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Suction tubing reversal as a dormant failure during airway management☆

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ABSTRACT

An intubation in the Emergency Department (ED) would never occur without suction set up and tested. However, due to the complexity and inherent failure potential of these devices, even checked suction devices can fail at a crucial juncture. We present a case report of suction that worked properly during pre-intubation preparation, but critically failed due to inappropriate set up. This situation is an example of a dangerous dormant failure that can easily reoccur in any ED.

1. Introduction

An intubation in the Emergency Department (ED) would never occur without suction set up and tested. However, due to the complexity and inherent failure potential of these devices, even checked suction devices can fail at a crucial juncture. We present a case report of suction that worked properly during pre-intubation preparation, but critically failed due to inappropriate set up. This situation is an example of a dangerous dormant failure that can easily reoccur in any ED.

2. Case report

An adult female with past medical history significant for congestive heart failure, chronic obstructive pulmonary disease on 2 liter nasal cannula home oxygen, weighing 132.5 kg and BMI of 60, was brought in by ambulance from nursing home because her home oxygen saturation was 53%. In the Emergency Department, the patient was placed on non-invasive positive pressure ventilation with some improvement. After 90 min, she continued to be lethargic, and an arterial blood gas showed worsening of respiratory status and the decision was made to intubate.

Due to her body habitus, hypercarbia, and hypoxemia, she was an expected difficult intubation, so she was prepared for an awake video bronchoscopic intubation. Two suction units were prepared (DeRoyal Crystaline Rigid Canister), with one canister attached to the bronchoscope and another canister to a Yankauer device. Both devices showed appropriate suction when tested by multiple providers. As the bronchoscope was placed into the oropharynx, significant secretions were encountered that were not cleared by multiple attempts at suctioning through the bronchoscope. After 2 additional bronchoscopic attempts failed due to inability to clear secretions, we switched to hyperangulated video laryngoscopy and successfully intubated.

3. Discussion

After the intubation attempt, the suction tubing canister that was hooked to the bronchoscope was examined, and a photo is shown in Fig. 1.

Oropharyngeal secretions are commonly encountered during endotracheal intubation attempts, so suction devices are usually prepared to improve glottis visualization, be it via direct laryngoscopy, video laryngoscopy, or fiberoptic laryngoscopy.

Most suction canisters are set up with suction tubing attaching from a hospital wall vacuum source into a suction canister through a central port while separate tubing connects from a peripheral port to a suction device, such as a Yankauer or the suction port of a bronchoscope. Of note, a piece of absorbent foam in the central port will stop gas exchange once liquid hits its surface, thereby acting as a functional one-way valve designed to activate when the suction canister fluid level rises to the top and protecting the hospital vacuum source.

In this case, the tubing was reversed. During testing during the pre-intubation preparation phase, full suction is delivered to the end devices. However, once the suction device was used, i.e. through the bronchoscope, the initial secretions contacted the foam, and this dramatically decreased the available suction. Of interest, the auditory

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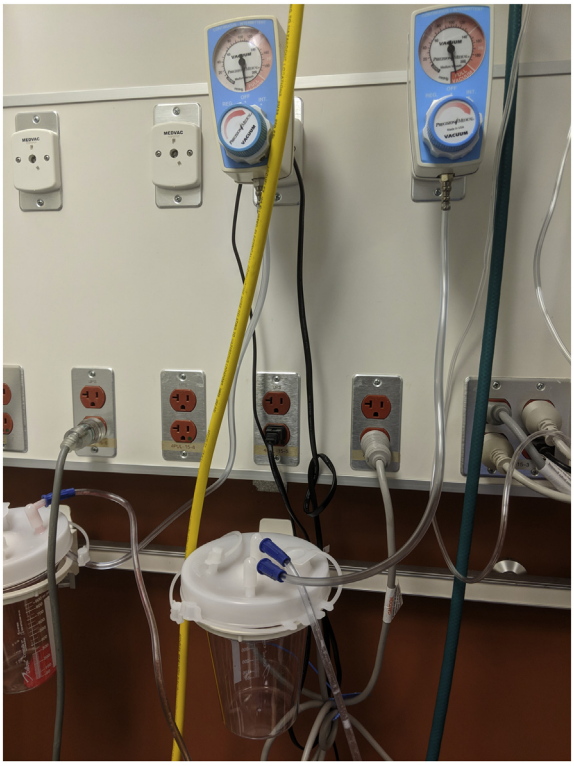

Fig. 1. Suction tubing canister setup used during intubation.

feedback remained the same. To our knowledge, there are no other case reports describing complications from suction tubing reversal.

Nearly all adverse events need both an active failure and latent failure [1], and our case is no exception. The tubing was reversed, but the equipment design was such that detection of the failure could not occur until device use. Clinicians should therefore check their suction setup, specifically examining the location of the tubing. Investigations to provide a systems-level correction, such as color-coding, should be explored in the future.

References

[1] Reason J. Human error: models and management. BMJ 2000;320(7237):768–70.

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