

# Methicillin-resistant staphylococcus aureus meningitis associated with spondylodiscitis and psoas abscess in an immunocompetent patient

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## To cite this article:

Hicham Bakkali, Rafai Mustapha, Belkouch Ahmed, Tahir Nebhani, Naoufal Chouaib, Saad Zidouh, Lahcen Belyamani. Methicillin-Resistant Staphylococcus Aureus Meningitis Associated with Spondylodiscitis and Psoas Abscess in an Immunocompetent Patient. *American Journal of Internal Medicine*. Vol. 2, No. 6, 2014, pp. 109-112. doi: 10.11648/j.ajim.20140206.14

**Abstract:** Methicillin-resistant staphylococcus aureus (MRSA) meningitis are rare. They are mostly considered as a nosocomial complication of a neurosurgical procedure or a contiguous infection. In this paper we discuss the case of an immunocompetent patient with methicillin-resistant staphylococcus aureus meningitis associated with bacteremia, spondylodiscitis of the lumbar spine and psoas abscess. The patient successfully followed an antibiotic therapy associating Levofloxacin, Rifampin and Vancomycin. This case highlights the importance of early diagnosis and proper treatment.

**Keywords:** Methicillin- Resistant Staphylococcus Aureus, Meningitis, Spondylodiscitis, Levofloxacin, Rifampicin, Vancomycin

## 1. Introduction

MRSA community acquired infections mostly concern patients with risk factors and particularly target the skin and soft tissues. They may lead to severe pneumonia, necrotizing fasciitis and septic shock. MRSA meningitis is a rare disease often associated with bacteremia and/or is secondary to a neurosurgical intervention or particularly ear, nose, and throat infections. Very few cases, other than this context, are reported in the literature.

This paper discusses the case of a patient with MRSA meningitis associated with bacteremia, spondylodiscitis and psoas abscess.

## 2. Observation

Mr. W.S is 60 years-old, with a history of leprosy, treated and cured when the patient was still a child. He was admitted in our medical department for disorders of consciousness with psychomotor agitation, fever and chills. According to the general examination, the patient confused time and space, and had incoherent thoughts with no sensorimotor deficits or cranial nerves problems. The Glasgow Coma Scale was

measured at 13/15, the neck was flexible and there were no signs of meningitis. Body temperature was at 39.5 °C, blood pressure at 150/80 mmHg, heart rate at 110 beats/minute, respiratory rate at 22 cycles/minute and oxygen saturation at 98% on room air. Pulmonary and cardiovascular tests showed no particular results. Other tests found skin lesions and leprosy sequelae on the right foot with no superinfection associated with intertrigo lesions. The brain computed tomography (CT) scan done when the patient was admitted showed no particular results. The blood cell count measured leukocytosis at 21000/mm<sup>3</sup> with neutrophil predominance. C-reactive protein (CRP) was up to 96 mg/l. Because of the clinical and biological infectious syndrome, urine cytobacteriological and blood testings were carried out. The lumbar puncture text (LP) found some xanthochromic liquid. Protein concentration level was measured at 4.34 g/l, glycorrachia at 4.4 mmol/l, and the glucose at 18 mmol/l. The direct examination showed 3500 elements/mm<sup>3</sup> of white blood cells, 87% neutrophils with the presence of gram-positive cocci. A probabilistic treatment of gram-positive cocci meningitis was initiated with Ceftriaxone 2 grams/12 hours. This treatment was readjusted 48 hours after the results of the blood test and the cerebrospinal fluid test that found a MRSA to which can react Levofloxacin, Vancomycin, Fosfomycin, Rifampicin and the fusidic acid.

The cytobacteriological examination of urine showed no particular results. The patient described here was given Levofloxacin (500mg/12 hours in the first day and then 500mg/day), Rifampicin 600 mg/day and Vancomycin 30 mg/kg/day. Fever disappeared (apyrexia) in the second day of treatment and the patient returned to normal consciousness in the fourth day (Glasgow Coma Scale 15/15). But the patient still suffered from abdominal pain and back pain associated with paraparesis. CT and then abdominal, lumbar spine and pelvic muscles MRI revealed an abscess in the left psoas muscle, L2-L3 and L3-L4 spondylodiscitis, epidural abscess and abscess in L2 to L4 vertebral bodies (Fig. 1). Chest and cervical-thoracic spine CT scans were normal. The transthoracic echocardiogram was also normal, eliminating thus the possibility of an endocarditis. Biological tests showed a decrease in the leukocyte levels at 13500/mm<sup>3</sup> and the CRP at 24 mg/l.



Figure 1a. coronal MRI



Figure 1b. Sagittal MRI

**Figure 1.** MRI lumbar spine and pelvic muscles showed the presence of an abscess of the psoas muscle partitioned left, L2-L3 and L3-L4 spondylodiscitis, L3-L4 epidural abscess and vertebral bodies abscess of L2 to L4

The surgical removal of the epidural abscess was carried out successfully. Intraoperative sampling showed the presence of neutrophils alone. The histological analysis of bone fragments showed no particular results and no inflammatory lesions. The treatment was good under Levofloxacin, Rifampin and Vancomycin as the different related levels started to be measured at their normal rates. Antibiotic treatment continued for 3 weeks for vancomycin, 7 weeks for Levofloxacin and Rifampin. The patient has had paraparesis sequelae which required some physical (rehabilitation) therapy sessions.

### 3. Discussion

Staphylococcus aureus meningitis is rare. It is estimated at 2- to 10% of cases of bacterial meningitis for adults [1, 2, 3, 4]. In the literature, diabetes, cancers, intravenous drug use and cardiovascular diseases are often described as risk factors [3, 5, 6]. It is due in most cases to nosocomial infections after a neurosurgery. It is mainly confined to MRSA. MRSA meningitis is usually secondary to hematogenous or a contiguous infection, especially ENT infections. Possible way in the case described here, is the intertrigo, especially as the patient frequently presented these types of lesions that were treated poorly; ECRU was normal and CT showed no sinusitis. The initial clinical picture was made according to the literature [3, 7], fever in 84% of cases, headache in 41% of cases, meningeal signs in 62% of cases and impaired consciousness in 75% of cases. The patient we are talking about here had fever and consciousness problems that appeared three days before he was admitted to the hospital. He had no meningeal signs. Laboratory testings including the results of the LP confirmed the diagnosis of bacterial meningitis. The cerebrospinal fluid test confirmed the MRSA. In the literature the positive gram coloring was found in 29-50% of cases of MRSA meningitis [3, 8, 9], whereas the test was positive in over 70% of cases [3, 5, 8]. The elevated protein and hypoglycorachie are not systematic [2, 3, 10]. Pintado *et al.* for example reported only 30% of elevated protein and 85% of hypoglycorachie [3]. A low glucose level and/or elevated protein do not always appear to be associated with a poor prognosis [10].

In the case discussed in this paper, meningitis was associated with bacteremia, spondylodiscitis, epidural abscess with a mass effect on the dural sheath and an abscess in the left psoas muscle. The literature reveals the possibility of association of MRSA meningitis with spondylodiscitis, epidural abscess/paraspinal, soft tissue infections, pneumonia, endocarditis, urinary infections, sinusitis, otitis media or osteomyelitis [3, 8, 10]. Nothing in the literature refers to any association with a psoas abscess, discussed in this case.

The patient described here received appropriate antibiotic therapy based on the results of antibiogram testing; 3 weeks for Vancomycin and 7 weeks for Levofloxacin and Rifampin. Surgical removal of the abscess helped improve the patient's clinical condition. Levofloxacin is a fluoroquinolone known as being bactericidal against gram-positive bacteria and having a good penetration into the CSF in cases of meningitis

[11]. Vancomycin is the antimicrobial agent the most commonly used to treat MRSA infections. It is however known to have poor concentrations in the CSF [12] but the inflammation condition associated with meningitis helps increase its concentration to moderate degrees [13]. Several medical reports stressed the use of Linezolid to treat central nervous system infections with MRSA; its penetration into the CSF can reach 70% [14]. Linezolid has been used successfully in association with Vancomycin [15, 16]. Valentini et al. reported a successful treatment of a teenager with MRSA community acquired pneumonia associated with bacterial meningitis. The treatment associated Linezolid, Rifampin and Teicoplanin for 5 weeks [17]. Fernandez-Ruiz et al. reported a case of MRSA meningitis complicated by cerebral infarction treated for 7 weeks successfully using Linezolid and Levofloxacin [18].

Recently, Daptomycin was used successfully as a treatment in an experimental model of meningitis in rabbits. It was significantly more bactericidal than Vancomycin in cases of infection with staphylococcus aureus [19, 20]. Lee et al. reported a case of MRSA meningitis successfully treated with Daptomycin and Rifampin [21].

A paraparesis sequelae was always there. Some physical (rehabilitation) therapy sessions were prescribed for him. Brouwer et al. reported a high incidence of neurological complications (>50%) in the recent series of staphylococcus aureus community acquired meningitis [22]. A recent literature review revealed that patients with MRSA community-acquired infections of the central nervous system who received Linezolid were cured without neurological sequelae, while patients treated with Vancomycin without Linezolid had neurological complications or passed away [23].

#### 4. Conclusion

MRSA Community acquired meningitis are rare but serious diseases. We have to think about it whenever we have MRSA bacteremia associated with neurological symptoms, and look for other infections, particularly in the bone, epidural, soft tissues, and endocarditis. The case we discussed in this paper illustrates this association by the presence of MRSA meningitis associated with bacteremia, epidural abscess, spondylodiscitis and psoas abscess. Antibiotic therapy (Levofloxacin, Rifampin and Vancomycin) was used as a treatment in this case, with the surgical removal of the abscess that needed and good the treatment. The patient still had discrete paraparesis sequelae.

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