Peer Review File

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Reviewer A

This is a case series describing three patients diagnosed with wound dehiscence following posterior cervical fusion surgery, which was treated with I&D and resection of prominent spinous processes. The manuscript is an easy read, but there are some areas for improvement to enhance the clarity and completeness of your work.

INTRODUCTION:

Comment 1: In lines 74-75, it is suggested to update your references to reflect more recent articles with larger sample sizes. According to Herrick (2018) and Uehara (2023), the reported rates of wound dehiscence have been higher (1% & 5%, respectively) than what was presented in your manuscript. This adjustment will ensure that your study aligns with the most current literature on the topic.

Reply 1: Thank you for your suggestions; we have added the citations and associated findings.

Changes 1:

- Added line 85: There are few cases of cervical wound dehiscence in the literature; reported rates have ranged from 1 – 5.2%.[2,3]
- See *highlight box*: Cervical dehiscence is a rare complication with reported rates of 1-5.2%.
- Lines: 284-290:

2. Herrick DB, Tanenbaum JE, Mankarious M, et al. The relationship between surgical site drains and reoperation for wound-related complications following posterior cervical spine surgery: a multicenter retrospective study. *J Neurosurg Spine*. 2018;29(6):628-634. doi:10.3171/2018.5.SPINE171313

3. Uehara M, Ikegami S, Oba H, et al. Frequency and Associated Factors of Postoperative Wound Dehiscence in Posterior Cervical Spine Surgery. *World Neurosurg*. 2023;172:e679-e683. doi:10.1016/j.wneu.2023.02.001

CASE 1:

Comment 2: It would be beneficial to discuss the etiology or predisposing factors in Case 1 that might have contributed to the development of discitis, osteomyelitis, paraspinal muscle and epidural abscesses. Factors such as the presence of a remote focus of infection or IV drug abuse could be relevant considerations in this context.

Reply 2: Thank you for your comment. We agree and have added text in the manuscript to highlight these risk factors. In this case, the patient had a positive history of IV drug abuse and smoking (1 pack per day).

Changes 2:

- Added lines 111-113: The patient's medical history was significant for intravenous drug abuse and a smoking history of one pack of cigarettes per day.
- Added lines 147-148: On radiograph, there was increased kyphosis of the cervical spine.

- Added lines 234-248: There were several risk factors in each case that likely contributed to cervical wound dehiscence. In case 1, the patient had a history of IV drug abuse and smoking that likely contributed to his postoperative MSSA infection. Although the patient's last use of IV drugs was unknown, IV drug abuse is associated with various musculoskeletal infections including skin and soft tissue complications.[8] The association between cigarette smoking and delayed wound healing is well studied in the literature.[9,10] Additionally, the patient was noted to have increased kyphotic posturing prior to the first revision surgery. Increased kyphotic posturing in patients with posterior spinal fusions has been shown to have a higher prevalence of wound dehiscence.[3,7] Given the patient's risk factors, this patient may have benefited from a more extensive prophylactic spinous process resection during the first revision surgery.

Comment 3: Additionally, please specify the grafts and/or biologics used in the fusion surgery to provide a comprehensive understanding of the cases.

Reply 3: Thank you for your recommendation. We agree and have added the information to the manuscript.

Changes 3

- Added lines 117-119: The patient underwent a T2-T3 decompression with left pedicle subtraction, irrigation and debridement (I&D) of the T2-T3 disc space, and C7-T5 posterior spinal fusion with a bone graft placement at T2-T3.
- Added lines 192-194: The patient ultimately underwent a C5-T2 and T5-T12 posterior spinal fusion using allograft and cancellous bone chips, a T8-T9 decompression and percutaneous fixation of L3-L5.

Comment 4: Regarding Figure 1 in line 116, please explain the reason for capturing a clinical picture of an uncomplicated surgical wound four days after the surgery. Was this documentation necessary to meet legal or administrative institutional requirements, or was there another specific purpose?

Reply 4: Thank you for your comment. Postoperative wound images are occasionally collected as part of our routine follow-up which is considered more for administrative purposes. However, in this case, the picture was taken after our service was consulted for concerns of scant drainage from the inferior portion of the wound. The picture was taken as routine documentation for a consult of a wound to see the progression of the wound at future visits.

Changes 4:

- No added text.

DISCUSSION:

Comment 5: Expand the discussion section to include an exploration of different risk factors identified in each case. It would be valuable to discuss potential strategies for preventing such complications or what the surgeon might have done differently to mitigate the risk. Incorporate relevant insights from the spinal surgery literature to support your findings and recommendations.

Reply 5: Thank you for your comment. We have added a paragraph discussing the different risk factors present in each patient. We added a section discussing what the surgeon may have done

differently in case 1 to prevent wound dehiscence which included more extensive prophylactic spinous process resection in the first revision surgery in a patient with multiple risk factors for wound dehiscence and posterior spinal instrumentation. We have also included data from spinal surgery literature discussing the risk factors present in each patient.

Changes 5:

- Added information to case 1 in lines 111-113: The patient's medical history was significant for intravenous (IV) drug abuse and a smoking history of one pack of cigarettes per day.
- Added information to case 2 in lines 158-159: A 67-year-old male with a history of type 2 diabetes presented to the ED with neck pain after a fall from standing two days prior.
- Added information to case 2 in lines 175-177: His postoperative course was complicated by hyperkalemia, acute renal failure, and significant weight loss which resulted a two-month inpatient hospital stay six months after his second surgery.
- Added information to discussion in lines 234-255: There were several risk factors in each case that likely contributed to cervical wound dehiscence. In case 1, the patient had a history of IV drug abuse and smoking that likely contributed to his postoperative MSSA infection. Although the patient's last use of IV drugs was unknown, IV drug abuse is associated with various musculoskeletal infections including skin and soft tissue complications.[8] The association between cigarette smoking and delayed wound healing is well studied in the literature.[9,10] Additionally, the patient was noticed to have increased kyphotic posturing prior to the first revision surgery. Increased kyphotic posturing in patients with posterior spinal fusions has been shown to have a higher prevalence of wound dehiscence.[3,7] Given the patient's risk factors, this patient may have benefited from a more extensive prophylactic spinous process resection during the first revision surgery.

  In case 2, the patient had type 2 diabetes and a concern for malnutrition due to a significant weight loss prior to the wound dehiscence. Malnutrition is a well-known cause of wound dehiscence.[3] Additionally, this patient began dialysis prior to his wound dehiscence which is known to be significantly associated with cervicothoracic wound dehiscence.[3]

  Lastly, the patient in case 3 had a post operative UTI with subsequent pyelonephritis prior to wound dehiscence. Post operative UTI is known to be associated with delayed wound healing and increases the likelihood of wound dehiscence.[11]
- Added citations to references section in lines 304-313:

  8. Dwivedi N, Breslin MA, McDermott A, Lin S, Vallier HA, Tornetta P. What Is the Financial Impact of Orthopaedic Sequelae of Intravenous Drug Use on Urban Tertiary-care Centers? *Clin Orthop*. 2020;478(10):2202-2212. doi:10.1097/CORR.0000000000001330

  9. Silverstein P. Smoking and wound healing. *Am J Med*. 1992;93(1A):22S-24S. doi:10.1016/0002-9343(92)90623-j

  10. Lee JJ, Patel R, Biermann JS, Dougherty PJ. The musculoskeletal effects of cigarette smoking. *J Bone Joint Surg Am*. 2013;95(9):850-859. doi:10.2106/JBJS.L.00375

11. Ollivere BJ, Ellahee N, Logan K, Miller-Jones JCA, Allen PW. Asymptomatic urinary tract colonisation predisposes to superficial wound infection in elective orthopaedic surgery. *Int Orthop*. 2009;33(3):847-850. doi:10.1007/s00264-008-0573-4

Comment 6: In lines 232-235, please provide a proper introduction when referring to the first and second case series. Begin by explaining that your literature search identified two case series and then proceed to discuss these findings further.
By addressing these points, your case series will be more comprehensive and offer valuable insights into wound dehiscence following posterior cervical fusion surgery. We hope these suggestions prove helpful in enhancing the quality and impact of your manuscript.
Reply 6: Thank you for this feedback. We have added an introduction and emphasized why our case series expands upon the literature.
Changes 6:

- Added text in lines 227-228: During our literature search, we identified two case series that discussed management techniques for cervical wound dehiscence.
- Added text in lines 231-233: We believe this case series identified valuable techniques which we expanded upon using spinous process resections in the treatment of cervical wound dehiscence."

References

Herrick DB et al. The relationship between surgical site drains and reoperation for wound-related complications following posterior cervical spine surgery: a multicenter retrospective study. J Neurosurg Spine. 2018 Dec 1;29(6):628-634.

Uehara M et al. Frequency and Associated Factors of Postoperative Wound Dehiscence in Posterior Cervical Spine Surgery; World Neurosurg. 2023 Apr;172: e679-e683

Reviewer B

This is a well written case series outlining the experience of the authors in managing cervical wound dehiscence due to prominent cervical-thoracic spinous processes.

Comment 7: I recommend further expounding the discussion section to include discussion of risk factors for the development of wound dehiscence due to spinous process in these patients. Was there any concern for poor nutritional status in these patients? Was there any concern for significant worsening of C2-7 SVA or cervical kyphosis following surgery?
Reply 7: Thank you for the feedback. We have added a section discussing the risk factors for wound dehiscence in each case. There was concern for malnutrition in case 2 which was added to the discussion. Secondly, in Cases 1 and 3, there was concern for kyphosis.
Changes 7:

- Added text to discussion section in lines 234-255: There were several risk factors in each case that likely contributed to cervical wound dehiscence. In case 1, the patient had a history of IV drug abuse and smoking that likely contributed to his postoperative MSSA infection. Although the patient's last use of IV drugs was unknown, IV drug

abuse is associated with various musculoskeletal infections including skin and soft tissue complications.[8] The association between cigarette smoking and delayed wound healing is well studied in literature.[9,10] Additionally, the patient was noticed to have increased kyphotic posturing prior to the first revision surgery. Increased kyphotic posturing in patients with posterior spinal fusions has been shown to have a higher prevalence of wound dehiscence.[3,7] Given the patient's risk factors, this patient may have benefited from a more extensive prophylactic spinous process resection during the first revision surgery.

In case 2, the patient had type 2 diabetes and a concern for malnutrition due to a significant weight loss prior to the wound dehiscence. Malnutrition is a well-known cause of wound dehiscence.[3] Additionally, this patient began dialysis prior to his wound dehiscence which is known to be significantly associated with cervicothoracic wound dehiscence.[3]

Lastly, the patient in case 3 had a post operative UTI with subsequent pyelonephritis prior to wound dehiscence. Post operative UTI is known to be associated with delayed wound healing and increases the likelihood of wound dehiscence.[11]

- Added citations to references section in lines 304-313:

8. Dwivedi N, Breslin MA, McDermott A, Lin S, Vallier HA, Tornetta P. What Is the Financial Impact of Orthopaedic Sequelae of Intravenous Drug Use on Urban Tertiary-care Centers? *Clin Orthop*. 2020;478(10):2202-2212. doi:10.1097/CORR.0000000000001330

9. Silverstein P. Smoking and wound healing. *Am J Med*. 1992;93(1A):22S-24S. doi:10.1016/0002-9343(92)90623-j

10. Lee JJ, Patel R, Biermann JS, Dougherty PJ. The musculoskeletal effects of cigarette smoking. *J Bone Joint Surg Am*. 2013;95(9):850-859. doi:10.2106/JBJS.L.00375

11. Ollivere BJ, Ellahee N, Logan K, Miller-Jones JCA, Allen PW. Asymptomatic urinary tract colonisation predisposes to superficial wound infection in elective orthopaedic surgery. *Int Orthop*. 2009;33(3):847-850. doi:10.1007/s00264-008-0573-4

Comment 8: Do the authors recommend prophylactic resection of spinous processes in certain situations?

Reply 8: Thank you for your comment. We believe in certain cases it is an acceptable practice to prevent risk of reoperation for these patients. In patients with high medical and social risk factors, it could be a viable practice. We also recognize that this is a small case series and further studies are needed to find a higher correlation. For example, in case 1, this patient may have benefited from more extensive prophylactic resection of spinous processes during the first revision surgery given the risk factors for wound dehiscence and increased kyphosis with posterior spinal fusion seen in this patient. This information was added to the discussion section. More research needs to be done on this topic.

Changes 8:

- Added text to the discussion section in lines 243-248: Given the patient's risk factors, this patient may have benefited from a more extensive prophylactic spinous process

resection during the first revision surgery.

- Added text to the conclusion section in lines 258-259: Further research needs to be done on prophylactic resection of spinous processes in patient with multiple risk factors for cervicothoracic wound dehiscence and posterior spinal instrumentation.