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Pseudomonas aeruginosa meningitis in neurosurgical patients with intraventricular catheters: assesment of different treatments

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Background: The treatment of *Pseudomonas aeruginosa* meningitis is a serious therapeutic problem due to emerging resistance. We describe the clinical features and the outcome of a group of patients with nosocomial neurosurgical meningitis treated with different therapeutic options

Material/methods: All patients adults with nosocomial postsurgical meningitis due to *P. aeruginosa* diagnosed at the Hospital Universitario Central de Asturias (Oviedo, Spain) between 1990 and 2014 were retrospectively reviewed. Nosocomial meningitis was defined according to the CDC definitions. Continuous values were expressed as mean and compared using Student t test or U of Man-Whitney. Categorical values were expressed as absolute and relative frequencies and were compared using Fisher's exact test or χ^2 test. A p value less than 0.05 was considered as statistically significant. A binary logistic regression analysis using a step-wise (Wald) to determine the factors influencing the mortality of the infection was performed.

Results: *P. aeruginosa* was isolated from 51 CSF cultures (58.8% men, mean age of 50 [18] years). The mean time elapsed between the surgery and the onset of the infection was 22[20] days (range 3-112). The most frequent underlying diseases were: hemorrhage (33.3%), neoplasm (33.3%), head trauma (27.5%) and hydrocephaly (6%). The most frequent symptom was fever (100%) followed by headache (43%) and altered mental status (39%). Twelve (23.5%) patients had meningeal signs. The patients received different treatments: Intravenous monotherapy with antipseudomonal cephalosporins (Group A: 27 cases), intravenous monotherapy with carbapenems (Group B: 6 cases), parenteral combined therapy with ceftazidime and aminoglycosides (Group C: 3 cases), combined intravenous and intrathecal therapy with cephalosporin or carbapenems plus amynoglycosides (Group D: 9 cases)

and combined intravenous and intrathecal therapy with colistin (Group E: 6 cases). There were no *statistically significant differences* in age, sex, underlying diseases, mixed culture and catheter removal between the different treatments. Treatment was associated with removal of the intraventricular catheter in 29 cases. The 17 (33.3%) patients, who died as a direct consequence of the infection, were included in group A (12, 44.4%), group B (2, 33.3%), group C (1, 33.3%) and group D (2, 22.2%). Mortality was significantly higher in group A (12 vs. 15, $p= 0.068$, OR 3.040 [0.877-10.544]). No patient from group E died (0 vs. 6 $p= 0.075$ OR 0.824 [0.705-0.962]). Multivariable analysis confirm that the mortality was higher in group A ($p=0.075$), and lower in intrathecally treated patients ($p= 0.50$), specially in group E ($p= 0.065$) but without significative differences.

Conclusions: Nosocomial meningitis by *P. aeruginosa* is an infection with high mortality in absence of intrathecal therapy. The use of intravenous and intrathecal administered colistin is a safe option.