

Shunt infection treatment

Management of CSF [shunt infection](#) should include removal of the [device](#), [external drainage](#), parenteral [antibiotics](#), and shunt replacement once the CSF is [sterile](#) ^{1) 2) 3) 4) 5)}.

see also [Ventriculoperitoneal shunt infection treatment](#).

Current recommendations for the empirical treatment of central nervous system (CNS) infection in the presence of a shunt recommend using IV [vancomycin](#) in combination with an agent that has adequate gram-negative coverage, such as [cefepime](#), [ceftazidime](#), [cefotaxime](#), or [meropenem](#). The ability of a medication to penetrate the CSF as well as the activity of the [antibiotic](#) against the bacterial [biofilm](#) are also important to consider for [antibiotic](#) choice ⁶⁾.

Such agents should be administered until the pathogen is identified and definitive treatment determined ^{7) 8)}.

For patients refractory to [vancomycin](#) therapy, [linezolid](#) 10 mg/kg every 8 hours has been shown to be effective as monotherapy in pediatric patients ⁹⁾.

The addition of [rifampin](#) as adjunctive therapy may also be considered due to its penetration into the CNS ¹⁰⁾.

The length of antibiotic therapy depends largely on the surgical approach used, the type of shunt, and the pathogen involved, with one study reporting a duration of therapy range of 4 to 47 days ^{11) 12)}.

More specifically, 7 to 10 days has been suggested for treatment duration ¹³⁾ with a longer course (10-14 days) recommended for gram-negative infections ¹⁴⁾.

In the case of complicated or treatment-resistant shunt infections, clinicians should consider intrathecal or intraventricular administration of antibiotics for increased efficacy due to their ability to achieve higher bactericidal concentrations within the CNS ¹⁵⁾.

Vancomycin and gentamicin are commonly used in this situation; however, there are no definitive recommendations on their use ^{16) 17)}

It is important that empirical antibiotic therapy for management is guided by accurate knowledge of prevailing aetiologies and local antibiotic sensitivity patterns.

Intraventricular antibiotic

see [Intraventricular antibiotic](#)

Removal of shunt hardware

In [2017](#), the Infectious Diseases Society of America (IDSA) published guidelines for healthcare-associated [ventriculitis treatment](#) and [meningitis treatment](#) ¹⁸⁾.

The removal of the infected [hardware](#), placement of an [external ventricular drain](#), [cultures](#), and treatment with IV or [intraventricular antibiotics](#) are all shown to be part of an effective management process ¹⁹⁾.

Optimal management of CSF shunt infection should include complete removal of the device, external drainage, and subsequent shunt replacement once CSF is sterile

In most instances, during the initial treatment with [antibiotics](#) the [shunt](#) is either externalized (i.e., tubing is diverted at some point distal to the [ventricular catheter](#) and connected to a closed drainage system), or sometimes the entire [shunt](#) may be removed. In the latter case, some means of CSF [drainage](#) must be provided in [shunt-dependent hydrocephalus](#) cases, either by insertion of an [external ventricular drain](#) (EVD), or by intermittent ventricular [taps](#) (rarely employed) or LPs (with communicating HCP). EVD allows easy monitoring of CSF [flow](#), control of [ICP](#), and repeated sampling for signs of resolution of infection (normalization of WBC count and surveillance cultures). In addition, EVD allows for possible administration of [intrathecal antibiotics](#). In symptomatic patients or those with a positive CSF culture ²⁰⁾, any [hardware](#) removed should be cultured, as only $\approx 8\%$ are sterile in [shunt infections](#). [Skin](#) organisms are fastidious and may take several days to grow. If there is an [abdominal pseudocyst](#), the fluid should be drained through the [peritoneal catheter](#) before removing it.

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