

Open Access

Simple and innovative methods of minimizing risk of aerosol generation during endoscopy

Sumitro Kosasih, Adli Metussin, Norwani Basir, Vui Heng Chong

Gastroenterology & Hepatology Unit, Department of Internal Medicine, Raja Isteri Pengiran Anak Saleha Hospital, Bandar Seri Begawan, Brunei Darussalam

To the Editor

We read with interest the following articles published in a recent issue of *Clinical Endoscopy*:^{1,2} the reports by Higashimori et al.¹ on the use of surgical masks in transnasal endoscopy and Charoenwat et al.² on Endoshield during transoral endoscopy to minimize aerosol scattering. Higashimori's group had previously reported the use of surgical masks with a small slit (~10 mm) at the center during transoral endoscopies and showed reduction of aerosol scattering.³ We, like many, have also tried ways to minimize the hazards of aerosol-generating procedures (AGPs) during the coronavirus disease 2019 (COVID-19) pandemic. We previously tried a small transparent plastic sheet with a slit at the center placed over the mouth guard, an Ambu bag mask with a valve (part of a glove with the tip cut off) placed over the mouth guard (Fig. 1A), and a scaffolding covered by a transparent plastic (Fig. 1B) similar to the one reported by Fujihara et al.⁴ However, there were several issues encountered with these methods, such as making procedures cumbersome, claustrophobic, and uncomfortable for patients, especially if performed without sedation. Currently, we are using the mask technique as described by Maruyama et al.,³ which we devised independently without prior knowledge of their

publication. In addition to a single slit, we also used a cross slit (~9-10 mm) placed at the center of the surgical mask, which we believe provides a better valve effect than a single horizontal or vertical slit (Fig. 1C). To date, we have not had any complaints regarding this technique, which is not surprising considering that patients are accustomed to wearing masks during the pandemic. Higashimori et al.¹ placed the mask without covering the nostrils during transnasal endoscopy. We posit that it may be more effective to adopt the method they had reported earlier,³ with a small slit (either single or crossed) placed on the mask for access to the nostril.

To date, there have been several publications that have reported the various strategies to minimize hazards of AGPs, particularly in upper gastrointestinal endoscopies.^{2,4-11} Many are variations of the head enclosures, including boxes made from Perspex referred to as Endoshield,² Endoscopic shield,⁵ and Endoprotector,⁶ and some with negative pressure.^{4,7} Other methods are modifications of the mouth guard. An innovative device that is commercially available, the B1 mouthpiece (MPC-ST; Fujifilm, Tokyo, Japan), utilizes a sponge-fitted mouth guard with a slit for the endoscope attached to a face shield.⁸ This has been shown to reduce aerosol scattering significantly, but not for aerosols $\leq 1.0 \mu\text{m}$.⁸ Hikichi et al.,¹⁰ in the latest issue of *Clinical Endoscopy*, reported on a novel mouthpiece which consisted of a conventional mouth guard and a hat-shaped attachment that has a large flange that covers the gaps between the mouth guard and angles of the mouth. This aerosol droplet guard acts as a valve that prevents aerosolized droplets being ejected from the mouth.¹⁰ There was another report on a very simple technique using a cut part of a rubber glove placed over the external part of the mouthguard to act as a valve.¹¹ We also considered this technique, but in our case the valve part was inverted in-

Received: February 5, 2022 Revised: March 3, 2022
Accepted: March 5, 2022

Correspondence: Vui Heng Chong
Gastroenterology & Hepatology Unit, Department of Internal Medicine, Raja Isteri Pengiran Anak Saleha Hospital, Jalan Putera Al-Muhtadee Billah, Bandar Seri Begawan BA1712, Brunei Darussalam
E-mail: vuiheng.chong@moh.gov.bn

© This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.



Fig. 1. (A) Ambu mask with an inverted cut glove creating a valve (issue: the extra distance between the opening and mouth guard made the procedure more difficult to control). (B) Scaffolding with a transparent plastic covering (issue: extra distance between the opening and patient, and a claustrophobic sensation for the patient, especially if not sedated). (C) Surgical mask with a cross slit (marked with red cross) at the center over the opening of the mouth guard. (D) Mouth guard with an inverted cut glove to acts as a valve (issue: gaps between the mouth guard and angles of the mouth).

ward (Fig. 1D). However, we settled on the current and simple improvisation with a surgical mask (Fig. 1C).

Despite the turmoil created by the highly infectious severe acute respiratory syndrome coronavirus 2, it is heartening to know that many endoscopy fraternities have been working independently, in this case, to reduce the hazards of AGPs. There are likely many other methods, innovations, and professional components (i.e., using 3-dimensional printer)¹¹ that have been developed, but not reported. Generally, all reported methods have been shown to be effective, albeit not completely eliminating aerosol scattering.¹⁻¹¹ Simple methods utilizing surgical masks are cheap and well tolerated, have been shown to reduce aerosol scattering, and should perhaps continue to be used after the COVID-19 pandemic. In conclusion, the proper use of enhanced personal protective equipment by those directly involved with AGPs is important.

Conflicts of Interest

The authors have no potential conflicts of interest.

Funding

None.

Author Contributions

Conceptualization: VHC; Writing—original draft: SK, VHC; Writing—review & editing: AM, NB, VHC.

ORCID

Sumitro Kosasih
Adli Metussin

<https://orcid.org/0000-0002-6699-1631>
<https://orcid.org/0000-0003-3092-7942>

Norwani Basir

<https://orcid.org/0000-0003-4608-3502>

Vui Heng Chong

<https://orcid.org/0000-0002-2844-4872>

REFERENCES

- Higashimori A, Maruyama H, Nadatani Y, et al. The “new normal” following the COVID-19 pandemic: a simple infection-prevention measure using a surgical mask during transnasal endoscopy. *Clin Endosc* 2021;54:618–620.
- Charoenwat B, Sirirattanakul S, Hangnak K, et al. “Endoshield”: a physical protective box for pediatric endoscopy during the COVID-19 pandemic. *Clin Endosc* 2021;54:688–693.
- Maruyama H, Higashimori A, Yamamoto K, et al. Coronavirus disease outbreak: a simple infection prevention measure using a surgical mask during endoscopy. *Endoscopy* 2020;52:E461–E462.
- Fujihara S, Kobara H, Nishiyama N, et al. Clinical efficacy of novel patient-covering negative-pressure box for shielding virus transmission during esophagogastroduodenoscopy: a prospective observational study. *Diagnostics (Basel)* 2021;11:1679.
- Sagami R, Nishikiori H, Sato T, et al. Endoscopic shield: barrier enclosure during the endoscopy to prevent aerosol droplets during the COVID-19 pandemic. *VideoGIE* 2020;5:445–448.
- Campos S, Carreira C, Marques PP, et al. Endoprotector: protective box for safe endoscopy use during COVID-19 outbreak. *Endosc Int Open* 2020;8:E817–E821.
- Benmassaoud A, Bessissow T, Wong P, et al. Novel negative pressure protective box in upper digestive endoscopy: a prospective case series. *Am J Gastroenterol* 2021;116:1339–1341.
- Huang IH, Sinonquel P, Verbeure W, et al. Impact on aerosol generation during upper endoscopy of mouthpiece designed to reduce COVID-19 droplet spread: single-center randomized controlled trial. *Endoscopy* 2022;54:81–83.

9. Sasaki S, Nishikawa J, Sakaida I. Use of a glove-covered mouthpiece during upper endoscopy to prevent COVID-19 transmission. *Clin Endosc* 2021;54:289–290.
10. Hikichi T, Jun N, Hamada K, et al. A novel endoscopic mouthpiece for COVID-19 prevention. *Clin Endosc* 2022;55:160–162.
11. Maehata T, Yasuda H, Kiyokawa H, et al. A novel mask to prevent aerosolized droplet dispersion in endoscopic procedures during the coronavirus disease pandemic. *Medicine (Baltimore)* 2021;100:e26048.