Single-Use Telescopic Bougie: Case Series

Evan Denis Schmitz MD
La Jolla, CA USA

Abstract

AIROD™ is a single-use telescopic bougie that is small enough to fit into a pocket. AIROD™ is sterile and can be expanded in hast when needed, saving precious seconds, while attempting to intubate a patient. The non-malleable bougie is able to overcome the compressive force of the oropharyngeal tissue improving the view of the vocal cords and facilitating advancement of an endotracheal tube into the trachea along with a laryngoscope. This series reports four cases of successful first pass intubation with the AIROD™.

Introduction

There are approximately 50 million intubations performed a year with 1/3 of those occurring in the USA. A multicenter registry of ED intubations, reporting data from 2002-2012, found that approximately 12% of intubations resulted in adverse intubation-related events such as death (1). In order to reduce the likelihood of adverse events it is imperative that the first attempt at endotracheal intubation is successful (2). Despite increasing adoption of expensive video laryngoscopy first-attempt intubation success rates are only 85% (1). The BEAM trial reported a 96% success rate in first-attempt intubation of a difficult airway with a bougie vs only 82% with endotracheal tube + stylet (3).

AIROD™ was designed to aid in the advancement of an endotracheal tube past the vocal cords with the use of a laryngoscope (Figure 1).

Figure 1. Single-Use Telescopic Bougie in the closed (A) and extended (B) position with an endotracheal tube loaded at the distal end.

AIROD™ can also improve the view of the vocal cords during intubation by displacing oropharyngeal tissue. The following case series demonstrates the usefulness of the AIROD™: each of the 4 intubations were successful on the first attempt and facilitated by the single-use telescopic bougie without causing any trauma. All intubations were performed by the author.

Case 1

A 70-year-old woman with severe COPD not on home oxygen presented with an oxygen saturation of 70%. She was found to have multi-lobar pneumonia predominately in the right upper and middle lobes. Despite bilevel positive airway pressure (BiPAP) therapy her hypoxia worsened, and she required intubation. Inspection of her oropharynx prior to intubation revealed very prominent 1st incisors as well as canines that were eroded at the roots left worse than right. Multiple black, necrotic molars were noted, right worse than left, with a putrid odor. Her oxygen saturation, despite being on 15L nasal cannula, hovered in the low 90s. In anticipation of a difficult airway the AIROD™ was prepared by extended the rods and ensuring the rods were in the locked position. A Miller 4 blade was gently inserted past the teeth and into the oropharynx. A grade 2 view (larynx plus the posterior surface of epiglottis) was obtained. This was immediately followed by gentle insertion of the AIROD™ which was advanced just distal to the vocal cords. An 8.0 endotracheal tube was advanced down the AIROD™ by the respiratory therapist while the AIROD™ was held in position. As the endotracheal tube was advanced into the oropharynx, hand position was changed from holding the AIROD™ to holding the tip of the endotracheal tube while the respiratory therapist held the distal end of the AIROD™. The endotracheal tube was then advanced past the vocal cords and into the trachea while the respiratory therapist removed the AIROD™ with ease. No complications occurred. No trauma occurred to the oropharynx, vocal cords or trachea. The patient was successful ventilated and oxygen saturations improved to high 90s.

Case 2

A61-year-old man with severe schizophrenia and acute delirium had a PaO2 of 61 mmHg despite BiPAP 14/6 on 90% fio2 with a minute ventilation of 18 L/min from multi-lobar pneumonia. A Miller 4 blade was gently inserted past the teeth and into the oropharynx. A grade 1 view (whole vocal cords seen; the epiglottis is not seen at all) was obtained. The AIROD™ was gently advanced 2 cm past the vocal cords followed by an assistant advancing a 7.5 endotracheal tube down the AIROD™ until grasped, then the endotracheal tube was slid into the trachea while the assistant held the distal end of the AIROD™. The AIROD™ was then removed intact with no evidence of airway trauma.

Case 3

A 54-year-old man with severe coronary artery disease on aspirin and Plavix with a history of a seizure disorder associated with alcohol withdrawal became unresponsive and a code blue was called. He was found to be apneic with oxygen saturation in the

50s. He was stimulated by the hospitalist and woke up. He was transferred to the ICU where he became completely unresponsive again and became apneic. He was immediately ventilated with a bag-valve mask and oxygenation improved to 100%. He then bolted up out of bed and became very combative. Propofol was given and he was laid supine and ventilated with a bag-valve mask. Inspection of his oropharynx revealed a very large tongue, some missing and multiple sharp teeth with mouth opening of only 2 fingerbreadths. There was blood and emesis in his oropharynx that was suctioned. A Miller 4 blade was inserted into the oropharynx but only a grade 4 view (the anterior tip of the epiglottis is seen and encroaching on the view of vocal cords obstructing <50% of view) could be obtained. The AIROD™ was inserted into the oropharynx in the fully extended and locked position and the proximal tip was used to gently lift the epiglottis exposing the vocal cords and improving the view to a grade 2. AIROD™ was advanced 2 cm past the vocal cords and an assistant advanced an 8.0 endotracheal tube down the AIROD™ until it was grasped, and the endotracheal tube was advanced successfully past the vocal cords while the assistant held the distal end of the AIROD™. The AIROD™ was removed intact without any oropharyngeal or vocal cord trauma.

Case 4

A 48-year-old obese who was an alcoholic and a smoker was critically ill with an admission albumin of 0.9 and lactic acid of 9 with multiorgan system failure from an intra-abdominal abscess with septic shock on 15 mcg/min of epinephrine and 25 mcg/min of Levophed. He was obtunded and in acute respiratory failure. The AIROD™ was pre-loaded with an 8.0 endotracheal tube onto the distal end of the AIROD™ prior to providing sedation with Etomidate and bag-valve mask ventilation in anticipation of a difficult airway: full beard, mouth opening 2 cm, large tongue, collapse of the walls of the oropharynx as well as false cords. Using a Miller 4 blade a grade 2 view was obtained and the AIROD™ was advanced 1 cm past the vocal cords followed by the endotracheal tube while an assistant held the distal end. There was no significant desaturation or trauma to the vocal cords or oropharynx. Pre-loading the AIROD™ with the endotracheal tube improved the speed and autonomy of the intubation.

Discussion

AIROD™ is a single-use telescopic endotracheal intubation bougie. It is rigid, made of stainless steel and sterilized. It telescopes to two feet and has a specialized 20-degree angled tip. Once expanded it locks so it cannot be retracted. An endotracheal tube 7.0 or greater can be advanced over the telescoping bougie for smooth placement in the adult trachea.

AIROD™ is non-malleable and can gently displace oropharyngeal tissue, it does not sag and pull like plastic bougies, the unique locking mechanism prevents collapse and the square handle improves dexterity as well as spatial awareness of the proximal tip.

AIROD™ telescopes open allowing for storage in small spaces such as a pocket or a crash cart without damaging its integrity like so many bougies that are ruined when bent for storage. Because of its small size, it can be stored in a myriad of places and easily accessed by emergency personnel in the field, emergency department, intensive care unit and operating room.

AIROD™ can be used with multiple different varieties of laryngoscopes. My preference is a Miller 4 laryngoscope because of the ability to lift the epiglottis and visualize the vocal cords especially in patients with a large tongue, limited mouth opening and decreased neck mobility. The AIROD™ can be slid along the length of the laryngoscope blade if needed to overcome the force of oropharyngeal tissue. Once the AIROD™ is advanced a few centimeters past the vocal cords the rigidity of the AIROD™ allows advancement of the endotracheal tube with ease because it can withstand the forces applied by the oropharyngeal tissue without significant bending. I have also used a Macintosh laryngoscope with the AIROD™ which allows for displacement of the tongue and oropharyngeal tissue but placement into the vallecula above the epiglottis can limit exposure to the vocal cords. The AIROD™ can overcome the limitation of the Macintosh laryngoscope by directly lifting the epiglottis, exposing the vocal cords then the AIROD™ can be gently slid along the posterior surface of the epiglottis past the vocal cords followed by advancement of an endotracheal tube for successful intubation. Because the AIROD™ is made of steel, similar to the Gliderite stylet used with the Glidescope as well as laryngoscopes and rigid bronchoscopes, it is possible that if used incorrectly trauma to the oropharynx as well as the trachea may occur, and caution is advised.

The cost of the AIRODTM is similar to the Glidescope's disposable covers that are used with each intubation. Because of the loss of direct sight and acute angles involved in the process of advancing an introducer during intubation with the Glidescope I do not recommend using the AIRODTM with the Glidescope. The AIRODTM was designed only to be used with adults.

Conclusion

AIROD™ is a sterile single-use telescopic bougie that is used along with a laryngoscope when performing endotracheal intubation. Because of its small size it is easily stored in a pocket, helicopter, ambulance, crash cart, operating room, emergency department, intubation box and in the intensive care unit. Its rigidity helps displace oropharyngeal tissue improving the view of the vocal cords and it facilitates advancement of an endotracheal tube. It can also be used in the closed position as a stylet making it an ideal instrument for first-attempt intubation along with a laryngoscope.

Conflict of Interest Disclosures

The author Evan Denis Schmitz, MD is the inventor of the AIROD™.

References

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