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ORIGINAL ARTICLE

Can the laryngeal mask play a role in electroconvulsive treatment? A pilot study☆

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Review

Abstract
Introduction: Optimising ventilation control in the anaesthetic process of electroconvulsive therapy (ECT) can be a method for improving the effectiveness and safety of some treatments. There are several approaches for inducing adequate therapeutic seizures in patients with medical co-morbidity or in those with high seizure thresholds, although all of them present limitations. A new approach is hyperventilation with laryngeal mask, a method that improves oxygenation, achieves hypocapnia, and lowers seizure threshold. Thus, hyperventilation with laryngeal mask could, hypothetically, be useful to decrease the energy needed to obtain adequate therapeutic seizures.
Material and methods: A randomised crossover study was conducted on 14 patients on maintenance ECT, using a laryngeal mask vs a facemask. When laryngeal masks were applied, the energy was reduced by 45% compared with the energy required when ventilated with facemasks (performed with standard dose).
Results: The results of the study revealed that, despite a 45% energy reduction with laryngeal mask, there were no significant differences in seizure length in either group.
Conclusions: These results prompt us to propose ventilation with laryngeal mask as an alternative to decrease energy applied without lowering seizure times. This is a preliminary study with a small sample, which opens new lines of research. Larger samples and other measurements of seizure adequacy are needed in future studies, in order to study possible improvements in ventilation and minimising adverse effects of ECT, especially in patients with medical co-morbidities.

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PALABRAS CLAVE
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Revisión

¿Puede tener un papel la mascarilla laríngea en la práctica de la terapia electroconvulsiva? Un estudio piloto

Resumen
Introducción: Optimizar el control de la ventilación en el proceso anestésico de la terapia electroconvulsiva (TEC) puede ser una forma de mejorar la efectividad y la seguridad del tratamiento. Existen varios métodos para inducir una convulsión terapéutica adecuada en pacientes con enfermedad médica comórbida o en aquellos con elevado umbral convulsivo, aunque todos presentan alguna limitación. Un nuevo abordaje es la hiperventilación con mascarilla laríngea, que produce una mayor oxigenación e hipocapnia, disminuyendo el umbral convulsivo. Este hecho puede, hipotéticamente, servir para disminuir la energía necesaria para obtener una convulsión terapéutica adecuada.
Material y métodos: Se ha realizado un estudio piloto aleatorizado y cruzado con 14 pacientes en TEC de mantenimiento, utilizando mascarilla laríngea versus mascarilla facial. Las sesiones de TEC con mascarilla facial se realizaron con la energía estándar, mientras que en las sesiones de TEC con mascarilla laríngea se disminuyó la energía en un 45%.
Resultados: A pesar de la reducción del 45% en la energía aplicada con el uso de mascarilla laríngea, no se han encontrado diferencias significativas en la duración de la convulsión en ambos grupos.
Conclusiones: Con estos resultados se podría proponer la ventilación con mascarilla laríngea como una alternativa para disminuir la energía aplicada sin repercutir en la duración de la crisis. Este es un estudio preliminar con una muestra pequeña, aunque abre nuevas líneas de investigación. Sería necesario aumentar la muestra y valorar otras medidas de calidad de las convulsiones en futuros estudios con el fin de estudiar sus efectos no solo en la dosis de energía necesaria, sino también en una posible mejora de la ventilación y una posible minimización de los potenciales efectos secundarios de la TEC, algo que sería relevante sobre todo en pacientes con comorbilidad médica.

Introduction

The progress made over more than half a century in practicing electroconvulsive therapy (ECT) has made the technique safer and minimised its side effects. This progress has taken place in the use of anaesthesia, the characteristics of modern ECT equipment and the protocol for use of the therapy.[1,2] In spite of this, some aspects of ECT require improvement. It is important to develop methods that are safer, simpler and more effective, to minimise adverse effects, especially cognitive ones.[2,3] It is important to find new methods that increase the safety of ECT and minimise its side effects, especially for 2 types of patients: those with medical comorbidities and at high risk under anaesthesia, as well as outpatients in maintenance therapy.[2,4–7]

Each individual has a different convulsive threshold, and there is a wide range of variability in this respect.[8–12] This is due to several factors (age, sex, electrode positioning, the use of psychoactive drugs, anaesthesia doses and type, the number of sessions, oxygenation and carbon dioxide levels, etc.). A high convulsive threshold may lead to a convulsion that is hardly effective, reducing the efficacy of the ECT[13] and leading to more adverse effects.

The lack of suitable convulsions, even with the maximum permitted energy,[10] is a common problem in clinical practice.[13] Several different strategies exist to improve convulsions: electric methods such as changes in pulse amplitude, or in the frequency, intensity and duration of the same, as well as the position of the electrodes.[14–17] Other methods seek to reduce the convulsive threshold,[18] such as the suppression of benzodiazepines,[19] the use of Ketamine as an anaesthetic,[9] the addition of Remifentanil,[20] light stimulation and muscle relaxants. Adenosine antagonists such as caffeine, theophylline and aminophylline have also been used, although they lead to cardiovascular complications among other risks.[21] Another strategy is to use sleep deprivation,[22] as this is accompanied by an increase in neuronal excitability. However, the complexity of this technique must be taken into consideration. The majority of the methods used increase side effects or are too complex to be applied in everyday clinical practice.

Hyperventilation gives rise to an increase in pO_2 and a fall in CO_2, and it may improve the quality of convulsions.[20,21,23–25] Hyperventilation prior to electrical stimulation is known to lower the convulsive threshold, and 100% oxygenation is recommended.[26] Hypocapnia prior to electrical stimulation is beneficial in preventing failed crises and improving the quality of convulsions.[20,23,26,27] Hyperoxygenation-hypocapnia are associated with better convulsions.[25,28]

There are different methods of assisted mechanical ventilation. The one used the most in everyday clinical practice is ventilation using a face mask (FM). Another method is ventilation using a laryngeal mask (LM).