Editorial

Oxygen Therapy—Use and Abuse in Acute Myocardial Infarction Patients

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In August 2008, an article was published in Heart entitled, “The Routine Use of Oxygen in the Treatment of Myocardial Infarction.” This article stimulated me to opine on this topic, which has been an interest of mine for many years.

Study Data

In their review, the authors found 51 potentially relevant studies. Unfortunately only 2 of these studies met the criteria of primary clinical outcome of mortality and secondary outcomes of infarct size, and occurrence of ventricular arrhythmias and opiate use. Neither of these studies had adequate statistical power to detect clinically important differences in other clinical outcome measures. Based on the authors’ systematic review and meta-analysis of randomized placebo-controlled trials of oxygen therapy in acute myocardial infarction, they concluded there is little evidence to determine the efficacy and safety of high flow oxygen therapy in acute myocardial infarction, and what evidence there is suggests that the routine use of high-flow oxygen in uncomplicated myocardial infarction may result in a greater infarct size and possibly increase the risk of mortality.

My View of the Issue

After reading this article, I reflected on my own position relating to the use of supplemental oxygen in acute myocardial infarction patients. I have been interested in this subject since the early 1970s. My interest was stimulated by discussions with Alistair Kenmure. At that time, Dr. Kenmure, a young cardiologist from Aberdeen, Scotland, was visiting the Johns Hopkins Cardiovascular Division where I was a young assistant professor. Dr. Kenmure and I discussed the subject of oxygen supplementation and hyperbaric oxygen in acute myocardial infarction patients, and he made the point that high-flow oxygen supplementation as well as hyperbaric oxygen could be potentially detrimental in animal models of acute myocardial infarction, as well as in humans. He and his colleagues have published several articles on this subject.

A Randomized Study of Supplemental Oxygen in Uncomplicated Acute Myocardial Infarction Patients

The study by Rawles and Kenmure was a parallel group, double-blind, controlled trial of oxygen therapy in uncomplicated myocardial infarction in which 200 patients with suspected myocardial infarction were randomized to receive either oxygen or compressed air by means of a medium concentration mask at a flow rate of six l/min for 24 hours.

Results

These investigators found that 9 out of 80 (11.25%) patients died in the oxygen group, and 3 out of 77 (3.8%) patients died in the compressed air group. Ventricular tachycardia occurred in 11 of 80 (13.8%) patients in the oxygen group and 5 out of 77 (6.4%) patients in the compressed air group. The findings of this study do not relate to myocardial infarction patients with heart failure, cardiogenic shock, or arrhythmias. In addition, medical therapy at the time of this study was not comparable to therapy in 2009.

What About Acute Myocardial Infarction Patients with Low Oxygen Saturations?

I don’t think anyone would argue against the use of oxygen in cardiac patients and pulmonary edema with low oxygen saturations. According to the American College of Cardiology (ACC) guidelines, it is reasonable to administer supplemental oxygen to acute myocardial infarction patients whose oxygen saturation is less than 90%. The level of evidence for this guideline is B, (ie, single randomized trial or non-randomized studies).

Why Worry About Supplemental Oxygen in Acute Myocardial Infarction Patients?

Those who use oxygen must recognize that it is a vasoactive substance; therefore, it is a drug and it does cost money. As pointed out by Davidson and colleagues, the adverse
responses to hyperoxia are greatest in patients with uncomplicated myocardial infarction, (ie, no heart failure or cardiogenic shock). 6

For instance, using supplemental oxygen in a patient who has a 95% oxygen saturation seems out of line with the main reason for using oxygen in any patient; that is, hypoxia. So, if there is no indication for its use it is hard to justify the use of supplemental oxygen in patients who are not hypoxic. This of course does not mean that oxygen saturations should not be monitored in an uncomplicated myocardial infarction patient, since patients with acute myocardial infarction can become hypoxic if there is a reinfarction or if there is a fluid balance problem resulting in pulmonary congestion.

Several studies are highly suggestive that hyperoxia is a potent vasoconstrictor stimulus to the coronary circulation, particularly, the microcirculation. 7 I have personally seen coronary angiograms that show a decrease in epicardial artery size after the patient inhaled 100% oxygen.

**Conclusion**

I must admit that when I see a patient with an uncomplicated myocardial infarction receiving supplemental oxygen whose oxygen saturation is 95%, I usually ask the housestaff and nurses why this patient is receiving oxygen. Most of the time the answer is, “Well, that’s the way it has always been done,” or the nursing staff thinks these patients need oxygen.

Another answer relates to guideline recommendations by the ACC that supplemental oxygen in the first 6 hours of an acute uncomplicated myocardial infarction is okay. 5 The level of evidence for this recommendation is C (based on expert opinion, case studies, and “Standard of Care,” (ie, the “Book of Common Wisdom”). As far as I am concerned, that is not good enough.

**References**


