Case Report

Neurologic Deterioration, Instrumentation Failure, and Cervical Autofusion Secondary to Noncompliance following Reconstruction for Discitis

Taylor Shackleford^a Reed Andrews^b Shari Cui^a

^aDepartment of Orthopedics, West Virginia University, Morgantown, WV, USA;

^bWest Virginia University School of Medicine, Morgantown, WV, USA

Keywords

Atlantoaxial autofusion · Drug abuse · Infection · Noncompliance · Spine

Abstract

Pyogenic spondylodiscitis (PS) is an infection of the vertebral body, end plate, and intervertebral disc with potential to extend to surrounding structures, including the epidural space. Bacterial seeding to cause PS stems from three major pathways: hematogenous seeding, direct inoculation, and extension of adjacent tissue infection. Advanced cases have potential to cause structural instability and neurologic compromise, requiring aggressive surgical treatment. When the etiology of PS is hematogenous seeding secondary to intravenous drug use (IVDU), treatment becomes more complicated. Psychosocial factors and medical comorbidities often impact treatment options and patient compliance. We present a case of PS secondary to IVDU complicated by treatment noncompliance, resulting in need for 360° reconstructive surgery. After the patient had been immobilized in a halo fixator for 8 months due to failure to return for follow-up, an unintended C1–C2 autofusion was discovered, revealing the consequences of long-term halo use.

© 2020 The Author(s)
Published by S. Karger AG, Basel

Introduction

Pyogenic spondylodiscitis (PS) is an infection of the vertebral body, end plate, and intervertebral disc with potential to extend to surrounding structures, including the epidural space. Bacterial seeding to cause PS stems from three major pathways: hematogenous seeding, direct inoculation, and extension of adjacent tissue infection. Left untreated, the disease can progress to adjacent bony destruction, severe deformity, and neurologic compromise associated with high morbidity and mortality [1]. While the mainstay of treatment is intravenous antibiotic therapy alone, as many as 54.4% of cases progress to require surgical intervention [2]. Though the pathway leading to PS varies by age and medical comorbidities, bacteremia causing hematogenous seeding of the vertebral body with extension into the disc space is a common source of infection [3]. When the bacteremia stems from intravenous drug use (IVDU), unique surgical, medical, and socioeconomic considerations exist. The IVDU patient population with PS is more likely to have cervical disease causing upper and lower limb neurologic deficits [4]. These patients often require surgical intervention to prevent further neurologic deterioration and reestablish structural stability of the cervical spine. Though they suffer from frequent surgical hardware failure and treatment noncompliance, they recover neurologic function at higher rates than non-IVDU patients with similar disease [4].

We present a case of septic discitis in a young patient whose treatment noncompliance resulted in catastrophic hardware failure requiring extensive 360° reconstructive spine surgery associated with complex medical sequelae of systemic disease.

Case Presentation

The patient was a 42-year-old female with a history of active IVDU who initially presented to an outside hospital with insidious onset of fever, chills, and neck pain. Imaging revealed C6–C7 osteodiscitis with associated bone loss and cervical kyphosis (Fig. 1). At this time, she had no neurologic complaints and a normal neurologic examination. The source of her infection was determined to be hematogenous seeding from infective endocarditis, likely secondary to IVDU. She underwent a C6 and C7 corpectomy with strut grafting and anterior fusion from C5 to T1 at the outside hospital.

She received 2 weeks of appropriate intravenous antibiotics postoperatively before leaving the hospital against medical advice. She presented twice thereafter to the same outside hospital, at 1 month and 2 months postoperatively. The first presentation was for increasing neck pain with advancing kyphosis found on imaging; though revision surgery was recommended, she refused surgery and left against medical advice. At the time of her second presentation, she manifested severe deficits in the left arm, resulting in no functional use of the extremity. She was found to have failed anterior fixation with a kyphotic deformity at her cervicothoracic junction measuring approximately 90° (Fig. 2). Examination revealed decreased sensation and motor function below the C5 nerve root level on her left upper extremity with normal function of the right upper extremity and bilateral lower extremities. She was started on broad-spectrum antibiotics and transferred to our tertiary care facility for further treatment.

Initial management at our facility involved medical workup and clearance with surgical optimization. The patient was placed into gradually increasing cervical traction through Gardner-Wells cranial tongs until acceptable correction of the kyphotic deformity was achieved at 25 pounds (Fig. 2). After medical optimization with metabolic bone consult, protein sup-

plementation, and nutritional support, she underwent two procedures in a staged fashion. The initial procedure was a posterior spine fusion from C2 to T5 with halo fixator placement. Post-operative computed tomography angiography was then completed for confirmation of anatomy and surgical planning. Two days thereafter, the patient underwent anterior spinal reconstruction with removal of anterior cervical hardware, five-level (C4–T1) corpectomy with strut graft placement, and C3–T2 anterior instrumentation and fusion. The locations of the loose implants and the majority of the infectious phlegmon necessitated ipsilateral longitudinal anterior cervical access by otolaryngology. She tolerated the procedures well with no change in neurologic examination. Operative cultures were positive for methicillin-resistant *Staphylococcus aureus*. She was started on a 6-week course of intravenous vancomycin with per os doxycycline. Medically, she was managed by the hospital inpatient infusion service and followed by spine surgery, nutrition, infectious disease, psychiatry, metabolic bone service, and multiple ancillary services. An external bone stimulator was also utilized to enhance fusion potential. She was subsequently transferred to a drug rehabilitation facility after 4 weeks of inpatient antibiotic therapy, with the goal of finishing her remaining antibiotics at the facility. She left against medical advice 2 days after transfer.

The patient failed to present for multiple clinic appointments thereafter despite several calls by the patient requesting removal of the halo fixator. Eight months postoperatively, she presented to a regional critical access hospital with generalized malaise, bacteremia, and pneumonia and was transferred to our facility again for advanced management. The original halo fixator was still in place upon arrival. After initial radiographs had been obtained, the halo was removed and repeat upright radiographs along with a cervical spine computed tomography were obtained (Fig. 3, Fig. 4). Imaging showed intact hardware without evidence of collapse as well as a solid bridged fusion through the entire construct. She incidentally was found to have an autofusion of C1 and C2, likely secondary to the duration of time spent in the halo fixator (Fig. 4). Clinically, she had marked improvement of left upper extremity neurologic examination with normal sensation and 4–/5 strength in all muscle groups. The remainder of her extremities continued to be neurologically intact. She admitted to continued IVUD and was diagnosed with hepatitis A, hepatitis C, acute liver failure, polymicrobial and multi-drug resistant bacteremia, a tricuspid valve vegetation 0.8 × 2 cm in size with severe insufficiency, and multiple pulmonary abscesses. After 2 weeks of treatment for her medical conditions, she left the hospital against medical advice, with continued bacteremia and in active liver failure, and has missed all follow-up appointments to date.

Conclusions

This case illustrates a consequence of unintentional long-term halo fixator use in the setting of incompletely treated PS. Noncompliance and socioeconomic difficulties resulted in halo immobilization for 8 months that, when coupled with inflammatory changes from exposure to pyogenic infection, caused autofusion of C1–C2. This complication will have a potentially significant impact on the patient's cervical range of motion that could have been prevented with timely follow-up. To our knowledge, this example is the first in the literature of C1–C2 autofusion secondary to prolonged halo fixator use in a patient treated for PS.

This case also demonstrates the challenges and costs faced by the healthcare system due to complexities unique to IVUD patients. Even in the most ideal of circumstances, patient compliance is necessary to achieve optimal outcomes in complex spondylodiscitis. Though this patient had minimal complications from her severe spine infection and near-total resolution

of her neurologic deficits, she is likely to succumb to incompletely treated multiorgan infection and sepsis. Management of spine infections in patients addicted to intravenous drugs requires a multidisciplinary approach in order to treat the array of consequences related to their dependence. Despite optimization of nearly all factors controllable within a tertiary medical institution, addiction will continue to cast a dark shadow on prognosis and outcomes. This case and similar cases illustrate the desperate need for programs and systems both in the hospital and after discharge to navigate patients struggling with addiction through their treatment. Rehabilitation after medical treatment is also a necessary step to decrease the chances of similar situations for the patient in the future. Funding of research and programs aimed at this population is essential to treating the growing crisis of opioid abuse and its medical consequences.

Acknowledgements

The authors would like to acknowledge Suzanne Danley for her help with this case report.

Statement of Ethics

The patient was informed that details from her case would be submitted for publication, and she provided written consent.

Disclosure Statement

The authors have no conflicts of interest to declare.

Funding Sources

The authors received no funding for this paper.

Author Contributions

T. Shackleford: critical review and major edits, creation of all figures, and final manuscript draft. R. Andrews: creation of the initial manuscript draft in its entirety. S. Cui: critical review and major edits of the manuscript.

References

- 1 Pola E, Autore G, Formica VM, Pambianco V, Colangelo D, Cauda R, et al. New classification for the treatment of pyogenic spondylodiscitis: validation study on a population of 250 patients with a follow-up of 2 years. *Eur Spine J*. 2017 Oct;26(Suppl 4):479–88.
- 2 Rutgers JP, Kempen DH, van Dijk M, Oner FC. Outcome of conservative and surgical treatment of pyogenic spondylodiscitis: a systematic literature review. *Eur Spine J*. 2016 Apr;25(4):983–99.
- 3 Márquez Sánchez P. Spondylodiscitis. *Radiologia (Madr)*. 2016 Apr;58 Suppl 1:50–9.

- 4 Wang Z, Lenehan B, Itshayek E, Boyd M, Dvorak M, Fisher C, et al. Primary pyogenic infection of the spine in intravenous drug users: a prospective observational study. *Spine*. 2012 Apr;37(8):685–92.

Fig. 1. Midsagittal magnetic resonance imaging on initial presentation.

Fig. 2. Computed tomography at the time of transfer to the tertiary care facility, before and after application of 25 pounds of skeletal traction.

Fig. 3. Eight months postoperative anteroposterior and lateral cervical X-ray.

Fig. 4. Computed tomography scan 8 months postoperatively showing autofusion of C1 and C2.