

## Postpartum meningitis by *Enterococcus faecalis* secondary to neuraxial anesthesia



### *Meningitis puerperal por Enterococcus faecalis secundaria a anestesia neuroaxial*

Meningitis is a rare cause of postpartum fever.<sup>1</sup> In nosocomial infections, enterococci are frequently involved.<sup>1</sup> Enterococcal meningitis (EM) is, however, an uncommon disease, accounting for only 0.3–4% of cases of bacterial meningitis,<sup>2</sup> with *E. faecalis* being the species involved in the majority of cases.<sup>3</sup>

EM may develop as a complication of postoperative infections or by hematogenous spread. The most common predisposing factor for postoperative EM is the presence of cerebrospinal fluid (CSF) devices, whereas hematogenous EM mainly affects patients with severe underlying conditions, e.g., cardiovascular or pulmonary disease, chronic renal failure and diabetes.<sup>4</sup> Rarely, *E. faecalis* can be directly inoculated by invasive procedures such as neuraxial anesthesia, either epidural or spinal.<sup>4</sup>

A 32-year-old secundigravida with a single non-complicated pregnancy attended our center for a check-up. Of note in her medical record were obesity (BMI: 37 kg/m<sup>2</sup>) and hypothyroidism.

The patient was admitted for labor induction at 38+2 gestational weeks. A combined spinal and epidural anesthesia was offered and performed following antiseptic measures (the anesthesiologist wore a hat, gloves and a mask, and the patient's skin was prepared with iodopovidone). The procedure was difficult due to the patient's obesity and two attempts were needed. Six hours later, she delivered vaginally without complications. The epidural catheter was removed immediately after delivery.

Almost 24 h after delivery, the patient presented an acute holocranial headache, not alleviated by painkillers or postural measures, and a fever (38.1 °C). The clinical examination was unremarkable. Blood cultures were performed, and intravenous (iv) ampicillin 1 g qid and gentamicin 80 mg tid were administered empirically against a possible postpartum infection. Blood tests showed leukocytosis (15,400 cells/ml) and mild neutrophilia. C-Reactive-Protein was 106.2 mg/dl (NR < 10). No other abnormalities were found. Cranial and abdominopelvic CT scans were unremarkable. Two hours later, the patient presented altered mental status and meningeal signs (Fig. 1). A lumbar puncture was performed immediately, revealing purulent CSF, pleocytosis (12,160 cells/mL, NR < 5 cells/mL), hyperproteinorrachia

(320.7 mg/dL, NR < 45 mg/dL) and hypoglycorrhachia (1 mg/dL, NR > 50% of glycemia). The antimicrobial regimen was modified to iv vancomycin 15 mg/kg tid and meropenem 2 g tid. CSF culture and polymerase chain reaction were positive for *E. faecalis*. Blood cultures were also later positive for *E. faecalis*. Treatment was adapted to iv ampicillin 2 g every 4 h and gentamicin 240 mg qid, resulting in clinical improvement over the following three days. After two weeks of treatment, the patient recovered completely without sequelae and was discharged on oral linezolid 600 mg bid for one week.

Although *E. faecalis* is a significant cause of nosocomial infections, meningitis is rare. Only six cases of EM related to neuraxial anesthesia, including ours, have been reported (Table 1),<sup>5–9</sup> two of them following obstetric procedures. *E. faecalis* may be inoculated during catheter insertion from bacteria on the skin or may spread by hematogenous means from a distant infection or through the contamination of the fluids perfusing into the peridural or spinal space.<sup>3,4</sup> In our case, despite following regular antiseptic measures for performing anesthesia, the procedure was difficult due to the patient's obesity. This condition may favor the inoculation of microbes into the CSF during catheter insertion. Moreover, there was no clinical condition or sign suggesting hematogenous spread from another source.

International guidelines recommend antimicrobial therapy using combinations of cell-wall-active antibiotics and aminoglycosides that are synergistically effective against enterococci.<sup>2,10</sup> Glycopeptides, e.g., vancomycin, have a lower CSF penetration and should be reserved for penicillin allergic patients and ampicillin-resistant strains.<sup>2</sup> The duration of antimicrobial treatment has not been established, but most reports suggest 2–3 weeks.<sup>2</sup> Additionally, enterococcus resistance is a growing problem worldwide.<sup>10</sup>

This is only the second case of postpartum meningitis due to *E. faecalis* reported so far. Although infrequent in the obstetric setting, acute meningitis is an infectious emergency requiring early diagnosis and treatment. It must be suspected in all cases of postpartum fever, particularly when headache is also present and not resolved with painkillers or/and postural measures. In obstetrical patients without a pathological medical history, neuraxial anesthesia during delivery may be a risk factor for bacterial meningitis where technical difficulties exist. Although data is limited, EM prognosis appears to favor a complete recovery without sequelae through antibiotic treatment. Preventing EM requires optimized antiseptic measures during neuraxial anesthesia administration.

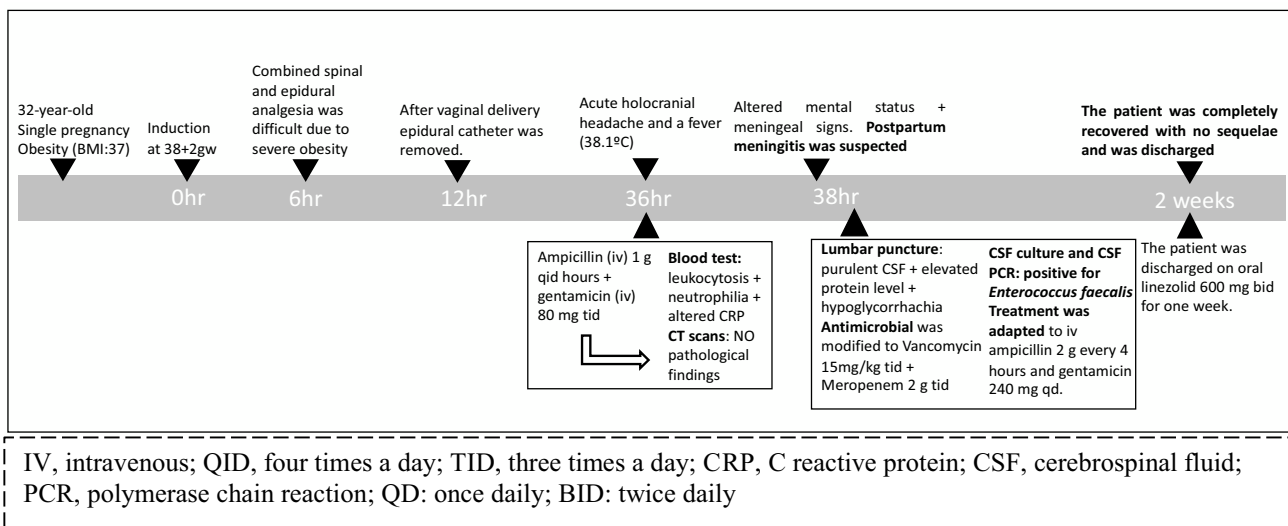


Fig. 1. Time-line of clinical evolution and medical interventions of the case.

**Table 1**  
Reported cases of enterococcal meningitis secondary to neuraxial anesthesia.

Patient	Reference list	Gender + age	Anesthesia indication + type	Symptoms	CSF analysis	CSF culture or PCR	Treatment (duration)	Evolution
1	5	F/80	Vertebral fracture/epidural	Fever, headache, altered mental status and meningeal signs	L: 3360 cel/ml P: 211 mg/dl G: 68 ml/dl	<i>E faecalis</i>	Ceftriaxone + Vancomycin (21d)	Complete recover
2	6	M/20	Inguinal hernia/spinal	Fever, headache, stiff neck, and meningeal signs	L: 9550 cel/ml P: 1239 mg/dl G: 19 ml/dl	<i>E faecalis</i>	Ampicillin + Gentamicin (NA)	Complete recover
3	7	M/22	Left knee ligamentoplasty/rachidian	Fever, headache, vomiting, meningeal signs	L: 1500 cel/ml P: 89 mg/dl G: 58 ml/dl	<i>E faecalis</i>	Linezolid (R to vancomycin) + Imipenem/cilastatin + Rifampicin (21d)	Complete recover
4	8	F/28	C-section/epidural	Fever, cellulitis, headache, stiff neck and photophobia	L: 3000 cel/ml P: 308 mg/dl G: 27 mg/dl	<i>E faecalis</i>	Penicillin G + Vancomycin (10d)	Complete recover
5	9	M/60	Left knee arthroscopy/epidural	Fever, headache, confusion, distorted speech	L: 1040 cel/ml P: 161 mg/dl G: 34 mg/dl	<i>E faecalis</i>	Ampicillin + Gentamicin (21d)	Complete recover
6	Reported here	F/32	Labor/CSE	Fever, headache, altered mental status, meningeal signs	L: 12,160 cel/ml P: 321 mg/dl G: 1 mg/dl	<i>E faecalis</i>	Ampicillin + Gentamicin (15d) Linezolid (7d)	Complete recover

CSF, cerebrospinal fluid; PCR, polymerase chain reaction; F, female; M, male; L, leukocytes count; P, protein concentration; G, glucose concentration; R: resistance; CSE: combined spinal and epidural anesthesia; NA, not available.

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These data have been generated as part of routine work in the laboratory and clinical consultation of the Hospital Dexeus University Hospital, Barcelona, Spain.

## Conflict of interest

None to declare.

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## Bibliografía

1. WHO recommendations for prevention and treatment of maternal peripartum infections. Geneva; 2015. [https://www.ncbi.nlm.nih.gov/books/NBK327079/pdf/Bookshelf\\_NBK327079.pdf](https://www.ncbi.nlm.nih.gov/books/NBK327079/pdf/Bookshelf_NBK327079.pdf).
2. Pintado V, Cabellos C, Moreno S, Meseguer MA, Ayats J, Viladrich PF. Enterococcal meningitis: a clinical study of 39 cases and review of the literature. *Medicine (Baltimore)*. 2003;82:346–64.
3. Traurig E. Post-dural puncture bacterial meningitis. *Anesthesiology*. 2006;105:381–93.
4. Donnelly T, Koper M, Mallaiah S. Meningitis following spinal anaesthesia – a coincidental infection? *Int J Obst Anesth*. 1998;7:170–2.

5. Laguna P, Castañeda A, López-Cano M, García P. Bacterial meningitis secondary to spinal analgesia. *Neurología*. 2010;25:552–6.
6. Tortosa JA, Hernández P. Enterococcus faecalis meningitis after spinal anesthesia. *Anesthesiology*. 2000;92:909.
7. Courmac J-M, Landais C, Gaillard T, Bordes J, Carli P. Méningite à *Enterococcus faecalis* après rachianesthésie traitée avec succès par linézolide. *Médecine et Maladies Infectieuses*. 2012;42:327–8.
8. Ready B, Helfer D. Bacterial meningitis in parturients after epidural anesthesia. *Anesthesiology*. 1989;71:988–90.
9. Siman-Tov T, Gadoth N. Enterococcal meningoencephalitis following epidural anesthesia. *Israel Med Assoc J*. 2004;6:780–1.
10. Maki DG, Agger VA. Enterococcal bacteremia: clinical features, the risk of endocarditis, and management. *Medicine (Baltimore)*. 1988;67:248–69.

Sandra Coll\*, Elena Murillo, Bernat Serra, Pilar Prats

*Obstetrical, Gynecologic and Reproductive Unit, Hospital Universitari Dexeus, Barcelona, Spain*

\* Corresponding author.

E-mail address: [sancoll@dexeus.com](mailto:sancoll@dexeus.com) (S. Coll).

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