Renin–angiotensin–aldosterone system antagonists: perioperative management

The renin–angiotensin–aldosterone system antagonists include angiotensin-converting enzyme inhibitors, angiotensin II receptor subtype 1 blockers and direct renin inhibitors (e.g. aliskiren). Their beneficial cardiovascular and renal effects made them key components in the therapeutic armamentarium of common diseases. Most patients presenting for cardiac or non-cardiac surgery will be taking one or more of those drugs, and the alterations they cause in cardiovascular physiology may be problematic in the perioperative setting (Wolf and McGoldrick, 2011). The scant literature available on whether these drugs should be stopped or continued in the perioperative period and the lack of guidelines supporting either approach contributes to the wide variation in clinical practice, which is often based on personal experience and local policy.

This article compares the pros and cons of continuing or withholding renin–angiotensin–aldosterone system antagonists in the perioperative period in patients undergoing cardiac or non-cardiac surgery.

Stopping or continuing renin–angiotensin–aldosterone system antagonists preoperatively

In non-cardiac surgery, chronic angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker therapy might be associated with renal dysfunction and intraoperative hypotension. However, renin–angiotensin–aldosterone system blockade-related hypotension seemed to be responsive to simple measures and was apparently not associated with adverse outcomes (London, 2017).

Evidence on the impact of angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers on cardiac, respiratory or renal complications or mortality is contradictory and flawed with methodological limitations. Despite the recommendations to stop angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers 24 hours before surgery, it seems premature to change clinical practice based on the evidence currently available (Roshanov et al, 2017).

In cardiac surgery, although there is some evidence suggesting that chronic treatment with renin–angiotensin–aldosterone system antagonists is associated with an increased incidence of intraoperative hypotension, need for vasopressors and renal dysfunction, the benefits of withholding those drugs preoperatively remain controversial (Drenger et al, 2012; Zhang and Ma, 2015). Continuation of angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker treatment in the perioperative period may have beneficial cardiovascular and renal effects in patients with chronic heart failure.

Resuming renin–angiotensin–aldosterone system antagonists postoperatively

Evidence suggests that angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker therapy should be resumed as soon as safe following either cardiac or non-cardiac surgery considering concurrent medications, surgical complications and overall cardiovascular risk profile. Failure to restart angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker treatment because of concerns over renal function is not justified and may have a detrimental impact on postoperative outcomes (Mudumbai et al, 2014).

Conclusions

The evidence currently available is contradictory and based on observational studies of modest quality. Further evidence is warranted to better inform clinical practice. Individual patient assessment is paramount when deciding whether to stop or continue renin–angiotensin–aldosterone system antagonists in the perioperative period. **BJHM**

Miss Ana-Catarina Pinho-Gomes, ST2, Department of Cardiothoracic Surgery, Manchester Royal Infirmary, Manchester M23 9LT

Dr Martin Beshwer, Consultant Cardiac Anaesthetist, Department of Cardiothoracic Surgery, Manchester Royal Infirmary, Manchester

Dr Niall O'Keeffe, Consultant Cardiac Anaesthetist, Department of Cardiothoracic Surgery, Manchester Royal Infirmary, Manchester

Correspondence to: Dr A-C Pinho-Gomes (anacatarina.pinhogomes@gmail.com)

Drenger B, Fontes ML, Miao Y et al; Investigators of the Ischemia Research and Education Foundation; Multicenter Study of Perioperative Ischemia Research Group. Patterns of use of perioperative angiotensin-converting enzyme inhibitors in coronary artery bypass graft surgery with cardiopulmonary bypass: effects on in-hospital morbidity and mortality. Circulation. 2012 Jul 17;126(3):261–269. https://doi.org/10.1161/CIRCULATIONAHA.111.059527

London MJ. Preoperative administration of angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers: do we have enough "VISION" to stop it? Anesthesiology. 2017 Jan;126(1):1–3. https://doi.org/10.1097/ALN.0000000000001405

Mudumbai SC, Takemoto S, Cason BA, Au S, Upadhyay A, Wallace AW. Thirty-day mortality risk associated with the postoperative nonresumption of angiotensin-converting enzyme inhibitors: A retrospective study of the veterans affairs healthcare system. J Hosp Med. 2014 May;9(5):289–296. https://doi.org/10.1002/jhm.2182

Roshanov PS, Rochwerg B, Patel A et al. Withholding versus continuing angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers before noncardiac surgery. Anesthesiology. 2017 Jan;126(1):16–27. https://doi.org/10.1097/ALN.0000000000001404

Wolf A, McGoldrick KE. Cardiovascular pharmacotherapeutic considerations in patients undergoing anesthesia. Cardiol Rev. 2011 Jan;19(1):12–16. https://doi.org/10.1097/CRD.0b013e3182000e11

Zhang Y, Ma L. Effect of preoperative angiotensin-converting enzyme inhibitor on the outcome of coronary artery bypass graft surgery. Eur J Cardiothorac Surg. 2015 May;47(5):788–795. https://doi.org/10.1093/ejcts/ezu298

Perioperative medicine in a nutshell articles are edited on behalf of Trainees with an interest in perioperative medicine (TRIPOM) (www.tripom.org) by Dr S Sothisrihari, ST7 trainee, London North East