Anaesthetic Techniques

Difficult laryngoscopy made easy with a "BURP"

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Displacement of the larynx by backward, upward and rightward pressure on the thyroid cartilage or "BURP" may improve visualization of the glottis in some cases of difficult direct laryngoscopy. In a patient with the Treacher-Collins syndrome in whom conventional laryngoscopy had proved impossible and tracheal intubation extremely difficult, this manoeuvre exposed the entire glottis and made tracheal intubation under direct vision easy. In a patient with protruding upper incisors and a prominent premaxilla which precluded a view of the glottis by conventional laryngoscopy, "BURP" again revealed the glottic opening and simplified the placement of an endotracheal tube. This experience suggests that "BURP" be considered as a potential aid in the management of difficult direct laryngoscopy.

La mobilisation du larynx vers l'arrière, le haut et la droite par manipulation du cartilage thyroïde peut améliorer la visualisation de la glotte lors d'une laryngoscopie directe difficile. Chez un porteur du syndrome de Treacher-Collins sur lequel la laryngoscopie traditionnelle s'était avérée impossible et l'intubation extrêmement difficile, cette manoeuvre a permis une exposition de la glotte en entier et grandement facilité l'intubation sous vision directe. La même observation s'applique à un patient dont une protusion des incisives supérieures et un maxillaire proéminent présentaient un obstacle sérieux à l'intubation. Ces expériences suggèrent que la manoeuvre déjà décrite peut être utile dans les cas d'intubation difficile sous vision directe.

Key words
COMPLICATIONS: intubation, tracheal;
INTUBATION, TRACHEAL: technique;
SYNDROMES: Treacher-Collins.

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Difficult direct laryngoscopy that complicates intubation of the trachea during anaesthesia is an important clinical problem. When not managed easily and reasonably expeditiously, it increases the risk for airway injury,[1] aspiration of gastric contents,[2] hypoxic brain damage and death.[3] When it is unforeseen prior to the induction of anaesthesia and all immediately available management techniques fail, the practicalities of arranging further management may require the cancellation and rescheduling of surgery. Accordingly, any new, simple method to overcome difficulty at laryngoscopy would be valuable in clinical practice.

The most popular simple aid for dealing with difficult laryngoscopy is posterior displacement of the larynx by firm backward pressure on the thyroid or cricoid cartilage.[4] Wilson *et al.* reported that this manoeuvre reduces the incidence of failure to view any portion of the glottis (classified as a Grade III or IV laryngoscopic view*) from about 9.2% to 1.6%.[5] A varient of posterior displacement employed by some anaesthetists in managing difficulty at laryngoscopy is "trial and error" shifting of the larynx about the neck with the laryngoscope in place in order to find the best endoscopic view. Anecdotal experience indicates that this manoeuvre can be helpful too. Even though displacements of the larynx appear to be commonly employed aids, the question of the optimal displacement for any type of laryngoscopic problem has not been addressed.

My hypothesis was that in some cases of difficult laryngoscopy, the view of the glottis could be improved by manually displacing the larynx in three specific directions – i.e., (1) posteriorly against the cervical vertebrae, (2) superiorly as far as possible and (3) slightly laterally to the right. This combination of displacements

*Cormack and Lehane have classified the views obtained at direct laryngoscopy into four Grades. Grade I represents visualization of the entire glottis; Grade II, exposure of the posterior portion of the glottis only; Grade III, visualization of the epiglottis only; and Grade IV, a view of the oropharynx or soft palate only, i.e., failure to see even the epiglottis.[6]

can be produced by exerting backward, upward and rightward pressure on the thyroid cartilage. The components of the manoeuvre can be remembered by the acronym "BURP."

The purpose of this communication is to introduce the "BURP" manoeuvre as a potential simple aid for the management of difficult laryngoscopy and to describe its striking benefit in two clinical cases.

Technique

The manoeuvre is applied most easily and effectively during general anaesthesia with muscle relaxation.* The patient's head and neck are brought into the "sniffing" position for conventional direct laryngoscopy. An assistant, who has been instructed beforehand, grasps the thyroid cartilage† between the thumb and index finger or between the thumb and third finger. The three pressures of "BURP" are then exerted in the following sequence (Figure). First, pressure is applied in a backward direction so as to abut the larynx against the bodies of the cervical vertebrae. Next, with this backward pressure maintained, pressure is added in an upward direction so as to shift the larynx superiorly as far as possible in the neck. Finally, additional pressure is applied to the left side of the thyroid cartilage in a rightward direction so as to move the larynx slightly towards the right side of the neck. This rightward displacement should be limited to about 2 cm in distance (in an adult) because a greater displacement seems to reduce the laryngoscopic view of the glottis or eliminate it altogether. With all three displacements maintained, laryngoscopy is performed and the endotracheal tube placed in the trachea. Alternatively, the laryngoscope is positioned prior to the application of "BURP" and kept in place as "BURP" is exerted.

Case #1

A six-year-old girl weighing 22 kg presented for a revision to a previous reconstruction of a deformed right pinna. She displayed the classical stigmata of the Treacher-Collins syndrome – including a downward oblique slanting of the palpebral fissures, notched lower eyelids, deformed external ears, severe micrognathia and a larynx placed well anteriorly close to the mentum. In addition, she was partially deaf. No other congenital abnormalities nor other medical problems were known.

*Anaesthesia with neuromuscular paralysis increases the mobility of the larynx in the neck and thereby facilitates the laryngeal displacements of "BURP." Obviously, anaesthesia and paralysis must not be induced if contraindicated by the airway problem itself.

†Grasping the cricoid cartilage is not as effective.

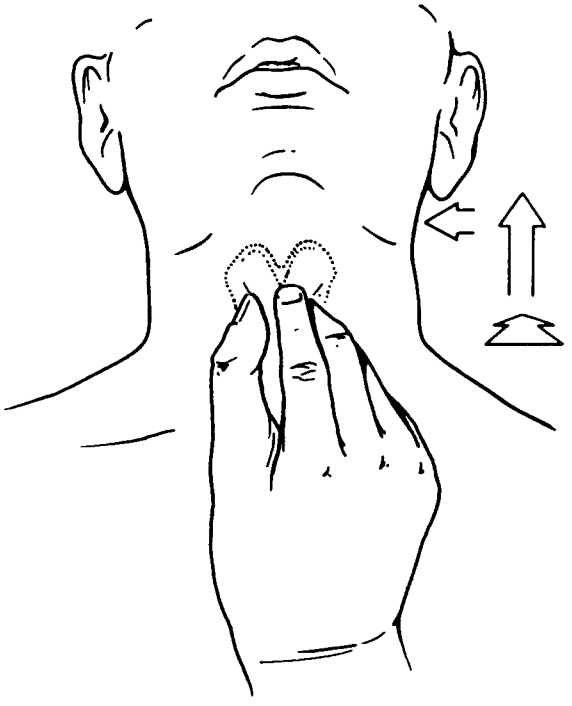

FIGURE Displacement of the larynx by backward, upward and rightward pressure on the thyroid cartilage or "BURP." Arrows indicate the directions of pressure application.

Six weeks previously the patient had presented at this institution for the initial reconstruction of her right pinna. On that occasion, anaesthesia had been induced with nitrous oxide and halothane. Upper airway patency was easily maintained. An attempt at direct laryngoscopy using a Macintosh #2.0 blade and then a straight Wis-Hipple #1.0 blade failed to expose even the epiglottis (i.e., the laryngoscopic view was Grade IV). The degree of difficulty was confirmed by two experienced anaesthetists. With the addition of backward pressure on the thyroid cartilage, only the tip of the epiglottis came into view. After numerous unsuccessful attempts at intubation over a 30-min period, a 4.5 mm tube fitted on a curved stylet was eventually passed blindly into the trachea. At the end of surgery, anaesthesia was terminated and the trachea extubated without sequelae.

On this admission another anaesthetist provided anaesthetic care. Following preoxygenation, anaesthesia was induced with thiopentone 125 mg. After the feasibility of positive-pressure ventilation with a face mask was assured, neuromuscular paralysis was induced with succinylcholine 30 mg. Once again, an attempt at direct laryngoscopy with a Macintosh #2.0 blade failed to expose any portion of the glottis, revealing only the oropharynx (i.e., a Grade IV view). Again, firm backward pressure

on the thyroid cartilage exposed just the tip of the epiglottis. However, the application of backward, upward and modest rightward pressure on the thyroid cartilage or "BURP" brought the entire glottic opening into view (i.e., converted the Grade IV laryngoscopic exposure into a Grade I view). The trachea was intubated immediately and easily with a 4.5 mm endotracheal tube. Surgery was completed and the trachea extubated without complication.

Case #2

A 39-year-old woman weighing 48 kg presented for sterilization by tubal occlusion. Eight years previously she had received a general anaesthetic for an ovarian cystectomy and was unaware of any anaesthetic complication. On clinical examination, she was noted to have unusually long upper incisors with an acute angle of inclination. She also displayed a prominent premaxilla with a pronounced overbite. Her medical history and physical examination were otherwise unremarkable.

Following the administration of d-tubocurarine 3 mg, anaesthesia was induced with thiopentone 250 mg and neuromuscular paralysis produced with succinylcholine 100 mg. Positive-pressure ventilation via a face mask was easily accomplished. Laryngoscopy using a Macintosh #3.0 blade revealed only the epiglottis – with or without application of backward pressure on the thyroid cartilage (i.e., the laryngoscopic view was Grade III). However, use of the "BURP" manoeuvre exposed nearly the entire glottic aperture (i.e., converted the Grade III laryngoscopic view into a Grade I view). The trachea was intubated easily with a 7.5 mm tube. Anaesthesia and surgery were otherwise uneventful.

A subsequent review of the record of anaesthesia at the time of the ovarian cystectomy revealed that laryngoscopy on that occasion had been "very difficult." Tracheal intubation had been performed blindly with a 6.5 mm tube on a stylet.

Comment

Displacement of the larynx by applying backward, upward and rightward pressure on the thyroid cartilage or "BURP" greatly facilitated laryngoscopy and tracheal intubation in each of these cases of difficult laryngoscopy. In the child with the Treacher-Collins syndrome, its effectiveness was evident in comparing the ease of laryngoscopy and intubation during two anaesthetic administrations six weeks apart. At the first procedure, conventional direct laryngoscopy had proved impossible and endotracheal intubation time-consuming and very difficult – as has been reported repeatedly in children with this syndrome.[7-12] At the second procedure, "BURP" was added to the same laryngoscopic technique and its independent effect observed. What had been an impossible laryngoscopy became a remarkably easy exposure of the entire glottis. What had been a tedious tracheal intubation accomplished blindly and only after numerous attempts became a straightforward procedure performed with full vision of the glottic opening. Similarly, in the patient with protruding upper incisors and an overbite in whom conventional laryngoscopy had previously not been possible, "BURP" revealed most of the glottis and eased the placement of an endotracheal tube. The benefit of "BURP" in each of these cases was striking and unmistakable. It was more effective than backward pressure on the thyroid cartilage alone.

The rationale for proposing "BURP" relates to the three anatomical factors proposed by Cormack and Lehane to be the principal causes of difficult laryngoscopy – i.e., (1) an anterior larynx, (2) a retrusion of the tongue and (3) protruding upper teeth.[6] In the presence of an anterior larynx or a posteriorly placed tongue, the usual laryngoscopic line of vision from the upper incisors to the glottis is probably obstructed by the base of the tongue.[6] In the presence of elongated upper incisors or a prominent premaxilla, the proximal end of this axis of vision is encroached upon by the upper teeth.[6] The posterior and superior shifts of the larynx brought about by "BURP" may improve the exposure in these circumstances by advancing the larynx around the base of the tongue towards the oropharynx. With the larynx in this position, the glottis may lie in a more vertical (i.e., anteroposterior) laryngoscopic line of vision that would be less affected by both the base of the tongue and the upper teeth. The moderate rightward displacement produced by "BURP" may further enhance the view by placing the glottis in a more open visual pathway along the right side of the oral cavity which is created as the laryngoscope blade sweeps the tongue towards the left.

The benefit of "BURP" in the two cases of this report can be accounted for by this rationale. The laryngoscopic difficulty in each appeared related to one or two of the three anatomic factors indicated above. In the first case, the child with the Treacher-Collins syndrome, the position of the larynx was clearly anterior. With the severe displaced micrognathia, the tongue can be assumed to have been posteriorly. In the second case, the upper incisors were elongated and the premaxilla prominent. The effect of "BURP" in each instance was probably to position the glottis in a more vertical, right-sided line of vision which was less affected by the base of the tongue and the teeth, as described above.

The place of "BURP" in the management of the whole range of problems producing difficult laryngoscopy cannot be inferred from this limited experience. Nonetheless, it should be noted that the two cases of this report rep-

resent all three anatomic factors believed to cause the majority of difficulties.[6] The fact that "BURP" was so helpful in both – which appeared to represent rather severe abnormalities of the three anatomical factors – suggests that it might be useful in many other cases of difficult laryngoscopy too. However, the ability of "BURP" to improve glottic exposure is undoubtedly limited and the manoeuvre may prove to be of little or no use in the presence of extreme deformities related to these factors nor with pronounced skeletal abnormalities such as flexion ankylosis of the cervical spine. In my opinion, the ultimate applicability of "BURP," as well as other aids proposed for difficult laryngoscopy, must await a detailed definition of the anatomical factors that give rise to laryngoscopic problems and their variation, as well as an objective and systematic approach to appraising the interventions.

Anaesthetists can gain experience with "BURP" in the management of the modest difficulties of laryngoscopy encountered frequently in everyday clinical practice.[5,13] In doing so, they will readily appreciate its potential usefulness. They may also meet with three minor problems. First, on occasion "BURP" may tend to oppose the endoscopist's effort to lift the laryngoscopic blade upward and forward in order to expose the glottis. In my experience, however, this modest opposition is more than offset by the better exposure afforded by "BURP" itself. Second, the application of "BURP" may distort the endoscopic anatomy of the larynx – and sometimes markedly so. In many cases, this distortion appears to be caused by an angulation and/or rotation of the larynx brought about by improper application of the "BURP" manoeuvre. Finally, the presence of "BURP" may impede somewhat the passage of the endotracheal tube into the upper trachea – presumably due to a minor alteration of the anatomy of the lower larynx and/or upper trachea. Such impedance can be overcome by rotating the tracheal tube gently as it enters the trachea or by releasing "BURP" immediately after the tip of the tube has passed the glottic rim.

It should be noted that "BURP" differs substantially from Sellick's manoeuvre. The pressures are applied to the thyroid rather than the cricoid cartilage and the displacements are backward, upward and rightward rather than backward alone. Accordingly, "BURP" cannot be expected to achieve the purpose of Sellick's manoeuvre, i.e., the occlusion of the upper oesophagus to prevent gastric regurgitation.

Displacement of the larynx by backward, upward and rightward pressure on the larynx or "BURP" is presented as a simple aid for consideration in the management of some cases of difficult laryngoscopy.

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