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Ventriculoperitoneal shunt infections: a retrospective analysis during a three-year period

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Background: Ventriculoperitoneal shunting (VPS) is a widely consecrated and a relatively easy neurosurgical procedure to treat patients with hydrocephalus, an abnormal accumulation of cerebrospinal fluid (CSF) in the brain. VPS infection rates, nevertheless, vary from 0.19% to 50%, and average from 10% to 20%, being associated with high neurological morbidity (10%), high mortality (5.7%) and high expenditures (US\$ 2.0 billion in annual hospital charges in the United States), covering both antibiotics and shunt reinsertion. Many studies suggest the implementation of a full institutional, both technical and behavioural, protocol for VPS is capable of significantly diminishing the risk of an implant-related infection. This study aims to determine the prevalence of VPS infection at a quaternary health centre, and its underlying risk factors.

Material/methods: Retrospective cohort that followed up to 365 days, from January 2013 to December 2015, 91 patients who underwent elective VPS in our Department. Were considered eligible elective first time VPS insertions. The primary endpoint was shunt-related CNS infection defined as: (1) occurs until 365 days after surgery; and (2) happens not before nor after shunt insertion; besides (3) positive CSF culture; or (4) positive CSF biochemistry in the presence of positive clinical signs. Alternative endpoints were other CNS surgeries, death, evasion and absence of shunt-related CNS infections in 365 days. Data noted over hydrocephalus aetiology, age, gender, CSF culture, blood culture, other CNS surgeries and date of infection diagnosis were obtained from patients' records. Epi Info 7® software was used for analysis.

Results: The mean age was 30.4 years old, 53.8% of the sample was male and 46.2% female. The shunt-related CNS infection prevalence was 21.9%, with a mean of 31 days after surgery. Ten of the infected were children (<17 years old) and ten were adults. Overall, the most common aetiologies

were malformations (25.2%) and SNC neoplasm (20.8%). The less common was trauma (6.6%). Common aetiologies in infected subjects were malformations and post-CNS-infections (30% each). The less common was trauma (5%). 35.1% of the subjects underwent another neurosurgery in 365 days, and most presented SNC malformations (34.4%). Three patients presented a positive blood culture (one Gram-negative-rod and two *Staphylococcus aureus*) and 12 patients a positive CSF culture (three Gram-negative-rods and nine *Staphylococcus aureus*).

Conclusions: The VPS-related CNS infection rate in our institution is similar to the higher end of the 10% to 20% mean in other centres. The implant-related infection occurs primarily within the first days of implantation, preferably around the first 30 days. This, alongside with the higher rates of CSF culture positivity in contrast to the blood culture, suggests these pathogens were directly inoculated during the surgical act. These results reinforces the need of implementation of a full institutional preventive protocol for VPS.