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Sponsors: Congress of Neurological Surgeons (CNS) and the American Society for Stereotactic and Functional Neurosurgery.

Endorsement: Reviewed for evidence-based integrity and endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons.

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Received, November 24, 2020.
Accepted, November 27, 2020.
Published Online, February 9, 2021.

Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines for Deep Brain Stimulations for Obsessive-Compulsive Disorder: Update of the 2014 Guidelines

BACKGROUND: In 2020, the Guidelines Task Force conducted another systematic review of the relevant literature on deep brain stimulation (DBS) for obsessive-compulsive disorder (OCD) to update the original 2014 guidelines to ensure timeliness and accuracy for clinical practice.

OBJECTIVE: To conduct a systematic review of the literature and update the evidence-based guidelines on DBS for OCD.

METHODS: The Guidelines Task Force conducted another systematic review of the relevant literature, using the same search terms and strategies as used to search PubMed and Embase for relevant literature. The updated search included studies published between 1966 and December 2019. The same inclusion/exclusion criteria as the original guideline were also applied. Abstracts were reviewed and relevant full-text articles were retrieved and graded. Of 864 articles, 10 were retrieved for full-text review and analysis. Recommendations were updated according to new evidence yielded by this update.

RESULTS: Seven studies were included in the original guideline, reporting the use of bilateral DBS as more effective in improving OCD symptoms than sham treatment. An additional 10 studies were included in this update: 1 class II and 9 class III.

CONCLUSION: Based on the data published in the literature, the following recommendations can be made: (1) It is recommended that clinicians utilize bilateral subthalamic nucleus DBS over best medical management for the treatment of patients with medically refractory OCD (level I). (2) Clinicians may use bilateral nucleus accumbens or bed nucleus of stria terminalis DBS for the treatment of patients with medically refractory OCD (level II). There is insufficient evidence to make a recommendation for the identification of the most effective target.

The full guidelines can be accessed at https://www.cns.org/guidelines/browse-guidelines-detail/deep-brain-stimulation-obsessive-compulsive-disord.

KEY WORDS: Bed nucleus of stria terminalis, Deep brain stimulation, Nucleus accumbens, Obsessive-compulsive disorder, Subthalamic nucleus

Neurosurgery 88:710–712, 2021 DOI:10.1093/neuros/nyaa596 www.neurosurgery-online.com

RECOMMENDATIONS

1. It is recommended that clinicians utilizebilateral subthalamic nucleus deep brain stimulation (DBS) over best medical management for the treatment of patients with medically refractory obsessive-compulsive disorder (OCD) (level I).
2. Clinicians may use bilateral nucleus accumbens or bed nucleus of stria terminalis DBS for the treatment of patients with medically refractory OCD (level II).

ABBREVIATIONS: ALIC, anterior limb of internal capsule; **BNST,** bed nucleus of stria terminalis; **CNS,** Congress of Neurological Surgeons; **OCD,** obsessive-compulsive disorder

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INTRODUCTION

Rationale

In 2014, guidelines for the treatment of obsessive-compulsive disorder (OCD) with deep

brain stimulation (DBS) were established by the American Society for Stereotactic and Functional Neurosurgery and the Congress of Neurological Surgeons (CNS).[1] The current article is a 5-yr review of the medical literature in accordance with the standard operating procedures and methodology of the CNS for developing clinical practice guidelines.

Objectives

The purpose of this update is to review the literature following publication of the original guidelines and to update the recommendations as appropriate.

METHODS

Writing Group and Question Establishment

The Guidelines Task Force initiated an update of the original systematic review of the literature and evidence-based guideline relevant to the use of DBS for the treatment of patients with OCD. This guideline update was developed for educational purposes to assist practitioners in their clinical decision-making processes. Additional information about the methods utilized in this systematic review is provided via the Congress of Neurological Surgeons Methodology.

Literature Search

The PubMed and Embase databases were searched using the terms "deep brain stimulation" and "obsessive compulsive disorder," or "electrical stimulation" and "obsessive compulsive disorder." Articles published between 1966 and December 2019 were screened via the inclusion and exclusion criteria established in the previous guideline publication (Table 2).[1] A total of 93 articles underwent full review and 17 met inclusion criteria. A total of 7 out of these 17 articles were analyzed in the original guidelines, and 10 new articles were selected for inclusion in this update (Figure 1).

Study Selection and Eligibility Criteria

A total of 93 citations underwent a full-text, double-blind review by the task force using the same inclusion and exclusion criteria as the original guideline.[1] The authors did not include systematic reviews, guidelines, or meta-analyses conducted by others. Those documents were developed using *different inclusion criteria* from those specified in this guideline. Therefore, those documents may include studies that do not meet the inclusion criteria specified above. See the PRISMA Article Flow Chart (Figure 1).

Data Collection Process

The abstracts that met the selection criteria mentioned above were retrieved in full-text form. Each article's adherence to the selection criteria was assessed. To determine how the data could be classified, the information in the full-text articles was then evaluated to determine whether they were providing results of therapy or were more centered on diagnostic or prognostic information. Agreement on these assessments and on the salient points regarding the type of study design and objectives, and the conclusions and data classification was then reached by exchanging drafts and comments among authors. The information was then used for the construction of the evidence tables.

Rating Quality of Evidence

The quality of evidence was rated using an evidence hierarchy for therapeutic studies. Additional information regarding the hierarchy classification of evidence is found on the CNS Guidelines Procedures and Policies page.

Revision Plans

In accordance with the National Academy of Medicine's standards for developing clinical practice guidelines, the task force will monitor related publications following the release of this document and will revise the entire document and/or specific sections "if new evidence shows that a recommended intervention causes previously unknown substantial harm; that a new intervention is significantly superior to a previously recommended intervention from an efficacy or harms perspective; or that a recommendation can be applied to new populations."[2] In addition, the task force will confirm within 5 yr from the date of publication that the content reflect current clinical practice and the available technologies regarding DBS for OCD.

RESULTS

Of the 10 studies evaluated to update the guidelines, no study fulfilled criteria to be classified as a class I study. One study was classified as class II, which was a trial of anterior limb of internal capsule (ALIC) or bed nucleus of stria terminalis (BNST) DBS.[3] Nine additional studies were classified as class III.[4-12] Table 4 outlines those studies included for consideration in the updated guidelines.

DISCUSSION

Since the publication of the original DBS for OCD guidelines in 2014, multiple new studies have been published. Although it is encouraging that additional studies have been performed, there continues to be a lack of high-quality randomized controlled trials to support Level I recommendations. However, based on the availability of new literature, a major update is required resulting in modification of the original recommendations (Table 4).

Key Issues for Future Investigation

Future guideline updates may consider the recommendation of a "striatal target" based on pooled evidence from these striatal subregions.

An additional area in need of further study is the identification of patient- or disease-specific phenotypes in order to determine which candidates will respond best to DBS. Therefore, there remains insufficient evidence to make a recommendation for the identification of the most effective target. Furthermore, the analysis performed in this guideline does not compare the efficacy or quality of data for DBS compared to other established or novel surgical therapies for OCD, including stereotactic radiosurgery, radiofrequency thermocoagulation, or focused ultrasound.

CONCLUSION

DBS is being increasingly used in the treatment of medically refractory OCD with overall good results, resulting in the publication of multiple new reports since the original guidelines were introduced in 2014. Although the overall level of evidence remains low, a major update to the original recommendations can be made due to the availability of new evidence. Additional research is necessary to identify which patient-specific characteristics and surgical target(s) are most likely to benefit patients with OCD.

Funding

This evidence-based clinical practice guidelines were funded exclusively by the Congress of Neurological Surgeons, which received no funding from outside commercial sources to support the development of this document.

Disclosures

All Guideline Task Force members were required to disclose all potential conflicts of interest (COI) prior to beginning work on the guideline, using the COI disclosure form of the AANS/CNS Joint Guidelines Review Committee. The CNS Guidelines Committee and Guideline Task Force Chair reviewed the disclosures and either approved or disapproved the nomination and participation on the task force. The CNS Guidelines Committee and Guideline Task Force Chair may approve nominations of task force members with possible conflicts and restrict the writing, reviewing, and/or voting privileges of that person to topics that are unrelated to the possible COIs. See Table 5 in the full guidelines for a complete list of disclosures. Dr Pouratian is a consultant for Abbott and Boston Scientific. Dr Hamani is on the Advisory Board for Medtronic.

Dr McKhann has a financial relationship with Koh Young Inc and receives grant support from the National Institutes of Health. Dr Pilitsis is a consultant for Boston Scientific, Nevro, TerSera, Medtronic, and Abbott, receives grant support from Medtronic, Boston Scientific, Abbott, Nevro, TerSera, NIH 2R01CA166379-06, and NIH U44NS115111, is a medical advisor for Aim Medical Robotics and Karuna, and has stock in Karuna.

Disclaimer of Liability

This clinical, systematic, evidence-based clinical practice guideline was developed by a multidisciplinary physician volunteer task force and is provided as an educational tool based on an assessment of the current scientific and clinical information regarding deep brain stimulation for the treatment of patients with obsessive-compulsive disorder. These guidelines are disseminated with the understanding that the recommendations by the authors and consultants who have collaborated in their development are not meant to replace the individualized care and treatment advice from a patient's physician(s). If medical advice or assistance is required, the services of a physician should be sought. The proposals contained in these guidelines may not be suitable for use in all circumstances. The choice to implement any particular recommendation contained in these guidelines must be made by a managing physician in light of the situation in each particular patient and on the basis of existing resources.

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Acknowledgments

The Guidelines Task Force would like to acknowledge the Congress of Neurological Surgeons Guidelines Committee for their contributions throughout the development of the guideline, the American Association of Neurological Surgeons/Congress of Neurological Surgeons Joint Guidelines Review Committee for their review, comments, and suggestions throughout peer review, as well as the contributions of Trish Rehring, MPH, CHES, Associate Director of Evidence-Based Practice Initiatives for the CNS. Throughout the review process, the reviewers and authors were blinded from one another. At this time, the Guidelines Task Force would like to acknowledge the following individual peer reviewers for their contributions: Jennifer Sweet, MD, Kimon Bekelis, MD, Jeffrey Olson, MD, Jon T. Willie, MD, and Sharona Ben-Haim, MD.

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