FPIN's Clinical Inquiries

Supplemental Oxygen Therapy for Nonhypoxemic Patients with Acute Coronary Syndrome

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Clinical Question

What are the risks and benefits of supplemental oxygen therapy in nonhypoxemic patients being treated for acute coronary syndrome?

Evidence-Based Answer

No conclusive evidence demonstrates that routine use of supplemental oxygen therapy is associated with clinical benefit or harm in nonhypoxemic patients with acute myocardial infarction (MI). (Strength of Recommendation [SOR]: A, based on systematic reviews and meta-analyses of randomized controlled trials [RCTs].) Supplemental oxygen therapy in patients with normal oxygen levels does not reduce pain, cardiac enzyme levels, infarct size, or the risk of in-hospital or 30-day mortality, but it does not worsen any of these outcomes. (SOR: A, based on systematic reviews and meta-analyses of RCTs.)

Evidence Summary

A 2016 Cochrane review of five RCTs (N = 1,173) compared the effects of supplemental oxygen with room air in adults presenting with acute MI (suspected or proven ST segment–elevation MI [STEMI] or non-STEMI) within 24 hours of symptom onset.[1] All trials compared supplemental oxygen administered via mask or nasal cannula at rates of 4 to 8 L per minute with room air; follow-up periods ranged from four weeks to six months. Mortality was the primary outcome in all studies, but three also measured patient-reported pain or opiate use (as a proxy for pain) and biochemical markers (e.g., creatine kinase, troponin); two assessed risk of recurrent MI or ischemia. Pooled results from the trials showed no evidence of mortality benefit from the routine use of supplemental oxygen therapy in patients presenting with acute MI. An intention-to-treat analysis found that the relative risk (RR) of all-cause mortality was 0.99 (95% CI, 0.50 to 1.95); the RR increased to 1.02 (95% CI, 0.52 to 1.98) when only patients with confirmed MI were included. The included trials (n = 250) showed no improvement in pain with supplemental oxygen therapy (pooled RR = 0.97; 95% CI, 0.78 to 1.20). Analysis of two trials assessing the risk of recurrent MI or ischemia found a nonsignificant increase in patients who received supplemental oxygen therapy (RR = 1.67; 95% CI, 0.94 to 2.99). The heterogeneity of included trials was moderate, and the overall risk of bias ranged from low (for ischemia recurrence) to high (for mortality). The overall quality of evidence was low.

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A 2018 meta-analysis that included three RCTs performed since the 2016 Cochrane review compared the effects of supplemental oxygen therapy with room air in patients with suspected or confirmed acute MI (N = 7,998).[2] Pooled results showed that supplemental oxygen therapy did not reduce the risk of in-hospital mortality (odds ratio [OR] = 1.11; 95% CI, 0.69 to 1.77) or 30-day mortality (OR = 1.09; 95% CI, 0.80 to 1.50) in patients with normal baseline oxygen levels.[3] Among patients with confirmed MI, there was no difference between the groups in terms of troponin levels (mean difference: –0.06; 95% CI, –0.70 to 0.59) and infarct size (mean difference: 0.91; 95% CI, –1.39 to 3.20). Statistical heterogeneity between studies was low, and evidence quality was low to moderate.

Recommendations from Others

American College of Cardiology Foundation/American Heart Association guidelines for the management of STEMI[4] and non-STEMI[5] recommend supplemental oxygen therapy for patients with arterial oxygen saturation less than 90%, respiratory distress, or other high-risk features of hypoxemia, noting that there is no evidence of benefit in patients with arterial oxygen saturation of 90% or more. Similarly, the European Society of Cardiology's 2017 guidelines for the management of STEMI recommend against supplemental oxygen therapy in patients with oxygen saturation of 90% or more, noting that there is no evidence of benefit but potential harm from hyperoxia in patients with uncomplicated acute coronary syndrome who are not hypoxemic.[6]

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