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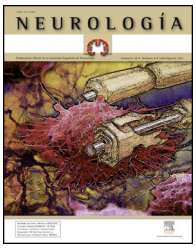

ORIGINAL ARTICLE

Central nervous system involvement in adult patients with invasive infection caused by *Streptococcus agalactiae*☆,☆☆

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Ventriculitis;
Stroke

Abstract
Introduction: *Streptococcus agalactiae* is frequently an asymptomatic coloniser and a cause of neonatal and puerperal sepsis. Infections in non-pregnant adults are uncommon. The frequency of neurological complications caused by invasive infection with this microorganism in adults remains unknown. Here, we study the frequency and characteristics of central nervous system (CNS) involvement in adults with invasive *S. agalactiae* infection.
Patients and methods: Review of all adults with invasive *S. agalactiae* infection between 2003 and 2011 in a tertiary hospital.
Results: *S. agalactiae* was isolated from blood, cerebrospinal fluid or synovial fluid in 75 patients. Among them, seven (9.3%) displayed neurological involvement: five men and two non-pregnant women, aged between 20 and 62 years. Diagnoses were spinal epidural abscess due to spondylodiscitis with spinal cord compression; acute bacterial meningitis; ischaemic stroke as presentation of bacterial endocarditis (two patients each); and meningoventriculitis after neurosurgery and ventricular shunting. One patient with endocarditis caused by *S. agalactiae* and *S. aureus* died in the acute phase, and another died 3 months later from metastatic cancer. The other patients recovered without sequelae. All patients had systemic predisposing factors for infection and five (71.4%) had experienced disruption of the mucocutaneous barrier as a possible origin of the infection.
Conclusions: CNS involvement is not uncommon in adult patients with invasive infection caused by *S. agalactiae*. Isolating *S. agalactiae*, especially in cases of meningitis, should lead doctors to search for predisposing systemic disease and causes of mucocutaneous barrier disruption.

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PALABRAS CLAVE
Streptococcus agalactiae;
Meningitis;
Absceso epidural espinal;
Espondilodiscitis;
Ventriculitis;
Ictus

Afectación del sistema nervioso central en la infección invasiva por *Streptococcus agalactiae* en adultos

Resumen
Introducción: El *Streptococcus agalactiae (S. agalactiae)* es un germen frecuentemente colonizador asintomático y causante de sepsis neonatal y puerperal. Las infecciones en adultos, fuera del embarazo, son poco frecuentes. No se conoce la frecuencia de complicaciones neurológicas en adultos con infección invasiva por este microorganismo. Hemos estudiado la frecuencia y las características de la afectación del sistema nervioso central (SNC) en pacientes adultos con infección invasiva por *S. agalactiae*.
Pacientes y métodos: Se revisó a todos los pacientes adultos con infección invasiva por *S. agalactiae* en un hospital terciario entre 2003 y 2011.
Resultados: En 75 pacientes se aisló *S. agalactiae* en sangre, líquido cefalorraquídeo o líquido articular. De ellos, 7 (9,3%) tuvieron afectación neurológica: 5 hombres y 2 mujeres no embarazadas, con edades entre 20 y 62 años. Los diagnósticos fueron: absceso epidural secundario a espondilodiscitis con compresión medular, meningitis bacteriana aguda, ictus isquémico como presentación de endocarditis bacteriana (2 pacientes cada uno) y meningoventriculitis tras neurocirugía y derivación ventricular. Un paciente con endocarditis por *S. agalactiae* y *S. aureus* falleció en la fase aguda y otra a los 3 meses por neoplasia metastásica. El resto se recuperó sin secuelas. En todos los casos, hubo factores predisponentes sistémicos para la infección y 5 (71,4%) tenían rotura de barrera mucocutánea como posible origen de la infección.
Conclusiones: La afectación del SNC es relativamente frecuente en pacientes adultos con infección invasiva por *S. agalactiae*. El aislamiento de *S. agalactiae* debe hacer investigar causas predisponentes sistémicas y causas de rotura de barrera mucocutánea, sobre todo en meningitis.

Introduction

Streptococcus agalactiae, or group B beta-haemolytic streptococcus, colonises the gastrointestinal tract, urinary tracts, the female genital tract, and the skin. It frequently causes puerperal infections and sepsis, as well as neonatal meningitis.[1] In non-pregnant adults, invasive infections caused by *S. agalactiae* are not infrequent, with an incidence of 4.4 cases per 100 000 inhabitants.[2] However, *S. agalactiae* infections of the central nervous system (CNS) are very rare in adults.[1–12] The frequency of neurological complications caused by invasive infection by this microorganism remains unknown. This study analyses the cases of invasive *S. agalactiae* infection in adults seen in a tertiary hospital within a 7-year period in order to study the frequency and characteristics of CNS involvement in these patients.

Patients and methods

We retrospectively analysed the clinical histories of all patients older than 18 years diagnosed with systemic or invasive infection caused by *S. agalactiae* and treated in our hospital from January 2003 to May 2011. To this end, we reviewed the database of the microbiology department and identified all *S. agalactiae* isolates detected during the study period. Isolates were selected from normally sterile sites such as blood cultures, cerebrospinal fluid (CSF), and synovial fluid (invasive infection), excluding any isolates from urine or skin. We selected all cases of neurological involvement in patients with invasive infections caused by *S. agalactiae*. We collected clinical and epidemiological data, results from complementary tests, treatments used, and outcomes of cases of neurological involvement.

Results

S. agalactiae was isolated in 75 patients, including 72 isolates from blood cultures, 3 from CSF, and 2 from synovial fluid. Of these patients, seven (9.3%) displayed neurological involvement: five men and two non-pregnant women with a mean age of 48 years (range 20—62). The patients' clinical characteristics are listed in Table 1.

Two patients (patients 1 and 2) presented symptoms of acute bacterial meningitis with fever, headache, and neck rigidity lasting 7 days in the first patient and 2 days in the second. Patient 2 displayed an altered level of consciousness. In both patients, CSF showed polymorphonuclear pleocytosis (4640 and 3800 cells/mm^3) with elevated protein levels (2 and 1.5 mg/dL) and low glucose levels (40 and 35 mg/dL). After recovering from meningitis, they were diagnosed with CSF fistula (patient 1) and pharyngeal and oesophageal epidermoid carcinomas with lymph node metastases (patient 2).

Patient 3 displayed symptoms of meningitis and ventriculitis, characterised by fever and decreased level of consciousness. These features appeared less than 24 hours after an external ventricular drain was placed to treat hydrocephalus secondary to resection of posterior fossa medulloblastoma. The CSF study revealed