



McCall, P., Lafferty, B. and Shelley, B. (2020) Don't forget the right ventricle. *Journal of Cardiothoracic and Vascular Anesthesia*, 34(8), pp. 2283-2284.  
(doi: [10.1053/j.jvca.2020.02.023](https://doi.org/10.1053/j.jvca.2020.02.023))

There may be differences between this version and the published version. You are advised to consult the publisher's version if you wish to cite from it.

<http://eprints.gla.ac.uk/210480/>

Deposited on 18 February 2020

Enlighten – Research publications by members of the University of Glasgow  
<http://eprints.gla.ac.uk>

1 **Letter to the editor: Don't forget the right ventricle.**

2

3 **Authors:**

4

5 Dr Philip McCall<sup>1,2</sup> MBChB, FRCA, MD

6 Clinical Lecturer in Anaesthesia, Critical Care & Peri-operative Medicine

7

8 Dr Brian Lafferty<sup>1,2</sup> MBChB, FRCA

9 Research Fellow in Anesthesia, Critical Care & Peri-operative Medicine

10

11 Dr Ben Shelley<sup>1,2</sup> MBChB, FRCA, DipPaed, FFICM, MD

12 Honorary Clinical Associate Professor / Consultant in Cardiothoracic Anaesthesia and  
13 Intensive Care

14

15 1. University of Glasgow

16 2. Golden Jubilee National Hospital

17

18 **Corresponding Author:** Dr Philip McCall

19

20 [philipmccall@nhs.net](mailto:philipmccall@nhs.net)

21

22 Anaesthesia, Critical Care & Peri-operative Medicine Research Group

23 University of Glasgow

24 Level 2

25 New Lister Building

26 Glasgow Royal Infirmary

27 Alexandra Parade

28 G31 2ER

29

30 **Acknowledgements:**

31 None.

32

33 **Statement of funding:**

34 This study was supported by the 2012 Association for Cardiothoracic Anaesthesia and Critical  
35 Care Project Grant. Dr Shelley is supported by National Health Service Research  
36 Scotland/Chief Scientists Office Career Research Fellowship.

37

38 **Declarations of Interest:**

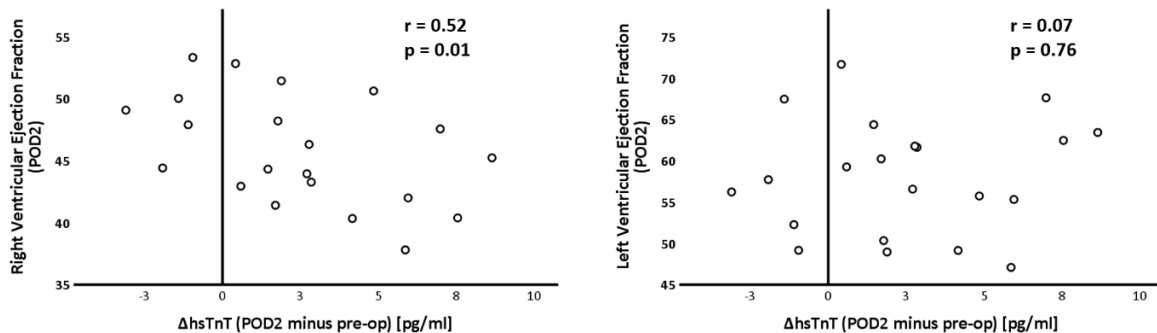
39 The authors have no conflicts of interest to disclose.

1 In their recent article, González-Tallada et al demonstrated an incidence of Myocardial Injury  
2 after Non-cardiac Surgery (MINS) of 27.3% in patients undergoing thoracic surgery<sup>1</sup>. MINS  
3 was defined as a post-operative Troponin I (TnI) level >0.04ng/ml (Higher than 99<sup>th</sup> percentile)  
4 without evidence of a non-ischaemic cause of TnI elevation. Independent association was  
5 demonstrated between occurrence of MINS and both; smoking and extent of resection  
6 (Lobectomy or Pneumonectomy compared to *other* types of resection). Unlike previous  
7 studies examining MINS, there was no association demonstrated between MINS and 30-day  
8 mortality<sup>2</sup>.

9 As suggested in their paper and the associated editorial<sup>3</sup>, right ventricular (RV) dysfunction  
10 may be implicated in the pathophysiology of post-operative troponin rises in patients  
11 undergoing lung resection. The importance of peri-operative RV dysfunction and its  
12 independent association with post-operative outcomes is increasingly being recognised in a  
13 non-cardiac surgery population<sup>4</sup>. A recent editorial in this journal highlighted the *“need for*  
14 *more studies examining the role of RV dysfunction in non-cardiac surgery”*<sup>5</sup>.

15 Our group has investigated peri-operative RV function in a cohort undergoing lung resection.  
16 Using cardiac MRI (a reference method for assessing RV function) and sequential analysis of  
17 biomarkers (high sensitivity TnT [hsTnT] and b-type natriuretic peptide[BNP]) we studied RV  
18 function in 27 patients undergoing open lobectomy<sup>6</sup>. This study demonstrated a deterioration  
19 in RV (but not left ventricular [LV]) function by post-operative day 2, that persisted to 2-  
20 months. There was also increases in pulsatile afterload resulting from the operative  
21 pulmonary artery. In this cohort, 12 patients (44.4%) fitted the criteria for MINS (with at least  
22 one post-operative hsTnT value above the 99<sup>th</sup> percentile). Interestingly, we were able to  
23 show association between changes in hsTnT and post-op RV function, but not LV function

1 (Figure 1). Additionally, there was also association between changes in BNP and RV function  
 2 but again, not LV function.



3

4 **Figure 1. Association between post-op changes in high sensitivity troponin T and cardiac**  
 5 **function (Right Ventricular Ejection Fraction and Left Ventricular Ejection Fraction).**

6 Pre-op = immediately pre-operatively, POD = postoperative day, hsTnT = high sensitivity troponin T.  
 7 Correlation statistic is Pearson's correlation coefficient.

8 In response to the question in the editorial by Dr Zhou; 'what do these elevations mean?' We  
 9 would suggest that they may, at least in part, reflect post-operative changes in RV function.

10 It has previously been demonstrated that more extensive lung resection is associated with  
 11 post-operative RV dysfunction<sup>7,8</sup>. This has been hypothesised to result from larger increases  
 12 in RV afterload associated with resection of larger proportions of the pulmonary vascular bed,  
 13 negatively impacting on RV function. It is plausible that the association between MINS and  
 14 extent of resection seen by González-Tallada et al represents the potential for larger increases  
 15 in RV afterload associated with pneumonectomy in comparison with smaller resections.

16 We feel that when trying to answer the questions about "is MINS clinically relevant" and "do  
 17 we need to intervene", the role of peri-operative RV dysfunction following lung resection  
 18 needs to be considered.

19 Yours Sincerely.

**1 References:**

- 2 **1.** González-Tallada A, Borrell-Vega J, Coronado C, et al.: Myocardial Injury After Noncardiac  
3 Surgery: Incidence, Predictive Factors, and Outcome in High-Risk Patients Undergoing  
4 Thoracic Surgery: An Observational Study. *Journal of Cardiothoracic and Vascular Anesthesia.*  
5 34:426-432, 2020.
- 6 **2.** Devereaux PJ, Biccard BM, Sigamani A, et al.: Association of Postoperative High-Sensitivity  
7 Troponin Levels With Myocardial Injury and 30-Day Mortality Among Patients Undergoing  
8 Noncardiac Surgery. *Jama.* 317:1642-1651, 2017.
- 9 **3.** Zhou EY, Valentine EA: Don't Go Chasing Troponins: Significance of Elevated High-Sensitivity  
10 Troponin I Levels After Thoracic Surgery. *Journal of Cardiothoracic and Vascular Anesthesia.*  
11 34:433-435, 2020.
- 12 **4.** Chou J, Ma M, Gyls M, et al.: Preexisting Right Ventricular Dysfunction Is Associated With  
13 Higher Postoperative Cardiac Complications and Longer Hospital Stay in High-Risk Patients  
14 Undergoing Nonemergent Major Vascular Surgery. *J Cardiothor Vasc An.* 33:1279-1286, 2019.
- 15 **5.** Silvertown N, Djaiani G: Right Ventricular Function and Perioperative Risk Assessment: The Time  
16 Has Come to Stop Being Sinister. *J Cardiothor Vasc An.* 33:1287-1289, 2019.
- 17 **6.** McCall PJ, Arthur A, Glass A, et al.: The right ventricular response to lung resection. *The Journal*  
18 *of Thoracic and Cardiovascular Surgery.* 158:556-565.e555, 2019.
- 19 **7.** Venuta F, Sciomer S, Andreotti C, et al.: Long-term Doppler echocardiographic evaluation of  
20 the right heart after major lung resections. *European Journal of Cardio-Thoracic Surgery.*  
21 32:787-790, 2007.
- 22 **8.** Wang ZH, Yuan JJ, Chu W, et al.: Evaluation of left and right ventricular myocardial function  
23 after lung resection using speckle tracking echocardiography. *Medicine.* 95:6, 2016.