RESUSCITATION 159 (2021) 35 –37

Available online at www.sciencedirect.com

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Letter to the Editor

A simple method to prevent aerosol dispersion during Cardiopulmonary Resuscitation using supraglottic airway devices

Cardiac arrest is a frequent event in COVID-19 patients. Chest compressions during Cardiopulmonary Resuscitation (CPR) may generate aerosols and transmission of SARS-CoV-2 to rescuers.[1] Therefore, it is imperative to use methods that avoid airway leaks. Tracheal intubation with a cuffed endotracheal tube provided with a High Efficiency Particle Arresting (HEPA) filter is the first-line technique to secure the airway.[2] Alternative but fewer effective methods if intubation fails are the use of supraglottic airway devices (SADs) or bag-mask with a HEPA filter and a tight seal.[3] Second-generation SADs have been defined how the primary rescue devices in delayed or failed tracheal intubations, and they should be present in the COVID-19 difficult airway trolley.[4] Nevertheless, all these devices have shown aerosol leakage in simulation trials.[5] Different techniques were proposed recently as a barrier method to prevent aerosol dispersion during CPR.[6] However, it has shown controversial results and there is only evidence that personal protective equipment protects healthcare practitioners.[6]

We describe the use of an endoscopic mask (VBM Sulz, Germany) with the support of harnesses to assemble over the SAD as an aerosol anti-leak method. The mask is inserted over the proximal end of the SAD through its flexible membrane, which guarantees an adequate seal that prevents airway leak and aerosolization. Meanwhile, its ventilation lumen is connected to a HEPA filter, and this in turn to a suction system. Therefore, this lumen is used as a suction channel and the viral particles present between the facial surface and the inner face of the mask remain deposited on the filter. Fig. 1 (Supplementary file)

Fig. 1 – Endoscopic mask inserted over different SADs. LTS-D (A), LMA ProSeal (B), AuraGain (C), I-gel (D), LMA Supreme (E), LMA Classic (F).

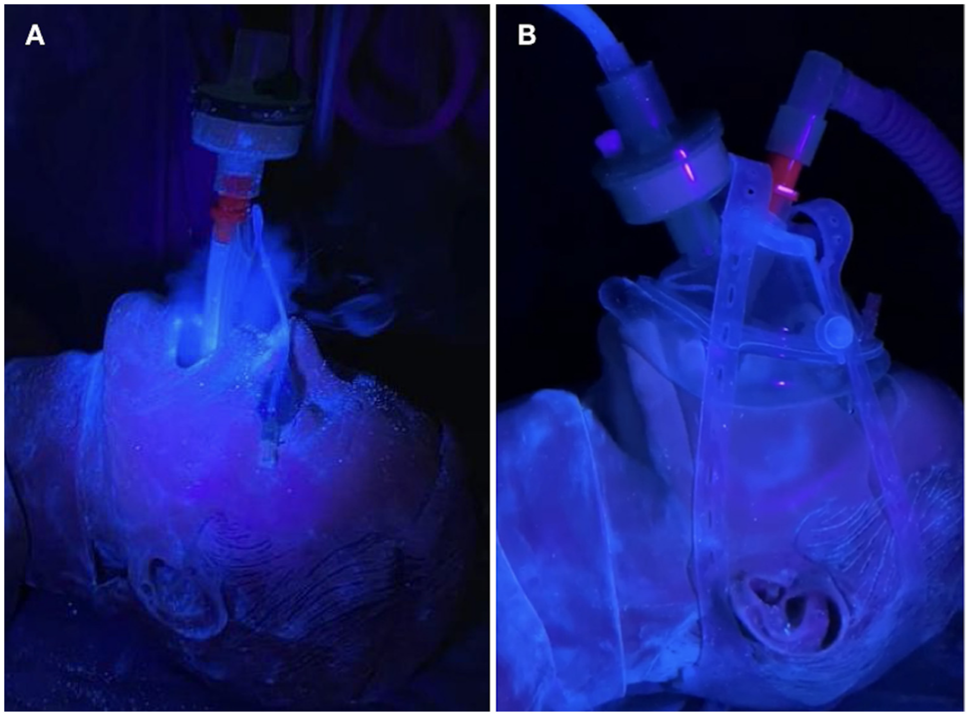

Fig. 2 – Image obtained during the application of five cardiac massages (depth of 5 to 6 cm at 2 compressions per second) on the Airman simulator (Laerdal, Norway) with the placement of the LTS-D with the cuff inflates with a manometer to 80 cm H2O (Panel A) and the same device covert by a mask assembled around it with the harness and viral filter (Coviden, Mansfiel, MA, USA) attachment (Panel B). The trachea was precharged previously with 3 ml of Glo Germ Powder (Glo Germ Northbrook, IL, US), an odorless powder that glows brightly when exposed to ultraviolet light. Panel A shows the generation of aerosol dispersion of the power due to the seal of the SAD is inferior to the positive pressure generated by cardiac massages, while panel B shows the effectiveness of sealing through the described method by not revealing power dispersion. The method was effective with all supraglottic airway devices tested.

shows the disposition of both devices with different SADs. Before being applied in clinical practice, this method was tested with several SADs in a simulation model, an Air Man simulator (Laerdal, Norway) charged with 2 ml of Glo Germ Powder. In all the tests carried out, the assumption of aerosol leakage with this simple method was verified. Fig. 2, panel A shows the expulsion of powder objectified by ultraviolet light through the mouth of the simulator with a Laryngeal Tube Suction-Disposable (VBM Sulz, Germany). However, the use of the described method eliminates the leak and aerosol contamination (Fig. 2, panel B, and video).

The use of an endoscopic mask assembled to the SAD as a barrier method to prevent dispersion of aerosols has several advantages. First, the technique requires the use of devices universally present in the difficult airway trolley, and the assembly process is quick and easy; second, the arrangement of both devices is compact, which prevents undesirable displacement of the SAD and consequently, inadequate ventilation through it; third, the material of the mask allows early detection of a possible SAD malposition, as well as its rapid correction since disassembly is simple. Thus, the method is reversible and reusable if disassembly is necessary; finally, the suction channel allows establishing a closed suction system which further reduces the possibility of leakage of aerosols and avoids the accumulation of viral particles in the space between the facial surface and the interface. Therefore, it minimizes the risk of dispersion of aerosols after removing the mask.

Conflict of interest

The authors declare no conflicts of interest.

Funding

Support was provided solely from institutional and/or departmental sources.

Acknowledgments

We especially thank Mr Nidal Gbareen, medical technologist, and Ms Tzameret Avivi, research coordinator, for their collaboration in the performance of the study.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.resuscitation.2020.12.012.

REFERENCES

1. Couper K, Taylor-Phillips S, Grove A, et al. COVID-19 in cardiac arrest and infection risk to rescuers: a systematic review. Resuscitation 2020;151:59–66.
2. Chahar P, Marciniak D. Cardiopulmonary resuscitation in COVID-19 patients. Cleve Clin J Med 2020 in press.
3. Edelson DP, Sasson C, Chan PS, et al. Interim guidance for basic and advanced life support in adults, children, and neonates with suspected or confirmed COVID-19: from the emergency cardiovascular care committee and get with the guidelines-resuscitation adult and pediatric task forces of the American Heart Association. Circulation 2020;141:e933–43.
4. Cook TM, El-Boghdadly K, McGuire B, McNarry AF, Patel A, Higgs A. Consensus guidelines for managing the airway in patients with COVID-19: guidelines from the difficult airway society, the association of anaesthetists the intensive care society, the faculty of intensive care medicine and the royal college of anaesthetists. Anaesthesia 2020 in press.
5. Somri M, Gaitini L, Gat M, Sonallah M, Paz A, Gómez-Ríos MA. Cardiopulmonary Resuscitation during the COVID-19 pandemic. Do supraglottic airways protect against aerosol-generation? Resuscitation 2020;157:123–5.
6. Sorbello M, Rosenblatt W, Hofmeyr R, Greif R, Urdaneta F. Aerosol boxes and barrier enclosures for airway management in COVID-19 patients: a scoping review and narrative synthesis. Br J Anaesth 2020 in press.

Mostafa Somri
Luis Gaitini
Anesthesiology Department Bnai Zion Medical Center, Faculty of Medicine Technion, Institute of Technology, Haifa, Israel

Dario Galante
Department of Anesthesia and Intensive Care, Ospedali Riuniti University Hospital, Foggia, Italy

Mhfod Sanallah
Jalaa Hossein
Anesthesiology Department Bnai Zion Medical Center, Faculty of Medicine Technion, Institute of Technology, Haifa, Israel

Manuel Ángel Gómez-Ríos*
Department of Anesthesia and Perioperative Medicine, Complejo Hospitalario Universitario de A Coruña, A Coruña, Galicia, Spain

* Corresponding author at: Departamento de Anestesiología, Complejo Hospitalario Universitario de A Coruña, Xubias de Arriba, 84, A Coruña, 15006, Spain.
E-mail address: magoris@hotmail.com (M. Gómez-Ríos).

http://dx.doi.org/10.1016/j.resuscitation.2020.12.012