Gram negative bacteria shunt infection

The prognosis of Gram negative bacteria shunt infection has been thought to be particularly poor. Stamos et al., reviewed all GNB shunt infections treated from January 1986 to January 1990 (n = 23). Of these infections 20 (87%) occurred within 4 weeks after shunt revision (median, 10 days). The most frequent symptoms were fever, lethargy, and irritability; the illness was not severe in the majority of these patients.

Escherichia coli was isolated from 12 of 23 patients (52%), Klebsiella pneumoniae from 5 (22%), and mixed GNB from 3 (13%) patients. Initial treatment always included immediate shunt removal, externalized ventricular drainage, and intravenous antibiotics. Extraventricular drainage revision and/or intraventricular antibiotics were required in four patients whose CSF cultures were persistently positive for GNB. At admission, these patients had CSF glucose levels of < 10 mg/dl and CSF positive for GNB by Gram's stain. The overall cure rate was 100%, and no recurrence was observed; however, a subsequent infection with a different organism developed in four patients. Only 2 of 19 patients (11%) who were followed up suffered apparent CNS damage. One patient died of unrelated causes shortly after treatment. Our findings indicate that 1) patients with GNB CSF shunt infections often appear relatively well at presentation; 2) CSF positive for GNB by Gram's stain and very low CSF glucose levels predict continued positive CSF cultures, despite appropriate antibiotic therapy; and 3) GNB CSF shunt infections can be successfully treated by prompt shunt removal, extraventricular drainage, and intravenous antibiotics [1)].

A total of 236 patients with nosocomial infection (NI) were identified and 378 isolates were recovered from blood cultures. Incidence of NI was 4.3 infections/1000 bed-days. Gram negative bacteria slightly predominated (54.5 %). The commonest bacteria were coagulase-negative staphylococci (CoNS, 26 %), Klebsiella pneumoniae (15.3 %), Pseudomonas aeruginosa (14.8 %), and Acinetobacter baumannii(13.2 %). Carbapenem resistance was found in 90 % of A. baumannii, in 66 % of P. aeruginosa, and in 22 % (2003-2007) to 77 % (2008-2012) of K. pneumoniae isolates ($p < 0.05$). Most CoNS and Staphylococcus aureus isolates (94 and 80 %, respectively) were methicillin-resistant. All Gram-negative isolates were sensitive to colistin and all Gram-positive isolates were sensitive to vancomycin and linezolid. Antimicrobial consumption decreased after 2007 ($p < 0.05$). Overall mortality was 50.4 %. In multivariate analysis, advanced age and stay in an Intermediate Care Unit (IMCU) were independent risk factors for in-hospital mortality ($p < 0.05$).

Overall, high incidence of NBSI and considerable resistance of Gram positive and particularly Gram negative bacteria were noted in neurosurgical patients. Mortality was high with advanced age and stay in IMCU being the most important death-related factor [2)].

1)
Stamos JK, Kaufman BA, Yogev R. Ventriculoperitoneal shunt infections with gram-negative bacteria. Neurosurgery. 1993 Nov;33(5):858-62. PubMed PMID: 8264883.
2)
Tsitsopoulos PP, Iosifidis E, Antachopoulos C, Anestis DM, Karantani E, Karyoti A, Papaevangelou G, Kyriazidis E, Roilides E, Tsonidis C. Nosocomial bloodstream infections in neurosurgery: a 10-year analysis in a center with high antimicrobial drug-resistance prevalence. Acta Neurochir (Wien). 2016 Sep;158(9):1647-54. doi: 10.1007/s00701-016-2890-5. Epub 2016 Jul 25. PubMed PMID: 27452903.