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Comparison of rates of drain-related ventriculitis according to definitions used

Authors
Hilary Humphreys, MD, FRCPI, FRCPath[1,2*]
Peter J Jenks, MD, MRCP, FRCPath[3]
Jennie Wilson, PhD[4]

[1]Department of Clinical Microbiology, The Royal College of Surgeons in Ireland, Dublin, Ireland
[2]Department of Microbiology, Beaumont Hospital, Dublin, Ireland
[3]Department of Microbiology and Infection Prevention and Control, Derriford Hospital, Plymouth, UK
[4]Richard Wells Research Centre, University of West London, London, UK

*Author for correspondence
Address for correspondence Department of Clinical Microbiology
RCSI Education and Research Centre
Beaumont Hospital
Dublin D09 YD60
Ireland
'Phone +3531 8093710
Email hhumphreys@rcsi.ie

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Madam,

We read with interest the recent comparison of ventricular drain-related ventriculitis (VDRV) according to which definitions were used.[1] Reyes and colleagues undertook a retrospective assessment of 52 cases of VDRV using four sets of definitions and found that using the National Healthcare Safety Network (NHSN) definitions resulted in substantially more cases of DDRV being identified.[1]

We recently undertook a pilot study as a prelude to the introduction of a national surveillance system of VDRV and as part of that process we reviewed a number of definitions. [2] However, because there can be over reliance on culture, we categorised VDRV as either definite or probable and allowed for the fact that bacteria isolated from the cerebrospinal fluid (CSF) could represent contamination, e.g. a single sample with coagulase negative staphylococci.[2] Of 45 cases of VDRV in four pilot centres, twenty of the twenty eight cases that were categorized, were definite.

Meningitis/ventriculitis following neurosurgery is complex and the infection rate can be expressed as a percentage of patients with a drain inserted or preferably as the rate of infection per 1,000 catheter days.[3-5] The latter metric reflects better the risk associated with device duration. Ramanan and colleagues reviewed 35 studies which included 752 infections and found that the rate was lower for high quality studies than for lower quality studies.[5] This effect is differents ~~compared~~ to that found with most other infections where better surveillance identifies~~leads to~~ higher rates of infection, thus perhaps emphasizing the complexity of this area

In a literature search of definitions used to diagnose VDRV, sixteen unique definitions were found.[6] A positive CSF culture was required in 50% but no definitions mandated that more than one CSF culture be positive to confirm infection. However, only 7/16 (44%) of the definitions were objective, i.e. relied on laboratory data and clinical findings that were not overly open to

interpretation.[6] This therefore explains in large part the variation in infection rates described in the literature.

The decision to start antibiotics in a neurosurgical patient with a drain *in situ* is largely a clinical one and must be guided by what is in the best interest of the individual patient. This will therefore often mean that more patients with suspected ventriculitis/meningitis will be empirically treated than are subsequently confirmed to have the infection. In a recent study from the Netherlands, 48/209 (23%) of patients with suspected ventriculitis were started on empirical antibiotics after subarachnoid haemorrhage.[7] However, in only 11 (5%) was the CSF culture positive. A high red blood cell count in the CSF, as might perhaps be expected in this group of patients, was statistically associated with CSF culture-negative case.[7]

While the greater availability of molecular methods to diagnose VDRV may assist in determining the microbial cause, there will always be a need to assess a combination of clinical features, microbiological results and other CSF parameters such as a protein, glucose and cell counts. Surveillance definitions, however, should allow for the complex nature of this condition and the difficulties in being sure of the diagnosis. In particular, not all cases are clear cut and a positive CSF culture does not always indicate VDRV, especially if involving an organism that may reside on the skin, hence the higher rate of VDRV with NHSN definitions.[1] Consequently, there is a need for international agreement on surveillance definitions that are practicable and as rigorous as possible. This will in turn facilitate comparisons between centres which can inform improvements in the care of these invasive devices and ultimately in patient outcomes.

H Humphreys MD, FRCPI, FRCPath[1,2]
P J Jenks, MD, FRCPath[3]
J Wilson, PhD[4]

[1]Department of Clinical Microbiology, the Royal College of Surgeons in Ireland, Dublin, Ireland
[2]Department of Microbiology, Beaumont Hospital, Dublin, Ireland
[3]Department of Microbiology and Infection Prevention and Control, Derriford Hospital, Plymouth, UK
[4]Richard Wells Research Centre, University of West London, London, UK

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1. Reyes MM, Munigala S, Church EL, *et al*. Comparing external ventricular drains-related ventriculitis surveillance definitions. *Infect Control Hosp Epidemiol* 2017; 38: 574-579

2. Humphreys H, Jenks P, Wilson J, *et al.* Surveillance of infection associated with external ventricular drains; proposed methodology and results from a pilot study. *J Hosp Infect* 2017; 95: 154-160

3. van de Beek D, Drake JM, D, Tunkel AR. Nosocomial bacterial meningitis. *N Eng J Med* 2010; 362: 146-154.

4. Humphreys H, Jenks PJ. Surveillance and management of ventriculitis following neurosurgery. *J Hosp Infect* 2015; 13: 52-8.

5. Ramanan M, Lipman J, Shorr A, Shankar A. A meta-analysis of ventriculostomy-associated cerebrospinal fluid infections. *BMC Infectious Dis* 2015; DOI 10.1186/s12879-014-0712-z

6. Lewis A, Wahlster S, Karinja S, Czeisler B, Kimberley WT, Lord AS. Ventriculostomy-related infections (VRI): the performance of different definitions for diagnosing infection. *Br J Neurosurg* 2016; 30: 49-56.

7. Hoogmoed J, van de Beek D, Coert BA, Horn J, Vandertop WP, Verbann D. Clinical and laboratory characteristics for the diagnosis of bacterial ventriculitis after aneurysmal subarachnoid hemorrhage. *Neurocrit Care* 2017; 26: 362-370