai, Ping-Hsun Yu (2020). Outcomes associated with amiodarone and lidocaine for the treatment of adult in-hospital cardiac arrest with shock-refractory pulseless ventricular tachyarrhythmia. Journal of the Formosan Medical Association, Volume 119, Issue 1, Part 2,. Pages 327-334, ISSN 0929-6646.
9. Ali MU, Fitzpatrick-Lewis D, Kenny M, Raina P, Atkins DL, Soar J, Nolan J, Ristagno G, Sherifali D. (2018) Effectiveness of antiarrhythmic drugs for shockable cardiac arrest: A systematic review.Resuscitation.; 132:63. Epub 2018 Sep 1
10. McLeod SL, Brignardello-Petersen R, Worster A, You J, Iansavichene A, Guyatt G, Cheskes S (2017) Comparative effectiveness of antiarrhythmics for out-of-hospital cardiac arrest: A systematic review and network meta-analysis. Resuscitation. 121:90. Epub 2017 Oct 14.

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