Reviewer’s report

Title: Pericardial Closure with Extracellular Matrix Scaffold Following Cardiac Surgery Associated with a Reduction of Postoperative Complications and 30-day Hospital Readmissions

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Reviewer: Jan Andreasen

Reviewer’s report:

The authors performed an observational multicenter cohort study to evaluate the clinical outcomes of pericardial closure using a decellularized matrix patch comparing patients in the study cohort with a patient cohort from a national database using inverse probability weighting for adjustment of baseline covariates.

The study area is relevant as no consensus exist to whether or not the pericardium should be closed. Furthermore, different techniques for pericardial closure have been described both in animal studies as well as in clinical studies.

I have some comments and suggestions regarding the manuscript:

Title: The title of the paper "Pericardial Closure with Extracellular Matrix Scaffold Following Cardiac Surgery Reduces Postoperative Complications and 30-day Hospital Readmissions" indicates a cause-relationship between the use of the pericardial patch and a reduced proportion of patients with pleural and pericardial effusion and 30-day readmission. However, this study was an observational study, and this study design can only point towards "associations". The title should therefore be: "Pericardial Closure with Extracellular Matrix Scaffold Following Cardiac Surgery is Associated with a Reduction of Postoperative Complications and 30-day Hospital Readmissions".

Abstract: The authors provides the readers with an informative and balanced summary of what was done and what was found, but the conclusion should be changed in accordance with the comments given above regarding the title stating an association instead of indication a cause-effect between pericardial closure with ECM and complications.

p-values are given for some significant results but not for all significant results mentioned in the abstract. P-values could be mentioned for all the results.

Introduction: A sufficient background and rationale for the investigation is reported and a specific objective of the study is stated. A prespecified hypothesis is missing.

Methods: The study design is sufficiently described, but important definitions regarding clinical outcomes in the RECON group are missing. In the "Limitations section" the authors importantly acknowledge that definitions of outcomes may differ between the study groups.
How were pleural and pericardial effusions defined? Was only effusions needing treatment registered or were all effusion diagnosed by CT scans, x-ray of the chest or diagnosed by the use of ultrasonography registered?

How were new-onset postoperative atrial fibrillation diagnosed (single ECGs? continuous monitoring? Holter?) and defined (POAF of any length?). Were only POAF needing treatment registered?

How was postoperative bleeding measured? Total drainage amount? or number of patients re-operated due to bleeding?

Line 112: outcome measures included 30-day readmission ..... should be ... 30-day all-cause unplanned readmission... (In the result and discussion section it is mentioned that readmission means all-cause readmission)

Basic information regarding routine surgical techniques are missing. Were all CABG procedures performed on-pump? Was any pharmacological methods used as a routine in order to reduce postoperative bleeding and were other efforts used in general in order to reduce postoperative bleeding? Do the authors have any general information about this? This information is important in relation to the external validity of the study - even if the study was a multicenter study.

How were chest tubes used? Did the centers routinely place chest tubes in the pleura space if opened? As early chest tube removal is associated with pleural and/or pericardial effusion it would also be interesting to have information on when chest tubes were removed as a routine. Do the authors have any information about this? There were probably also some differences between hospitals.

Clear information are provided regarding data for the control group retrieved from the National Readmission database Cohort.

Statistical methods: The authors should explain how the study size was arrived at.

The authors used inverse probability of treatment weights to account for any potential imbalance of baseline demographic and comorbidities. I will leave the evaluation regarding how this specific type of propensity score technique was used to a statistical reviewer, but the idea using a propensity score model for balancing the distribution of measured potentially confounding covariates is appreciated.

Results: A total of 1,420 patients were enrolled in the RECON study. Why were only results from patients undergoing isolated CABG and valve patients ±CABG reported in the present study?

Do the authors have any information regarding the main reasons for re-admissions?

In line 230 it is stated that pericardial closure using ECM also reduced 30-day all-cause unplanned readmission. The implies a course-effect relationship, but only associations can be
identified in observational studies. I suggest that the text is modified to …pericardial closure is also associated with ….

Discussion: In the first section it is mentioned that 1,420 patients were enrolled and the readers will get the impression that all patients were included in the analyses which they were not. The authors should also mention the number of patients that were actually included in the analyses of the reported study.

Line 248-249: In this sentence indicates a cause-effect. The sentence should be modified to …. pericardial closure is associated with a significant reduction in the 30-day all-cause unplanned readmission rates. In lines 258-260 the authors are discussing a potential background for a cause-effect, which is appreciated.

Line 296-297: the text should be changed to indicate an association and not a cause-effect between closing the pericardium and a reduced incidence of pleural effusion.

Important limitations of the study are acknowledged by the authors.

A short discussion of generalizability of the study results outside USA would be nice. Databases may be more related to use of resources in USA compared to database information in e.g. Scandinavia.

Conclusion: The conclusion should be changed indicating an "association" between pericardial closure and the outcomes of interest, as an observational study does not provide data in order to support a conclusion indicating that pericardial closure was the cause of a reduced proportion of patients with complications.

References: References referred to in the text should be given in a single paragraph, and the reference style doesn't seem to comply with the guidelines for authors.

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