

News Release

Title

Made in Nagoya; Development of a mask for bronchoscopy to prevent infection under COVID-19 pandemic; image evaluation

Key Points

- Development of the mask that prevents droplets spread during endoscopic procedures.
- The effectiveness of masks in preventing droplets was confirmed with a droplet visualization experiment.
- The mask is designed based on normal surgical masks, and low cost and easy to wear.
- Reduction of the infection risk during endoscopic procedures, with and post COVID-19 epidemic.
- Medical contribution against COVID-19 disasters with the collaboration of University, mask manufacturers, and companies in Nagoya city.
- Presentation of the new endoscopy style with/post COVID-19.

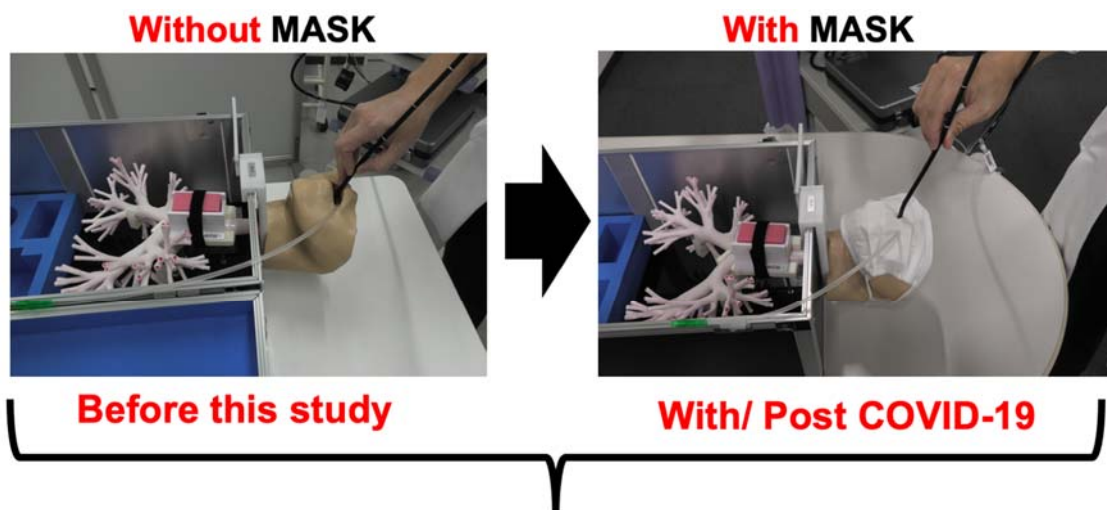
Summary 1

Graduate student **Hirotohi Yasui (co-first author 1)** in the department of respiratory medicine, Nagoya University Graduate School of Medicine, Assistant Professor **Shotaro Okachi (co-first author 2)** in the department of respiratory medicine, Nagoya University Graduate School of Medicine, Undergraduate student **Noriaki Fukatsu (co-first author 3)** in Nagoya University School of Medicine, S-YLC Project Assistant Professor **Kazuhide Sato (co-first author 4, corresponding author)** in the department of respiratory medicine, Nagoya University Graduate School of Medicine and the mask manufacturer in Nagoya successfully developed the mask preventing droplets spread during endoscopy such as bronchoscopy, along the industry-academia collaboration. The mask is a surgical mask with a designed fold, and a slit for the endoscope and suction tube. We have applied for a patent for this mask jointly with a mask manufacturer (patent pending). This mask will be launched by Suzuken Co., Ltd. under their own brand name “Kenz e-mask”. (Timing to be launched: November in 2021, and Main contact of product: Suzuken Co., Ltd. Kenz product department)

In order to verify the effectiveness of this mask in preventing droplets, a high-sensitivity particle visualization experiment was conducted with the cooperation of Shin Nippon Air Conditioning Co., Ltd., and the mask clearly reduced the spread of droplets.

This mask can be used not only for bronchoscopy, but also for upper gastrointestinal endoscopy, laryngoscopy, and nasopharyngeal swab collection, and expected to be widely useful in preventing droplet infection with examinations and treatments. The mask is designed based on surgical masks commonly used in daily life, disposable, low-cost, and easy to use. We believe this mask reduces the risk of infection in endoscopy procedures, not only to the healthcare providers but also to the patients.

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Summary 2

Research Background

The global pandemic of new coronavirus infection (COVID-19) is continued, and there is concern that the number of patients will continue to increase in worldwide. In addition to dealing with infected patients, asymptomatic patients have been reported in medical practice, and therefore, it is necessary to always take measures to prevent infection. Bronchoscopy is essential for the diagnosis and treatment of respiratory diseases such as lung cancer, but is a high infection risk procedure due to droplet scattering with inserting the endoscope into the airway. Therefore, contact and droplet prevention precautions (eye protection, long-sleeved gowns, etc.), N95 masks or equivalent masks are recommended. However, even with these precautions, during bronchoscopy, a number of droplets and aerosols are generated along with cough, and contaminate people and equipment in the space, increase infection risk when putting on and taking off

protective equipment and environmental contamination. This could increase infection risk not only for healthcare providers but also for patients undergoing endoscopy.

Research Results

This research group and the mask manufacturer headquartered in Nagoya City have jointly developed a mask for endoscopy aiming at mass-production, used on the patient's side and prevents droplet generation, as an industry-academia collaboration project. The mask is based on low-cost and normal surgical mask that patients are familiar with. The mask has designed folds, and slits for the endoscope and suction tube. In addition, we have applied for a patent for this product jointly with a mask manufacturer. The mask is easy to use and can be disposed immediately after use (Fig. 1).

In order to visualize and evaluate the effectiveness of this mask in preventing droplets, we conducted high-sensitivity particle visualization experiment using a with the cooperation of Shin Nippon Air Conditioning Co. The Visualization of Fine Particles System (ViEST) can visualize floating fine particles with a specialized light source and ultra-sensitive camera. We had the examinee cough, and compared the results with and without this mask (with the endoscope or suction tube). As a result, it was confirmed that the mask protects against droplets.

Figure1



Research Summary and Future Perspective

We confirmed the mask effect during endoscopy. This mask can be used not only for bronchoscopy but also for upper gastrointestinal endoscopy to examine esophageal and gastric diseases, laryngoscopy to examine nasal and throat diseases, and nasopharyngeal swab fluid collection used for diagnosis of COVID-19, influenza, and so on. Therefore, it is expected to be widely useful for prevention of droplet infection associated with tests and procedures.

We are planning to launch the mask on November in 2021 and preparing so that we can distribute them to clinical sites soonest by collaborating with Suzuken Co., Ltd. who will be a seller.

Technical Terms

Bronchoscope: The device with a thin and soft tube with a diameter of about 3-6mm to look into the trachea and bronchi leading to the lungs deep in the chest. It has the same structure as a gastroscope, but much thinner. It is an important instrument for patients suffering from diseases of respiratory (such as trachea, bronchi, and lungs), and is used to observe the inside of the trachea and bronchi, collect tissue and cells for accurate diagnosis (bronchoscopy), and treat diseases that cause narrowing of the trachea and bronchi (bronchoscopic treatment).

Droplets and aerosols: Droplets are the fine scattering drop of water that with cough or sneeze. In general, aerosols are the particles smaller than droplets and drifting through the air. Infection occurs when droplets or aerosols containing pathogens are inhaled or adhere to mucous membranes.

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