Case Report

Blind intubation through Laryngeal Mask Airway in a cannot intubate-difficult to ventilate patient with massive hematemesis

ABSTRACT

Massive hematemesis could be challenging situation requiring emergency airway control and urgent surgical treatment. We report a case of difficult airway management with blind intubation through Laryngeal Mask Airway in a 56-year-old patient with massive hematemesis. After failed endoscopic attempts to stop bleeding, worsening of hemodynamics called for emergency intubation and surgery. After failed intubation attempts and face-mask ventilation worsening, a classic LMA was used for rescue ventilation and decision was made to intubate through LMA. The airway exchange was aided by a nasogastric tube (NGT) through LMA, confirmed with capnography and surgery was started successfully and uneventfully. Unexpected difficult airway can be extremely challenging situation, especially in emergency settings with no possibility to delay surgery. In those cases, literature suggests different intubating techniques through LMA. Blind intubation through LMA aided by NGT showed to be a suitable option in resources-limited settings, where advanced supraglottic devices and/or optical devices are not available.

Key words: Cannot intubate-cannot oxygenate; emergency department; hematemesis; Laryngeal Mask Airway

Background

Massive hematemesis, especially when related to hemodynamic instability, represents a condition requiring emergency airway control, patient stabilization, and urgent endoscopic or surgical option.

Airway management in such a situation can be challenging because of the emergency setting, high risk for aspiration and limited visibility during maneuvers.[1]

We report a case of difficult airway management in patient requiring emergency surgery for massive hematemesis,

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discussing adopted strategy with blind/aided intubations through LMAs and reviewing available literature indications and reports in similar situations.

Case Report

A 52-year-old male obese patient (weight 115 kg, height 181 cm), with history of hypertension, analgesics abuse due to chronic back pain, came to Emergency Department for repeated massive hematemesis episodes. Upon arrival, the patient was conscious, with slightly reduced response to painful stimulation and regularly reflexive pupils; vital signs were recorded: heart rate was 145 bpm, non-invasive blood pressure 80/45 mmHg, SpO_2 86% in room air. Blood tests were performed, urinary catheter and indwelling arterial line for blood pressure monitoring and serial blood gas measurements were placed. After anamnesis excluded presence of active liver disease and esophageal varices, the patients signed the informed consent so that a gastric tube was gently positioned to drain blood from stomach, and immediately after a Sengstaken Blackmore tube to in an attempt to stop bleeding.

Emergency endoscopy was arranged and performed with locally sprayed 10% lidocaine and minimal sedation with midazolam 1 mg, resulting in failure to identify and control active source of bleeding with endoscopic treatment. Following the worsening of hemodynamic conditions and impossibility to stop bleeding, immediate surgical access was scheduled. Patient was moved to operatory room and, under vital parameters monitoring and 3 minutes preoxygenation in 100% oxygen, a rapid sequence induction was performed with etomidate 0.2 $mg^{*}kg^{-1}$, suxamethonium 1 $mg^{*}kg^{-1}$, and fentanil 100 mcg. Cricoid pressure (CP) was applied in order to decrease the risk of regurgitation. Before the procedure, patient was not carefully studied for airway management, due to urgent setting, but a Mallampati 3 score and slightly reduced neck movement were recorded. At a first direct laryngoscopy, no glottic structures were visible; a second attempt, after aspiration of blood and releasing of CP, showed a Cormack-Lehane 3 grade with partial view of lingual border of epiglottis.

Intubation was attempted blindly twice with styletted tube, unsuccessfully, whereas ventilation by face-mask was getting quickly worse. As the oxygen saturation was descending rapidly (spO_2 60%), a number 4 classic LMA was placed after repeated mouth aspiration. Mask was inflated accordingly to manufacturers' instruction (25 ml of air) and manual ventilation was obtained via gentle but frequent insufflation with 100% Oxygen. Once saturation was fully recovered, considering emergency surgery and aspiration risk, the decision to intubate through LMA was taken.

Optical instruments (video/fiberoptical) were not available. We then inserted a 16 Fr standard nasogastric tube (NGT) blindly through LMA, finding indirect sign of passage in trachea in easy advancement without resistance and repeated free air aspiration. Then, we cut proximal tip of NGT and kept granting ventilation passing proximal end of NGT via holed catheter mount. Next, proximal part of LMA with glued connector was cut and removed to allow passage of a 7,5 mm endotracheal tube (ET) through LMA by railroading on NGT [Figure 1].

Before removing the LMA, the ET cuff was inflated and position confirmed by capnography.

After successful intubation, surgery started and patient was successfully treated for duodenal ulcer. Vital parameters were stable throughout the operation, but blood and plasma transfusion were necessary according to blood test results. At the end of the surgery, the patient was moved to intensive care unit for postoperative monitoring and uneventfully extubated the day after using a safe extubation technique.[2]

Discussion

Airway management may be particularly challenging during a massive hematemesis scenario, which may lead to a difficulty in the recognition of airway anatomy, increasing the risk for a cannot intubate-cannot ventilate setting.[1]

The existing literature underlines the need for airway examination also in emergency conditions, suggesting the

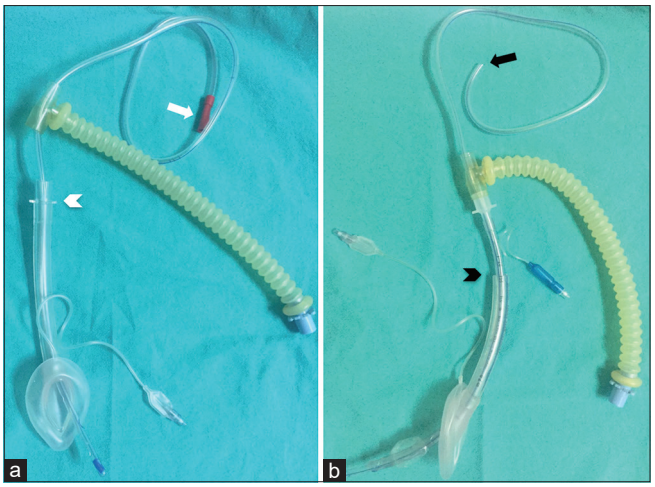

Figure 1: Reconstruction of the NGT-aided intubation technique. (a) GT passed inside cLMA through catheter mount for periprocedural oxygenation. White arrow pointing GT connector for air aspiration test, white chevron pointing cLMA airway connector. (b) endotracheal tube railroaded on NGT inside the cLMA. Black arrow pointing at proximal GT ending with connector removed and black chevron pointing at proximal ending of cLMA connector removed to allow tube passage. Catheter mount connected to endotracheal tube for periprocedural oxygenation

use of simplified scores based on anatomical landmarks, airway obstruction and neck mobility which could quickly and reliably predict difficult airway management also in emergency department.[3]

In our case, the airway examination was abbreviated due to the emergent status and deteriorating clinical conditions.

Our quick evaluation indicated obesity, limited neck extension and a Mallampati 3 score; a careful post-procedural examination showed slightly reduced inter-incisor distance and short neck as predicting factors for difficult laryngoscopy, in addition to active bleeding.[3,4]

Another factor which could promote more difficult laryngoscopy is application of Cricoid Pressure (CP) during rapid sequence induction. There is much debate in the literature whether or not this maneuver has real effectiveness in terms of aspiration protection in front of clear evidence that it worsens ventilation, laryngoscopy and supraglottic airway devices (SAD) placement.[5]

In this case, we performed rapid sequence induction maintaining CP during the first laryngoscopic attempt; due to failed view, CP was stopped for the second attempt and a Cormack-Lehane 3 was obtained.

Airway Management guidelines support early recurrence to SADs in case of difficult airways,[4-7] and their use as successful bridge to secure the airways has been remarked also in ASA Closed Claims Analysis.[8] For these reasons, it was our choice after two failed intubation attempts and desaturation to use LMA, with immediate benefit on saturation by an effective ventilation. Subsequently, an intubation through LMA was planned. Literature recommendations for difficult airway management include the choice of 2nd-generation SGA, which guarantee gastric access through the dedicated channel for gastric tube insertion and decompression, in addition to a better sealing pressures and possibility to intubate.[9] Not by chance, they have been recently indicated as rescue devices also in high risk situation for aspiration and emergency surgery.[10]

However, 2nd-generation SGA could be not available in every setting, and it was our case. Furthermore, in our hospital we lacked videolaryngoscopes, which are the first choice in case of unanticipated difficult airway.[11]

This is the first report of blind-aided intubation through classic LMA during a massive hematemesis. The main problem with intubation via LMA is represented by the presence of a glued standard circuit connector limiting the ET diameter and by the tube length, resulting in a difficulty to intubate through it in the adult patient.[12,13] Newer devices, such as AirQ ® (Mercury Medical, USA) obviate this problem with shorter airway conduit and removable connector,[14,15] while i-LMA ® (Teleflex Medical, Ireland) was designed with a short airway conduit and dedicated ET with detachable connector, designed to allow intubation with high success rate also with blind technique.[16]

Despite not designed for this purpose, many techniques have been described for intubation through classic LMA,[1] as the LMA-Aintree-fiberoptic combination.[18] The Aintree® (Cook Medical, USA) airway exchange catheter (AEC) is larger and shorter than a conventional airway exchange catheter, allowing introduction of a relatively large diameter flexible bronchoscope (up to 44 mm) and leaving the distal part of the instrument free to move and to operate [Figure 2].

After LMA introduction, ventilation can be initiated, and a fiberoptic bronchoscope with the pre-mounted AEC can be inserted inside the mask through ventilation port of catheter mount. Visualized introduction of the instrument between vocal cords and into the trachea is mandatory before releasing the AEC inside the LMA and removing the bronchoscope. LMA is then removed leaving *in situ* the Aintree, which is then used to railroad the tube into trachea with or without help of laryngoscope. Despite being more rarely used, this

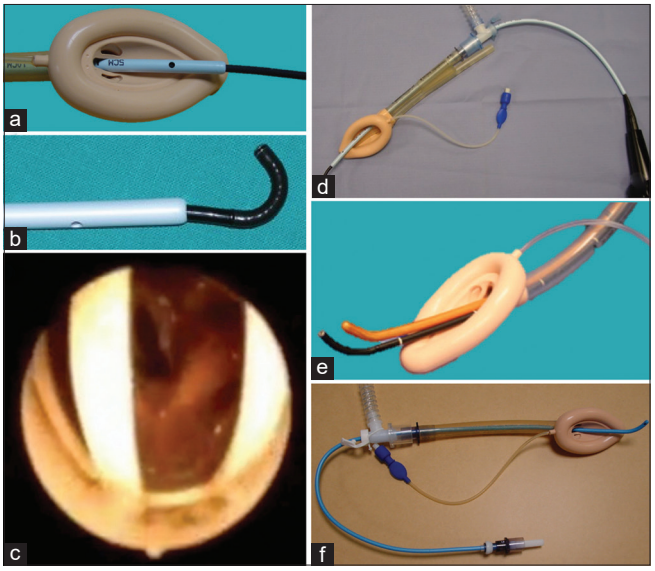

Figure 2: The Aintree™ (Cook Medical, Bloomington, USA) and cLMA technique (a) Aintree™ AEC and FOB coming out in the cLMA inflated cuff. (b) detail of FOB tip free movement inside Aintree™. (c) live fiberoptic view of FOB-Aintree™ inside the LMA airway. (d) Aintree™ – Proseal – LMA™ assembly. (e) gum elastic bougie - FOB technique trough cLMA. (f) blind cLMA-Introducer (Frova Introducer, Cook, Bloomington, USA) technique

technique has also been described for ProSeal LMA® also in case of airway anatomy distortion.[19,20]

The Aintree-fiberoptic technique remains superior compared to blind insertion of AEC[21] or gum elastic bougie (GEB) through LMA,[22] but it requires training to be used,[23] as exchange maneuver could be challenging and fiberoptic skills may be not universally spread.[24]

Blind intubation techniques through LMA report a variable success rate (30-93%),[25] while the most used GEB-aided technique varies from 27.5% to 63%.[22,26-28]

The use of NGT has been described by Mathes[29] in combination with LMA Supreme ® (Teleflex Medical, Ireland), although aided by fiberoptic guidance. In our case, NGT was used because of unavailability of AEC, and preferred to GEB because of being hollow, able to allow air aspiration and therefore confirm tracheal positioning through end-tidal CO_2 detection.[30] Other alternative is use of guidewire,[17,31] but this technique is more prone to wire impingement if operated blindly, not allowing any control without contemporary use of fiberoptic bronchoscope.

Conclusions

Patients with upper digestive tract or airway hemorrhage represent a specific challenge because even in absence of anatomical difficulties for ventilation and laryngoscopy, they could evolve into difficult to ventilate or intubate scenarios. Intubation through SADs in case of rescue ventilation and need for urgent surgery should always be considered and Fiberoptic assisted intubation through 2nd generation SGAs should always be preferred as it is safer and more effective than any blind technique.

However, in case of missing advanced devices, Blind intubation through LMA aided by NGT could be a rescue alternative in emergency in resource-limited settings, despite it not being recommended routinely.

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Conflicts of interest
There are no conflicts of interest.

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