

The duration of sexual activity in years and the number of partners is correlated with overall risk for HBI among adults [5]. Perhaps sexually active adolescents, as a group, are too young and have not had sufficient exposure to the hepatitis B virus to demonstrate an increased prevalence. It also appears that hepatitis B is not as prevalent as other STDs among adolescents [8]. Future studies may demonstrate that the seroprevalence of prior hepatitis B infection is higher among adolescents with a large number of sexual partners such as prostitutes, homeless adolescents who engage in "survival sex," and older adolescents, possibly warranting prevaccination screening.

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Intraventricular Quinupristin/Dalfopristin for the Treatment of Vancomycin-Resistant *Enterococcus faecium* Shunt Infection

Quinupristin/dalfopristin (RP59500, Synercid; Rhone-Poulenc Rorer, Collegeville, PA) is a new semisynthetic streptogramin antibiotic under investigation that is bactericidal against gram-positive bacteria (except for *Enterococcus* species). The usual quinupristin/dalfopristin MIC₉₀ values are 1–4 mg/L for *Enterococcus faecium* [1]. A recent report indicates that quinupristin/dalfopristin has shown some penetration into the CSF when given iv for treatment of experimental meningitis in the rabbit model [2]. One case of CNS shunt infection with vancomycin-resistant *E. faecium* (VREF) has been reported in an 8-month-old infant [3]. The infant was given iv quinupristin/dalfopristin, 7.5 mg/kg every 8 hours, and 1 mg intraventricularly daily for 28 days, with resolution of symptoms and sterilization of the CSF. We describe the second case of a VREF-shunt infection in which the CSF was sterilized with intraventricular and iv quinupristin/dalfopristin.

A 23-year-old male with spina bifida and a ventriculoperitoneal shunt was hospitalized and underwent abdominal surgery. His hospital stay was complicated by respiratory failure, intermittent arrhythmias, and multiple infections. Approximately 1 month after admission, the neurosurgery team was consulted because the patient was thought to have a shunt infection. The CSF cultures yielded *Enterococcus faecalis*, susceptible to ampicillin and vanco-

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mycin. The shunt was removed surgically and replaced with a ventricular catheter, and therapy with intraventricular vancomycin, 5 mg daily, and gentamicin, 4 mg daily, was instituted. One month after treatment of the CSF shunt infection with intraventricular antibiotics and weekly replacement of the ventricular catheter, cultures were negative for *E. faecalis*; however, CSF cultures yielded VREF. The VREF isolate was susceptible to chloramphenicol, and therapy with iv chloramphenicol, 1,000 mg q.i.d., was started. CSF cultures continued to yield VREF for 45 days, despite appropriate medical and surgical treatment.

Because of the failure of chloramphenicol to clear the VREF from the CSF, U.S. Food and Drug Administration (FDA) approval for intraventricular use of quinupristin/dalfopristin and patient consent were obtained for the institutional review board–approved emergency use of both intraventricular and iv quinupristin/dalfopristin. Laboratory testing confirmed susceptibility of the VREF isolate to quinupristin/dalfopristin, with a zone diameter of inhibition of 24 mm from the 15- μ g quinupristin/dalfopristin disk. The following are preliminary breakpoints for *E. faecium*: susceptible, MIC \leq 1 μ g/mL (zone diameter, \geq 19 mm); intermediate susceptibility, MIC = 2 μ g/mL (zone diameter, 16–18 mm); resistant, MIC \geq 4 μ g/mL (zone diameter, \leq 15 mm) [4].

On the basis of the only report on the use of intraventricular quinupristin/dalfopristin [3], the assumed volume of ventricular CSF (50 mL), and the MIC of quinupristin/dalfopristin for *E. faecium* [1, 4], a 2.0-mg dose of quinupristin/dalfopristin was administered intraventricularly. Intravenous quinupristin/dalfopristin, 7.5 mg/kg q8h, and chloramphenicol, 1,000 mg q6h, were also given. The patient received intraventricular quinupristin/dalfopristin daily for 2 days, and then the ventricular catheter was removed.

Two days later, a head CT scan was obtained; this revealed hydrocephalus. A ventricular catheter was placed, and a CSF specimen was obtained, cultures of which yielded VREF. Therapy with intraventricular quinupristin/dalfopristin, 2 mg daily, was restarted. The patient developed neurological deficits 5 days later, and a CT

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scan revealed anterior and posterior cerebral artery infarctions of unknown origin. Electroencephalography was performed, which detected no brain activity, and the decision was made to withdraw life support. A CSF culture performed on a specimen obtained antemortem yielded no growth of organisms.

The five doses of intraventricular quinupristin/dalfopristin and 10-day course of iv quinupristin/dalfopristin administered to the patient did eradicate VREF from the CSF after unsuccessful treatment with iv chloramphenicol for >2 months. The reason for the failure of chloramphenicol and the success of quinupristin/dalfopristin, both bacteriostatic agents, is unclear. Because there are no known reports of quinupristin/dalfopristin-associated cerebral vasospasm or thromboembolic events, we believed the patient's cerebral infarctions could be considered only remotely related to quinupristin/dalfopristin.

The eradication of VREF after therapy with quinupristin/dalfopristin administered intraventricularly and iv to this patient is promising; however, the fatal outcome is of concern. Intraventricular administration of quinupristin/dalfopristin needs to be studied

to determine its safety and the minimum dosage needed to eradicate VREF from the CSF.

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Epidural Abscess Due to Deep-Neck Infection

Deep-neck infections and abscesses require prompt diagnosis and treatment to prevent life-threatening complications such as airway obstruction, mediastinitis, jugular thrombophlebitis, and cavernous sinus thrombosis [1]. We describe a very rare case of deep-neck infection complicated by a cervical epidural abscess (CEA).

A 44-year-old man with a 4-day history of right-sided neck pain and fever (temperature, 38.2°C) was referred to the Department of Otolaryngology, Oulu University Hospital (Oulu, Finland). Physical examination revealed neck swelling posterior to the sternocleidomastoid muscle, and turning of the head was very painful. There were no signs of pharyngeal infection. Ultrasonographic examination of the neck revealed diffuse swelling with edema without distinct abscesses. Treatment with iv cefuroxime, 1.5 g t.i.d., was initiated. During the subsequent 48 hours, the neck swelling increased, but contrast-enhanced CT revealed only multiple, small, low-attenuation spaces deep to the sternocleidomastoid muscle, interpreted as edema.

Because of continued neck swelling, surgical exploration was undertaken 4 days after admission. This revealed a large abscess in the scalenus muscle region. Gram staining of the abscess specimen showed gram-positive cocci in groups, and a culture of the specimen later yielded *Staphylococcus aureus*. The antibiotic treatment was changed to parenteral clindamycin, 600 mg t.i.d., and rifampin, 450 mg b.i.d.

One day after surgery, the patient complained of fulminant headaches and upper and lower extremity pain. He also had difficulty

urinating. An MRI revealed an epidural abscess extending from vertebral levels C2 to T10 (figure 1). Neurosurgical consultants determined that operative treatment was not indicated, given that there were no signs of spinal-cord compression and surgical risks included fulminant complications such as meningitis.

The patient recovered slowly. After 2 weeks, iv clindamycin was replaced by an oral regimen that was continued for another 2 weeks, whereas rifampin therapy was discontinued. Two months later, a repeated MRI did not show any signs of epidural abscess. Two and one-half years after the infection, the patient continued

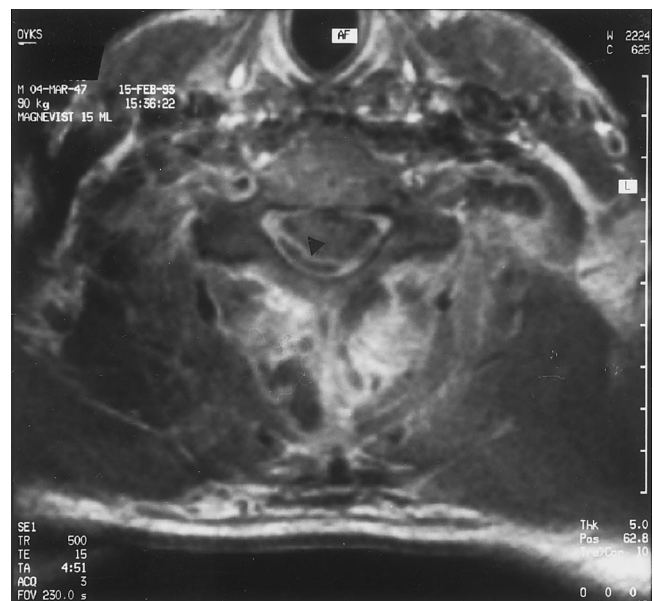


Figure 1. MRI of the neck showing an epidural abscess (arrowhead) at the C5 vertebral level in a 44-year-old male patient with deep-neck infection.

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