



Case report

Successful treatment of multicompartamental cerebral ventriculitis caused by *Acinetobacter baumannii*

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A B S T R A C T

We present a case report of a 58-year-old woman with subarachnoid haemorrhage complicated by non-communicating hydrocephalus. During the course of her neurosurgical management, she developed external-ventricular drain associated ventriculitis which in turn was complicated by lack of communication between third and fourth ventricles. The causative organism was a fully-sensitive *Acinetobacter baumannii*, a nosocomial pathogen often associated with complicated treatment regimens and poor outcomes. This patient was successfully managed by a multi-disciplinary team involving neurosurgeons, neuroradiologists and infection specialists. Patient made a full recovery following double CSF diversion and intravenous plus intrathecal antimicrobial therapy.

Case report

A 58-year-old woman presented to a local district general hospital with a history of sudden-onset headache, visual loss, projectile vomiting followed by collapse. Her Glasgow Coma Scale was 4 out of 15 on the scene as recorded by paramedics, which improved to 7 by the time she had arrived at the local emergency department. CT scan on admission revealed a significant intracranial haemorrhage occupying all the ventricles arising from an arteriovenous malformation (AVM) in the left cerebellar hemisphere (Fig. 1). This AVM was noted in a CT scan of the head performed 4 years ago following an episode of dysaesthesia. However, following a neurosurgical consultation at the time, the option of treatment with gamma-knife was declined due to its high risk.

The patient was transferred to our regional neurosurgical centre, and immediately taken to theatre on arrival to undergo external ventricular drainage (EVD) of the right lateral ventricle. She was then managed in the Intensive Care Unit (ICU) for the ten days subsequently. During her ICU stay, patient had a tracheostomy, and was treated with a course of broad-spectrum antibiotics for an episode of ventilator associated pneumonia.

Following a stepped down to the neurosurgical high dependency unit, the patient's EVD became blocked and was subsequently replaced. At this point samples of her cerebrospinal fluid (CSF) grew *Staphylococcus epidermidis* consistent with EVD associated ventriculitis. She was treated with a course of intrathecal vancomycin. Following further episodes of catheter failure in the ensuing weeks, the EVD was replaced on two occasions.

Almost one month after admission, the patient developed another episode of EVD associated ventriculitis and the CSF cultures grew a

fully-sensitive *Acinetobacter baumannii*. This episode of ventriculitis was treated with a combination of intrathecal gentamicin and intravenous high dose meropenem 2gm TDS. During the course of her recovery, patient developed an acute decline in the cognitive function, and the third EVD drain in the right frontal horn had stopped working. An MRI scan showed periventricular oedema surrounding the fourth ventricle, implicative of an encysted ventricle (Fig. 2). Emergency drainage of the fourth ventricle was performed via a right transcerebellar approach using image guidance, leaving the patient with a second EVD catheter in situ. One week later, the patient returned to operating theatres for the insertion of a ventriculoperitoneal shunt. Following this, imaging implied that the left lateral ventricle had become isolated and thus a second proximal catheter was inserted in the left frontal horn and connected to the same valve. The patient subsequently underwent a successful surgical management of the cerebellar AVM the following month and made a full recovery with a vigorous input from therapists.

Discussion

Acinetobacter infections of the central nervous system are well recognised and of increasing prevalence [1]. Studies have been published that estimate their associated mortality to exceed 15%, and may reach as high as 71% [2,3]. Pathogens of this genus are also highly capable of developing extensive and multidrug resistances, rendering the infections they cause complicated [4]. Intracranial *Acinetobacter baumannii* infections may not always present overtly with stereotypical symptoms of fever and progressive consciousness deficits, but rather as a

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Fig. 1. Right frontal horn EVD in situ on the background of intraventricular haemorrhage.

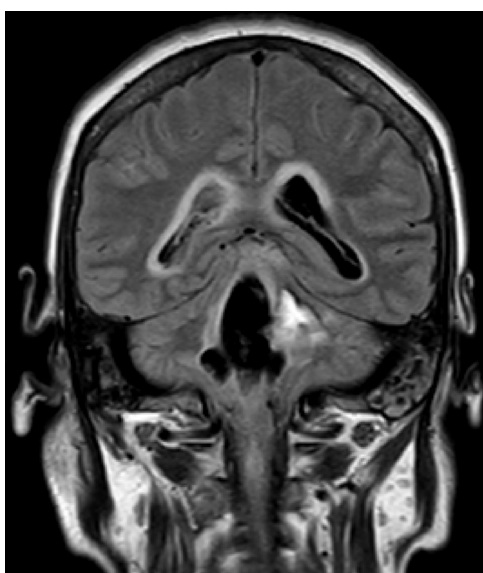


Fig. 2. Left cerebellar haematoma with markedly dilated fourth ventricle and extensive oedema and distortion of the midbrain.

pseudomeningitis or pseudoventriculitis [5]. Many risk factors for the development of *Acinetobacter* spp. infections have been suggested. These include craniotomy, spinal anaesthesia, long ITU stays and implantation of CSF drainage devices. In one study including cases with multiple causative pathogens, the meningitis observed in 78 of 91 patients was EVD-associated [6]. The difficulty associated with their management render reports of infections caused by *Acinetobacter* spp. highly relevant to clinical practice.

Due to the poor transmission of many intravenous agents across the blood-brain barrier, intrathecal administration has been adopted in many cases. The use of intrathecal aminoglycosides is well reported as a method of sterilising the CSF in cases of confirmed *Acinetobacter baumannii* infection [4]. The intrathecal administration of gentamicin is perhaps the most familiar to most physicians, although the use of

netilmicin has also been reported [7]. With extensive reports of resistance among *Acinetobacter* spp., colistin has been increasingly used. Individual reports have found intrathecal colistin therapy to be a safe and efficacious alternative [8]. However, clear-cut data of use of intrathecal antimicrobial therapy is very limited and guidelines are very old [11]. The efficacy of other, less familiar antimicrobial agents (e.g. sulbactam & polymyxin B) has been reported, as has the use of rifampicin in the management of *Acinetobacter* spp. infections [9].

Although the use of newer drugs such as tigecycline is not advised due to the lack of evidence and data [2,4], administration of carbapenems in the management of *A. baumannii* infections is well established and familiar to many clinicians. Initially this class of antibiotics demonstrated relatively low rates of resistance development among *Acinetobacter* spp., although emerging strains are exhibiting resistance rates of over 40% [1]. Interestingly, it appears that *Acinetobacter* may be able to develop resistance to specific compounds within a class, whilst other drugs of the same type remain effective [10].

In conclusion, this complex case of ventriculitis was made unpredictable by the fact that the ventricles were communicating microbiologically but not sufficiently to allow CSF flow. The decision was subsequently made to administer intrathecal aminoglycosides at both sites in conjunction with an intravenous carbapenem. This was a course of conventional antibiotics, as opposed to those that are increasingly resorted to in the management of such infections. This familiarity made the management safer for the patient, and resulted in successful resolution of her infection. Due to lack of quality data on this rare infection, large scale multicentre, prospective studies are urgently required to develop evidence-based comprehensive, organism-specific guidelines for EVD associated ventriculitis.

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