

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

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To the Editor

We read with interest the following articles published in a recent issue of *Clinical Endoscopy*:<sup>1,2</sup> the reports by Higashimori et al.<sup>1</sup> on the use of surgical masks in transnasal endoscopy and Charoenwat et al.<sup>2</sup> 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.<sup>3</sup> 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.<sup>4</sup> 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.,<sup>3</sup> 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.<sup>1</sup> 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,<sup>3</sup> 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.<sup>2,4-11</sup> Many are variations of the head enclosures, including boxes made from Perspex referred to as Endoshield,<sup>2</sup> Endoscopic shield,<sup>5</sup> and Endoprotector,<sup>6</sup> and some with negative pressure.<sup>4,7</sup> 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.<sup>8</sup> This has been shown to reduce aerosol scattering significantly, but not for aerosols  $\leq 1.0 \mu\text{m}$ .<sup>8</sup> Hikichi et al.,<sup>10</sup> 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.<sup>10</sup> 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.<sup>11</sup> We also considered this technique, but in our case the valve part was inverted in-

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**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)<sup>11</sup> that have been developed, but not reported. Generally, all reported methods have been shown to be effective, albeit not completely eliminating aerosol scattering.<sup>1-11</sup> 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.

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