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A Flexible Solution for Emergency Intubation Difficulties

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The inability to correctly position the patient may cause difficulty during oral endotracheal intubation. Examples of such circumstances include cases of suspected cervical spine injury and cases of restricted access to the patient in the prehospital environment. The Eschmann tracheal tube introducer, more commonly called the "gum elastic bougie," is a valuable aid to oral intubation. The case reported herein, of a successful bougie-assisted oral intubation in the prehospital setting, highlights the usefulness of the technique. Physicians considering the use of the gum elastic bougie for intubation difficulties after rapid sequence induction should seek specific training in the use of the instrument.

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INTRODUCTION

Difficulty in intubation occurs unpredictably in 4% of nonobstetric patients and is encountered in 27% of patients assessed as having the potential for such difficulties.¹ When adult patients are placed in a neutral cervical spine position, with both manual in-line stabilization and cricoid pressure, 22% have only the epiglottis visible at laryngoscopy.^{2,3}

The gum elastic bougie (GEB) is a semirigid, resin-coated, braided polyester instrument that has been in clinical use for about 30 years (Figure).⁴ The GEB is 60 cm long, with graduations at 10-cm intervals, and it can be used with endotracheal tubes of 6.0 mm or more in internal diameter. The first 2.5 cm of the bougie is angled to approximately 40 degrees. This angling allows the tip of the GEB to be maintained in the midline while the advancing hand is kept out of the field of view. The following case report describes a successful bougie-assisted intubation in the prehospital setting.

CASE REPORT

A 25-year-old man was driving a "super go-kart" when he crashed into a concrete barrier at about 100 km/hour. The driver sustained a closed-head injury and several long-bone fractures. His helmet was fractured by the impact.

The patient had an initial Glasgow Coma Scale (GCS) score of 10, which decreased to 5. Paramedics at the scene could not intubate the patient because of trismus. A medical helicopter was dispatched; on its arrival, the patient was semierect in the go-kart, with a heart rate of 100, BP of 100/70 mm Hg, and GCS of 5. His pupils were equal, 2 mm, in bright sunlight.

Rapid sequence induction was performed, but because of the patient's position in the go-kart, cricoid pressure and manual stabilization of the cervical spine could be provided only if the intubating physician moved to the patient's side. Consequently, laryngoscopy revealed an oblique view of the rotated larynx, with no glottis visible on the left and only the posterior portion of the glottis visible on the right. Primary bougie-assisted oral intubation was successful on the first attempt along a "bent boomerang" course through the larynx. Because the view of the larynx was rotated in two planes, the use of a stylet-mounted tube would have totally obscured the available view of the larynx.

The patient remained in the ICU for 4 days and was hospitalized for another 39 days. He was discharged to a brain-injury unit for further rehabilitation.

DISCUSSION

Intubation with the GEB, which can be performed after rapid sequence induction, is a three-step process: (1) intubation of the trachea with the GEB, (2) passage of the endotracheal tube over the GEB into the trachea, and (3) removal of the GEB and securing of the endotracheal tube. Intubation times between 21 and 45 seconds, with a 100% success rate, were reported for this technique in 26 patients in whom only the epiglottis was visible on laryngoscopy.²

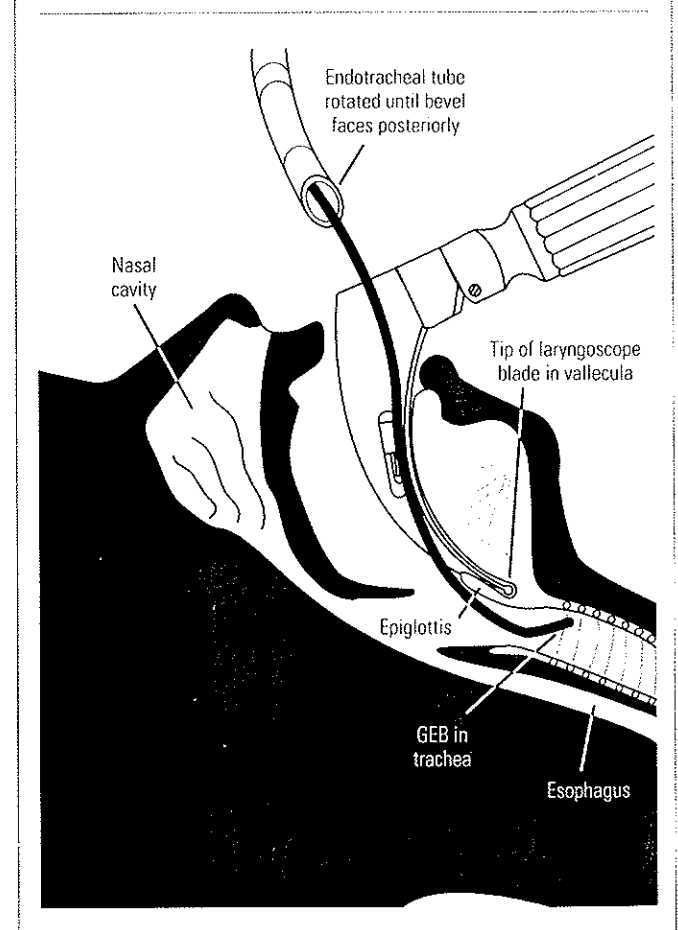
In patients with part of the glottis or only the epiglottis visible, the GEB can be advanced under direct vision beneath the epiglottis and "walked" off the vocal folds through the rima of the glottis. Successful placement of the GEB into the trachea can be ascertained on the basis of three signs: (1) the "clicks" of the bougie over the tracheal rings, (2) the holdup of the bougie at approximately 45 cm by a small bronchus, and (3) the rotation of the bougie as it enters a bronchus.⁵⁻⁷

The clicks of the GEB as it advances over the tracheal rings are felt in about 90% of cases; holdup of the GEB at 45 cm occurs in all remaining endotracheal bougie placements.⁷ The flexibility of the bougie allows it to be left in situ, bent over the side of the patient's mouth, permitting bag-mask ventilation, if required during the procedure.

To pass the endotracheal tube over the GEB, an assistant lubricates the bougie and then mounts an endotracheal tube on it. Control of the GEB is transferred to the assistant while the endotracheal tube is advanced over the bougie. For optimal passage of the tube over the GEB into the trachea, the laryngoscope is left in place and the endotracheal tube is advanced with the bevel facing posteriorly.^{4,7}

When the endotracheal tube is believed to be in position, it is stabilized while the assistant withdraws the GEB. The endotracheal tube is secured once its position in the

Figure.
GEB-assisted oral intubation.



trachea has been confirmed clinically by the presence of bilateral breath sounds. The patient's oxygen saturation and end-tidal CO₂ levels should be monitored closely until a follow-up chest radiograph can be obtained.

Variations on this technique have yielded successful oral GEB-assisted intubation in both spontaneously breathing and paralyzed patients without the visualization of laryngeal structures.⁸⁻¹⁰

The complications of this technique include esophageal intubation, sore throat, and hoarseness.⁴⁻⁶ One case of hemopneumothorax following GEB-assisted intubation has been described.¹¹ The case was managed conservatively, with complete resolution visible on chest radiography 3 months later.

The GEB can be unobtrusively stored on an intubation trolley. Because no set-up time is needed, it can be deployed rapidly in an emergency. The flexibility of the GEB can be increased with local prewarming, and the device can be sterilized and reused as recommended by the manufacturer. The GEB retails for \$68 in the United States from SIMS, Incorporated. It is an inexpensive solution to many intubation problems following rapid sequence induction in the emergency department and prehospital settings.

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