

Peer Review File

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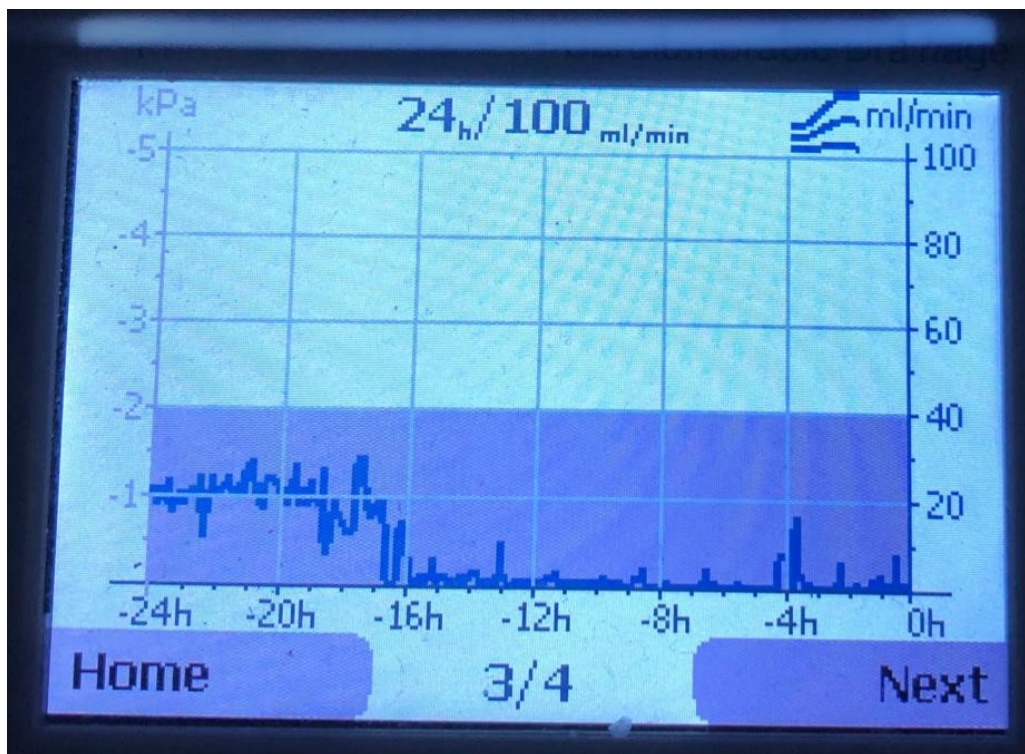
Reviewer A

Comment 1: How did you determine 20 cc over a 6 hour period for drainage system as your criteria? please explain.

Reply 1: We use Medela digital drains that indicate to us [second by second] what the current air leak is. There is a plot we see to ensure that the leak is below 20ml/min for more than 6 hours. The changes can be found in lines 86-89.

Comment 2: Can you also show a graph over time? meaning how many cases were used by digital drainage vs. not? and if that changed over time? meaning did you start digital drainage in 2012 or later and how those results were affected?

Reply 2: Thank you, a plot is shown below:



Since 2012, all our patients in our institution are managed with digital drains, hence all patients in our study are with digital drains. We have highlighted this on line 92.

Comment 3: In the methods, please describe more in detail the assessment and removal of the drain? do attendings look at this system? is this specifically any provider can weigh in and make the decision with this system?

Reply 3: Thank you, we used a strict protocol, which is easy to follow and assess using digital drains, allowing the empowerment of wider members of the surgical team [including junior trainees and specialist nurses] to make drain removal decisions. We have further expanded the methods to clarify this on lines 115-117 and this is further reinforced in the discussion on lines 177-180.

Comment 4: Was there more literature on Thopaz system in other institutions? it seemed a little sparse, thus not sure if this is really used that often?

Reply 4: This is a hugely useful point which we thank you for your highlighting. There has already been a good base of reporting for the use of Thopaz drain systems, of which Pompili et al. (2014) undertook a randomized trial of digital vs traditional drainage systems for lobectomy/segmentectomy patients across 4 international centres (UK, Europe, Asia, United States). We have highlighted the pertinent points of this study in the discussion, linking this into the benefit of reduced drain duration and length of hospital stay the Thopaz system brings. This study has been highlighted as excellent quality in a NICE (National Institute of Health and Care Excellence) guidance of Thopaz portable digital system for managing chest drains. The changes are found in lines 165-167.

Comment 5: Can you break down lobe vs. wedge and see if there were differences between lobe vs. segment?

Reply 5: Thank you for your question, but the primary outcome for protocol failure is the need to re-insert drains in 17 patients and the operating procedure was lobectomy n=12, wedge n = 1, pleural surgery n= 4. As the numbers are small, it is not possible for us to screen for any differences between lobectomy and segmentectomies.

Comment 6: Can you also include results based on your pleurodesis/blebectomy cases? and how those results compare to lung resection?

Reply 6: As for above comment.

Comment 7: Were these all cases all comers? can you distinguish from cancer vs. benign cases? i think there would be differences when stratified that may show that digital is not superior in some cases? also chemo/XRT or by stage stratification?

Reply 7: The protocol applied to all patients undergoing thoracic surgery that require a drain, excluding pneumonectomy and lung volume reduction surgery.

Comment 8: Can you also include by actual amount median amount of pleural effusion as it pertained to your results? do you have that data, I think that would be helpful to coincide pleural effusion amount with digital drainage and subsequent chest tube removal to see if there is a certain "ballpark" amount of effusion that would help readers?

Reply 8: Thank you for raising this comment, whilst our protocol solely assesses air leak for the criteria for drain removal, we agree that having a reference for fluid output assessed by the digital drains in pleural effusion is a useful reference for readers. As such, we have gone back through our database of patients and recorded the fluid output, both in actual amounts and relative to size in ml/kg. This is presented in the results, in lines 152-154.

Comment 9: How did you determine exclusion of sanguineous effusion vs. SS in your inclusion/exclusion criteria?

Reply 9: These patients were excluded by visual inspection (frank blood, or white chyle).

Comment 10: How did your results and reintervention rates differ over time?

Reply 10: We have previously published these results in JTD [Mesa-Guzman et al, 2015].

Comment 11: How did ERAS and different protocols used at your hospital over time get accounted for in your model?

Reply 11: Thank you for raising the importance of recovery after surgery, interestingly we do not have a formal ERAS programme at our hospital. As most of our patients had drains removed on the first post-operative day, our drain protocol fits with our overall post-operative recovery strategy. This is addressed in lines 221-225.

Comment 12: Was a regression analysis done to see if there were any independent factors associated with drainage removal? stage, benign vs. malignant, baseline pfts, i think that would add a lot to this paper

Reply 12: Thank you, the decision for drain removal is protocol based, so it is not based on any clinical features [or associations].

Reviewer B

Comment 1: The authors report a low re-intervention rate of 2.1% using their criteria for chest drain removal but a residual pneumothorax and pleural effusion rate of 17.7% and 9.4%, respectively. If possible, the manuscript could be strengthened by providing the indication for re-intervention (pneumothorax, effusion, SQ, etc...) and the associated symptom (SOB, pain, etc...).

Reply 1: Thank you for this valuable comment. The primary indication for re-intervention with chest drain was progressive or persistent pneumothorax, or surgical

emphysema. This has since been further detailed and highlighted on lines 206-208.

Comment 2: Noting the low re-intervention rate, the authors should highlight in the discussion and conclusion the presence of a residual pneumothorax or effusion after chest drain removal is not an absolute indication for re-intervention. This is an important point as early removal of chest drains can result in radiographic abnormalities that are clinically insignificant and do not require intervention.

Reply 2: Thank you raising this important comment. We unequivocally agree with this and hence have reinforced this pertinent point in the discussion, on lines 202-208.

Comment 3: In the paragraph between lines 170 and 180, the authors begin with ample references but go on to state that “the principle determinant of duration of drain is fluid” (lines 174-6) and “most air leaks resolve within the first day” (lines 178-9). The authors should provide references for these statements or consider re-wording them to reflect the variability in air leak duration based on patient factors, type of resection and intra-operative findings.

Reply 3: Thank you for raising this comment with regards to how this paragraph reads in the discussion. These comments are principally pertaining to our own experience (Mesa-Guzman et al, JTD, 2015), including our previous study on progressively permissive drain removal criteria with a median drain duration of 1 day, which we have now further referenced in the paragraph for clarity as well as clarifying the variability of air leak duration. The changes are seen in lines 191-194.