

Publication

Characteristics and treatment outcome of cerebrospinal fluid shunt-associated infections in adults: a retrospective analysis over an 11-year period

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BACKGROUND: Data on infections associated with cerebrospinal fluid (CSF) shunts among adults are limited. Therefore, we performed a retrospective study of shunt-associated infections in adults. **METHODS:** Patients aged ≥ 12 years with infections associated with CSF shunts and admitted to our institution (University Hospital Basel, Basel, Switzerland) from January 1996 through December 2006 were included retrospectively. Hospital charts were reviewed, and follow-up was performed by assessment of later hospitalizations and telephone contact with patients, their families, and general practitioners. **RESULTS:** Seventy-eight episodes of infection associated with ventriculoperitoneal shunt (65 episodes), ventriculoatrial shunt (7), lumboperitoneal shunt (5), and central nervous system reservoir (1) were included. Median patient age was 50 years (range, 12-80 years); 49 (63%) of the patients were men. Most infections (48 [62%]) manifested within 1 month after shunt surgery. Fever was present in 61 episodes (78%), neck stiffness was present in 35 (45%), and local signs of infection were present in 38 (49%). In CSF, leukocyte count was $>5 \times 10^6$ cells/L in 80% of episodes, and lactate level was 11.9 mmol/L in 81% of episodes. Leukocyte counts were significantly higher in CSF obtained by use of lumbar puncture (median leukocyte count, 573×10^6 cells/L; $P = .001$) and valve puncture (median leukocyte count, 484×10^6 cells/L; $P = .016$) than in ventricular CSF (median leukocyte count, 8.5×10^6 cells/L). Overall, results of CSF cultures were positive in 66% of episodes (48 of 73 episodes for which CSF was collected), and microorganisms were isolated more often from valve puncture CSF specimens (91% of specimens) and ventricular CSF specimens (70%) than from lumbar CSF specimens (45%). The most prevalent organisms were coagulase-negative staphylococci (found in 37% of specimens), *Staphylococcus aureus* (18%), and *Propionibacterium acnes* (9%). A surgical procedure was performed to treat infection in 63 (81% of the episodes) (shunt removal in 37 episodes and shunt replacement in 26). The shunt was retained without surgery for 15 episodes (19% of episodes). Median duration of patient follow-up was 4.6 years (range, 0.1-11.1 years), with favorable treatment outcome in 75 (96%) of 78 cases. One of the 63 patients who underwent surgical treatment of shunt-associated infection experienced infection relapse; of the 15 patients who received treatment with antibiotics alone, 1 experienced infection relapse and 1 died. The 2 relapses involved rifampin-resistant coagulase-negative staphylococci. **CONCLUSIONS:** Shunt-associated infections among adults often present with nonspecific clinical signs, and affected patients can have normal CSF leukocyte counts and lactate levels; therefore, a high index of suspicion and improved methods are required for diagnosing shunt-associated infection.

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