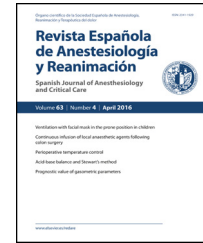




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CASE REPORT

Anaesthesia management in epilepsy surgery with intraoperative electrocorticography[☆]

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KEYWORDS

Drug-resistant epilepsy;
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Abstract Epilepsy surgery is a well-established treatment for patients with drug-resistant epilepsy. The success of surgery depends on precise presurgical localisation of the epileptogenic zone. There are different techniques to determine its location and extension. Despite the improvements in non-invasive diagnostic tests, in patients for whom these tests are inconclusive, invasive techniques such as intraoperative electrocorticography will be needed.

Intraoperative electrocorticography is used to guide surgical resection of the epileptogenic lesion and to verify that the resection has been completed. However, it can be affected by some of the anaesthetic drugs used by the anaesthesiologist. Our objective with this case is to review which drugs can be used in epilepsy surgery with intraoperative electrocorticography.

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PALABRAS CLAVE

Epilepsia farmacorresistente;
Electrocorticografía intraoperatoria;
Anestesia

Manejo anestésico en la cirugía de epilepsia con electrocorticografía intraoperatoria

Resumen La cirugía de la epilepsia es un tratamiento bien establecido para pacientes con epilepsia farmacorresistente. El éxito de la cirugía depende de una localización quirúrgica precisa de la zona epileptógena. Existen diferentes técnicas para determinar su localización y extensión. A pesar de las mejoras en los tests diagnósticos no invasivos, en aquellos pacientes en los que no son concluyentes, se necesitarán técnicas más invasivas como la electrocorticografía intraoperatoria.

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La electrocorticografía intraoperatoria se utiliza para guiar la resección quirúrgica de la lesión epileptógena y para comprobar que la resección ha sido completa. Sin embargo, se puede ver afectada por algunos de los fármacos anestésicos que utilizamos. Nuestro objetivo con este caso clínico es revisar qué fármacos se pueden utilizar en la cirugía de epilepsia con electrocorticografía intraoperatoria.

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Introduction

Epilepsy is a neurological disease characterised by recurrent seizures due to excessive or hypersynchronous neuronal activity in the brain, which often results in neurobiological, cognitive, psychological and social consequences. It is among the most common chronic neurological diseases, and affects 0.5–1% of the population. An epileptic seizure is the onset of transient neurological signs or symptoms, with or without decreased alertness, with or without convulsions and other clinical manifestations. Seizures may manifest in different ways, depending on the location of the neurons affected. Although most epilepsies are controlled with drugs, 30% of patients continue to manifest seizures, and are diagnosed with drug-resistant epilepsy. In these cases, surgical resection of the epileptogenic lesion should be considered. The success of this procedure depends mainly on the location of the epileptic focus. Many techniques have been used to locate epileptogenic foci, including neuroimaging tests (to detect structural abnormalities), electrophysiological studies, and neuropsychological tests. However, in the case of intractable partial epilepsy, or when the lesion does not coincide with the epileptic focus,^{1–3} intraoperative electrocorticography (ECoG) is performed. In these cases, it is important to consider the anaesthetic strategies explained in this case study of a patient scheduled for ECoG-guided right selective amygdalohippocampectomy.

Case study

We present the case of a 57-year-old man, Glasgow 15, ASA II, with drug-resistant epilepsy from the age of 19. He presented focal crises with altered consciousness, oral and bimanual automatisms and ictal vocalisations at a rate of 8 crises per month, and 1 episode of status epilepticus. These symptoms were facilitated by the appearance of periods of stress followed by relaxation, usually at night. His usual treatment consisted of phenobarbital (100 mg/12 h), lacosamide (200–300 mg), pregabalin (300 mg/12 h). He was scheduled for ECoG-guided excision of the epileptogenic lesion. The patient consented to the publication of his case.

Before surgery, he was admitted to the Epilepsy Unit for video-EEG monitoring. During his stay in the unit he presented 9 crises, all originating in the right anterior temporal lobe. The surgeons decided to perform hippocampal

ECoG-guided right selective amygdalohippocampectomy for refractory epilepsy secondary to right mesial sclerosis.

Electrocardiogram, non-invasive blood pressure and pulse oximetry monitoring were started on arrival in the operating room. A bilateral BIS sensor was placed according to the international 10–20 system, and the BIS Vista was used to record the BIS values. General anaesthesia was induced with dexmedetomidine perfusion ($0.3 \mu\text{g kg}^{-1} \text{h}^{-1}$), fentanyl (300 μg), propofol (110 mg) and rocuronium (40 mg) to facilitate endotracheal intubation. A line was placed in right internal jugular vein and also in the left radial artery for invasive monitoring of arterial pressure. As the patient required intraoperative neurophysiological monitoring, anaesthesia was maintained with propofol (741 mg), remifentanyl ($0.06 \mu\text{g kg}^{-1} \text{min}^{-1}$), and dexmedetomidine ($0.3 \mu\text{g kg}^{-1} \text{h}^{-1}$) to maintain BIS values between 45 and 60. Rocuronium ($0.3 \text{mg kg}^{-1} \text{h}^{-1}$) was also administered for motor blockade. Before the start of intraoperative ECoG monitoring, dexmedetomidine and rocuronium perfusion was maintained and propofol and remifentanyl were decreased to reduce the depth of anaesthesia while maintaining motor blockade and to facilitate electrocorticographic recording. ECoG monitoring was successful, and the surgeons resected the epileptic lesion. The patient was extubated in the operating room and transferred to the post-anaesthesia care unit. He was discharged home 5 days later.

Discussion

ECoG is an invasive electrophysiological procedure first used in 1950 by Penfield and Jasper in Montreal to map the cerebral cortex in humans undergoing epilepsy surgery. The aim is to: (a) identify the focus and limits of the epileptogenic zone; (b) assess the extension of the resection and (c) verify complete removal of the epileptic lesion after resection.¹ All this is achieved without causing neurological damage. Intraoperative ECoG is recorded by means of electrodes placed directly on the exposed cerebral cortex, at the subdural or deep level. This recording may vary depending on the location of the electrodes, the existence of pre-existing lesions, and the effect of preoperative medication and different anaesthetic drugs.⁴ Many of the anaesthetic drugs used in surgery affect neurotransmission and have an important inhibitory and excitatory effect on cerebral cortical activity. Awake craniotomy, which minimises this dual effect, is the procedure of choice. In patients under general

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