

Adjacent level spondylodiscitis after anterior cervical decompression and fusion

Basu Saumyajit, Sreeramalingam Rathinavelu

ABSTRACT

Postoperative spondylodiscitis after anterior cervical decompression and fusion (ACDF) is rare, but the same occurring at adjacent levels without disturbing the operated level is very rare. We report a case, with 5 year followup, who underwent ACDF from C5 to C7 for cervical spondylotic myelopathy. He showed neurological improvement after surgery but developed discharging sinus after 2 weeks, which healed with antibiotics. He improved on his preoperative symptoms well for the first 2 months. He started developing progressive neck pain and myelopathy after 3 months and investigations revealed spondylodiscitis at C3 and C4 with erosion, collapse, and kyphosis, without any evidence of implant failure or graft rejection at the operated level. He underwent reexploration and implant removal at the operated level (there was good fusion from C5 to C7) followed by debridement/decompression at C3, C4 along with iliac crest bone grafting and stabilization with plate and screws after maximum correction of kyphosis. The biopsy specimen grew *Pseudomonas aeruginosa* and appropriate sensitive antibiotics (gentamycin and ciprofloxacin) were given for 6 weeks. He was under regular followup for 5 years his myelopathy resolved completely and he is back to work. Complete decompression of the cord and fusion from C2 to C7 was demonstrable on postoperative imaging studies without any evidence of implant loosening or C1/C2 instability at the last followup.

Key words: Adjacent level infection, anterior cervical decompression and fusion, cervical spine, complications, postoperative infection

INTRODUCTION

Postoperative pyogenic infection is a well documented complication of spine surgery. It is commonly the operated level that gets involved when there is infection in the postoperative period. Adjacent level discitis after anterior cervical spine surgery is an uncommon entity. We report a case of C3-4 infective spondylodiscitis following anterior cervical discectomy and fusion (ACDF) from C5-7. We have attempted to identify the causes for such adjacent level infections and detailed the treatment we instituted.

CASE REPORT

39-year-old gentleman who noticed progressive difficulty in

walking along with tingling sensation in all four limbs since September 2002. He was diagnosed to be suffering from spastic quadriplegia due to cervical spondylotic myelopathy secondary to prolapsed intervertebral disc at C5/6 and C6/7 levels and was operated in July 2003 in another hospital. Through a left anterior approach, C6 corpectomy, C5/6 and 6/7 discectomy and autogenous bone grafting was done along with stabilization using stainless steel plate/screws [Figure 1a, b]. He made good postoperative recovery with improvement in gait, paresthesia, and grip strength. Radiograph done in the immediate postoperative period was showing a stable graft implant construct in proper alignment. In the postoperative period, around 2 weeks, he noticed a discharging sinus from the operation site, which healed completely with antibiotics at around 4 weeks (records of culture/sensitivity of that hospital were not available, but as the sinus had healed well, we presumed the organism had responded to the antibiotic prescribed). As there was clear evidence of postoperative infection at the surgical site, further investigation with a sinogram and computed tomography (CT) scan at this point with proper recording of the investigations could have yielded much better insight about the progression of the disease. This remains a limitation of this study.

He developed neck pain along with weakness of all four limbs and incomplete bladder evacuation after 3 months

Park Clinic, Gorky Terrace, Kolkata, India

Address for correspondence: Dr. Saumyajit Basu,
Park Clinic, 4, Gorky Terrace, Kolkata, India.
E-mail: saumyajitbasu@hotmail.com

Access this article online	
Quick Response Code:	Website: www.ijoonline.com
	DOI: 10.4103/0019-5413.96367

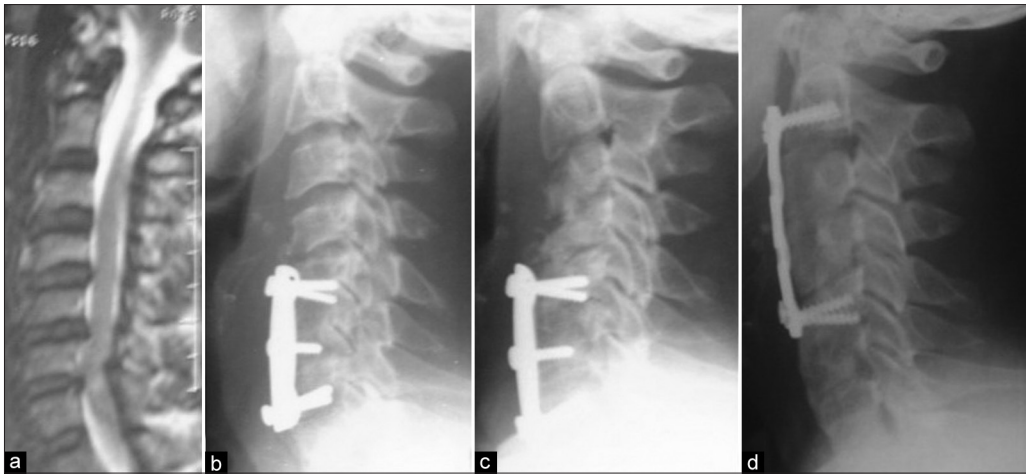


Figure 1: Preoperative MRI (a) and immediate postoperative X-ray (b) after the first surgery (C6 corpectomy and fusion from C5–C7). X-ray before reexploration (c) (showing destruction, collapse, and kyphosis of C3 and C4) and X-ray after the second surgery (d) (corpectomy C3 and C4, bone grafting, and stabilization with correction of kyphosis)

of surgery. His quadriplegia progressed to a completely bedridden state before admission to this hospital. Examination showed diffuse tenderness around the neck and diminished neck movements. Neurologically, he had spasticity with grade 2/5 power in all four limbs. Both the upper and lower limb reflexes were exaggerated with bilaterally extensor plantar and positive Hoffman sign. There was sensory diminution to pinprick C5 downward and he had to be catheterized for urinary incontinence.

The total and differential white cell count, random blood sugar, blood urea, serum creatinine, alkaline phosphatase, and serum electrophoresis were within normal limits, except for a very high erythrocyte sedimentation rate (ESR) of 102 mm/h and C-reactive protein (CRP) of 12.1 mg/L. The enzyme-linked immunosorbent assay (ELISA) for human immunodeficiency virus (HIV), Hepatitis B Antigen HBsAg, and hepatitis C virus (HCV), were negative. The radiograph on admission showed C5–C7 instrumented fusion and collapse of C3 and C4 with wedging of the vertebral bodies. C3/4 and C4/5 disc space was diminished. Marked kyphosis with apex at C3/4 and mild forward subluxation of C2 on C3 was also noted [Figure 1c]. As the implant was of stainless steel, further assessment with magnetic resonance imaging (MRI) could not be done. CT myelogram was done through lumbar puncture with Iohexol. CT myelogram showed inability of the dye to move upward. The plate and screws were in good position without loosening and bone graft at C6 corpectomy site was well incorporated. Localized kyphosis and soft tissue thickening in front of C3 and C4 were noted [Figure 1c].

He was initially put on skull traction for 2 days and repeat surgery was done in December 2003. The patient was examined by an ENT surgeon and normal functioning of vocal cords and intactness of the left recurrent laryngeal

nerve was confirmed. Right sided approach was used to reach the cervical spine. Implant removal was done and there was solid fusion demonstrated from C5 to C7. Thickened soft tissues anterior to C3–C4 vertebral body were removed and sent for biopsy. Aspirate from the region was sent for aerobes, anaerobes, tuberculosis, and fungal culture. Destroyed C3 and C4 bodies were removed and bone grafting was done along with titanium plate screw fixation from C2 to C5 [Figure 1d]. The bone graft was taken from right anterior iliac crest. He made an uneventful recovery. At the time of discharge, his neurological status had improved from ASIA “C” to ASIA “D”. His grip strength had improved. He was mobilized on a Sternal Occipital Mandibular Immobilization (SOMI) type of brace.

The culture report showed growth of *Pseudomonas aeruginosa* and according to the sensitivity, gentamycin 80 mg BD was given intravenously for 3 weeks as inpatient and then he was switched over to ciprofloxacin 500 mg BD orally for another 3 weeks. Histology ascertained pyogenic osteomyelitis. He was discharged after 3 weeks of IV antibiotics when his consecutive CRP levels (done at weekly intervals postoperatively) started showing a decreasing trend. His CRP level at discharge was 1.2 mg/L. At 6 weeks followup, his neurological status improved to ASIA “E”. SOMI brace was discontinued after 6 weeks and hard collar was given for another 6 weeks. Full activity was allowed at 6 months.

The patient was followed up at yearly interval 6th month followup. At his latest followup, (December 2008), his motor power was normal, and he was doing his routine activities satisfactorily. He was back to work. Anteroposterior and lateral flexion extension radiographs were done at followups to check for loosening of implant, signs of recurrence of infection, and adjacent level changes after the long fusion.



Figure 2: Clinical picture (a) X-ray (b) and MRI (c) of the patient after 5 years, showing complete decompression and fusion from C2 to C7

Most recent imaging confirms adequate decompression of the spinal cord and good fusion from C2 to C7 [Figure 2]. X-rays did not show any instability at C1/C2 at the last followup.

DISCUSSION

Postoperative spinal infections are not common, possibly due to prophylactic antibiotics and abundant blood supply. Its prevalence ranges from 0 to 1.1%.¹ Adjacent level infection in anterior cervical spine surgeries with spinal instrumentation without causing destruction of the operative site is a rare entity and has only been described in a case report by Kulkarni² in which the causative organism was *Serratia marcescens*, which is normally a contaminant in saline solutions. Although *Staphylococcus aureus* is the commonest organism identified with spinal infections, the rare association of *Pseudomonas* with postoperative cases is well established. It was found in 2 out of 46 patients who were culture positive in the series of Weinstein.³ We could not find literature support for any particular organism associated with adjacent level disease.

It was difficult to analyze the exact cause of adjacent level discitis because the primary surgery was done at a different hospital whose records were not accessible. It might be a contaminated needle used for marker X-rays, or the Casper pins, used peroperatively. Hematogenous spread of infection also could not be ruled out. He did not have other predisposing factors for infection, like diabetes, rheumatoid arthritis, chronic steroid use, alcoholism, or an immunocompromised state. It was all the more difficult to account for absence of loosening as stainless steel implants often form a pseudocapsule that harbors bacteria which lead to loosening and interfere with fusion. A sinogram and CT scan at the time of presentation with sinus could have guided more towards etiology and progression of this infection.

The patient presented with pain, neurological deficit due to cord compression, and kyphotic deformity. Antibiotics are the first line of treatment in any case of infection, but conservative treatment with antibiotics alone in this patient would not have helped to improve these problems; so, we opted for stabilization and decompression along with deformity correction. Spinal stability is very important for suppression and eventual elimination of infection.⁴ The use of metallic implants in an infected spine is safe and does not lead to persistence or recurrence of infection,^{4,5} even in immunocompromised patients.⁶ The combination of debridement and instrumentation helps restore and maintain the alignment of the spine. It stabilizes the spinal column and allows early mobilization. Various options of anterior column reconstruction were there, including cement⁷ and titanium mesh cage,⁸ but we chose autogenous iliac crest graft.⁹ Long term clearance of infection is more likely with the use of titanium or titanium alloy implants than with stainless steel implants. Hence, we chose to treat this patient with repeat anterior exploration, implant removal, C3 and C4 corpectomy for decompression and deformity correction by autogenous bone grafting and stabilization from C2 to C5 with titanium plate and screw.¹⁰ We are aware of the long term colonization of implants with microbes,¹¹ when used in infected areas, but in the 5 years of followup, he has shown no signs of such concern. Hence, we have not taken out the implants.

There is still controversy regarding the duration of intravenous and oral antibiotics. Whether a strict protocol of 6 weeks of intravenous and another 6 weeks of oral antibiotics is really helpful is also not known. The period of postoperative antibiotics was chosen empirically as 3 weeks of IV antibiotics followed by 3 weeks of oral antibiotics. We have used this regime based on the clinical improvement in pain and general well being of the patient and decrease

in the consecutive CRP levels after first week of surgery. As the CRP levels were near normal by the end of 3rd week, we switched over to ciprofloxacin which is much less toxic for long term use than an aminoglycoside. There is still no level one evidence regarding the duration of antibiotic therapy, monitoring of blood parameters (though CRP is commonly recommended), and the correct time to switch over from IV to oral regime.¹²

REFERENCES

1. Keiper G, Stambough J. The Cervical Spine. 3rd ed. Philadelphia: Lippincott-Raven Publishers; 1998.
2. Kulkarni AG, Hee HT. Adjacent level discitis after anterior cervical discectomy and fusion (ACDF): A case report. *Eur Spine J* 2006;15 Suppl 5:559-63.
3. Weinstein MA, McCabe JP, Cammisa FP Jr. Postoperative spinal wound infection: A review of 2,391 consecutive index procedures. *J Spinal Disord* 2000;13:422-6.
4. Lee MC, Wang MY, Fessler RG, Liauw J, Kim DH. Instrumentation in patients with spinal infection. *Neurosurg Focus* 2004;17: E7.
5. Chen WH, Jiang LS, Dai LY. Surgical treatment of pyogenic vertebral osteomyelitis with spinal instrumentation. *Eur Spine J* 2007;16:1307-16.
6. Carragee E, Iezza A. Does acute placement of instrumentation in the treatment of vertebral osteomyelitis predispose to recurrent infection: Long-term follow-up in immune-suppressed patients. *Spine* 2008;33:2089-93.
7. Chen JF, Lee ST. Antibiotic-polymethylmethacrylate strut: An option for treating cervical pyogenic spondylitis. Case report. *J Neurosurg Spine* 2006;5:90-5.
8. Kuklo TR, Potter BK, Bell RS, Moquin RR, Rosner MK. Single-stage treatment of pyogenic spinal infection with titanium mesh cages. *J Spinal Disord Tech* 2006;19:376-82.
9. Przybylski GJ, Sharan AD. Single-stage autogenous bone grafting and internal fixation in the surgical management of pyogenic discitis and vertebral osteomyelitis. *J Neurosurg* 2001;94(1 Suppl):1-7.
10. Stone JL, Cybulski GR, Rodriguez J, Gryfinski ME, Kant R. Anterior cervical debridement and strut-grafting for osteomyelitis of the cervical spine. *J Neurosurg* 1989;70:879-83.
11. Shad A, Shariff S, Fairbank J, Byren I, Teddy PJ, Cadoux-Hudson TA. Internal fixation for osteomyelitis of cervical spine: The issue of persistence of culture positive infection around the implants. *Acta Neurochir (Wien)* 2003;145:957-60.
12. Sell P. Comments on "Surgical treatment of pyogenic vertebral osteomyelitis with spinal instrumentation" (W. -H. Chen *et al.*). *Eur Spine J* 2007;16:1317-8.

How to cite this article: Basu S, Sreeramalingam R. Adjacent level spondylodiscitis after anterior cervical decompression and fusion. *Indian J Orthop* 2012;46:360-3.

Source of Support: Nil, **Conflict of Interest:** None.