MedCrave
Step into the World of Research

Journal of Neurology & Stroke

Case Report

Open Access

CrossMark

Intramedullary abscess associated with acute bacterial meningitis: a case report and review of the literature

Abstract

Intramedullary spinal cord abscess (ISCA) is a rare infection of the central nervous system. Untreated, it may result in significant morbidity and mortality.

We describe the case of a 34-year-old man, who initially was admitted for bacterial meningitis. 3 days after initiation of antibiotic therapy, a gradually and progressive weakness appeared on the left side of his body with numbness on the contralateral side. MRI of the spine demonstrated an ISCA at level of C4. A myelotomy and surgical drainage was performed. Postoperatively, the patient had improved significantly his neurological deficit.

ISCA is still a life-threatening condition, we point out that the diagnosis should be highly suspected, if a cystic spinal cord lesion is surrounded by significant medullar edema associated with fast onset of symptoms, especially in a context of sepsis or acuate meningitis.

Prompt surgical evacuation followed by adequate antibiotic therapy, are the mainstays of treatment.

Keywords: cervical spinal cord, intramedullary abscess, Spinal MRI, Myelotomy

Volume 10 Issue 3 - 2020

Marouane Hammoud, Fayçal Lakhdar, Mohammed Benzagmout, Khalid Chakour, Mohammed El Faiz Chaoui

Department of Neurosurgery, Hassan II University Hospital of Fez, Morocco

Correspondence: Marouane Hammoud, Medicine doctor, Department of Neurosurgery, Hassan II University Hospital of Fez, Morocco, University Sidi Mohammed Ben Abdellah, Fez, Morocco, Email marouane.hamoud@gmail.com

Received: April 20, 2020 | **Published:** June 29, 2020

Abbreviations: ISCA, intramedullary spinal cord abscess; MRI, magnetic resonance imaging; CSF, Cerebrospinal fluid

Introduction

Intramedullary spinal cord abscess (ISCA) is a suppurative infection of the central nervous system. First descripted by Hart in 1830, ISCA has been associated with high mortality and morbidity rate before the antibiotic era.[1,2]

The infection involves the spinal cord resulting in a suppurative collection, the mechanism can be a direct inoculation of microorganisms as in cases of penetrating spinal injuries, or secondary to a hematogenous spread of primary infection as in cases of sepsis, even more rarely ISCA may be secondary to acuate bacterial meningitis.[3,4]

We present a case with acute bacterial meningitis complicated by cervical ISCA, managed successfully with surgical drainage, and adequate antibiotics. We conclude that a high clinical suspicion of this rare entity is a key for early diagnosis and management to avoid irreversible spinal cord damage.

Case description

A 34-year-old man with 2-day history of fever and confusion, he was admitted to the neuro-reanimation department for suspicion of meningitis. On examination Glasgow Coma Scale (GCS) was 14 but was able to follow conversation. His neck was stiff with positive Kernig's and Jolt accentuation of headache (JAH) signs.

He has no neurological deficits.

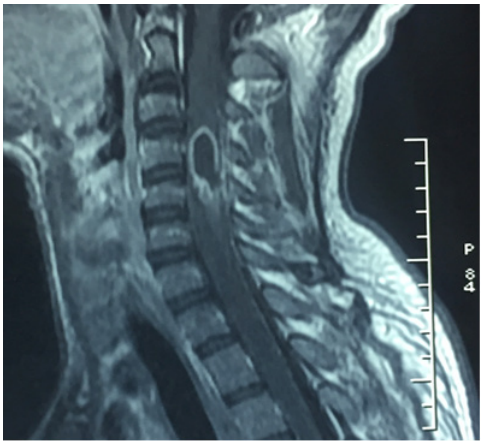
The brain MRI was normal. Biological results revealed a white blood cell count of 12300 cells/mm^3, 60 mg/dl C reactive protein. Culture of blood was negative.

Lumbar puncture results showed significant CSF leucocytosis (486 cells/µl) with neutrophilic predominance, and decreased CSF glucose level.

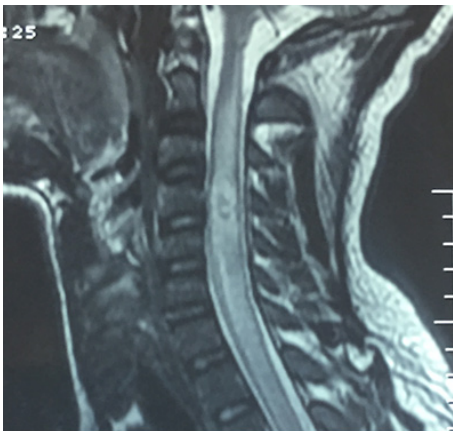
Based on patient's symptoms, and CSF results, the diagnosis of bacterial meningitis was made. Antibiotic was begun intravenously with Cefotaxime, associated with dexamethasone.

Three days after admission, the patient presented a rapid progressive tetraparesis, with increasing neck pain,

On examination, the muscle strength of the upper extremity was 2/5, and 3/5 in his lower extremity, with a positive Hoffman's and Babinski's signs. A spinal MRI revealed an intramedullary cystic mass, at level of C4, with ring enhancement after injection of gadolinium, associated with perilesional edema extending from the level of C2 to C7 (Figure 1).



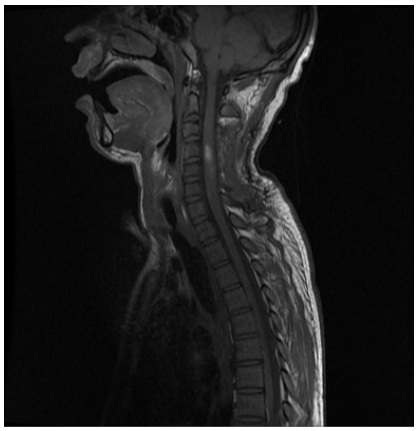
A) T1-weighted image with contrast showing an intramedullary cystic lesion with ring enhancement.



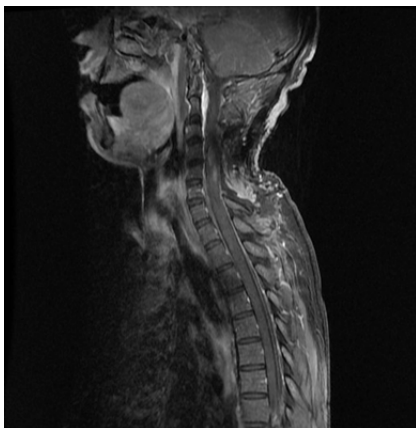
B)T2-weighted image showing extensive spinal cord edema above and below the lesion.

Figure 1 Preoperative sagittal MRI of the cervical spinal cord.

Given the acute neurologic decline with imaging features suggestive of an ISCA, The patient underwent surgical drainage. A skin incision was made from C3 to C7, then, and C4 C5 C6 laminectomy was performed. On exploration, the dura mater was rather tense. After isolating the surgical zone with cottonoid, we proceeded to a limited midline myelotomy at C4 level; a yellow-colored purulent fluid was discharged (Figure 2). The abscess was completely drained; combined with copious irrigation with normal saline solution. Then, a watertight closure of the dura mater was performed.



A) T1- weighted image.

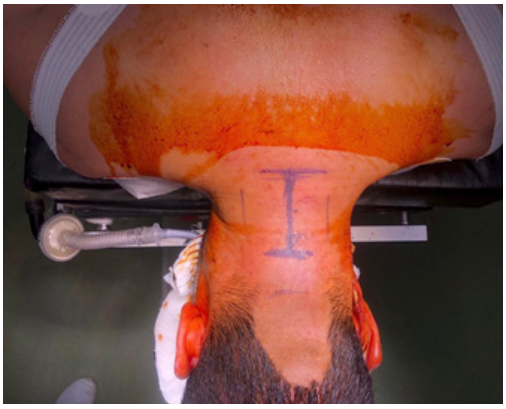


B) T1-weighted image with contrast.

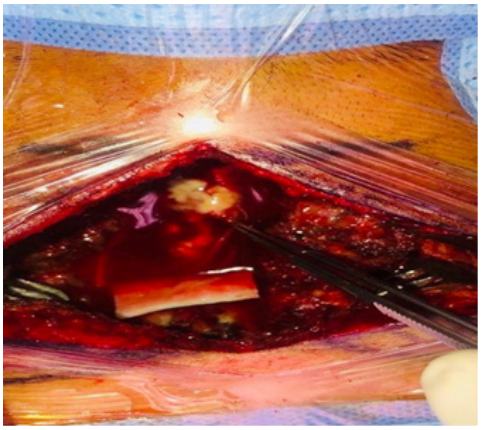
Figure 2 Postoperative sagittal MRI of the cervical spinal cord.

Pus sample tested positive for Staphylococcus aureus. Based on the culture sensitivity antibiotics were then switched to Vancomycin for 6 weeks. Postoperatively, the patient started to improve his muscles strength from day 3. He was sent for neuro-rehabilitation.

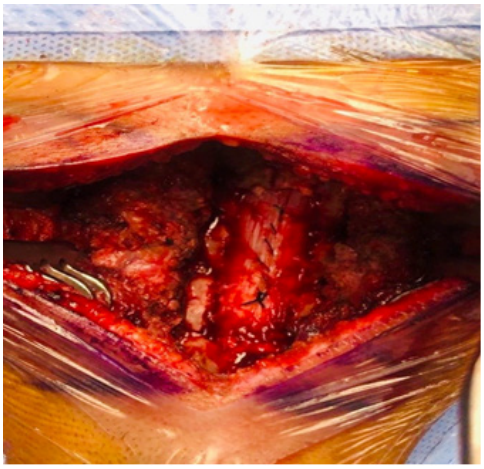
Follow-up spinal MRI performed 1 week after surgery showed a complete evacuation of the abscess, with decreased extent of perilesional edema (Figure 3). After 1year follow-up, the patient has improved totally his neurological deficit, without any complications.



A) A midline incision was performed from C3 to C7.



B) After dural opening, yellow-colored pus was discharged after midline myelotomy.



C) The dura was totally closed.

Figure 3 Intraoperative photographs.

Citation: Hammoud M, Lakhdar F, Benzagmout M, et al. Intramedullary abscess associated with acute bacterial meningitis: a case report and review of the literature. *J Neurol Stroke.* 2020;10(3):120–123. DOI: 10.15406/jnsk.2020.10.00423

Discussion

Intramedullary spinal cord abscess (ISCA) are a rare entity, with only 197 cases reported in the literature since its first description by Hart in 1830.[1,2] ISCA are historically associated with poor prognosis. In the 'pre-antibiotic era'; the literature reported up to 90% mortality rate, nowadays, with the instauration of a correct antibiotic treatment, this number was significantly lowered at 4%.[4–6]

From a histopathological point of view, ISCA is an infection of the spinal cord tissue with the same stages of development as the brain abscess formation, Although, the collection of pus is surrounded by a capsule. The infection may extend to the subarachnoid space leading to meningitis or ventriculitis.[2,5]

In adult population, ISCA is caused by (% cases): Dermal sinus infection in 29 %, sepsis 27%, and endocarditis 1%. While in 43% of cases, no site of infection was identified (cryptogenic origin).[7–9]

Even more rarely, ISCA can complicate acute bacterial meningitis. Vo et al. described a case of young man with acuate meningitis complicated by a cervical intramedullary abscess.[9]

Other authors have reported cases of penetrating spinal injuries that were complicated with ISCA. In those cases, the mechanism of infection is direct inoculation of germs into the spinal cord.[10,11]

In children, intramedullary abscess formation is often a complication of congenital neuroectodermal infection, generally located in the lumbar segment.[12,13]

S. aureus is the most frequent pathogen to cause bacterial ISCA,[6] the causative micro-organism in our case. Other microorganisms commonly found are Bacteroides species, Haemophilus species, and Listeria monocytogenes.[5,13]

Mycobacterium tuberculosis has also been reported, Torres C et al. described tubercular intramedullary abscess associated with active tuberculosis infection.[14]

The clinical presentation of ISCA depends on the location and level of the involvement. A literature review by Kurita et al. revealed the following signs and symptoms (% cases): Neurological deficits in 68%, sphincter dysfunction 56%, fever in 40%, meningism in 12%, and brain stem disorders in 4%. The cardinal signs « fever, pain, and neurological deficits » occur in only 30% of the cases.[6]

The clinical presentation can be acute, or subacute, mimicking Guillain-Barre syndrome, or spinal cord tumors. Although ISCA could occur in all ages, it predominantly affects children and young adults, and it is more prevalent in males than females.[1,15]

The cervical and upper thoracic spinal cord, are the most involved segments in cases of cryptogenic ISCA. The abundant vascularisation of those segments in comparison with the lower thoracic and lumbar segments could explain this.[16]

Spinal MRI is the exam of choice; it provides good demonstrations of the size of the lesion, its location, and identifies any associated spinal cord abnormalities.[17]

Murphy et al. reported that the presentations of ISCA on MRI are similar to those of a cerebral abscess. In the early stages of infectious myelitis, MRI shows high-signal intensities on T2WI. The lesion reveals poorly defined enhancement on T1WI with contrast. One week later, the lesion becomes less diffusely hyper-intense on T2WI. The marginal enhancement is clearly defined on T1WI with contrast. Diffuse marginal cord edema was also noted.[18]

Also, a ring-enhancing spinal lesion is a nonspecific feature. Recently, Diffusion-Weighted MR has been added to the imaging techniques, as a more sensitive and specific method for the differential diagnosis of ISCA from spinal cord tumors such necrotic gliomas, metastatic and demyelinating lesions. The abscess has high signal intensity on DWI and low values of ADC.[19]

Overall, the treatment of ISCA focuses on the surgical drainage of the suppurative collection followed by specific intravenous antibiotics.[5,7,20,21]

In a pediatric case series of 38 children, Chan et al. found that a good prognosis resulted from early drainage and the administration of antibiotic.[5]

Large decompressive laminectomy should be done as the ISCA can mimic a spinal cord tumor, followed by a minim myelotmy to preserve the spinal cord vascularisation.[7]

Also, isolating the surgical zone before and after the myelotomy is required to prevent the high risk of CSF dissemination. Resection of the abscess capsule is not advisable, due to the high risk of spinal cord damage, with no significant benefit.[22]

In pediatric patients with extensive abscess; to protect from subsequent orthopaedic complications of large laminectomy; advancing gently a catheter through the minimised myelotomy is an effective technique to drain the abscess.[23]Although some good outcomes were also reported in patients treated only with intravenous antibiotics, without surgery. Kurita et al. noted that there were no significant differences in prognosis between surgical and nonsurgical group. He suggested that the most significant variable for outcome were the rapidity of diagnosis and the widespread availability of antibiotics with excellent penetration into spinal cord tissue.[6]

However, the indications for only medical treatment remain uncertain. Other factors to consider are: size of the abscess, severity and rapidity of neurological deficits, association with congenital abnormalities, and presence of immunocompramise.[6]

Therefore, once the diagnosis of ISCA is made, the majority of authors, regardless of the patient's age, indicate prompt surgical drainage, followed by antibiotics. Otherwise irreversible neurologic complications can occur from compression of spinal cord.[20,23,24]

Conclusion

ISCA is a rare life threatening condition that can mimic others intramedullary pathologies. Therefore, it should be kept in mind in front of the diagnosis of cystic spinal cord lesions, especially in patients with fever, backache, and rapidly progressive neurological deficit. A prompt surgical drainage associated with intravenous antibiotics appears the most successful option.

Acknowledgments

None.

Conflicts of interest

The author declares no conflicts of interest.

References

1. Sarah Lapointe, Catherine Legault, Robert Altman, et al. Intramedullary Spinal Cord Abscess; Descriptive Review of the Literature (P2.015). *Neurology.* 2016;86(16 Supplement): P2.015.
2. Hart J. Case of encysted abscess in the center of the spinalcord. Dublin Hospital Report 1830; 5:522–524
3. Iwasaki M, Yano S, Aoyama T, et al. Acute onset intramedullary spinal cord abscess with spinal artery occlusion: a case report and review. *Eur Spine J*. 2011;20(Suppl 2):S294–S301.
4. Chandran Raj, Bhanuprabhakar Rajmohan, Sumukhan Sivakumar. Intramedullary Spinal Cord Abscess: Illustration of Two Cases and Review of Literature. *Indian Journal of Neurosurgery*. 2017;06(1).
5. Chan CT, Gold WL. Intramedullary abscess of the spinal cord in the antibiotic era: clinical features, microbial etiologies, trends in pathogenesis, and outcomes. *Clin Infect Dis*. 1998;27(3):619–626.
6. Kurita N, Sakurai Y, Taniguchi M, et al. Intramedullary spinal cord abscess treated with antibiotic therapy—case report and review. *Neurol Med Chir (Tokyo)*. 2009;49(6):262–268.
7. Al Barbarawi M, Khriesat W, Qudsieh S, et al. Management of intramedullary spinal cord abscess: experience with four cases, pathophysiology and outcomes. *Eur Spine J*. 2009;49(6) :262–268.
8. Arnáiz-García, María Elena, Jose María González-Santos, et al. Intramedullary Cervical Abscess in the Setting of Aortic Valve Endocarditis. *Asian Cardiovasc Thorac Ann*. 2015;23(1):64–66.
9. Vo DT, Cravens GF, Germann RE. *Streptococcus pneumoniae* meningitis complicated by an intramedullary abscess: a case report and review of the literature. *J Med Case Reports.* 2016;10(1)**:**290.
10. Da Silva PSL, De Souza Loduca RD. Intramedullary spinal cord abscess as complication of lumbar puncture: a case-based update. *Childs Nerv Syst.* 2013;29(7):1061–1068.
11. Rifaat M, el-Shafei I, Samra K, et al. Intramedullary spinal abscess following spinal puncture: case report. *J Neurosurg*. 1973;38(3):366–367.
12. Dho YS, Kim SK, Wang KC, et al. Catastrophic intramedullary abscess caused by a missed congenital dermal sinus. *J Korean Neurosurg Soc*. 2015;57(3):225–228.
13. Simon JK, Lazareff JA, Diament MJ, Kennedy WA. Intramedullary abscess of the spinal cord in children: a case report and review of the literature. *Pediatr Infect Dis J*. 2003;22:186e192.
14. Torres C, Riascos R, Figueroa R, et al. Central nervous system tuberculosis. *Top Magn Reson Imaging*. 2014;23:173–189.
15. Zeidman SM, Ducker TB. Infectious complications of spine surgery. In: Benzel EC, editor. Spine Surgery, Techniques, Complication Avoidance and Management. Pensylvania, Livingstone. 1999. pp: 1451–1452.
16. Gillilan LA. The arterial blood supply of the human spinal cord. *J Comp Neurol*. 1958;110(1):75–103.
17. Roh JE, Lee SY, Cha SH, et al. Sequential magnetic resonance imaging finding of intramedullary spinal cord abscess including diffusion weighted image: a case report. *Korean J Radiol*. 2011;12(2):241–246.
18. Murphy KJ, Brunberg JA, Quint DJ, et al. Spinal cord infection: myelitis and abscess formation. *Am J Neuroradiol*. 1998;19:341e348.
19. Dörflinger-Hejlek E, Kirsch EC, Reiter H, et al. Diffusion-weighted MR imaging of intramedullary spinal cord abscess. *AJNR Am J Neuroradiol*. 2010;31(9):1651–1652.
20. Bunyaratavej K, Desudchit T, Pongpunlert W. Holocord intramedullary abscess due to dermal sinus in a 2-month-old child successfully treated with limited myelotomy and aspiration. *Case report J Neurosurg*. 2006;104(4 Suppl):269–274.
21. Sinha P, Parekh T, Pal D. Intramedullary abscess of the upper cervical spinal cord. Unusual presentation and dilemmas of management: case report. *Clin Neurol Neurosurg*. 2013;115(9):1845–1850.
22. Papagelopoulos PJ, Peterson HA, Ebersold MJ, et al. Spinal column deformity and instability after lumbar or thoracolumbar laminectomy for intraspinal tumors in children and young adults. *Spine.* 1997;22:442–451.
23. Verdier EP, Konsol O, Portillo S. Intramedullary cervical abscess mimicking a spinal cord tumor in a 10-year-old girl: a case-based review. *Childs Nerv Syst* 2018;34:2143–2147.
24. Morimoto K, Takemoto O, Nakamura H, et al. (2003) Spinal dermal sinus associated with intramedullary abscess and dermoid. *Pediatr Neurosurg*. 2003;39(4):225–226.

Citation: Hammoud M, Lakhdar F, Benzagmout M, et al. Intramedullary abscess associated with acute bacterial meningitis: a case report and review of the literature. *J Neurol Stroke.* 2020;10(3):120–123. DOI: 10.15406/jnsk.2020.10.00423