

Occult shunt infections—think of biofilms

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In this issue of *Acta Neurochirurgica*, Mounier et al. [1] describe a case of a biofilm-associated infection of a ventricular catheter that was removed from a patient with shunt malfunction. All the commonly measured inflammatory parameters and CSF cultures were negative. Scanning electron microscopy of the shunt tubing demonstrated bacterial cocci embedded in a polymeric matrix.

We have been teaching our residents that the most common cause of shunt malfunction is infection, even when the patient is without inflammatory symptoms. Initial cultures are, however, not uncommonly negative, leading to a delay in diagnosis and appropriate treatment [4]. Furthermore, some bacteria, such as polysaccharide forming *staphylococci*, are resistant to antibiotic eradication without removing the shunt tubing [5]. Mounier et al.'s case report illustrates a possible common mechanism for these difficulties.

Biofilm formation is an evolutionary selected mechanism to allow microbiota to survive in the hostile environment of our bodies. Over the last decade, biofilms have been implicated in the difficulty of diagnosing and eradicating infections in a wide array of clinical situations, especially in the presence of surgical foreign-body implants [2]. As the bacteria are sequestered from the bodily fluids by their polysaccharide envelope, standard culture techniques fail to detect their presence. Furthermore, antibiotics cannot penetrate the slime and effectively reach the infective organisms.

The authors used a scanning electron microscope to demonstrate the biofilm. This technique is not widely available in the clinical setting. Alternative strategies to arrive at a diagnosis of a biofilm-associated infection such as polymerase chain

reaction should therefore be investigated. Sonification of the removed shunt tubing prior to culture might increase the ability to identify sequestered bacteria [3].

Practical questions raised by this case report include the role of prophylactic antibiotics after removing a malfunctioning shunt when the possibility of an occult infection is present. When revising a blocked shunt, it should be preferable to install new hardware rather than merely unblocking and preserving the previous tubing.

Defeating evolutionary microbial survival strategies is a continuing battle, which requires us to adapt our treatment paradigms accordingly.

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