

Emergency gum elastic bougie-assisted tracheal intubation in four patients with upper airway distortion

[L'intubation trachéale d'urgence assistée par une bougie en caoutchouc élastique chez quatre patients qui présentent une distorsion des voies aériennes supérieures]

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Purpose: The gum elastic bougie (GEB) has been in use for a long time and allows tracheal intubation in most cases of difficult direct laryngoscopy. Use of the GEB when anatomical landmarks of the upper airway are not recognizable has not been reported. We describe our experience of airway management with the GEB in cases of severe upper airway distortion.

Clinical features: Four patients with severe respiratory distress caused by upper airway distortion secondary to various non-malignant causes were managed with the GEB. For these four patients, a rapid sequence induction of anesthesia was performed with a surgeon present during the procedure. The GEB was used as the initial intubating technique in all cases and allowed a rapid and successful tracheal intubation in spite of non-recognizable anatomical structures. The distal hold-up feeling after GEB insertion confirmed, in all cases, the correct intratracheal position of the GEB.

Conclusion: The GEB can be a valuable tool in cases of difficult airway management caused by upper airway distortion. The lack of visualization of normal pharyngeal structures did not prevent the successful insertion of the GEB in the trachea in the four patients reported.

Objectif : La bougie de caoutchouc élastique (BCE), utilisée depuis longtemps, permet une intubation endotrachéale dans la plupart des cas de laryngoscopie directe difficile. Mais aucune publication ne mentionne l'usage d'une BCE dans les cas où on ne peut reconnaître les repères anatomiques des voies aériennes supérieures. Nous avons utilisé la BCE dans des cas de distorsion sévère des voies aériennes supérieures.

Éléments cliniques : Quatre patients présentant une détresse respiratoire sévère causée par une distorsion des voies aériennes

supérieures secondaire à diverses causes non malignes ont été intubés avec une BCE. Tous ont été anesthésiés selon une séquence d'induction rapide réalisée en présence d'un chirurgien. La BCE a été utilisée initialement pour l'intubation des quatre patients. L'intubation rapide a été réussie malgré les structures anatomiques non identifiables. La rétention distale ressentie après l'insertion de la BCE a confirmé, dans tous les cas, la position intratrachéale correcte de la BCE.

Conclusion : La BCE peut être un outil valable dans les cas d'intubation difficile causée par une distorsion des voies respiratoires supérieures. L'absence de visualisation des structures pharyngiennes normales n'a pas empêché l'insertion réussie de la BCE dans la trachée de nos quatre patients.

THE optimal strategy for the management of injured or distorted upper airway resulting in obstructive asphyxia is not clearly defined.¹ Awake intubation is most often impossible in asphyxiated and agitated patients. On the other hand, the decision to induce general anesthesia in patients with an anticipated difficult airway may have potentially lethal consequences. We report our experience of emergency gum elastic bougie (GEB)-assisted blind intubation in four patients with a severely compromised airway.

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Case reports

Case 1

A 37-yr-old female patient was admitted for thyroidectomy. Anesthesia, surgery and the immediate postoperative period were uneventful. Six hours after the end of the surgical procedure, the patient became rapidly dyspneic and restless. It was noted that her neck had become swollen and arterial oxygen saturation was 80% despite the administration of oxygen with a facemask. After a rapid sequence induction (RSI) with etomidate 0.3 mg·kg⁻¹ and succinylcholine 1 mg·kg⁻¹, tracheal intubation was attempted. During laryngoscopy, glottic exposure was impossible because of a hematoma-induced anatomical distortion of standard laryngeal landmarks. After two unsuccessful attempts at tracheal intubation, a GEB (Eschmann Endotracheal Tube Introducer; Sims Portex, Hythe, UK) was simply inserted towards the presumed laryngeal structures and advanced until a resistance was encountered. Then a 6.0-mm internal diameter (ID) tube was rapidly threaded over the GEB. CO₂ monitoring confirmed tracheal intubation.

Case 2

A 71-yr-old man scheduled for a left carotid endarterectomy under general anesthesia was extubated on arrival in the postanesthesia care unit (PACU). Although initially eupneic, 15 min later he became rapidly dyspneic and dysphonic. Reintubation was decided and direct laryngoscopy showed that a voluminous hematoma had seeped into the laryngeal structures and massively diverted the hypopharyngeal structures. Three attempts at tracheal intubation resulted in esophageal intubation. Finally, a GEB was advanced blindly towards the presumed laryngeal inlet. In the absence of any sensation of resistance, the bougie was immediately removed and a second attempt made. Hold-up was obvious at 40 cm on the second insertion attempt. A 6.0-mm ID tube was rapidly threaded over the GEB and CO₂ monitoring confirmed tracheal intubation.

Case 3

An 80-yr-old woman was anesthetized for emergency surgery (strangled umbilical hernia). After tracheal intubation, a nasogastric tube was inserted through the right nostril after several vain attempts through the left nostril. Anesthesia and surgery were uneventful. Immediately at extubation in the PACU, the patient experienced an episode of arterial oxygen desaturation requiring brief (three minutes) face mask ventilation. With 100% arterial saturation, a nonbreathing oxygen mask was applied. Rapidly, the patient became dyspneic

and agitated. Facial features brutally changed to a puffy face and neck with obvious extensive *sc* emphysema. Tracheal reintubation was decided. At laryngoscopy, direct glottic exposure was impossible. None of the classic anatomical laryngeal landmarks could be recognized. Tracheal “blind” intubation was attempted twice resulting in worsening of laryngeal lesions (mucous membrane bleeding) and oxygenation. Finally, a GEB was advanced through the presumed airway channel. A hold-up sensation was felt at the first attempt allowing successful tracheal intubation with a 6.5-mm ID tube. A spiral computed tomography of the neck and chest showed diffuse *sc* and submucosal emphysema originating from a large nasopharyngeal mucosal wound and false route in the right nostril induced by attempts at nasogastric tube insertion.

Case 4

A 60-yr-old male patient was referred to our hospital for emergency esophageal surgery three hours after the voluntary oral ingestion of caustic. Upon arrival in the operation room the patient was both agitated and dyspneic and severely hypoxic (SpO₂ = 75–80%). A RSI was performed. During laryngoscopy, glottic exposure was impossible because of diffuse and impressive mucosal burns of the oral cavity and the pharynx. Blind tracheal intubation was attempted several times, systematically resulting in esophageal intubation. A GEB was directed towards the presumed laryngeal inlet. Adequate position of the bougie was confirmed when a hold-up resistance was encountered after about 35 cm of the GEB had been inserted. A 6.5-mm ID tracheal tube was threaded over the GEB into the trachea and its position confirmed by capnography.

Discussion

We have documented four cases of successful tracheal intubation using a GEB in asphyxiated patients suffering from severely compromised upper airway. The GEB has been proposed for a long time in cases of unexpected difficult laryngoscopy, when the cords cannot be seen.^{2–4} In these asphyxiated patients requiring emergency oxygenation, we applied a difficult airway management algorithm recommended in cases of unexpected difficult laryngoscopy.⁵ The GEB is proposed as the first step, the intubating laryngeal mask airway as the second and a surgical airway as the ultimate step. Since this algorithm for difficult airway management is observed scrupulously in our institution, it is not surprising that it was applied in these four cases of unexpected difficult intubation occurring outside the operating room.

All patients required emergency oxygenation with a surgeon present at intubation. Tracheal intubation was mandatory. Although clinical features, physical examination of the neck and face, and respiratory pattern predicted a difficult tracheal intubation we performed a RSI in order to gain access to the trachea as quickly as possible. A strictly awake intubation was inappropriate in these cases as awake intubation is time consuming. It requires patient preparation and their active cooperation. Sedation, topical oropharyngeal mucous anesthesia and superior laryngeal and proximal tracheal blocks are mandatory. Unless these conditions are fulfilled, fiberoptic assisted-tracheal intubation is difficult or impossible. None of the patients described would have tolerated awake intubation. Moreover, fiberoptic visualization would have been impossible in the presence of a severely damaged and distorted upper airway. Tracheal access was urgent and this was our main challenge. A rapid surgical airway was probably the most rational alternative. However, dissecting the anterior wall of the neck and pre-tracheal tissues in the presence of hematoma, *sc* emphysema, edema and a surgical wound might have been hazardous under local anesthesia. We decided to induce general anesthesia in order to attempt direct tracheal access. Assuming that tracheal intubation had failed with the GEB, an emergency surgical airway was planned. One minute after succinylcholine injection, the GEB had secured tracheal access in all four patients. In all four patients, a surgeon was immediately available to secure a surgical airway. Non-availability of this alternative should forbid the decision to provide general anesthesia.

The GEB was advanced blindly towards the presumed laryngeal inlet. The lack of correct visualization of the epiglottis did not prevent successful placement of the GEB into the trachea when a distal hold-up was felt. Threading the tracheal tube on the bougie was simple in three patients, but more difficult in one. Surprisingly, "clicks" were never felt in any patient intubated successfully with the GEB, suggesting that the quality of laryngeal exposure might influence tactile sensations at the time of bougie insertion.

In summary, these four cases emphasize the interest of the GEB as an alternative to rapidly assist tracheal intubation in patients with a distorted airway prior to securing an emergency surgical airway.

References

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