Role of MR in the diagnosis of spinal epidural abscess

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Authors: M. Iodice; Curti/IT
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Learning objectives

Since long delays in the diagnosis of spinal infection can significantly increase morbidity and mortality, early diagnosis is very important and radiologic investigation of patients with spinal infection is critical to patient management.

Because of its many advantages MR imaging has been considered the optimal imaging study for the evaluation of spinal inflammatory disease. Advantages of MR include its multiplanar capabilities and soft-tissue contrast resolution thanks to which all compartments in and around the spine, into which an inflammatory process might extend, are displayed with MR imaging, and, unlike other imaging studies, it provides direct visualization of the disk and the spinal cord.

The purpose of this e-poster is to evaluate the role of MRI and its higher sensitivity than CT in the diagnosis of spinal epidural abscess.
**Background**

Epidural abscesses (EP) are a rare cause of acute or subacute spinal cord compression, completely reversible if treated promptly, but potentially devastating because of late diagnosis or inadequate treatment, as to be considered a neurological emergency.

Biological agents mainly involved are bacteria, fungi, parasites and more often, among the first S. aureus, but over the years it has lost the absolute primacy. Predisposing factors are diabetes mellitus, trauma, intravenous drug abuse, alcoholism, cachexia, and tattoos and of course immunodeficiency related to the human immunodeficiency virus (HIV). Most spinal epidural abscesses are thought to result from the haematogenous spread of infectious agents usually from a cutaneous or mucosal source or dental abscesses, genitourinary, pulmonary infections, but also, is possible the direct spread of infection into the epidural space from a source adjacent to the spine (osteomyelitis of a vertebral body, back of throat abscess). Epidural abscesses may complicate epidural anesthesia (incidence of about 22%), however the occurrence of epidural abscess as a result of epidural catheter insertion is rare, about 0.04%.

More often they occur in the lower thoracic and lumbar regions abscesses, for anatomical reasons (here the epidural space is wider) and the collection is usually posterior to the spinal cord (anterior epidural space it is virtual).

Spinal abscesses may occur with localized pain, tenderness and sensitivity to percussion (usually in the thoracic or lumbar regions), often severe, sometimes with radiating root pain followed by limb weakness. Spinal pain and fever are usually the only symptoms present and weakness may last for hours or days before a precipitous neurological deterioration in paraplegia or quadriplegia.

In most patients whose cerebrospinal fluid has a high content of protein and a lymphocytic pleocytosis, in approximately 1 / 3 of cases there is an osteomyelitis. The diagnosis relies on clinical suspicion (spinal cord compression in a patient with infective framework, fever, significant medical history) and requires MR in urgency. Lumbar puncture is not significant showing nonspecific inflammation with increased risk of dissemination of the pathogen. Today the mortality rate is 10-15% and good recovery is possible if treatment is appropriate and timely. The treatment requires emergency decompression of the spinal cord and nerve roots and removal with surgical drainage of the abscess, the pus collected from any lesions should be stained with the Gram method and examined with cultivation techniques. Although antibiotics have been effective alone in some patients with partial loss of function, the presence of an epidural abscess is, even without deficit, at risk of precipitous and irreversible deterioration of neurological functions and requires surgical treatment of decompression.
Antimicrobial treatment of spinal epidural abscesses should start early initially with a penicillinase-resistant penicillin. In patients treated with warfarin anticoagulation and in whom an epidural hematoma is suspected, phytonadione (vitamin K1) must be administered at a dose of 2.5 to 10 mg SC or fresh frozen plasma. Patients with thrombocytopenia should be given platelets.

We describe two cases (both male, aged 50 and 57 respectively) with a notably herniated lumbar disc (the first at level L4-L5, the latter at L5-S1) admitted to the Radiological department of Caserta Civil Hospital from the emergency department for recurrence of low back pain accompanied by leg pain, initially unilateral associated with worsening fever lasting more than 5 days. One of them had undergone epidural puncture two weeks before.
Imaging findings OR Procedure details

Patients came to the Radiological department of Civil Hospital of Caserta, were first subjected to CT in emergency and, subsequently, because of the aggravation of low back pain and persistence of high fever, they underwent RM.

In both cases, the CT scan (Fig. 1 and 2 about the older patient) showed only findings related to the known lumbar disc pathology. MR imaging was performed on 1.5-T. T1- and T2-weighted images were obtained with contiguous sections in sagittal view with 4-mm thick sections supplemented by 4 mm-thick axial sections. T1-weighted images were obtained also after administration of intravenous paramagnetic contrast medium (gadolinium).

The MRI has revealed multiple collections posterior to the cauda equina with a high signal intensity on T2-weighted images and with low signal intensity, slightly higher than CSF, on T1-weighted images. After intravenous administration of gadolinium (Gd) these masses showed significant enhancement (as shown in Figure 3, 4 and 5. Fig 3 and 4: sagittal view of the patient of 57 years on T2-weighted images (3) and T1 weighted images after Gd (4); fig. 5: patient aged 50 axial section on T1 weighted images after Gd).

Already on T2 weighted images abscess collections are easily distinguishable, appearing as masses with high intensity signal but contrast medium is useful to better appreciate the limits and the septa within the collections. In the case of fig. 5, the collection also extends to the left posterolateral at the level of the interapofisary joint L2-L3. In both cases the abscesses were removed with surgical drainage.
Fig. 1: CT scan of the older patient shows only findings related to the known lumbar disc pathology

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**Fig. 2:** CT scan of the older patient shows only findings related to the known lumbar disc pathology

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Fig. 3: RM sagittal view of the patient of 57 years on T2-weighted images

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**Fig. 4:** RM sagittal view on T1 weighted images after Gd.

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**Fig. 5:** RM in patient aged 50: axial section on T1 weighted images after Gd

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Conclusion

Patients with a spinal epidural abscess often present first in the emergency department setting.

CT is useful in case of emergency, for the ready availability, but because of the low intrarachidian contrast resolution it allows diagnosis only for indirect signs such as bone alterations and soft tissue infiltrations (fig. 6). Magnetic Resonance Imaging, also with administration of Gadolinium is the diagnostic modality of choice to confirm the presence and determine the location and the extent of an abscess (fig 7).

Multiplanar imaging, visualisation of the soft tissues around the spine (including paraspinal musculature) and a direct visualisation of the disk and the spinal cord confer a distinct advantage of MRI over CT and, where available, should always be used.
Fig. 6: CT scan sagittal reconstruction

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Fig. 7: RM axial section on T1 weighted images after Gd.

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Personal Information


DIPARTIMENTO DEI SERVIZI INTEGRATI E DIAGNOSTICI Azienda Ospedaliera di Rilevanza Nazionale "S'ANNA E SAN SEBASTIANO" DI CASERTA

*DIPARTIMENTO DI INTERNISTICA CLINICA E SPERIMENTALE "F.MAGRASSI"-U.O.C. DI RADIODIAGNOSTICA-SECONDA UNIVERSITÀ DEGLI STUDI DI NAPOLI

**DIPARTIMENTO ASSISTENZIALE DI DIAGNOSTICA PER IMMAGINI E RADIOTERAPIA AZIENDA OSPEDALIERA UNIVERSITARIA "FEDERICO II" DI NAPOLI
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