Invasive primary intracerebral infections in women caused by *Streptococcus intermedius* manifesting as purulent meningitis and intracerebral abscess

Invazivní primárně intracerebrální infekce u žen způsobené *Streptococcus intermedius* a manifestující se jako purulentní meningitida a intracerebrální absces

Dear Editor,

Brain abscess is characterised as a purulent infection of the brain with cerebritis leading to central necrosis can be caused by a broad spectrum of infectious agents. Here we report two cases of invasive infections of *Streptococcus intermedius* in women with no identified primary focus other than the intracerebral manifestation.

**Patient 1** is a 55-years-old woman treated chronically for depression. She was admitted to the local department of neurology for fatigue and sleeplessness and showed slowed psychomotor reactions, dysarthria, lesion of the right VIIth nerve and positive meningeal signs. Blood tests showed an elevation of C-reactive protein (CRP) (141 mmol/L) and leucocytosis (14.9 × 10⁹/L). A native CT scan showed vasogenic edema in the left frontal lobe (50 × 40 × 55 mm) with a centrally localized focus (21 × 20 × 20 mm). IV anti-edematous therapy was started together with IV amoxicillin/clavulanate. The next day, a contrast enhanced CT scan identified a circular tumor-like focus in the left frontal lobe with surrounding edema. The suspected diagnosis of glioblastoma was made and the patient was transferred to the Department of Neurology of the University Hospital.

On day 6 at DID, the patient continued to improve. She suffered only from minor dysarthria, inflammatory markers returned to normal (leucocytes 7.7 × 10⁹/L, CRP 5.5 mmol/L) and CSF laboratory results further improved (Tab. 1). On day 10, the MRI showed the brain abscess and ventriculitis. In addition, however, a pathological content of the lateral ventricle appeared as small abscesses (Fig. 1A). Based on these findings, a drainage of the abscess was initiated with confirmatory bacteriological findings from the abscess material. At this point, the sensitivity of the identified agent was established as having minimal inhibitory concentrations (MIC) for penicillin (MIC = 0.008 mg/L). Therefore, the antibiotic combination was terminated and a high dose of crystalline penicillin was administered instead (48 MIU/day). The ventricular drainage continued for 4 days and then was terminated. The MRI performed on...
INVASIVE PRIMARY INTRACEREBRAL INFECTIONS IN WOMEN CAUSED BY STREPTOCOCCUS INTERMEDIUS

Tab. 1. Laboratory findings in cerebrospinal fluid of both patients on the days of hospitalization indicated in the left column.

<table>
<thead>
<tr>
<th>Cerebrospinal fluid</th>
<th>Neutrophils (1/mm³)</th>
<th>Lymphocytes (1/mm³)</th>
<th>Glucose (mmol/L)</th>
<th>Protein (g/L)</th>
<th>Cl⁻ (mmol/L)</th>
<th>Lactate (mmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>day 1</td>
<td>&gt; 10,000</td>
<td>0</td>
<td>0.26</td>
<td>1.9</td>
<td>119</td>
<td>13.5</td>
</tr>
<tr>
<td>day 4</td>
<td>1,298</td>
<td>176</td>
<td>2.46</td>
<td>0.6</td>
<td>112</td>
<td>7.8</td>
</tr>
<tr>
<td>day 6</td>
<td>528</td>
<td>80</td>
<td>2.66</td>
<td>0.7</td>
<td>121</td>
<td>5.4</td>
</tr>
<tr>
<td>Patient 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>day 1</td>
<td>6,912</td>
<td>2,304</td>
<td>0.66</td>
<td>2.3</td>
<td>114</td>
<td>2.15</td>
</tr>
</tbody>
</table>

Day 32 showed further regression of brain edema, a decrease of abscess size and no CSF circulation pathology. Antibiotic therapy was terminated on day 62, when the MRI showed a disappearance of the liquid in the site of the former abscess and signs of scarring in the surrounding tissue (Fig. 1B). The patient finally recovered with no residual finding.

Patient 2 is a 43-year-old woman. Her first symptoms started 3 days before as fever and headaches leading to meningeal signs. Her DIND entry exam showed fever, hypohydration, positivity of upper meningeal signs, but she was fully conscious and neurologically showing only transient problems with dystaxia of her left upper limb. The blood laboratory tests showed high CRP (272.7 mmol/L) and fibrinogen (6.1 mmol/L) values as well as leucocytosis (16.33 × 10⁹/L). CSF examination supported a diagnosis of bacterial meningitis (Tab. 1), but microscopy and agglutination tests were negative. MRI showed no focal infection of the brain. PCR for the panel of bacteria was negative. The patient was re-

Fig. 1. MRI scan of the brain of patient 1 on day 10 showing the brain abscess and ventriculitis with pathological content in the left lateral ventricle appearing as small abscesses (A) and day 62 showing a disappearance of the liquid in the site of the former abscess and signs of scarring in the surrounding tissue (B).

Obr. 1. MR vyšetření mozků pacientky číslo 1 ukazuje 6. den hospitalizace mozkový absces a ventrikulitis s patologickým obsahem v levé postranní komoře ve formě malých abscessů (A) a 62. den vy- mizení tekutiny v místě původního abs- cesu se známkami jizvení v okolní tkání (B).
hydrated, therapy with ceftriaxon (4g/day) was started and, after negative results for Listeria spp, ampicillin and corticosteroids were added. Simultaneously, a thorough exam failed to identify a potential focus of the infection. On day 3 after admission, Streptococcus intermedius was identified by both cultivation and sequencing from CSF with a good sensitivity to penicillin (MIC = 0.018mg/L). Antibiotic therapy was thus adjusted to a high dose of crystalline penicillin potassium salt (48 MIU/day), which led justed to a high dose of crystalline penicillin.

The formation of abscesses [1–4]. Our case indicating a propensity of this bacteria to the normalization of the levels of inflammatory markers. The complete normalization of the CSF was, however, achieved after 18 days post-admission. The patient was released 21 days after the beginning of hospitalization showing no residual symptoms.

Both cases showed invasive infections caused by Streptococcus intermedius, which are relatively rare, but pose a relatively high pathogenic potential. Previous studies showed patients with diseases caused by this bacteria indicating a propensity of this bacteria to the formation of abscesses [1–4]. Our case report 2, however, showed a patient with an invasive infection without abscess formation, which is very rare. In both presented cases, no primary focus was found elsewhere, despite of the extensive searching [5]. This suggests a hematogenous spread of Streptococcus intermedius. The diagnosis of Streptococcus intermedius is critical since the growth conditions are anaerobic. When examining CSF, tests may not always include bacteria from this group. For the molecular analysis, the next step then is a panbacterial DNA test with subsequent sequencing (16s rRNA) [1,2,6,7].

Antibiotic therapy before the identification of the pathogen needs to cover a broader spectrum and is achieved by a combination therapy, which includes third generation cephalosporins with metronidazol and, potentially, vancomycin [8]. A targeted therapy shall then be introduced after the causative agent has been identified and sensitivity has been tested. Penicillin is the antibiotic of choice in infections caused by Streptococcus intermedius [6–9]. In the case of Streptococcus intermedius resistance to penicillin, cefotaxim, teicoplanin or vancomycin are available [9,10].

References