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Case Report

# Rapid outdoor non-compression intubation (RONCI) of cardiac arrests to mitigate COVID-19 exposure to emergency department staff

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ABSTRACT

The COVID-19 pandemic has introduced numerous challenges for Health Care Professionals, including exposing Emergency Department (ED) staff to the SARS-CoV-2 virus during Cardiopulmonary Resuscitation (CPR). Recent guidelines from the American Heart Association (AHA) prioritize early intubation with viral filter placement to minimize hospital staff exposure. We propose a novel technique for rapid outdoor non-compression intubation (RONCI) of cardiac arrest patients while en route from the ambulance bay to the resuscitation bay to further decrease the risk of viral aerosolization.

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## 1. Introduction

With the emergence of the COVID-19 pandemic, the ethical and moral obligations regarding cardiac arrest care are evolving [1]. While Cardiopulmonary Resuscitation is the gold standard, only 7.6% of out-of-hospital cardiac arrest (OHCA) patients who receive CPR survive to hospital discharge [2]. Also, CPR, intubation, and resuscitation of the critically ill expose health care professionals to significant infection risk [3,4]. This has prompted many to question the standard resuscitation of COVID-19 infected cardiac arrest patients, so modification of current resuscitation practices is being explored on many different levels [5]. We present a case of an outdoor non-compression intubation of a patient in cardiac arrest to minimize COVID-19 exposure to staff while still providing standard Advanced Cardiac Life Support (ACLS).

## 2. Case report

A 75-year-old male was found by family unresponsive in cardiac arrest and was last seen well 1 h prior to arrival. EMS initiated CPR and transported with Basic Life Support (BLS) in process and a fifteen-minute estimated time of arrival (ETA). In the ED, we conducted a pre-resuscitation briefing and prepared the appropriate equipment in advance. We donned Airborne PPE (Personal Protective Equipment), PAPR (Powered Air-Purifying Respirator) hoods, and placed a Video Laryngoscope (VL) in our ambulance bay. The ETT (endotracheal tube) setup (ETT, rigid stylet, syringe) and ventilator circuit tubing setup (inline suction, corrugated tubing, viral filter, end tidal CO2) with BVM (Fig. 1) were placed in the VL accessory basket in the intubation staging area (Fig. 2). This "ventilator tubing" setup is used because it is transferable between vents without clamping the ETT, minimizes the risk of gross viral filter contamination, and utilizes in-line suction as well as end tidal CO2 monitoring.

Upon EMS arrival, CPR continued until the stretcher was positioned in our intubation staging area. We discontinued CPR momentarily, inserted the ETT, inflated the ETT cuff, and connected the viral filter setup. We resumed CPR immediately and provided ventilations with a BVM. The intubation was performed in <15 s. We then transported the patient to our Decontamination (DECON) room where resuscitation continued. After multiple rounds of ACLS, resuscitation was terminated due to futility. Later, after discussion with the family, the patient had complained of "cold-like" symptoms and worsening shortness of breath for the previous three days.

## 3. Discussion

During the COVID-19 pandemic, intubation is the highest risk ED procedure [6-9], and continuing CPR during intubation likely increases exposure risk. Non-compression intubation is suggested by ED resuscitation experts and the American Heart Association (AHA) to minimize COVID-19 exposure to staff. Before this pandemic, compression interruption was anathema except for ventilation and pulse and rhythm checks, [10 ] but considering the increased risks to staff, novel approaches to intubation during cardiac arrests should be considered.

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**Fig. 1.** RONCI setup: ETT, inline suction, corrugated tubing, viral filter, ETCO2, BVM.

To avoid unknown and high-risk exposures, our ED currently treats all cardiac arrests as if COVID-19 positive. Prior to EMS arrival, our ED staff dons Airborne PPE consisting of an N95 respirator, goggles, gown, and gloves [11]. Additionally, those managing the airway and those performing compressions don PAPR hoods [12]. All cardiac arrests are resuscitated in our negative pressure DECON Room [13].


**Fig. 2.** RONCI staging area with VL and equipment.

Theoretically, once intubated with the ETT cuff inflated and viral filter in place, viral exposure is minimized and contamination of the surrounding area is diminished [14]. In order to even further mitigate staff exposure, we decided to trial rapid outdoor non-compression intubation (RONCI) in a well-ventilated area with cuff inflation and viral filter placement prior to ED entrance. Our experience revealed several key points to keep in mind prior to performing RONCI.

While seamless teamwork, leadership, and communication are always necessary during resuscitations, the current pandemic emphasizes the importance of refining these techniques [15]. Communication suffers while wearing full PPE and PAPR hoods; so pre-assigning roles, practicing specific procedures, and utilizing simplified means of communication are indispensable.

To avoid lengthy interruptions in CPR and worsening mortality [10], we recommend limiting the RONCI attempt to less than 10–15 s. If successful intubation cannot be performed within this timeframe; we recommend aborting the attempt, resuming CPR, and attempting later in a controlled environment where more equipment is available. Supraglottic airways can also be considered if intubation is unsuccessful [5].

The AHA recommends that the "provider…with the best chance of first-pass success" should perform the intubations in suspected COVID-19 infected patients in cardiac arrest [5]. We suggest positioning RONCI equipment ergonomically prior to EMS arrival, and adjusting the EMS stretcher height to optimize first-pass success. Recognizing the limitations of this technique and applying it to the correct patient populations is of utmost importance. While no standard definition of a difficult airway exists, providers should quickly recognize airways with a high likelihood of first pass failure (massive upper GI bleeds, neck trauma, severe morbid obesity, etc.) and move directly to the resuscitation bay [16].

Finally, some practical considerations that may preclude this technique include adverse weather conditions, suboptimal ambulance bay layouts, and short EMS arrival times.

## 4. Conclusion

In this case, we discuss a novel technique for intubation to decrease staff exposure to aerosolized COVID-19. We found that this technique is easily performed, requires no specialized equipment, and provides an early closed system to minimize aerosolization. In the future, a more advanced setup including portable suction will likely be utilized.

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## Declaration of competing interest

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