An Unusual Case of Deep Brain Stimulation Wound Infection Secondary to COVID-19 Mask-Related Friction

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Keywords

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cuss the case and management of a mask-related skin infection overlying a deep brain stimulation (DBS) electrode necessitating explantation.

Introduction

The first report of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the resultant disease COVID-19 was documented December 2019 [1]. The ensuing global impact was immeasurable with worldwide effects on economics, employment, politics, health-care resource allocation, and individual morbidity and mortality [2]. Universal masking of patients, health-care workers, and the general public emerged as a nonpharmacological population health intervention to control COVID-19 transmission and infection rates [3]. Following widespread implementation of mask-wearing policies in hospitals, there were reports of adverse mask effects among health-care providers, including headaches, nasal dryness, eye dryness, acne exacerbation, skin breakdown, altered cognition, and epistaxis [4, 5].

To date, there is no reported mask-related morbidity in a postoperative neurosurgical patient. We herein dis-

Case Presentation

A 60-year-old previously healthy male was referred for neurosurgical consultation for treatment-refractory major depressive disorder (MDD). Past treatments included multiple pharmacological trials, psychotherapy, transcranial magnetic stimulation, and electro-convulsive therapy without success. The characteristics of his depression were described as deep constant sadness with frequent passive suicidal ideation. There were no focal neurological deficits and his mental status exam was consistent with major depressive disorder. He was enrolled into a phase I clinical trial and underwent stereotactic insertion of bilateral deep brain stimulation electrodes into the subcallosal cingulate cortex (Fig. 1a, c). This procedure was well tolerated without complications. There was no psychiatric benefit derived from adjustment of the stimulation parameters, and his severe major depressive symptoms persisted.

At the 10-week postsurgical follow-up, there was a region of erythema and blistering noted in the right mastoid region at the level of the tunneled bilateral extension cables, at the location of the previously well-healed incision. This was suspected secondary to friction-related contact with a COVID-19 face mask the patient was wearing in the community. The area of erosion developed along the region of his mask strap, further suggesting a pressure-

Fig. 1. **a, c** Axial and coronal T1-weighted images showing postoperative deep brain stimulation electrode tip position in the subcallosal cingulate target. **b** Right mastoid region of wound breakdown first seen during clinic follow-up. Shown in the image is a region of erythema and fluctuance along with region of conflict with mask strap (white arrow). **d** At time of surgery right mastoid region shows progression to complete skin breakdown with evidence of stimulator lead (white arrow).

related phenomenon rather than surgical site infection. This mask, unlike medical-grade masks, had straps looping behind the head, rather than around the ear, resulting in compression/friction of the healing incision in the mastoid region (Fig. 1b). Despite initial improvement on cephalexin and with mask modification, the site progressed with maceration, fluctuance, and tenderness. Given the lack of therapeutic benefit and the open wound overlying the DBS lead (Fig. 1d), a decision was made for operative intervention to irrigate the wound, revise the region of skin breakdown, and explant bilateral electrodes.

At surgery, an elliptical incision was made excising the infected rim of the tissue over the mastoid scar. The DBS hardware was explanted, and wounds were thoroughly irrigated. Postoperatively the patient was neurologically intact. The following day, the patient developed severe nausea, vomiting, headache, and fever. Cultures revealed *Pseudomonas aeruginosa*, and his antibiotic regimen was adjusted to 3 weeks of intravenous cephalexin and oral ciprofloxacin. He healed well from his explantation and made alterations to his mask-wearing practices. Given the lack of clinical efficacy, there are no re-implantation plans at this time.

Conclusion

We describe a case of post-DBS insertion wound breakdown secondary to COVID-19 mask utilization necessitating explantation. With the growing number of patients utilizing a variety of different masks, avoidance of direct incisional compression is an important part of patient counseling following shunt or DBS insertion given the possibility and morbidity of friction-related complications. Certainly, our DBS team will take precautions to discuss specific mask types with future patients. We are not aware of other such complications and therefore do not yet consider mask practices into lesioning decision-making before mask-wearing modification.

Statements of Ethics

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. There are no further ethical disclosures.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Armaan K. Malhotra was involved in manuscript writing, literature review, and was part of the surgical team. Benjamin Davidson was involved in manuscript writing, literature review, editing, and was part of the surgical team. Peter Giacobbe was involved in case report design, manuscript editing, and was part of the psychiatric team. Clement Hamani was involved in case report design, manuscript writing, editing, and was part of the surgical team. Nir Lipsman was involved in case report design, manuscript editing, and was part of the surgical team.

References

- 1 Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. [N Engl J Med](#). 2020;382(8):727–33.
- 2 Anderson RM, Heesterbeek H, Klinkenberg D, Hollingsworth TD. How will country-based mitigation measures influence the course of the COVID-19 epidemic? [Lancet](#). 2020;395(10228):931–4.
- 3 Brooks JT, Butler JC, Redfield RR. Universal masking to prevent SARS-CoV-2 transmission-the time is now. [JAMA](#). 2020;324(7):635–7.
- 4 Kumar S, Singh A. Prolonged use of n95 mask a boon or bane to healthcare workers during covid-19 pandemic. [Indian J Otolaryngol Head Neck Surg](#). 2021:1–4.
- 5 Rosner J. Adverse effects of prolonged mask use among healthcare professionals during covid-19. [Infect Dis Epidemiol](#). 2020;6(130):1–5.