

Reviewer A

The authors describe a case of delayed prevertebral abscess formation following ACDF, highlight the potential complications of partial thickness injuries to the esophageal-pharyngeal anatomy, and discuss the diagnosis and treatment of these complications. This case report is an addition to a growing literature on delayed complications related to esophageal perforation post-ACDF. Several revisions and clarifications are recommended.

Introduction:

- In line 36, it is note that “the patient is doing well 3 months from her last surgery....” In line 141, it is noted that “the patient is now 6 months status post her final procedure.” Please correct this inconsistency.

- Reply: This inconsistency was corrected to state 6 months for both.
- Changes in text: line 36 changed to 6 months instead of 3 months

- Lines 56: The phrase “delayed deep infections carry a more significant burden” is confusing. Does this mean patients with this complication have a greater morbidity or mortality? Also, the authors should clarify what timeframe is considered delayed.

- Reply: Yes, a more significant burden for us meant a higher morbidity and or mortality.
- Changes in text: line 56-57 now include clarification : “However, delayed deep infections, occurring, greater than 2 months from surgery, carry a more significant burden leading to more morbidity and mortality, and can commonly be caused by esophageal perforation leading to seeding of oropharyngeal flora in the deep prevertebral space(3).”

- Lines 61-64: Specific information regarding the incidence of esophageal perforation, and specifically delayed deep infection, will provide context regarding the rarity of this complication.

- Reply: Thank you for this suggestion, an incidence has been included to provide more context
- Changes in text: lines 64-65 now read: “Due to the rarity of this complication, with an incidence reported between 0.3%-0.9%, a gold standard of management is yet to be described.”

Case Presentation:

- Lines 103-105: This sentence is confusing. It should perhaps read “a 5 mm diameter area of blue dye was seen around the level of C6, which...”

- Reply: Thank you for this grammatical correction – this was adopted in the phrasing you suggested.
- Changes in text: lines 103-105 now read: “A 5 mm diameter area of blue dye was seen around the level of C6, which we surmised represented a partial thickness defect of the esophageal wall.”

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- Lines 112-114 and 121-124: If available, consider including the MRI, barium esophagram, and laryngoscopy images in the figures.
 - Reply: We will include 2 new figures – one MRI correlated with lines 112-114 and one esophagrams sequence correlated with 121-124.
 - Line 126: How was the tear repaired?
 - Reply: The tear was repaired primarily with 3-0 and 4-0 vicryl.
 - Changes in text: The line now reads: “The piriformis tear was repaired primarily with 3-0 and 4-0 vicryl and a repeat laryngoscopy and hydrogen peroxide leak test was performed which demonstrated no extravasation.”

Discussion:

- Lines 158-161: The authors mention the paucity of literature on delayed prevertebral abscess formation. A discussion about specifically how few reports exist in the literature would highlight why this case is an important and unique addition.
 - Reply: We have added more wording to describe how few reports exist and why our case is unique.
 - Changes: Lines 160-163 now read: “A current literature review found less than 10 case reports of late prevertebral abscess formation, none of which required this number and complexity of revision procedures. Therefore, this case reinforces critical learning points that could provide clarity on future treatment protocols for this rare complication.”
- Line 166: Specific labs should be mentioned rather than saying “infectious labs.”
 - Reply: Specific labs are now included.
 - Changes: Lines 168-170 now read: “ Symptoms such as neck pain and swelling, fever, and elevated infectious labs such as erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and elevated white blood cell count should prompt urgent advanced imaging.”
- Lines 198-210: The authors should further discuss the indications for specific flaps. What are the indications for an SCM flap and why was an SCM flap performed initially? It would be helpful for the authors to describe when and why surgeons should consider reinforcing the closure with vascularized tissue. The authors also recommend early collaboration with otolaryngology and should describe how this collaboration could play a role in flap reinforcement and prevention of multiple procedures.
 - Thank you for this comment. We have incorporated your suggestions and added to this section.
 - Changes in text: Lines 206-210 now read: “We would argue that all leaks after ACDF surgery should be addressed both with primary repair and a vascularized tissue. The SCM flap is an excellent option, due to its proximity to the injury, its ease of mobilization, and minimal donor site morbidity. The reason for early use of this flap is to create a buttress between the scarred bone of the cervical vertebrae and the cervical esophagus while also eliminating dead space, improving antibiotic delivery, and shortening the time to recovery.”
 - Additionally, lines 218-220 now read: “Involving and collaborating early with otolaryngology allows for immediate and definitive soft tissue closure and

provides a critical analysis of any future issues and healing potential. This should lead to a decreased necessity for multiple procedures.”

General Comments:

1. This manuscript discusses the theme of delayed esophageal injury and use of a muscular flap to repair. The authors highlight, several times, the rarity of such events. Curiously, the recent case study by Gibson et al. in the Journal World Neurosurgery, which reviewed a very similar scenario, was not cited or discussed in this manuscript.

- Reply: Our apologies, this article was not published at the time of our literature review, as it was published just last month. We will include it in our references.

2. In reading this manuscript, it is still not clear what the purported cause of the persistent infection was prior to the final repair, in the absence of any deep esophageal violation (based on the multitude of studies). It would be reasonable for authors to comment regarding this seeming discrepancy. Is one argument that earlier diagnostics were not sensitive enough? In other words, why was this patient having persistent abscess, drainage and progression of her infection if no evidence of esophageal perforation was detected?

- Reply: It is difficult to ascertain exactly why this patient had a negative work up originally with multiple esophagrams. Our theory is that the patient had a full thickness tearing of her esophagus at some point that attempted to heal. This is why the barium esophagrams was negative, but intraoperative dye testing and direct laryngoscopy did demonstrate some pooling and partial tearing. This would argue that the sensitivity of esophagrams for partial thickness tears is not very accurate, and there should be a lower threshold to do more invasive/sensitive tests like intraoperative dye and direct laryngoscopy. This is all discussed in lines 174-182.
- Changes to text: 181-183 now read: “As supported by this case, early direct visualization of the mucosa through intraoperative dye testing or even laryngoscopy may be beneficial and should be considered when symptoms persist even if esophagrams are negative.”

3. The figures do not have figure legends, and figures with multiple images should be appropriately labeled as “A” and “B.” Finally, there are spelling and grammatical errors that should be addressed.

- Reply: This has been changed and resubmitted as suggested above.
- Changes in text: Figures now have legends and figures with multiple images labeled “A’ and B”. Manuscript was proofread again to address spelling and grammatical errors.

Reviewer B

The authors present an interesting case of late postoperative esophageal perforation and prevertebral abscess in an unfortunate patient who had undergone a multitude of operations. I think that, simply due to pure absurdity, details of the repeated workups for complication after complication will be of general interest. Additionally, I commend the authors for their review of delayed esophageal perforation, which is indeed a relatively rare, yet devastating complication.

Recommendations:

-The Abstract can be a little less detailed and shorter regarding operative/diagnostic techniques

- Reply: Thank you for your recommendation. The abstract was shortened as suggested.
- Changes in text: Lines 29-34 now read: “A healthy 47-year-old female presents 9 months after a C4-C7 ACDF done at an outside institution with a large prevertebral abscess, osteomyelitis, hardware failure, and pseudoarthrosis secondary to esophagopharyngeal defect and prominent hardware. Overall, the patient underwent 8 surgeries, and required an extended course of IV antibiotics, multiple diagnostic procedures, and complex soft tissue coverage using an anterolateral thigh free flap. Currently, the patient is doing well 6 months from her last procedure without any complications or plan for future surgery.”

-Similarly, the Discussion section, while informative, does not necessarily need to provide such a lengthy review of dysphagia following cervical surgery (162-179), as I think that the primary novelty of this case is the amount of reoperations that this patient underwent as well as repeated workup for esophageal perforation.

- Reply: Thank you for your comment. The paragraph was shortened slightly, but we feel it adds value to what we believe should be the algorithm for working up these rare complications.
- Changes to text: lines 161-169 now read: “The work-up of dysphagia should begin with a thorough history and physical examination and serial cervical spine radiographs to evaluate for hardware migration or prominence and to look for prevertebral space emphysema. While some edema in the perioperative period is normal, late dysphagia should not have any associated swelling and warrants further investigation. Symptoms such as neck pain and swelling, fever, and elevated infectious labs such as erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and elevated white blood cell count should prompt urgent advanced imaging. A CT and or MRI of the neck with and without contrast should be obtained to rule out prevertebral abscess and or osteomyelitis. Finally, an ENT consult should be placed urgently to evaluate for esophageal/pharyngeal perforation, most commonly using a barium esophagogram”