

Efficacy of silver-bearing external ventricular drainage catheters: a retrospective analysis

Clinical article

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Object. Catheter-related infection of CSF is a potentially life-threatening complication of external ventricular drainage (EVD). When using EVD catheters, contact between the ventricular system and skin surface occurs and CSF infection is possible. The aim of this analysis was to compare the efficacy of silver-bearing EVD catheters for reducing the incidence of infection with standard nonimpregnated EVD catheters in neurosurgical patients with acute hydrocephalus.

Methods. Two hundred thirty-one consecutive patients were retrospectively reviewed. Of these, 164 were enrolled in the final analysis. Six patient charts were incomplete or missing, 15 patients were excluded because of catheter insertion within the previous 30 days, 6 because of a suspected CSF infection before ventriculostomy, 7 because the catheter was removed < 24 hours after insertion, and 33 patients because of the requirement of bilateral ventriculostomy. The control group with standard nonimpregnated EVD catheters consisted of 90 patients. The study group with silver-bearing EVDs consisted of 74 patients. For assessing the primary outcome, the authors recorded all CSF samples and liquor cell counts routinely obtained in sterile fashion. After removal of the catheters, they also reviewed microbiology reports of the removed catheters to assess colonization of the catheter tips.

Results. The occurrence of a positive CSF culture, colonization of the catheter tip, or liquor pleocytosis (white blood cell count > 4/ μ l) was ~ 2 times less in the study group with silver-bearing EVD catheters than that in the control group (18.9% compared with 33.7%, $p = 0.04$). Positive CSF cultures alone occurred 2 times less frequently for microorganisms in the study group (2.7% compared with 4.7%, $p = 0.55$). Silver-bearing catheters were 4 times less likely to become colonized as nonimpregnated EVDs (1.4% compared with 5.8%, $p = 0.14$). Liquor pleocytosis was half as likely in the study group (17.6% compared with 30.2%, $p = 0.06$).

Conclusions. Although of limited sample size and thus underpowered for subgroup analysis, this analysis indicates that EVD catheters impregnated with silver nanoparticles and an insoluble silver salt may reduce the risk of catheter-related infections in neurosurgical patients. (DOI: 10.3171/2009.8.JNS091297)

KEY WORDS • external ventricular drain • catheter •
silver nanoparticle • cerebrospinal fluid infection • ventriculostomy

Abbreviations used in this paper: CRI = catheter-related infection;
EVD = external ventricular drainage; ICP = intracranial pressure.