Peer Review File

Article information: https://dx.doi.org/10.21037/jtd-23-621

Review Comments

Reviewer A

Review of the paper entitled: "Management of complications after chest wall resection and reconstruction: a narrative review" by Savvas Lampridis, Department of Cardiothoracic Surgery, Hammersmith Hospital, London, UK. The authors effectively report the current literature about complications after chest wall resection focusing on the prosthesis issues and respiratory failure that are the most frequent and those that need more attention and clinical skills on their management. This paper could be considered as a guide to surgeons who are approaching to the chest wall resection and reconstruction, but I have some questions and suggestions that could improve the paper quality:

Comment 1: In the paragraph methods, I suggest including the type (RCT, prospective trials, retrospective, case reports and so on) and number of the subtypes of the papers included to understand the quality of the studies.

Reply 1: We thank the reviewer for the suggestion to provide more details on the types and numbers of studies included in the review. As this is a narrative review, we did not exclude studies based on design. We have expanded the Methods section, as suggested, to reflect this. Please note that the specific study designs are mentioned when individual studies are cited in the subsequent sections of the manuscript.

Changes in the text: We have revised the Methods section to include the above and other suggestions: "We conducted a literature search using the PubMed database on February 12, 2023. To identify newly published material, auto-alerts were enabled through March 15, 2023. The search incorporated the following terms: chest wall, thoracic wall, resection,

reconstruction, complication (Table S1). The results were filtered to include only articles published in English after 1980. No restrictions were applied regarding study design. We subsequently screened the titles and abstracts to exclude articles clearly outside the scope of postoperative complications, such as those focused solely on surgical techniques, prosthetic material comparisons, non-human studies, etc. The full-text versions of the remaining articles were obtained for further evaluation. All authors independently assessed pertinent publications, with any disagreements resolved through discussion. The search strategy is summarized in Table 1." See page 4, lines 78-88.

Comment 2: Regarding the paragraph management of complications, I suggest inserting two other important topics: the first is the use of VAC therapy in the management of wound and deep infections or dehiscence (for example, Rocco G, Martucci N, La Rocca A, La Manna C, De Luca G, Fazioli F, Mori S. Postoperative local morbidity and the use of vacuum-assisted closure after complex chest wall reconstructions with new and conventional materials. Ann Thorac Surg. 2014 Jul;98(1):291-6. doi: 10.1016/j.athoracsur.2014.04.022. Epub 2014 May 21. PMID: 24857855.) because VAC therapy is considered a valid and effective approach to these important issues after chest wall resection.

Reply 2: We thank the reviewer for the thoughtful suggestion to discuss the use of VAC therapy in managing wound complications after chest wall resection and reconstruction. We agree this is an important therapeutic approach and have added a new paragraph on this topic. We believe this addition appropriately addresses the use and benefits of VAC therapy for postoperative wound complications in this patient population.

Changes in the text: We have added the following paragraph: "Vacuum-assisted closure (VAC) therapy has become an effective option for managing wound infection following chest wall resection and reconstruction. By promoting drainage and accelerated healing, VAC therapy can enable infection control and facilitate coverage of defects with soft tissue flaps. A

retrospective study by Rocco *et al.* (26) demonstrated the utility of VAC therapy for treating local sepsis in a cohort of 86 patients who underwent resection of chest wall tumors and subsequent reconstruction with biologic or synthetic materials. Among 7 patients who developed local sepsis requiring reoperation, VAC therapy enabled complete wound healing in all cases over a median period of 14 months (range, 5- 60 months). Prosthesis removal was deemed necessary in 4 of these patients (3 cases of polytetrafluoroethylene mesh and 1 patient with porcine acellular collagen matrix). Therefore, VAC therapy can be a useful tool for controlling local infection following chest wall resection and reconstruction, potentially reducing the need for prosthesis removal. However, further research is warranted to clarify optimal protocols for integrating VAC therapy to reduce infectious complications in this clinical setting." See page 8, lines 167-181.

Comment 3: Another critical issue in the management of complications in complex chest wall reconstruction is the failure of rigid implant (for example, Berthet JP, Gomez Caro A, Solovei L, Gilbert M, Bommart S, Gaudard P, Canaud L, Alric P, Marty-Ané CH. Titanium Implant Failure After Chest Wall Osteosynthesis. Ann Thorac Surg. 2015 Jun;99(6):1945-52. doi: 10.1016/j.athoracsur.2015.02.040. Epub 2015 Apr 24. PMID: 25916874; Bongiolatti S, Voltolini L, Borgianni S, Borrelli R, Innocenti M, Menichini G, Politi L, Tancredi G, Viggiano D, Gonfiotti A. Short and long-term results of sternectomy for sternal tumours. J Thorac Dis. 2017 Nov;9(11):4336-4346. doi: 10.21037/jtd.2017.10.94. PMID: 29268502; PMCID: PMC5720975) that should be reported and discussed in a narrative review focused on surgical complications.

Reply 3: We thank the reviewer for the excellent suggestion to discuss the important issue of rigid implant failure after chest wall resection and reconstruction. We agree this is a critical complication that warrants inclusion in our narrative review. We believe the added paragraph and references appropriately address rigid implant failure as a complication to be aware of in

this patient population. Please let us know if any clarification or modification would further improve our response.

Changes in the text: We have added the following subsection: "Titanium implant failure: Titanium implants are often utilized in reconstruction of chest wall defects to provide stabilization and acceptable cosmetic outcomes. However, these rigid materials carry a risk of delayed failure, including fractures, displacements, and disconnects between components. To characterize titanium implant failure after chest wall osteosynthesis, Berthet *et al.* (32) reported outcomes from two centers using the STRATOS (MedXpert, Heitersheim, Germany) or Matrix Fixation System (DePuy Synthes, Raynham, Massachusetts, USA) for repair of defects spanning over three ribs and with or without sternal involvement. In a retrospective analysis of 29 patients undergoing oncological chest wall resection, the rate of implant failure identified on follow-up thoracic CT was 44.8%, although only 10.3% of patients were symptomatic. Interestingly, failures occurred after the fourth postoperative month, excluding technical factors. Anterior implant location and use of three or more devices increased failure risks. Similarly, Bongiolatti *et al.* (33) described fracture and dislocation of titanium bars in 1 of 11 patients following sternectomy and reconstruction with the STRATOS. This implant failure presented at 3 months with arrhythmia and chest pain, requiring bar removal and flap reconstruction. Collectively, these findings reveal delayed titanium implant failure is an important potential complication after chest wall reconstruction that warrants close radiologic monitoring and consideration of preventive techniques, such as limiting the number of implants used. Ongoing refinements in titanium osteosynthesis devices are warranted to help address this issue." See page 14, lines 320-340.

Comment 4: I suggest considering the division of the paper in some groups because chest wall resections are a heterogeneous group of procedure including sternectomy, chest wall resection associated with lung resection, small resections and wider resections, and each group has

complications that should be separately discussed.

Reply 4: We appreciate the reviewer raising the question of whether it would be beneficial to divide the manuscript into sections discussing complications for different resection subtypes (e.g., sternectomy, chest wall and lung resection, small resections, wider resections). We carefully considered this suggestion, as we agree there may be some differences in complication rates depending on the specifics of the resection. However, after deliberation, we have decided not to restructure the manuscript for the following reasons:

- Many studies analyze complications cumulatively across different resection subtypes due to the overall rarity of these procedures, so there is insufficient evidence to make meaningful comparisons between subtypes.
- The management principles for a given complication are unlikely to differ dramatically based solely on the resection subtype. The current narrative structure allows a concise yet comprehensive overview of managing complications globally.
- Creating sections for each subtype would disrupt the narrative flow and make the paper feel fragmented. There would also be redundancies, needing to repeat certain points in multiple sections.
- The current structure effectively covers management of complications following chest wall resection and reconstruction in a general sense, which aligns with the overall scope.

We believe the manuscript's current organization provides optimal continuity and breadth to overview the management of complications in this patient population as a whole. We have thus opted to keep the original structure intact rather than attempting to subdivide the paper by specific resection subtypes, though we recognize the merits of both approaches. Nonetheless, we have divided the section “Surgical site complications” into subsections (namely, “Infection”, “Hematoma, seroma, dehiscence”, “Flap complications” and “Titanium implant failure”) to make the information more scannable, digestible, and accessible to readers. Please

let us know if any clarification would be helpful regarding our decision to retain the initial narrative structure.

Reviewer B

The Authors have reviewed a large number of papers starting from the 80s. In this review the narration of chest wall resection and reconstruction complications is described section by section regarding the type of complication instead of complications regarding the type of resection and reconstruction. This methodology sounds interesting. I totally agree with the conclusions.

Comment 1: First of all, I would suggest to better describe the exclusion criterion of "clearly irrelevant content" considering I know several papers that are excluded with not so irrelevant content potentially. They might be excluded by introducing more clear and stronger exclusion criteria.

Reply 1: We appreciate the reviewer's suggestion to provide greater clarity regarding the exclusion criteria beyond just "irrelevant content". To better describe our exclusion process, we have revised the Methods section accordingly. We believe this additional detail gives more context about the types of papers excluded during our search process. Please let us know if any further clarification on the exclusion criteria would be helpful.

Changes in the text: We have revised the Methods section to include the above and other suggestions: "We conducted a literature search using the PubMed database on February 12, 2023. To identify newly published material, auto-alerts were enabled through March 15, 2023. The search incorporated the following terms: chest wall, thoracic wall, resection, reconstruction, complication (Table S1). The results were filtered to include only articles published in English after 1980. No restrictions were applied regarding study design. We subsequently screened the titles and abstracts to exclude articles clearly outside the scope of postoperative complications, such as those focused solely on surgical techniques, prosthetic

material comparisons, non-human studies, etc. The full-text versions of the remaining articles were obtained for further evaluation. All authors independently assessed pertinent publications, with any disagreements resolved through discussion. The search strategy is summarized in Table 1." See page 4, lines 78-88.

Comment 2: In the paper, there is a constant use of the generic term complication. I am confident that to be more detailed (i.e., infection, migration, granuloma, disruption, reaction, ventilatory impairment...) could be helpful for the reader. For this reason, I would suggest dividing each chapter into subsections, one each type of complication described with summarizing table if applicable.

Reply 2: We thank the reviewer for the suggestion to use more specific complication terminology throughout the manuscript when feasible. Upon review, we found that complications are already categorized where possible into specific types, such as infection, hematoma, respiratory failure, etc. The more general term "complication" is appropriately used when referring to collective analyses or multiple complication types together. We believe the terminology used is suitably precise given the nature of the data and analyses discussed. However, we greatly appreciate this feedback to ensure optimal clarity and specificity in our writing. Please let us know if there are any areas of the paper, we could improve by using more precise complication terms.

Reviewer C

Dear authors, it has been quite interesting reviewing the manuscript. It provides a nice narrative review about the topic, but I have found some details I suggest improving before considering the manuscript for publication. There is a major issue that appears once in a while along the paper that needs to be addressed: In my opinion there is enough material to focus only on pure chest wall resection instead of including tumoral situations involving major lung resections extended to chest wall resection. Apart from that, please find my comments for improvement:

Comment 1: Which is the order for references? They do not follow the order of appearance in the text nor alphabetical order.

Reply 1: We appreciate the reviewer raising this important question about the reference order. We would like to clarify that references #2-19 are included in Table 2, which is situated at the end of the manuscript, as per the journal's instructions for this initial draft. Having these references only appear later in the table has likely caused confusion regarding reference numbering. We have confirmed that citation numbering follows Vancouver style with sequential order of appearance. Please let us know if we can provide any further clarification on the reference order. We aim to ensure that the references are clear and understandable for all reviewers during the peer review process.

Comment 2: I am surprised that only one reference is used to account for the possibility of local complications (number 10). I would encourage authors to give a range of percentage of complications, instead, taken from the different papers.

Reply 2: We appreciate the reviewer's feedback to cite a range of surgical site complication rates reported in the literature. As per the suggestion, we have revised the text accordingly. Please let us know if we can provide any clarification or if you have additional suggestions for improving the revised text.

Changes in the text: We have modified the text as follows: “Surgical site complications are mainly related to the wound, prosthesis, or soft tissue flap and have been reported to occur at rates ranging from 4% to as high as 49% of patients undergoing chest wall resection and reconstruction (Table 2).” See page 5, lines 103-105.

Comment 3: If in reference number 20, percentage of complications is 3.1%, the previous rate of 36% is quite high. I refer to my previous comment.

Reply 3: We appreciate the reviewer's comment stemming from the seemingly contradictory

complication rates cited. However, the 3.1% rate from reference #20 refers only to re-interventions, whereas the now revised 4%-49% range refers to overall surgical site complications, including wound infections, hematomas, seromas, etc. Therefore, the 3.1% rate for re-interventions does not contradict the broader range for total complications. Upon re-reviewing the text, we believe the cited complication rates accurately reflect the literature and do not require revision. However, we recognize the potential confusion and thank you for the opportunity to clarify the difference in the specific *vs.* broad complication rates cited. Please let us know if we can provide any additional explanation around the appropriate complication rates for total surgical site issues *vs.* re-interventions specifically.

Comment 4: I am surprised that the authors highlight the complication rate of using the omentum for reconstruction using one single reference and highlighting it in the abstract. It is clear that omentum is quite useful in these settings when appropriately handled. Sometimes there is nothing else to apply. I would recommend changing the abstract and further discussing pros and cons of the omentum use based in a review of other relevant references.

Reply 4: We appreciate the reviewer raising this important concern about the balanced representation of evidence regarding omentum flap reconstruction. We agree that relying solely on one reference overstated the risks and that a broader review is needed for an impartial analysis. As suggested, we have revised the abstract to remove the statement identifying omentoplasty as an independent risk factor. In the manuscript, we have expanded the discussion of omentum flap complications and benefits by incorporating findings from additional studies. These revisions provide a more comprehensive and objective evaluation of the potential advantages and disadvantages of omentum flaps for chest wall reconstruction. We also discuss technical factors that may influence outcomes based on the current literature. We aim to give the reader an unbiased overview of the evidence. We are grateful for the opportunity to strengthen the manuscript's reliability through these changes.

Changes in the text: We have removed the following from the abstract: “Predictors of impaired wound healing include omentoplasty and tumor ulceration.” We have added the following in the main text: “Despite these technical considerations, other authors have reported more favorable outcomes with omental flaps, especially for the reconstruction of radiation-induced injuries of the chest wall (21). Indeed, the anti-inflammatory and angiogenic agents produced in the omentum can make it a suitable graft in this patient population, which carries a high risk of wound-healing complications (22).” See Page 6, lines 129-134.

Comment 5: Please clarify the meaning of sentence in lines 125 to 126. 13.6% what is referred to?

Reply 5: Thank you for catching the lack of clarity around the 13.6% figure cited. To address this, we have revised the sentence to better specify what this percentage refers to. Please let us know if the revised sentence now clearly conveys the intended meaning or if we can provide any other clarification.

Changes in the text: We have modified the text as follows: “Concerning tumor or chest wall ulceration, the authors reported a prevalence of 13.6% in their study cohort but did not provide further insights.” See page 6, lines 121-122.

Comment 6: Paragraph from line 152 to 167 is a mixture of ideas that need to be organized. I cannot understand why the treatment of a bronchopleural of esophageal fistula is included in a paper dealing with chest wall resection and reconstruction. I know that this situation can happen after lung cancer resection but not after a pure chest wall resection. In my opinion, the topic is broad enough to include discussions about different situations like lung resection, chest wall resection. My suggestion is not mixing concepts and focus on pure chest wall resection. Please clarify and modify accordingly.

Reply 6: We appreciate the reviewer thoughtfully pointing out that the passage discussing

mediastinitis, bronchopleural fistula, and esophageal fistula is not directly relevant to the scope of chest wall resection and reconstruction. As they rightly noted, these complications pertain to chest wall resections in the context of co-existing diseases, not as standalone procedures. We are grateful for the opportunity to improve the clarity and coherence of the narrative through this change. Please let us know if the removal of that passage sufficiently addresses your feedback, or if we should modify the response in any way. We aim to focus the discussion directly on the topic of interest and appreciate your help in improving the quality of our work.

Changes in the text: We have removed the following passage: “An omentum flap has been proposed to be more effective than a pectoralis major flap in controlling post-sternotomy mediastinitis (24,25). However, an omentum flap carries the risk of peritoneal infection within this context and may not be readily available in patients who had undergone previous laparotomy (22). Finally, intrathoracic transposition of muscle or omentum can be employed to buttress the repair of a bronchopleural or esophageal fistula, thereby mitigating further contamination (26).”

Comment 7: To me, the last comment about the need for a multidisciplinary approach to treating the patient is quite relevant. I would suggest including this idea in the abstract to highlight it.

Reply 7: We appreciate the reviewer's excellent suggestion to highlight the importance of a multidisciplinary approach in the management of complications following chest wall resection and reconstruction. We fully agree this is a critical point warranting attention. To address this feedback, we have added a relevant statement to the Abstract. Drawing attention to the need for coordinated, multispecialty care aligns well with the manuscript's aims. Please let us know if we can provide any clarification or additional detail regarding how we have addressed this feedback.

Changes in the text: We have modified the conclusions of the Abstract as follows:

“Conclusions: An emphasis on anticipating and judiciously managing complications of chest wall resection and reconstruction, alongside a coordinated multidisciplinary approach, can optimize outcomes for patients undergoing this intrinsically complex surgery.” See page 2, lines 42-45.

Comment 8: Please add the trademark symbol to all the commercial names included in the paper.

Reply 8: We appreciate the reviewer raising the question of including trademark symbols for commercial product names. Upon review of the journal's instructions to authors, we did not find a stated requirement for this stylistic formatting. The use of trademark symbols is also not standard practice in medical/scientific writing. Therefore, we have respectfully opted not to include trademark symbols throughout the paper, as we believe this convention would be unfamiliar and potentially distracting to readers. However, we are certainly willing to add trademark symbols if advised by the editor that it is required. We aim to format the paper according to the typical conventions in this field, unless instructed otherwise by the journal. Thank you for your understanding regarding our decision.

Comment 9: In this section, I miss a comment about the use of Vacuum system to deal with some infections and dehiscence of the wounds.

Reply 9: Thank you for the suggestion to discuss the use of VAC therapy for wound infections and dehiscence. We wholeheartedly agree this is an important therapeutic approach warranting inclusion. Please let us know if we can elaborate further on the role of VAC therapy or if the added paragraph sufficiently addresses its use for wound complications following chest wall resection and reconstruction.

Changes in the text: We have added the following paragraph: “Vacuum-assisted closure (VAC) therapy has become an effective option for managing wound infection following chest wall resection and reconstruction. By promoting drainage and accelerated healing, VAC

therapy can enable infection control and facilitate coverage of defects with soft tissue flaps. A retrospective study by Rocco *et al.* (26) demonstrated the utility of VAC therapy for treating local sepsis in a cohort of 86 patients who underwent resection of chest wall tumors and subsequent reconstruction with biologic or synthetic materials. Among 7 patients who developed local sepsis requiring reoperation, VAC therapy enabled complete wound healing in all cases over a median period of 14 months (range, 5- 60 months). Prosthesis removal was deemed necessary in 4 of these patients (3 cases of polytetrafluoroethylene mesh and 1 patient with porcine acellular collagen matrix). Therefore, VAC therapy can be a useful tool for controlling local infection following chest wall resection and reconstruction, potentially reducing the need for prosthesis removal. However, further research is warranted to clarify optimal protocols for integrating VAC therapy to reduce infectious complications in this clinical setting." See page 8, lines 167-181.

Comment 10: Treating broad flap failure because of necrosis/infection can be very demanding. I would suggest including a comment about how to treat this severe situation covering the exposed surface using biosynthetic material or tilapia derivatives like patients who are extensively burned.

Reply 10: We appreciate the reviewer raising the important issue of managing extensive flap loss resulting in large, exposed areas after chest wall reconstruction. We investigated the possibility of discussing bioengineered skin substitutes and tilapia derivatives as an alternative reconstructive approach, as suggested. However, our review found a lack of strong evidence substantiating their efficacy specifically in this context compared to standard grafts. Most data on these products are in other wound types, such as burns. Considering this limitation, we have respectfully opted to focus only on approaches with robust evidence in chest wall reconstruction in alignment with the scope of this narrative review. We would be happy to consider inclusion of information on bioengineered skin substitutes if the reviewer can provide

sources demonstrating evidence for their use following flap failure particularly in chest wall reconstruction. Otherwise, we hope the reviewer understands our decision to exclude discussion of materials without sufficient supporting data in this patient population and setting. Please let us know if we can provide any clarification or additional detail on our rationale.

Comment 11: I would include some comments about the utility of vascular doppler to follow the viability of the free flap during the initial days.

Reply 11: We thank the reviewer for the excellent suggestion to mention the use of Doppler ultrasonography for postoperative monitoring of free flap viability. We agree this technique is a valuable tool for assessing flap vascular status after chest wall reconstruction involving free tissue transfer. Please let us know if we can provide any clarification or additional detail regarding how we have addressed this comment.

Changes in the text: We have added the following: "Postoperatively, repeated physical examination of free flaps is imperative, which can be supplemented by Doppler ultrasonography to assess flap perfusion. This allows early identification of vascular compromise to preserve flap viability." See page 12, lines 271-273.

Comment 12: Again, when dealing with respiratory complications lung resection and chest wall resection is included. Please clarify whether you keep both entities or not within the text. Again, I suggest not covering both topics.

Reply 12: We appreciate the reviewer raising this question about the scope regarding inclusion of lung resection when performed concurrently with chest wall resection. However, we have respectfully decided to keep the manuscript unchanged by continuing to encompass evidence from studies where lung resection was performed along with chest wall resection when indicated. We believe including these cases is appropriate and clinically valuable for multiple reasons:

- One of the most common indications for chest wall resection is infiltration by lung cancer, which necessitates lung resection in addition to chest wall excision. Excluding these prevalent cases would significantly reduce applicability and utility for readers.
- The vast majority of published studies analyze complications collectively for patients undergoing lung resection together with chest wall resection, rather than investigating isolated chest wall resection alone. Excluding studies with concomitant lung resection would result in discarding a substantial volume of the most relevant evidence and data on this topic.
- We expect the overall principles of complication management are unlikely to differ dramatically based on whether lung resection was performed along with chest wall resection. The narrative flow and organization of the paper is logical and cohesive with both situations included and mentioned as needed.

In summary, we believe it is appropriate and important to retain the current scope, encompassing concomitant lung resection in order to provide an optimally useful overview of complication management following chest wall resection. We hope you understand our decision to keep the manuscript unchanged in this regard. Please let us know if we can provide any additional clarification or justification on why we believe it is suitable to include concurrent lung resection where clinically indicated.

Comment 13: Paragraph within lines 333 to 344 and lines 345 to 354 (references 9 and 17): I would add as many details about the position of the defect as possible. Probably the group of patients that did not undergo any reconstruction were those with posterior or minor defects that we anticipate have no influence on respiratory function. However, most patients with rigid reconstruction probably had an anterior (or anterolateral) and/or large defect. Therefore, groups are not comparable. If this is the situation, the conclusion is that anterior (or anterolateral) and/ or large defects once covered with a rigid system do not provide different respiratory

complications than minor defects that were not reconstructed or those middle size that received a non-rigid reconstruction. Please, review and comment.

Reply 13: We appreciate the reviewer thoughtfully pointing out the underlying differences between patient groups in the cited studies that complicate direct comparisons. Per your astute suggestion, we have added statements in these sections to acknowledge that patients undergoing rigid prosthesis reconstruction likely had larger and more anterior defects, while also noting the equivocal median ribs resected between groups. We agree providing this context better allows readers to interpret the data with appropriate caution given the probable uneven distribution of defect extent and location across the reconstruction groups. Please let us know if we can provide any clarification or additional detail regarding how we have addressed this important point.

Changes in the text: We have added the following: "Indeed, patients undergoing rigid prosthesis reconstruction in this study likely had larger and more anterior defects than those undergoing nonrigid or no reconstruction. The comparability of these uneven patient groups should be considered when interpreting the reported respiratory complication rates." See page 17, lines 384-388. We have also added the following passage: "However, patients in the rigid prosthesis group had a higher mean number of resected ribs (3.4 *vs.* 2.7; P<0.001), suggesting larger defect sizes, although median ribs resected was equivalent between groups. The potential impact of this underlying difference in defect extent should be considered when comparing respiratory outcomes between the rigid and flexible reconstruction groups." See page 17, lines 398-403.

Comment 14: Data about the Leuzzi study is also difficult to understand due to the presence of lung resection. Please add as much as possible data to clarify the results.

Reply 14: We appreciate the reviewer's suggestion to add more details on the Leuzzi *et al.* study to help clarify the context and results. Upon re-reviewing the original manuscript text,

we found that it already provides a concise, yet comprehensive summary of the key details needed to interpret the findings on respiratory function outcomes, including:

- The percentage of patients (15.4%) undergoing concurrent lung resection along with chest wall reconstruction.
- The lack of significant change in overall pulmonary function tests postoperatively.
- The significantly greater reductions in pulmonary function for patients with *vs.* without concomitant lung resection.
- The impact of defect location but not number of ribs resected on pulmonary function changes.

As the original text summarizes the critical aspects of the study population and results, we believe no additional details need to be added. Including further specifics could be redundant without enhancing clarity. We aimed to balance brevity and key contextual details when discussing this study's methods and findings. However, we are extremely appreciative of the reviewer identifying this section for additional review. The feedback enabled us to re-confirm the completeness of the original text in summarizing the necessary details from Leuzzi *et al.* We are grateful for the reviewer's dedication to ensuring appropriate clarity for readers on this topic. Please let us know if we can provide any clarification or elaboration regarding the original text summary. Otherwise, we believe the current information aptly elucidates the context and findings from this study.

Comment 15: Also, data from reference 5 is controversial. How many of those patients with a flap were in the ICU for flap stabilization instead of being for respiratory complications? It is not unusual that plastic surgeons require at least one more day of mechanical ventilation to keep the patient stable hemodynamically after the procedure. This time can sometimes be extended because of problems in the flap. Therefore, again, more details are needed to properly interpret the results.

Reply 15: We appreciate the reviewer raising this important point. We have further clarified in the text that the increased respiratory support and ICU stay for patients with flaps versus those without flaps may be partially attributable to the greater complexity of operations necessitating soft tissue reconstruction, rather than isolated effects of the flaps themselves.

Changes in the text: We have added the following: “More extensive resections could reasonably increase the need for postoperative respiratory support, irrespective of flap coverage. In any case, the clinically significant difference in respiratory support between these patient groups underscores the importance of careful operative planning when muscle or myocutaneous flaps are anticipated for chest wall reconstruction.” See page 20, lines 454-459.

Reviewer D

Congratulations to the authors for the good work done. Nice review on the management of complications after chest wall resection and reconstruction with good literature search. Upon completion, I also suggest viewing this work “Reconstructive options of the chest wall after trauma: a narrative review" Divisi D. *et al.* DOI: 10.21037/asj-22-19 AME Surgical Journal”. Complications are always a difficult topic that no one wants to highlight in their case studies, but on which experience allows for general improvement. Good writing with minimal need for revision of the language. Great training tool.

Reply: We thank the reviewer for recommending the narrative review by Divisi *et al.* on reconstructive options after chest wall trauma. Upon reviewing this article, we agree it provides a high-quality overview of various techniques for reconstruction following traumatic injury to the chest wall. However, after careful consideration, we determined the work does not closely align with the aims and scope of our own review focused specifically on management of postoperative complications after chest wall resection and reconstruction. Since our paper centers on evidence-based strategies for preventing and treating complications in this context, as opposed to a review of reconstruction techniques following chest wall trauma, we concluded

the work suggested by the reviewer does not warrant direct citation within our manuscript. We do appreciate the reviewer highlighting this related paper, which provides excellent discussion of options for chest wall repair after trauma, and we are grateful the reviewer took the time to suggest additional relevant literature for our consideration.

Reviewer E

Comment 1: The biggest concerns after soft-tissue only reconstruction are paradoxical breathing and flail chest. Are there any reports on these?

Reply 1: We thank the reviewer for raising the important issue of flail chest and paradoxical breathing. We agree these potential complications warrant further discussion. In response to your comment, we have added a new paragraph pertaining to these issues. Please let us know if you have any additional feedback or suggestions on this topic.

Changes in the text: We have added the following paragraph: "Although infrequently reported, flail chest and paradoxical breathing motion are important potential risks following chest wall resection and reconstruction, which can lead to significant respiratory morbidity. Patients at greatest risk are those undergoing large resections, especially of the anterior or lateral chest wall. Weyant *et al.* (9) observed paradoxical motion in 2 patients after total sternectomy and rigid reconstruction, as well as in 1 patient following subtotal sternectomy. All these patients required prolonged mechanical ventilation, with 2 needing tracheostomy and 1 dying from respiratory failure 3 months postoperatively. Comparable results were reported in a retrospective analysis of 71 patients undergoing resection of primary chest wall tumors or lung cancers with thoracic wall invasion (35). Of those, 36 patients were not reconstructed, 33 patients underwent prosthetic stabilization (in 6 cases with the additional use of muscle flaps), and 2 patients underwent reconstruction with muscle flaps only. Flail chest developed in 9 patients, 6 of whom had not undergone chest wall reconstruction. The authors found a significant correlation between defect location and flail chest incidence, with anterior and

lateral areas being most critical. Patients undergoing prosthetic stabilization of these high-risk defects exhibited lower rates of flail chest compared to those without reconstruction. Furthermore, acute respiratory complications occurred in all non-reconstructed patients after resection at critical chest wall sites, compared to only 5.7% of those with reconstruction. In summary, current evidence indicates anterior or lateral chest wall defects and those spanning 3 or more ribs, unless covered by the scapula, typically warrant prosthetic reconstruction to maintain rigidity and minimize respiratory morbidity. In severe cases of postoperative respiratory dysfunction, reoperation for prosthetic reconstruction, especially with rigid materials, should be considered to improve chest wall mechanics, although evidence to guide specific indications is lacking." See page 21, lines 482-506.

Comment 2: Are there any reports of patients with only soft-tissue reconstruction who developed severe postoperative respiratory problems and required rigid reconstruction? Please, elaborate on it.

Reply 2: Thank you for raising the excellent question about rigid stabilization potentially becoming necessary in patients with severe respiratory issues after initial soft tissue reconstruction. We reviewed the literature seeking evidence on this specific scenario but were unable to find robust data directly documenting cases requiring conversion from soft tissue repair alone to rigid materials due to postoperative respiratory complications. However, we agree with the premise that in severe situations, rigid stabilization could plausibly improve chest wall mechanics and lung function compared to soft tissue coverage alone. Given the lack of clear reports, criteria for when to consider revision are uncertain. But we have incorporated a statement in the revised manuscript text noting that rigid stabilization may be beneficial in some cases of major respiratory dysfunction following soft tissue reconstruction, though indications remain unclear. We appreciate you bringing up this clinically relevant consideration, which led us to acknowledge the potential role of rigid materials for salvage

procedures when initial soft tissue repair fails to provide adequate chest wall rigidity and respiratory function postoperatively. Please let us know if you have any other feedback or thoughts on this topic.

Changes in the text: We have added the following sentence: "In severe cases of postoperative respiratory dysfunction, reoperation for prosthetic reconstruction, especially with rigid materials, should be considered to improve chest wall mechanics, although evidence to guide specific indications is lacking." See page 22, lines 503-506.

Reviewer F

This review provides a valuable overview of the management of complications following chest wall resection and reconstruction and highlights the need for ongoing research in this area. The discussion of minimally invasive techniques is fascinating and suggests that these approaches may potentially reduce the incidence of complications in the future. I have several questions.

Comment 1: The authors focused on postoperative complications in the review. Are there any specific factors that increase the risk of developing postoperative complications following chest wall resection and reconstruction?

Reply 1: We appreciate the reviewer raising the important question of specific factors that may increase the risk of complications following chest wall resection and reconstruction. In our original manuscript, we briefly touch on major patient and operation-related factors associated with increased risks of surgical site complications (tumor ulceration, omentoplasty) and respiratory complications (number of resected ribs, concomitant lobectomy). However, as the reviewer astutely points out, we did not provide a comprehensive overview of potential preoperative risk factors across other domains, such as patient comorbidities, performance status, nutritional status, age, etc. Upon careful consideration, we decided not to significantly expand the discussion on preoperative risk factors because it could detract from the intended

focus of this narrative review, which is specifically the management of postoperative complications rather than prediction. Since we aimed to provide a targeted synthesis of the evidence guiding prevention and treatment of complications after chest wall resection and reconstruction, we believe extensively delving into preoperative risk assessment would not align well with the scope of this paper. However, we agree that preoperative risk stratification is a crucial component of optimizing outcomes for this patient population. We appreciate the reviewer raising this issue, which highlights an important potential area for separate, in-depth analysis in future research. Please let us know if you have any other feedback regarding the focus and structure of our manuscript.

Comment 2: The authors described as follows. “Chest wall resection and reconstruction is associated with high morbidity, with as many as 59% of patients developing postoperative complications.” (Page 20, line 440-441) I think this morbidity rate is slightly high. What are the reasons for the high complication rates in recent studies? Why not describe the range? Please provide the references on which you based your statement.

Reply 2: Thank you for catching our overly specific statement about postoperative morbidity rates after chest wall resection and reconstruction. You make an excellent point that citing the full range of rates documented across studies provides important context, rather than a single percentage. Please let us know if you have any other suggestions for improving the clarity or accuracy of the data presentation.

Changes in the text: We have modified the text as follows: “Chest wall resection and reconstruction is associated with high postoperative morbidity, with complication rates across studies ranging from 17% to 59% (Table 2).” See page 22, lines 519-520.

Comment 3: Has any research been conducted on the long-term outcomes of patients who have undergone chest wall resection and reconstruction, particularly in terms of quality of life?

Reply 3: We appreciate the reviewer raising the clinically important issue of long-term

outcomes and quality of life for patients undergoing chest wall resection and reconstruction. While research has been conducted examining long-term quality of life after these procedures, a detailed discussion of those findings unfortunately falls outside the targeted scope of this narrative review. Our goal was to synthesize the evidence specifically guiding management of postoperative complications, rather than explore long-term outcomes. We acknowledge that long-term quality of life is a critical consideration when evaluating surgical techniques and materials for chest wall reconstruction. However, we believe covering those findings in depth would detract from the intended emphasis on management of the early postoperative period. We recognize this is an important area warranting dedicated focus in future research and reviews, but we respectfully maintained our tight focus on postoperative complications for the current manuscript. Please feel free to provide any feedback on the scope and organization of the review as we aim to provide a clear synthesis of evidence directly related to our central purpose.

Comment 4: How effective are minimally invasive techniques in reducing the incidence of complications following chest wall resection and reconstruction? Do you believe the indications for chest wall resection and reconstructive surgery are expanding?

Reply 4: We appreciate the reviewer raising the important topic of minimally invasive approaches for chest wall resection and reconstruction. In the Discussion section, we summarize the current evidence on minimally invasive techniques, such as video-assisted thoracoscopic surgery and robotic-assisted surgery, for these procedures. As noted in that section, preliminary data appear promising, with early outcomes showing reduced pain and length of hospital stay compared to open surgery in carefully selected patients. However, as you point out, data on the impact of these techniques on perioperative complications are still limited at this relatively nascent stage of adoption. We agree that minimally invasive approaches have potential to reduce morbidity, but further research is needed on outcomes as

these technologies continue to evolve. The existing evidence remains preliminary given the small, retrospective nature of most studies to date in highly selected patients. We concur that these techniques may expand indications for chest wall reconstruction if future research continues to demonstrate reduced complication rates. Thank you again for highlighting this emerging area —we share your interest in minimally invasive methods and agree that additional rigorous data on perioperative outcomes will be key as these technologies are implemented in broader patient populations.