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Three-chamber chest drain system in the COVID-19 era: is there a risk of further transmission?

To the Editor

Once a chest tube is placed, during an emergency or after thoracic surgery, a Chest Drain System (CDS) is attached. The most commonly used CDSs are the analogic three-chamber plastic units, consisting respectively in a drainage, a water seal and a suction chamber [1].

The three chambers are in communication and the water seal prevents the air returning to the pleural space during inspiration. As a CDS is set up, the water seal is filled with standard saline solution or water. If your choice is a wet CDS the suction column also has to be filled up to the desired level.

The dramatic outspread of coronavirus disease 2019 (COVID-19) has changed the management of patients undergoing thoracic surgery and, consequently, the habits of a Thoracic Surgery ward and operating theatre. Unfortunately, COVID-19 transmission to patients and health care staff is well reported [2]. We would like to arise concerns about the chances of infection for both nurses and surgeons when using standard CDS in COVID-19 patients.

This is mainly for three reasons: firstly, in the case of a broken or overturned CDS there could be a direct contamination by fluids from the chest cavity. Secondly, we cannot exclude that aerosol transmission occurs from within the CDS to the surrounding atmosphere [3]. Finally, there can be contamination while dealing with the suction system, because the CDS may be connected to

the external wall vacuum by a plastic tube. As previously described, a CDS is a system of three plastic chambers and viable coronavirus has been detected on plastic surfaces up to 72 hours after application [4].

For all these reasons the safety of a standard three plastic chamber CDS in a COVID-19 patient has to be questioned in its present form, without appropriate precautions. The best means of protecting physicians and nurses from COVID-19 infection during daily ward activities shouldn't be the cleaning of the CDS. Once connected to the chest tube(s) the CDS is placed on the floor and periodical cleaning with alcoholic solutions (e.g. twice a day) exposes the operators to further contamination.

A reasonable way to reduce the possibility of contamination is to substitute the fluids commonly used to fill the water-seal chamber (for both dry and wet CDS) and the suction chamber (for the wet CDS only). We advocate the use of an alcohol-based solution (ethanol 62–71%) instead of water/saline solution to fill both the water-seal and suction chamber in order to minimize the risk of aerosol diffusion.

Ethanol-based solutions are found to be more effective in the prevention of further spread of COVID-19 on inanimate surfaces if compared to chlorhexidine and other biocidal agents [5]. The solution has to maintain the fluid properties of water to ensure the correct functioning of the CDS. Finally, the risk of alcohol evaporation and direct inhalation by the patient into the chest

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cavity during inspiration is negated by the unidirectionality of the system. However, further studies are needed to confirm our advice.

Conflict of interest

The authors have nothing to disclose.

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