ISSN: 0975-833X

Available online at http://www.journalcra.com

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

International Journal of Current Research
Vol. 13, Issue, 08, pp.18423-18424, August, 2021

DOI: https://doi.org/10.24941/ijcr.41124.08.2021

RESEARCH ARTICLE

REDUCING AEROSOLIZED PARTICLES AND DROPLET SPREAD IN ENDOSCOPIC SINUS SURGERY DURING COVID-19

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ARTICLE INFO

ArticleHistory:
Received 27th May, 2021
Received in revised form
10th June, 2021
Accepted 15th July, 2021
Published online 30th August, 2021

Key Words:

COVID-19,
Endoscopic Sinus Surgery,
Mask, Negative Pressure.

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ABSTRACT

The severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) responsible for the coronavirus disease 2019 (COVID-19) was first reported in Wuhan, China, in December 2019 and has since spread globally in a few short months. The use of negative pressure mask technique resulted in 98%reduction in the fine particulate aerosol stimulation and eliminated larger respiratorydroplet spread during stimulated ESS including during external drill activation. As global ENT services resume routine elective operating, we demonstrate the potential use of a simple negative pressure mask technique to reduce the risk of viral exposure for the operator and theatre staff during ESS.

Citation: Dr. Hetal Chauhan. "Reducing Aerosolized Particles and Droplet Spread in Endoscopic Sinus Surgery during COVID-19*", 2021. International Journal of Current Research, 13, (08), 18423-18424.*

INTRODUCTION

FESS (functional endoscopic sinus surgery) is a minimally invasive procedure which uses nasal endoscopes to enlarge the nasal drainage pathways of the paranasal sinuses to improve sinus ventilation and allow access of topical medication. SARS-Cov-2 is responsible for the corona virus disease 2019 was first reported in Wuhan, China, in December, 2019 and has since spread globally in a few short months.

The WHO defines respiratory droplets as particles >5-10microm and respiratory nuclei <5microm. Concern has thus been raised regarding the safety of otorhinolaryngologist and theatre staff performing surgery within the upper airway, particularly when using powered instrumentation. Using simulations of both aerosols and larger droplets in a cadaveric model, this study investigates the potential for a simple negative pressure mask technique to decrease the potential risk of intraoperative droplet and aerosol exposure for operation theatre staff.

METHODS

This study was no required as no living specimen were used. Two models were utilized, first was smoke to simulate fine particle aerosolization and second fluorescein staining to stimulate respiratory droplet spread.

The study was conducted in C.U. Shah Medical college anatomy laboratory on the same cadaveric specimen.

RESULTS AND DISCUSSION

As our understanding of SARS Cov-2 transmission evolves, adequate protection of our hospital staff from both contracting the virus and unwittingly acting as asymptomatic vector has been paramount. In our cadaveric study Sharma et al. again showed droplet spread with powered drill use but also up to 6cmusing a microdebrider for 10 mins. We only tested a 3 minute period of powered instrument activation rather than of full duration ESS.

Scenario	Procedure	Mask	Duration	Droplet spread	Maximum distance
1	Powered microdebrider ESS	No	3min.	No	-
	Powered microdebrider ESS	Yes	3min.	No	-
2	Powered drilling of frontal recess and beak	No	3min.	Yes	8cm
	Powered drilling of frontal recess and beak	Yes	3min.	No	-
3	External drill activation with negative pressure	yes	15sec.	yes	Confined within mask, nil external
	External drill activation without negative pressure	yes	15sec.	Yes	Confined within mask, nil external

CONCLUSION

Our study demonstrates the effectiveness of a simple negative pressure mask in reducing droplet and respiratory nuclei generated during ESS. Thus, reducing potential exposure for both operator and operation theatre staff.

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