



Reversal of tetraplegia in a patient with haematogenous cervical epidural abscess

Pavlos KATONIS, Xenia SOUVATZIS, Nikolaos TSAVALAS, Kalliopi ALPANTAKI

From the University Hospital of Heraklion, Heraklion, Crete, Greece

Pyogenic haematogenous cervical epidural abscess complicated by tetraplegia is an uncommon entity, but its clinical importance overshadows its rarity. Predisposing risk factors for spinal epidural abscess include diabetes, intravenous drug abuse, liver disease, renal failure, malignancy, HIV, infection elsewhere, rheumatoid conditions, trauma and a number of spinal interventions. Lack of recovery and death are much more frequent when complete paralysis exists since more than 24 to 48 hours. Most authors combine decompressive laminectomy and antibiotics. Anterior decompression and needle aspiration are rarely used, the former more specifically in case of anterior abscess formation. A high index of suspicion along with reliance on gadolinium-enhanced MRI is essential to diagnose the pathology and institute appropriate treatment on an individual basis. The authors report on a diabetic male patient who developed a cervical epidural abscess with tetraplegia after dental extraction. He was treated within six hours by one stage anterior/posterior decompression and fusion, with complete recovery.

Keywords: haematogenous cervical epidural abscess ; reversal ; tetraplegia ; surgical intervention.

INTRODUCTION

Epidural abscess, especially at the cervical level, is a rare and sometimes dramatic condition (10,20, 22,32) with significant morbidity and mortality (11, 21,29). The initial complaints, mainly neck pain and fever, are vague and cause a delay in diagnosis

which leads to neurological deterioration in a short span of time (7,12,35,36,37). Taking into account all the predisposing risk factors (6,29,32), an optimal and successful therapy is only possible with early diagnosis and immediate proper treatment (6,20, 29,41), because a complete neurologic deficit existing for 24 hours (25,42) to 48 hours (31) is associated with the worst possible neurological impairment

CASE REPORT

A 72-year-old male diabetic was seen in a peripheral hospital on May 17, 2007 with a headache, low fever, and severe neck pain, two weeks after the

-
- Pavlos Katonis, MD, PhD, Associate Professor of Orthopaedics and Spinal Surgery.
 - Kalliopi Alpantaki, MD, PhD, Junior Consultant of Orthopaedics and Spinal Surgery.
Department of Orthopaedic Surgery and Traumatology, University Hospital, Heraklion, Crete, Greece.
 - Xenia Souvatzis, MD, PhD, Consultant-Anaesthesiologist.
Department of Anaesthesiology, University Hospital, Heraklion, Crete, Greece.
 - Nikolaos Tsavalas, MD, Resident-Radiologist.
Department of Radiology, University Hospital, Heraklion, Crete, Greece.

Correspondence : Kalliopi Alpantaki, MD, Department of Orthopaedic Surgery, University Hospital, Heraklion, Crete, Greece. E-mail : apopaki@yahoo.gr

© 2011, Acta Orthopædica Belgica.

extraction of a second molar. After clinical examination he was sent home on pain medication with a diagnosis of muscle spasm. Plain radiographs were interpreted as normal. The pain improved because of the analgesics, but the fever increased, while progressive dysphagia and numbness of the upper and lower extremities developed. On May 28, the patient was admitted to the University Hospital because of total tetraplegia (Frankel A). The body temperature was 38.3°C, the blood pressure 95/75 mm Hg, the pulse rate 94/min and the respiratory rate 20/min. White blood cell count : 15.400 WBC/mL ; blood formula : 86% neutrophils ; sedimentation rate 110 mm/h ; C-reactive protein 7.2 mg/L. Blood sugar : moderately elevated ; Na 133 mEq/L ; K 3.10 mEq/L. Gadolinium-enhanced MRI showed a large high-signal intensity epidural abscess with a diameter of 10 mm, involving the anterior epidural space from C1 to C4, and leading to marked compression of the spinal cord (Fig. 1). The ideal surgical approach was not obvious. Firstly, MRI findings demonstrated a homogeneous enhancement of the C1-C4 ventral spinal epidural abscess suggestive of solid and suppurative granulation tissue, not proper for evacuation. Secondly, the solid abscess was located very high to be treated via an anterior approach which is technically demanding and exposes to esophageal and neurovascular injuries. Thirdly, a single posterior approach would necessitate extensive manipulation of the spinal cord in order to reach the anterior mass. For these three reasons a combined anterior/posterior approach was chosen. At first a corpectomy C3 was performed via a left anterior approach. At that time the patient had been tetraplegic for 6 hours. The abscess was débrided, irrigated and evacuated. Specimens were sent for culture and broad spectrum antibiotics were administered intravenously : clindamycin 1.8 g/day and ofloxacin 2 g/day. A titanium mesh, filled with bone grafts from the iliac crest, was placed between the vertebral bodies C2 and C4, after which an anterior plate was applied (Orthofix, Blackstone). Finally a posterior midline approach allowed a wide laminectomy, partial facetectomy, diligent irrigation and débridement. A polyaxial screw-rod system (Medtronic Sofamor Danek, NJ, USA) was

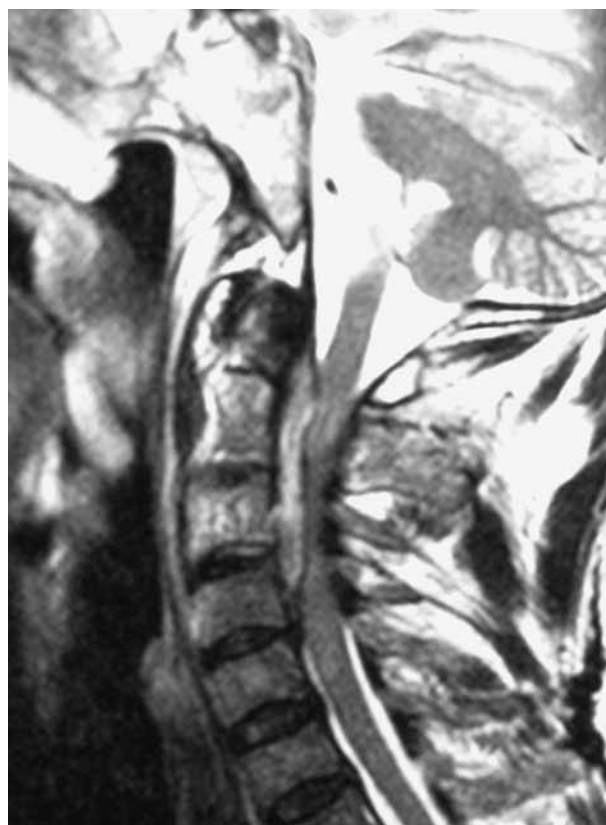


Fig. 1. — Cervical sagittal T2-weighted MRI-scan at the time of admission, revealing an anterior epidural collection C1-C4. Note the high signal intensity of the cord.

used for fixation occiput-C5 through the lateral masses (Fig. 2). Forty-eight hours postoperatively the fever subsided while the neurological condition showed some improvement to Frankel C. The pathogen isolated from the pus was *Staphylococcus aureus*, resistant to methicillin, so that the antimicrobial therapy was changed to Teicoplanin 400 mg/day, according to the antibiogram : 6 weeks intravenously and 6 weeks perorally. After one week an intensive rehabilitation program was started. Two months later, the patient was discharged with a Frankel D stage, being ambulatory and self-care. Six months after diagnosis MRI showed resolution of all inflammatory tissue : 3 years after surgery a Frankel E stage was reached, while MRI was absolutely normal without signs of myelopathy (Fig. 3). The patient returned to normal life.

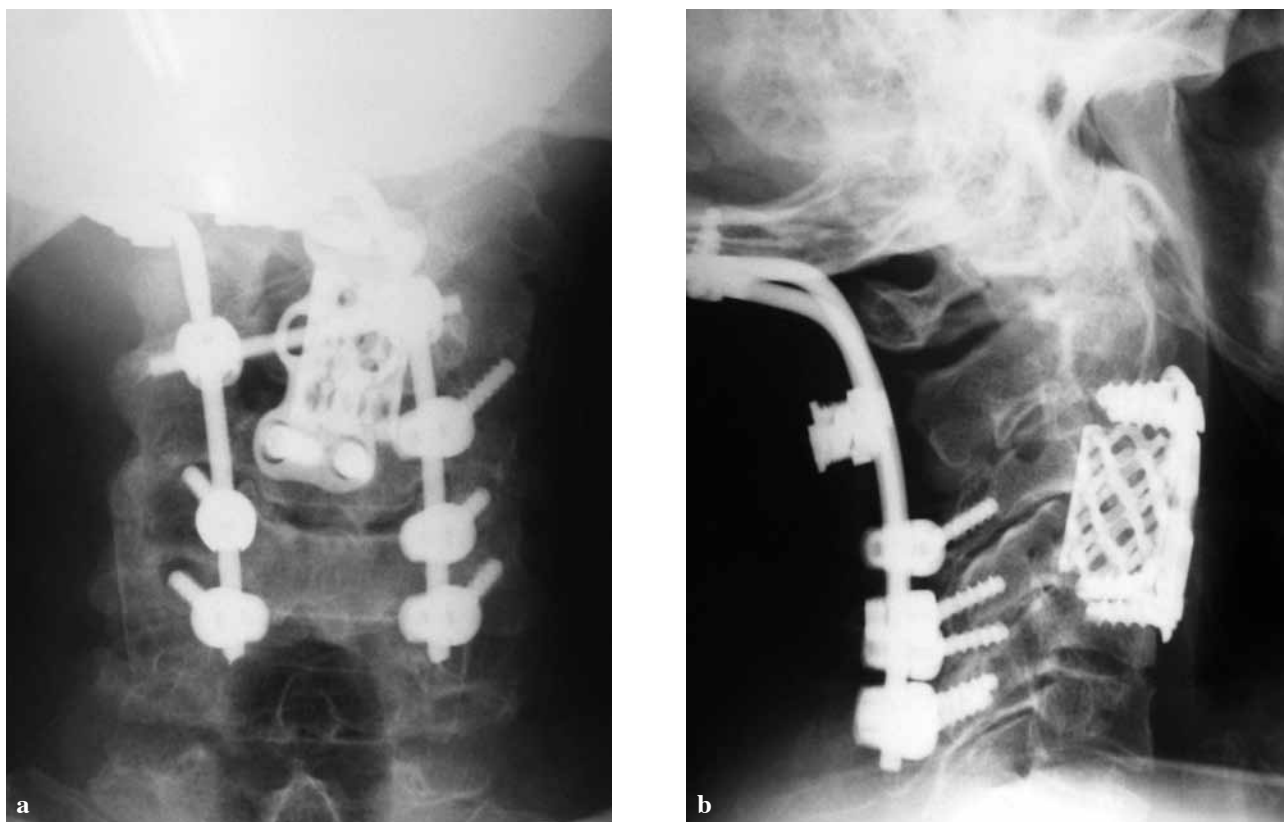


Fig. 2a,b. — Anteroposterior and lateral plain radiographs, nearly three months postoperatively

DISCUSSION

Cervical epidural abscess complicated by tetraplegia is an emergency. It usually occurs in individuals between age 30 and 60, more often in men (14,28,32). Reihnsaus *et al* (31), in a meta-analysis of the international literature, found 915 cases of epidural abscess at all levels, 140 of which or 19% were located at the cervical level; the death rate was 15% for epidural abscesses in general, treated between 1991 and 1997. Extension from a discitis or a vertebral osteomyelitis occurred in 59 out of 915 cases. Inoculation from distant infections was much more frequent. A wide range of organisms can cause an epidural abscess, but *Staphylococcus aureus* is the first offender (11,21,29,30,32,33). This means that isolation of the responsible agent and an antibiogram are necessary in order to secure appropriate antimicrobial treatment; this succeeds in 35% to 70% (6,29). Open surgery remains the most

successful way to obtain the pathogen (14,19,29,32). Although much less common, *E.Coli* is predominant among the Gram-negative bacteria, which may be more common in drug users (17). The dental extraction was probably at the origin in the current case (9,17,40). A haematogenous or a lymphatic spread might have been involved. The venous network of the oral cavity communicates with the intracranial venous sinuses, which communicate with the vertebral venous plexuses (39).

The clinical picture varies from slight spinal pain to severe neurological disability, with a tendency to progress insidiously from the former to the latter (20,22). In addition to neurological findings, patients usually develop fever and elevated inflammatory markers (12,14,19,22,29).

All publications confirm the great value of MRI for diagnosis and follow-up. It yields multiplanar images with high contrast between soft-tissue structures, and without bone artifacts (21,22,26,29,33).



Fig. 3. — Cervical sagittal T2-weighted MRI three years after diagnosis : all inflammatory changes have resolved. The signal intensity of the cord is normalized.

Gadolinium-enhanced MRI allows better delineation of the abscess from contiguous structures and can predict its intraoperative appearance, thereby guiding the surgical approach and management (13, 24, 26).

The almost universally accepted therapeutic strategy consists of laminectomy combined with the proper antibiotic treatment. Most cases associated with spondylodiscitis are located anteriorly to the spinal cord, and thus surgical débridement with or without stabilization is usually performed via an anterior approach (4, 27). The goal of reconstruction is to maintain alignment, prevent deformity, achieve fusion and decompress the spinal canal (5, 16). However, the use of instrumentation in grossly infected areas remains controversial. The authors preferred a single stage anterior/posterior débridement and fusion (8), while others prefer a two-stage débridement, decompression, and stabilization (16, 27, 29, 31). The two most common prerequisites for conservative management are the absence of severe neurological deficits (3, 20, 21, 23, 38) and the indirect identification of the causative microorganism (1, 2, 3, 11, 34, 38).

REFERENCES

1. **Ahl T, Hedström M, von Heijne A, Hammers Stiernstedt S.** Acute spinal epidural abscess without concurrent spondylodiscitis, Successful closed treatment in 10 cases. *Acta Orthop Scand* 1999 ; 70 : 199-202.
2. **Baker AS, Ojemann RG, Baker RA.** To decompress or not to decompress – spinal epidural abscess. *Clin Infect Dis* 1992 ; 15 : 22-27.
3. **Biasotto M, Cadenaro M, Di Lenarda R.** Actinomyces parotid infection after mandibular third molar extraction. *Minerva Stomatol* 2003 ; 52 : 531-534.
4. **Bo W, Longyi C, Jian T et al.** A pyogenic discitis at C3-C4 with associated ventral epidural abscess involving C1-C4 after intradiscal oxygen-ozone chemonucleolysis : a case report. *Spine* 2009 ; 34 : E298-E304.
5. **Chelsom J, Solberg CO.** Vertebral osteomyelitis at a Norwegian university hospital 1987-97 : clinical features, laboratory findings and outcome. *Scand J Infect Dis* 1998 ; 30 : 147-151.
6. **Daroviche RO, Hamill RJ, Greenberg SB, Weathers SW, Musher DM.** Bacterial spinal epidural abscess. Review of 43 cases and literature survey. *Medicine (Baltimore)* 1992 ; 71 : 369-385.
7. **Del Curling O Jr, Gower DJ, McWhorter JM.** Changing concepts in spinal epidural abscess : a report of 29 cases. *Neurosurgery* 1990 ; 27 : 185-192.
8. **Dimar JR, Carreon LY, Glassman SD et al.** Treatment of pyogenic vertebral osteomyelitis with anterior débridement and fusion followed by delayed posterior spinal fusion. *Spine* 2004 ; 29 : 326-332.
9. **Emery SE, Chan DP, Woodward HR.** Treatment of hematogenous pyogenic vertebral osteomyelitis with anterior débridement and primary bone grafting. *Spine* 1989 ; 14 : 284-291.
10. **Fang D, Cheung KM, Dos Remedios ID, Lee YK, Leong JC.** Pyogenic vertebral osteomyelitis : treatment by anterior spinal débridement and fusion. *J Spinal Disord* 1994 ; 7 : 173-180.
11. **Fieseler HG, Kumm D, Braun M.** [An important differential diagnosis for persistent back pain.] (in German). *Schmerz* 2001 ; 15 : 110-115.
12. **Hadjipavlou AG, Mader JT, Necessary JT, Muffoletto AJ.** Hematogenous pyogenic spinal infections and their surgical management. *Spine* 2000 ; 25 : 1668-1679.
13. **Harrington P, Millner PA, Veale D.** Inappropriate medical management of spinal epidural abscess. *Ann Rheum Dis* 2001 ; 60 : 218-222.
14. **Heusner AP.** Nontuberculous spinal epidural infections. *N Engl J Med* 1948 ; 239 : 845-854.
15. **Hollin SA, Hayashi H, Gross SW.** Intracranial abscesses of odontogenic origin. *Oral Surg Oral Med Oral Pathol* 1967 ; 23 : 277-293.
16. **Katonis P, Papadopoulos CA, Muffoletto A, Papagelopoulos PJ, Hadjipavlou AG.** Factors associated

- with good outcome using lateral mass plate fixation. *Orthopedics* 2004 ; 27 : 1080-1086.
17. **Khan SH, Hussain MS, Griebel RW, Hattingh S.** Title comparison of primary and secondary spinal epidural abscesses : a retrospective analysis of 29 cases. *Surg Neurol* 2003 ; 59 : 28-33.
 18. **Lam KG, Pande KC, Mehdian H.** Surgical decompression : a life-saving procedure for an extensive spinal epidural abscess. *Eur Spine J* 1997 ; 6 : 332-335.
 19. **Lang IM, Hughes DG, Jenkins JFR et al.** MR imaging appearances of cervical epidural abscess. *Clin Radiol* 1996 ; 50 : 466-471.
 20. **Lu CH, Chang WN, Lui CC, Lee PY, Chang HW.** Adult spinal epidural abscess : clinical features and prognostic factors. *Clin Neurol Neurosurg* 2002 ; 104 : 306-310.
 21. **Lyu R, Chen CJ, Tang LM, Chen ST.** Spinal epidural abscess successfully treated with percutaneous, computed tomography guided, needle aspiration and parenteral antibiotic therapy : case report and review of the literature. *Neurosurgery* 2002 ; 51 : 509-512.
 22. **Mampalam TJ, Rosegay H, Andrews BT, Rosenblum ML, Pitts LH.** Nonoperative treatment of spinal epidural infections. *J Neurosurg* 1989 ; 71 : 208-210.
 23. **Mann S, Schütze M, Sola S, Piek J.** Nonspecific pyogenic spondylodiscitis : clinical manifestations, surgical treatment, and outcome in 24 patients. *Neurosurg Focus* 2004 ; 17 : E3.
 24. **Nakase H, Matsuda R, Tamaki R et al.** Two-stage management for vertebral osteomyelitis and epidural abscess : technical note. *Neurosurgery* 2006 ; 58 : E1219.
 25. **Nishimura H, Uemura Y, Fukuda S, Kamada Y, Moriwaki T.** [Two cases of pyogenic cervical discitis presenting tetraparesis.] (in Japanese). *No Shinkei Geka* 2000 ; 28 : 631-637.
 26. **Ogden AT, Kaiser MG.** Single-stage debridement and instrumentation for pyogenic spinal infections. *Neurosurg Focus* 2004 ; 17 : E5.
 27. **Parkinson JF, Sekhon LH.** Spinal epidural abscess : appearance on magnetic resonance imaging as a guide to surgical management. Report of five cases. *Neurosurg Focus*, 2004 ; 17 : E12.
 28. **Priest DH, Peacock JE Jr.** Hematogenous vertebral osteomyelitis due to *Staphylococcus aureus* in the adult : clinical features and therapeutic outcomes. *South Med J* 2005 ; 98 : 854-862.
 29. **Ramchandani PL, Sabesan T, Peters W.** Subdural empyema and herpes zoster syndrome (Hunt syndrome) complicating removal of third molars. *Br J Oral Maxillofac Surg* 2004 ; 42 : 55-57.
 30. **Rath SA, Neff U, Schneider O, Richter HP.** Neurosurgical management of thoracic and lumbar vertebral osteomyelitis and diskitis in adults : a review of 43 consecutive surgically treated patients. *Neurosurgery* 1996 ; 38 : 926-933.
 31. **Reihsaus E, Waldbaur H, Seeling W.** Spinal epidural abscess : a meta-analysis of 915 patients. *Neurosurg Rev* 2000 ; 23 : 175-204.
 32. **Revol P, Gleizal A, Kraft T et al.** Brain abscess and diffuse cervico-facial cellulitis : complications after mandibular third molar extraction. *Rev Stomatol Chir Maxillofac* 2003 ; 104 : 285-289.
 33. **Rigamonti D, Liem L, Sampath P et al.** Spinal epidural abscess : contemporary trends in etiology, evaluation and management. *Surg Neurol* 1999 ; 52 : 189-196.
 34. **Rust TM, Kohan S, Steel T, Lonergan R.** CT guided aspiration of a cervical epidural abscess. *J Clin Neurosci* 2005 ; 12 : 453-456.
 35. **Sampath P, Rigamonti D.** Spinal epidural abscess : a review of epidemiology, diagnosis and treatment. *J Spinal Disord* 1999 ; 12 : 89-93.
 36. **Sandhu FG, Dillon WP.** Spinal epidural abscess : evaluation with contrast-enhanced MR imaging. *AJNR* 1991 ; 12 : 1087-1093.
 37. **Schimmer RC, Jeanneret C, Nunley PD, Janneret B.** Osteomyelitis of the cervical spine : a potentially dramatic disease. *J Spinal Disord Tech* 2002 ; 15 : 110-117.
 38. **Tacconi L, Johnston FG, Symon L.** Spinal epidural abscess – review of 10 cases. *Acta Neurochir (Wien)* 1996 ; 138 : 520-523.
 39. **Tang HJ, Lin HJ, Liu YC, Li CM.** Spinal epidural abscess – experience with 46 patients and evaluation of prognostic factors. *J Infection* 2002 ; 45 : 76-81.
 40. **ter Avest E, Uyttenboogaart M, Dorgelo J, ter Maaten JC.** A patient with neck pain and fever. Combined prevertebral and intraspinal abscess in a patient with a de novo HIV infection. *Neth J Med* 2009 ; 67 : 356-357.
 41. **Valero R, Castaneda O, de Francisco A et al.** [Clinical suspicion of vertebral osteomyelitis : back pain in patients with hemodialysis by catheter related infection]. (in Spanish). *Nefrologia* 2004 ; 24 : 583-588.
 42. **Wheeler D, Keiser P, Rigamonti D, Keay S.** Medical management of spinal epidural abscesses : case report and review. *Clin Infect Dis* 1992 ; 15 : 22-27.