Category: Adult nursing

Study type: Systematic review

RM title: Routine supplementary oxygen for the normoxic patient with suspected acute myocardial infarction is no longer warranted

Citation: Shimin Fu, Xia Lv, Qin Fang, et al. Oxygen therapy for acute myocardial infarction: A systematic review and meta-analysis. 2017; 74:8-14

Commentary

Implications for practice and research

- In the absence of robust evidence that oxygen is beneficial or harmful, patients with suspected acute myocardial infarction (AMI) should have oxygen therapy titrated to oxygen saturation levels in accordance with guidelines.
- A large randomised trial – DET0_2X-AMI – has recently reported no mortality difference at 365 days between normoxic patients with suspected AMI who received oxygen vs ambient suggesting supplementary oxygen can safely be withheld in such patients.

Context

Oxygen therapy has been a mainstay of emergency management of patients with suspected AMI for decades. In recent years systematic reviews have raised concerns that oxygen may be harmful to AMI patients, but the quality of evidence has been low. Following a Cochrane review in 2010 international guidelines adopted a more cautious approach to recommendations on oxygen than previously, reflecting the lack of evidence. Trials have been underpowered, inadequately performed, and failed to answer key questions on outcomes of interest to patients. The findings of a 'definitive' trial to address the uncertainty have recently been reported.

Methods

This systematic review was conducted to assess effectiveness and safety of oxygen for patients with AMI, and followed guidance from the Cochrane Collaboration and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. Primary outcomes were short term mortality and recurrent AMI; secondary outcomes were arrhythmia incidence and pain.

Findings

Five randomised trials involving 921 patients met inclusion criteria. Risk of bias was unclear for one trial and high for the other four. Oxygen administration was not associated with reduction in short-term mortality compared with room air (relative risk, RR: 1.08, 95% CI 0.31-3.74), and there was a significant increase in recurrent AMI in those receiving oxygen (RR: 6.73, 95% CI 1.80-25.17). Neither the incidence of arrhythmia or pain were reduced in

the oxygen group compared to the air group (RR 1.12, 95% CI 0.91-1.36 and RR 0.97, 95% CI 0.91-1.04 respectively).

Commentary

These findings are broadly consistent with previous Cochrane reviews on this topic. The search for the present review overlapped with publication of an updated Cochrane review including the same five trials but with a larger population (1173).[2] It is assumed that Fu et al. only analysed data from trial patients with confirmed AMI.

None of the included studies managed to answer the question 'is oxygen helpful or harmful in AMI?' Conducting a robust randomised trial in a sick population such as those with suspected AMI, is challenging, with the need to address issues such as how to obtain consent,[3] how to recruit in the prehospital setting where paramedics may have low exposure to patients with the condition of interest, and where the intervention may be administered for an hour before the patient reaches hospital (not to forget blinding, and the regulatory burden). Trials focused on 'hard' patient outcomes such as mortality need, in AMI, to be large and expensive – the risk being that trialists focus on surrogate outcomes such as quantification of biomarker release or imaging endpoints.[4]

It is possible to design, and secure funding, for robust, adequately powered trials in this challenging milieu, and to do so efficiently, reducing cost and burden on participants and researchers alike. As this commentary was being drafted, Hofmann and colleagues from Sweden reported findings from their registry-based randomised trial in which 6690 patients with suspected AMI and had an oxygen saturation $\geq$ 90% were randomised to supplementary oxygen or ambient air and followed up for 365 days. Randomisation and follow-up were performed using the Swedish Web-system for Enhancement and Development of Evidence-based care in Heart disease Evaluated According to Recommended Therapies (SWEDEHEART) registry, linked to administrative datasets. The primary end point of death from any cause within 1 year after randomization occurred in 5.0% of patients (166/3311) assigned to oxygen and in 5.1% of patients (168/3318) assigned to ambient air (hazard ratio, 0.97; 95% confidence interval [CI], 0.79 to 1.21; P=0.80).[1] This landmark trial has immediately influenced international guideline recommendations and will change practice worldwide.[5] Routine supplementary oxygen for the normoxic patient with suspected AMI makes no difference and is no longer warranted.

References

1. Hofmann R, James SK, Jernberg T, et al; DETO2X–SWEDEHEART Investigators. Oxygen Therapy in Suspected Acute Myocardial Infarction. *N Engl J Med*. 2017: doi: 10.1056/NEJMoa1706222. [Epub ahead of print]
2. Cabello JB, Burls A, Emparanza JI, Bayliss SE, Quinn T. Oxygen therapy for acute myocardial infarction. Cochrane Database Syst Rev. 2016 19;12:CD007160
3. Davies H, Shakur H, Padkin A, et al. Guide to the design and review of emergency research when it is proposed that consent and consultation be waived. *Emerg Med J*. 2014;**31**:794-5
4. Bikdeli B, Punnanithinont N, Akram Y, et al. Two Decades of Cardiovascular Trials With Primary Surrogate Endpoints: 1990-2011. *J Am Heart Assoc*. 2017;**6**: pii: e005285.

5. Ibanez B, James S, Agewall S, et al. European Society of Cardiology (ESC) 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. *European Heart Journal* 2017; **00:** 1–66 doi:10.1093/eurheartj/ehx393

Competing interests: TQ is an author of a Cochrane review on the same topic and receives funding for research from NIHR.

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