Case Report

# Cervical wound dehiscence following internal fixation of the cervical and thoracic spine: a report of three cases

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**Background:** Wound dehiscence is a known postoperative complication, but in cervical spine surgery it is rare and there is a lack of documented literature. This case report discusses novel complications of wound dehiscence in three patients who were treated with spinous process ostectomies after posterior cervical surgeries.

**Case Description:** In total three cases are reported in these reports. Case one documents the management of a patient with full-thickness cervical wound dehiscence following a cervical paraspinal infection corrected with posterior spinal fixation and fusion. This patient was treated with resection of the prominent spinous processes. Case two documents the management of a patient with an odontoid fracture requiring revision surgery. The patient developed a full-thickness wound dehiscence and was treated with resection of the prominent spinous processes. Case three was a patient suffering from a T9 spinal cord injury who was also treated for multiple vertebral fractures. The patient eventually developed internal cervical wound dehiscence which resulted in removal of the prominent spinous processes.

**Conclusions:** This case report documents the successful treatment of cervical wound dehiscence which is a rare postoperative complication of cervical spinal surgery. This information is valuable as treatment strategies and research into cervical wound dehiscence are limited to a single case report.

**Keywords:** Cervical wound dehiscence; spinous process resection; internal fixation; case report

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## Introduction

Postoperative wound complications are one of the most common in spine surgery, however, cervical wound dehiscence is rare after spinal fusions (1). There are few cases of cervical wound dehiscence in the literature; reported rates have ranged from 1–5.2% (2,3). Diagnosis most commonly occurs 9–25 days postoperatively (4). The causes for wound dehiscence are multi-faceted, and known risk factors include chronic corticosteroid use, methotrexate use, human immunodeficiency virus infection, uncontrolled diabetes mellitus, malnutrition, smoking, obesity, poor oral health, surgical infection with *Staphylococcus aureus*, and postoperative urinary tract infections (UTIs) (5).

Guidelines for the management of posterior cervical wound dehiscence are limited as well. To date there are only two published case series regarding the management of posterior cervical wound dehiscence (6,7). However, the first case series focused primarily on the repair of dural leaks and infection in patients with cervical wound dehiscence (6). The second case series focused on using

lower trapezius island myocutaneous flaps for coverage of complex wound dehiscence in the cervical and thoracic spine (7).

The purpose of this case report is to document cases of postoperative cervical wound dehiscence and to share outcomes of spinous process resections and skin approximation for management of this complication. This case report should aid in the treatment and management of future patients suffering from this complication. We present this article in accordance with the CARE reporting checklist (available at https://jss.amegroups.com/article/view/10.21037/jss-23-91/rc).

## Case presentation

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Verbal informed consent was obtained from the patients for publication of this case report and accompanying images. A copy of the written documentation is available for review by the editorial office of this journal.

### *Case 1*

A 41-year-old male initially presented to the emergency department (ED) with a chief complaint of thoracic back pain after carrying scrap metal over his head. His symptoms started with minor numbness of the upper extremities and neck pain. His symptoms progressed and on physical exam the patient had numbness and tingling from the T4 dermatome radiating down both legs. The patient also had motor deficits that were worse in the left lower extremity and bilateral continuous clonus in the lower extremities. The patient denied any bowel or urinary incontinence. The patient's medical history was significant for intravenous (IV) drug abuse and a smoking history of one pack of cigarettes per day. Magnetic resonance imaging (MRI) without contrast showed T2–T3 discitis and osteomyelitis with extrusion of the disc into the anterior epidural space causing severe stenosis. Other findings included a thoracic epidural abscess, central cord remodeling, and a paraspinal soft tissue abscess that measured 2.2 cm × 1.2 cm × 2.3 cm. 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. Intraoperative cultures were obtained. The fascial layer was closed with a running locking suture using 1-0 Vicryl. The subcutaneous layer was closed with 2-0 Vicryl and the skin was closed with staples.

Cultures returned positive for methicillin-sensitive *Staphylococcus aureus* (MSSA) and the patient was treated with 6 weeks of oxacillin. The patient's in-hospital postoperative course was unremarkable as the incision healed appropriately at his 2-day, 4-day, and 2-week evaluation (*Figure 1*). The patient was discharged home with a hard collar.

At the 6-week outpatient follow-up, radiographs showed stable hardware; physical examination showed some signs of an internal wound dehiscence as there were prominent spinous processes noted at the cervicothoracic junction. The skin was intact with no drainage or erythema noted from the incision. The patient continued to ambulate and was transitioned to a soft collar. At the 3-month follow-up, the patient continued to progress and returned to light-duty. The incision remained intact, but the spinous processes deep to the skin were more prominent compared to previous visits. Given the adequacy of the skin over the spinous processes, the patient was released for normal activity as tolerated. One month later, while playing with his dog, the patient felt a tear over the incision and was found to have a full-thickness wound dehiscence with protrusion of the spinous processes (*Figure 2*). The patient

**Highlight box**

**Key findings**
- Prominent spinous process at the level of a previous posterior cervical incision is a sign of internal cervical wound dehiscence.

**What is known and what is new?**
- Cervical dehiscence is a rare complication with reported rates of 1–5.2%.
- Risk factors for cervical wound dehiscence include chronic corticosteroid use, methotrexate use, human immunodeficiency virus infection, uncontrolled diabetes mellitus, malnutrition, smoking, obesity, poor oral health, surgical infection with *Staphylococcus aureus*, and postoperative urinary tract infections.
- Cervical wound dehiscence can be safely managed with spinous process resection and approximation of the skin.

**What is the implication, and what should change now?**
- This case series presents successful management strategies for this clinical complication to help aid in the future management of patients.

**Figure 1** Patient 1: 4-day postoperative intact wound.

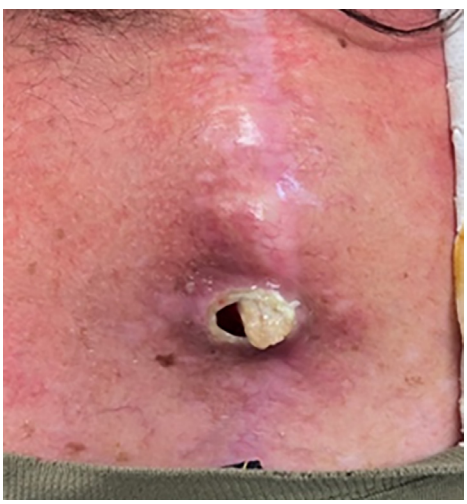

**Figure 2** Patient 1: 4-month postoperative cervical wound showing full-thickness wound dehiscence with protrusion of a spinous process.

was recommended to undergo operative intervention for resection of the spinous process, I&D, and approximation of the muscle tissue and fascia.

Intraoperatively, the wound was dissected to the posterior aspect of the cervical spine and cultures were obtained. The spinous processes of T4 and T5 that were visible were

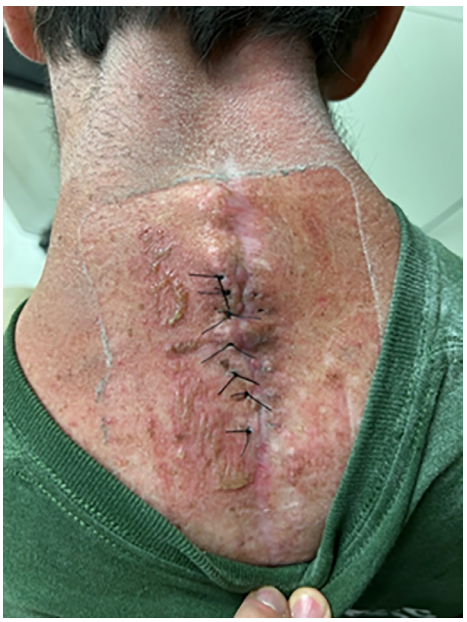

**Figure 3** Patient 1: 2-week postoperative cervical wound incision after reoperation for spinous process ostectomy and I&D. I&D, irrigation and debridement.

removed, and the wound was copiously irrigated with saline. Flaps were raised to allow for adequate coverage of scar and fascia. Vancomycin powder and a hemovac drain were placed in the wound. The wound was closed using running and locking 1-0 polydioxanone suture (PDS) in the fascial layer, running 2-0 PDS in the subcutaneous layer, and simple interrupted 2-0 nylon for skin closure.

At the 2-week follow-up, the incision showed positive signs of healing overall, although there was some blistering noted; the sutures remained in place for another week. The spinous process at the level above the incision (C6, C7, and T1) was more prominent postoperatively but was not prominent prior to surgery (*Figure 3*). On radiograph, there was increased kyphosis of the cervical spine. One week later, sutures were removed, and the wound looked well healed overall despite some erythema.

Six weeks following the second surgery, the spinous process at C6, C7, and T1 had eroded through the skin. The patient was scheduled for resection of those spinous processes and a large paraspinal flap for wound coverage. Intraoperatively, the wound was irrigated with saline, and the flap layer was closed using an interrupted suture with #2 FiberWire. The subcutaneous layer was closed with 2-0 PDS and the skin was closed with 2-0 nylon in a vertical

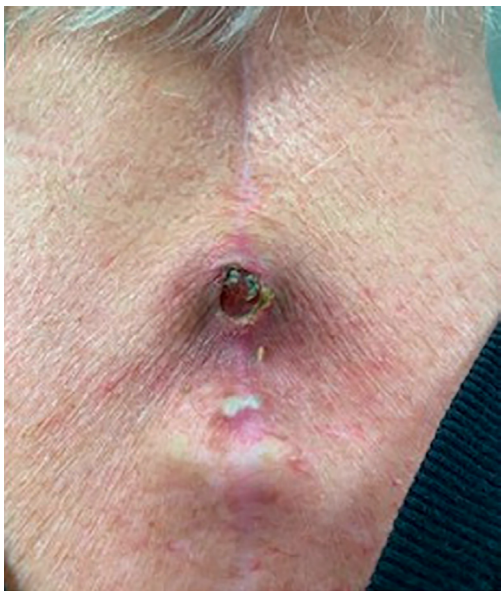

**Figure 4** Patient 2: posterior cervical spine wound showing signs of wound dehiscence.

mattress. At the 2-week, 1-month, and 6-month follow-up visits, the incision looked well healed with no signs of dehiscence.

### *Case 2*

A 67-year-old male with a history of type 2 diabetes presented to the ED with neck pain after a fall from standing 2 days prior. The patient had a history of cervical myelopathy and a surgical history of C4 corpectomy, C3–C5 anterior instrumentation and fusion, C3–C6 laminectomy, C7 partial laminectomy, and C3–C7 posterior spinal instrumentation and fusion 4 years prior to his fall. Initial computerized tomography (CT) images showed an acute type 2 odontoid fracture with no significant displacement. The patient's physical examination was significant for decreased sensation at the upper extremities bilaterally and positive bilateral Hoffman's sign. The patient was managed nonoperatively in a hard collar with vitamin D supplementation and follow-up 1 week later. Subsequent visits were grossly unremarkable, but at the 5-month follow-up, plain radiographs showed non-union of the odontoid fracture requiring operative management.

The operative plan was to extend posterior instrumentation superiorly to C1 and C2, and inferiorly to T1 as screw loosening was noted at C7 on preoperative CT. Intraoperatively, the existing posterior hardware was removed and replaced with new hardware. Vancomycin powder was placed into the wound, and the wound was closed using #1 Vicryl for the fascia, 2-0 Vicryl for the subcutaneous layer, and staples for the skin. Overall, the patient had an uneventful inpatient postoperative course and staples were removed at the 2-week follow-up. His postoperative course was complicated by hyperkalemia, acute renal failure, and significant weight loss which resulted a 2-month inpatient hospital stay 6 months after his second surgery.

Eleven months after his initial surgery, the patient noticed a small wound over his posterior incision that initially developed while sitting in dialysis three times per week (*Figure 4*). A decision was made to schedule an I&D of the wound with complete resection of the C7 and T1 spinous process and partial resection of the superior portion of the T2 spinous process. Intraoperatively, the spinous processes were removed, the wound was thoroughly irrigated, and the wound was closed with #1 Vicryl for the fascia layer, 2-0 Vicryl for the subcutaneous layer, and staples for the skin. Postoperatively, the patient's wound healed well. Staples were removed 11 days after surgery, and there was no evidence of dehiscence or infection at 3 months. The incision continued to do well at the patient's 2-year follow-up appointment and the patient was released and instructed to return as needed.

### *Case 3*

A 55-year-old male with a past medical history of ankylosing spondylitis presented to the ED after motor vehicle collision rollover resulting in "chalkstick" fractures at T1 and T9 and a nondisplaced fracture at L4 confirmed on CT imaging. On examination, the patient was noted to have a complete spinal cord injury at T4. 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. The wounds were closed using #1 Vicryl for a running locking suture in the deep fascia, 2-0 Vicryl with a running suture for the subcutaneous layer, and staples for the skin. The patient's postoperative hospital course was complicated by a UTI. On postoperative day 4, the hemovac drain was removed and the incision remained intact with no signs of dehiscence or infection. The patient continued to have fevers secondary to a UTI at 2 weeks postoperatively, but his incision remained well healed. Plain radiographs showed

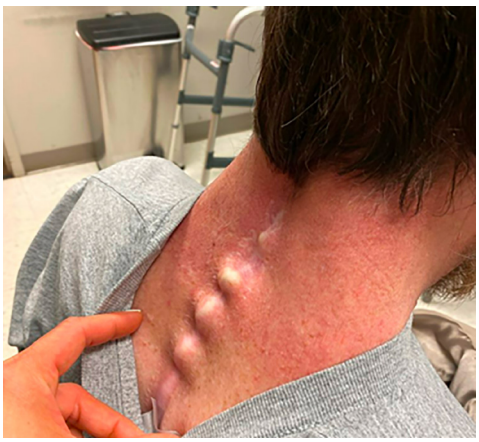

**Figure 5** Patient 3: significant prominence of the cervical and thoracic spinous processes with notable blanching of the skin.

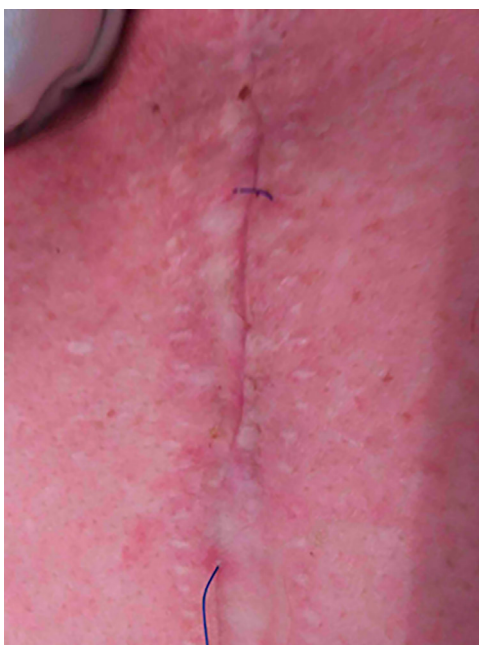

**Figure 6** Patient 3: 2-week postoperative cervical and thoracic wound.

stable hardware and maintained alignment. Due to the spinal cord injury at T4, the patient lost abdominal core tone and there was concern for hardware fatigue and failure overtime.

The patient was later readmitted for concerns of renal infection. CT and MRI imaging obtained during this admission showed failure of the lumbar hardware. The patient was subsequently revised with lumbopelvic extension. The incision was closed in normal fashion using #1 Vicryl for the fascial layer, 2-0 Vicryl for the subcutaneous layer, and 2-0 Prolene simple interrupted sutures for the skin.

At the following postoperative clinic visit, now 3 months from the index surgery, all wounds, including the lumbar incision, were well healed, but physical examination showed some prominent hardware at the cervicothoracic junction. The spinous processes were now very prominent at the 7-month follow-up. It was determined the cause was deep muscle dehiscence, but the skin remained mobile and blanched only with pressure. No operative measures were taken at that time. One month later, the patient's physical examination worsened as there were more prominent spinous process and constant skin blanching despite continued skin mobility (*Figure 5*). Given these findings and the risk of full wound dehiscence, the patient was scheduled for resection of the C6, C7, T1, T2, and T3 spinous processes. Intraoperatively, the spinous processes were resected with no complications. The deep fascia was closed with a 0 Vicryl with a running locking suture. The subcutaneous layer was closed using 2-0 Vicryl, and the skin was closed using 2-0 Prolene. At the 2-week follow-up, sutures were removed as the wound appeared to be healing well (*Figure 6*). The patient continued to have no complications at his 2-year postoperative follow-up visit.

## Discussion

Cervical wound dehiscence following cervical and thoracic posterior spinal fusion is a rare but serious complication that can be well managed through removal of the prominent spinous process and incision/debridement. We believe that this case report demonstrates successful treatment of cervical wound dehiscence with notable prominence of spinous processes, a topic that is not well documented in the literature. During our literature search, we identified two case series that discussed management techniques for cervical wound dehiscence. The first case series utilized debridement with vacuum sealing drainage for patients with cerebrospinal fluid leakage and/or postoperative infections (6). The second case series primarily utilized lower trapezius island myocutaneous flaps (7). We believe this case report identified valuable techniques which we expanded upon using spinous process resections in the treatment of cervical wound dehiscence.

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.

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 postoperative UTI with subsequent pyelonephritis prior to wound dehiscence. Postoperative UTI is known to be associated with delayed wound healing and increases the likelihood of wound dehiscence (11).

## Conclusions

Our case report demonstrates three cases of successful treatment strategies involving the resection of prominent spinous processes and serves as a preliminary report for further research. 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. This case report is limited by the reporting of only three patient outcomes. We believe this case report will aid in the treatment and management of future patients with this rare but serious complication.

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## Footnote

*Reporting Checklist:* The authors have completed the CARE reporting checklist. Available at https://jss.amegroups.com/article/view/10.21037/jss-23-91/rc

*Peer Review File:* Available at https://jss.amegroups.com/article/view/10.21037/jss-23-91/prf

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at https://jss.amegroups.com/article/view/10.21037/jss-23-91/coif). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Verbal informed consent was obtained from the patients for publication of this case report and accompanying images. A copy of the written documentation is available for review by the editorial office of this journal.



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