Encephalitis

Encephalitis is an often-misunderstood condition, in part as a consequence of insufficient coverage of this topic during undergraduate training. Consequently, many doctors do not gain adequate knowledge about the condition to inform their postgraduate practice, therefore do not have a sufficient index of clinical suspicion for the disease and are not able to effectively diagnose and treat patients. This article presents one medical student's (MF) experience of the condition, reflecting on gaps in their medical school training and on their subsequent experience of the condition as a junior doctor.

Encephalitis case: presentation

It was during one of the typical busy acute emergency department night shifts as a foundation doctor that I first encountered an elderly man who would change my appreciation of acute neurology completely. He was brought to the emergency department by a concerned family member who had initially noticed very mild changes in the patient's behaviour approximately 3 days before presentation. Over the course of these 3 days the patient had become progressively more confused and had started to develop word-finding difficulties. These symptoms were associated with mild headache and low-grade fever. The clinical examination identified features of mild dehydration but was otherwise unremarkable and the patient was relatively well in himself.

My initial thoughts were to exclude an infection given the fever and do an urgent computed tomography scan of the head to look for evidence of haemorrhage or a mass, given the confusion.

I did not consider encephalitis as one of my differential diagnoses, and neither did my senior colleagues, at least not at this stage.

Routine blood results were within normal range, including the full blood count, and the computed tomography scan did not identify any intracranial abnormalities. I commenced the patient on intravenous fluids, started broad-spectrum intravenous antibiotic cover and referred him to the medical team for admission and further investigations including a lumbar puncture. There was no suggestion from my senior colleagues that performing the lumbar puncture was urgent and it was certainly not being entertained that it be performed in the accident and emergency department.

I later followed the patient up and found that the medical team had commenced intravenous aciclovir empirically, that a lumbar puncture was not performed until the following day, and that this confirmed the diagnosis which was not even on the accident and emergency team's differential list: herpes simplex virus encephalitis.

Were we taught enough about encephalitis at medical school?

During my years at medical school the main focus of neurology teaching, other than neuroanatomy and physiology, was on the pathophysiology, diagnosis and management of multiple sclerosis, Parkinson's disease, stroke and epilepsy. When it came to acute neurological presentations, in addition to stroke, there was a lot of emphasis placed on the diagnosis and management of meningitis, especially in the context of paediatric patients, and it was in this context that encephalitis was briefly described. Certainly the importance of early recognition, urgent lumbar puncture and emergency intravenous antibiotics was made clear for meningitis; but these same principles were not taught when it came to encephalitis. This left the medical students with the perception that we need not worry about this rare and esoteric condition which we were unlikely to encounter, just so long as we did not miss meningitis.

However, encephalitis is well recognized as a significant cause of mortality and morbidity worldwide. Studies have identified that encephalitis is more prevalent then previously considered, with an incidence of approximately 5–8 cases/100 000/year (Granerod et al, 2013). It is estimated that there are up to 6000 cases of encephalitis in the UK per year. This means that at least a few patients with this condition will present to most district general hospitals each year (Ellul and Solomon, 2018). Indeed, contrary to my previous perception, encephalitis is at least as common as bacterial meningitis and motor neurone disease (Michael et al, 2010; Easton, 2016).

Presentation

Even with this appreciation, clinical suspicion can be challenging as patients with encephalitis often present with vague symptoms. These include headache, fevers and other features suggestive of infective process before the onset of neurological and, in some cases, neuropsychiatric symptoms.

Aetiology

In medical school encephalitis was presented as primarily a result of infection, with a main focus on diagnosis and management of herpes simplex virus encephalitis and very little emphasis on other potential aetiologies.

However, encephalitis can be caused by a wide variety of infectious and non-infectious aetiologies, which poses a significant diagnostic challenge (Hasbun et al, 2017). Viral encephalitis is the most common aetiology with herpes simplex virus the leading sporadic cause. Nevertheless, many other sporadic infections such as varicella zoster and enteroviruses, and a broad range of epidemic pathogens are important, including those spread by mosquitoes, such as West Nile virus, and those transmitted by other vectors, such as tick-borne encephalitis

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virus (Armangue et al, 2014). In immune-compromised patients, such as those with HIV or following organ transplantation, an even longer list of potential aetiologies needs to be considered, such as cytomegalovirus and human herpes virus 6 (Granerod et al, 2010; Solomon et al, 2012). In addition, it is becoming increasingly apparent that antibody-mediated encephalitis is a significant cause, with some studies suggesting that up to 20% of cases could be autoimmune in nature (Armangue et al, 2014). However, despite extensive testing, the aetiology is not identified in 37–62% of cases (Armangue et al, 2014; Ellul and Solomon, 2018).

Diagnosis, management and prognosis

Diagnosis of encephalitis hinges crucially on results of analysis of the CSF obtained by lumbar puncture which demonstrates evidence of CNS inflammation (Raschilas et al, 2002). As a medical student I was taught the principles of performing a lumbar puncture. I knew the indications, the surface anatomy and the procedural approach. However, even as a qualified junior doctor and active member of the accident and emergency team, I did not feel like I had either the time or, crucially, the confidence to perform a lumbar puncture before the patient's transfer to the acute medical unit. This reflects a gap in my training in terms of hands-on exposure in performing important practical skills both as a medical student and as a foundation trainee.

In terms of management of viral and antibody-mediated encephalitis, early treatment with antiviral medications or immunotherapy is critical (Whitley et al, 1986; Armangue et al, 2014; Ellul and Solomon, 2018). Nevertheless, encephalitis remains a life-threatening inflammation of the brain, with a mortality of 10–30%.

Encephalitis is a complex condition to diagnose and also manage following the acute insult. Patients often have little in the way of physical difficulties (excepting fatigue and epilepsy) and therefore they are often discharged quickly and without follow up. Weeks and months later the true nature of the injury to their brain and associated difficulties for survivors (and their families) may begin to emerge; often with significant emotional, behavioural and cognitive consequences (Easton, 2016; Cooper et al, 2017) (*Figure 1*). As a result, referral for a range of rehabilitative therapies and interventions may be required. Neuropsychology will often be a key treatment and a significant amount of support and information can be provided by the Encephalitis Society (www.encephalitis.info).

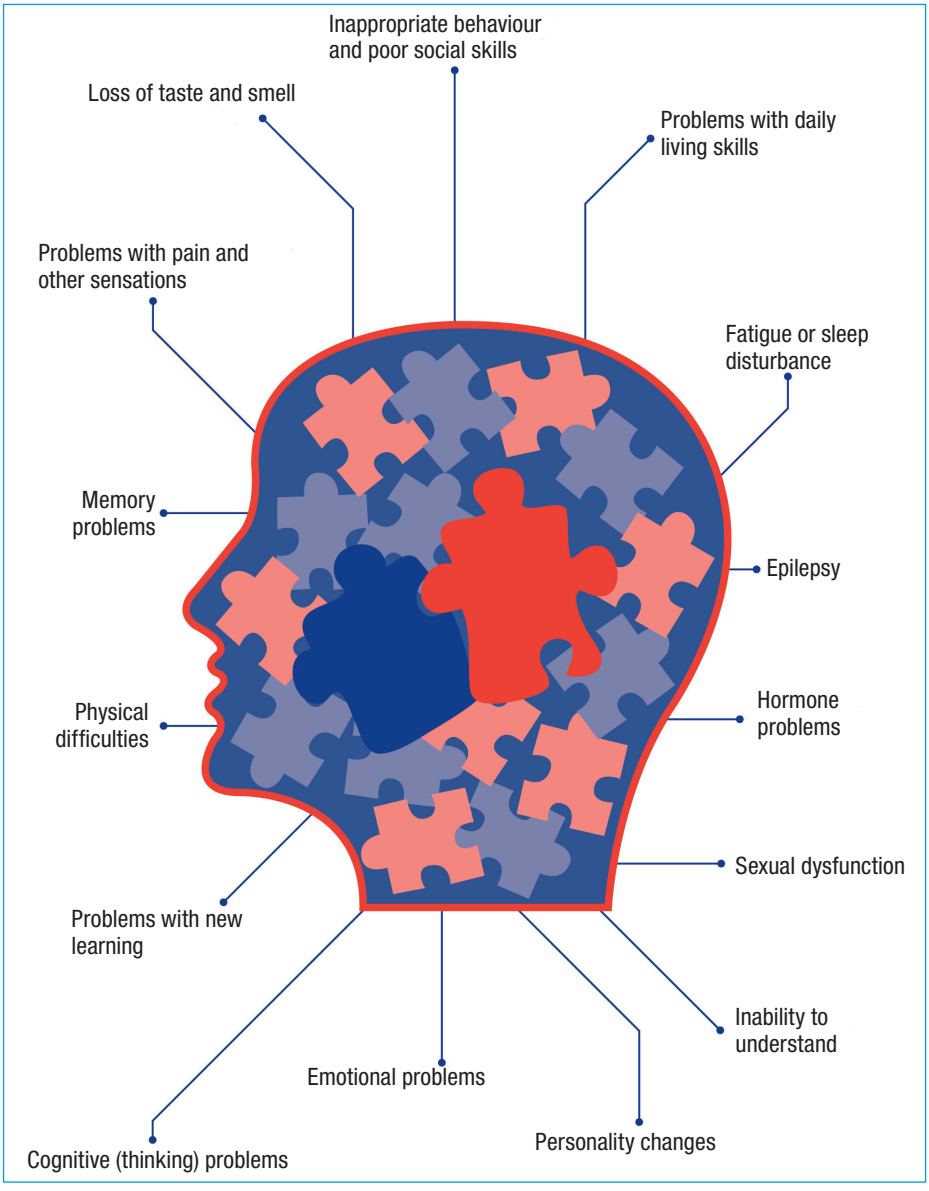

Figure 1. Outcomes of encephalitis.

My progress: how confident do I feel to diagnose encephalitis now?

Reflecting on the cases I have seen during 2 years of foundation training, I believe that I would now have more confidence to consider encephalitis as a differential diagnosis for quite a few of the patients I assessed over the last 2 years and going forward. Having said that, I am aware of my somewhat privileged position of having subsequently worked closely with a tertiary neurology centre and learned first hand about this complex condition. Indeed, even despite this I am not certain that I feel confident performing a lumbar puncture on my own – despite now appreciating the importance of this being undertaken urgently to establish the diagnosis and direct treatment.

In writing this article I have also reflected on the experiences of my fellow junior doctors; I believe that it is fair to say that during clinical training, in addition to exposure to a wide variety of presentations, regular feedback from senior and allied colleagues is the key to better understand the complexity of ways in which encephalitis can present. Indeed, had I not taken the time at the end of my shift to go to the medical ward

KEY POINTS

- Encephalitis is a medical emergency.
- Encephalitis has at least as high an incidence as purulent meningitis and motor neurone disease.
- Lumbar puncture and neuroimaging are key to diagnosis.
- Early diagnosis and treatment can reduce mortality and morbidity.
- Survivors often have ongoing difficulties and will require referral to a range of allied professions, including neuropsychology, and to other sources of support and information such as the Encephalitis Society.
- Encephalitis should be given equal weight to other acute neurological emergencies in undergraduate curricula.

to follow up on the patient I had referred I never would have known of this important diagnosis that both I and the accident and emergency team had missed.

Improved appreciation of both the incidence and clinical presentation combined with knowledge of the potential consequences of delaying or missing the diagnosis and treatment made me realize that encephalitis is a neurological emergency that must not be missed. Junior doctors cannot afford to dismiss the possibility of a diagnosis of encephalitis as a result of misperceptions about its frequency, a limited appreciation of the clinical presentation, or because of a lack of confidence and skill in performing a lumbar puncture, as urgent diagnosis and treatment saves lives.

Moreover, a critical component of undergraduate training must be in undertaking lumbar punctures so that junior doctors are competent to perform this vital investigation and crucially that they appreciate that, other than in specific situations, the lumbar puncture can and indeed should be performed urgently.

Finally, following reflections on this case and in writing this article the authors would recommend that encephalitis should be given equal weight in undergraduate curricula to other acute neurological emergencies such as meningitis, Guillain–Barré syndrome, status epilepticus and stroke. They also suggest that didactic lectures and clinical exposure should be led by both neurologists and acute medical physicians or emergency physicians – the former can provide the detailed aetiological and therapeutic training, presenting the latest developments in the field, but without the involvement of clinicians on the front-line there is a risk of perpetuating the myth that encephalitis is a disease of tertiary care that need not be considered by junior doctors and more generally by those in general practice or secondary care.

Conclusions

Encephalitis is a life-threatening emergency condition with high levels of morbidity for survivors. Many medical students receive little teaching about to this condition in direct contrast to some other neurological conditions that, despite a similar – or maybe even lower – incidence, continue to have higher clinical and teaching profiles. A sound understanding of the condition, its diagnosis, treatment and long-term management can save lives and reduce the burden of brain injury experienced in survivors. **BJHM**

Figure 1 *is reproduced by kind permission of the Encephalitis Society.*

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