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Difficult Intubation in Patient with Short Thyromental Distance: Usefulness of Tongue Traction Maneuver

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Abstract

Introduction: Short Thyromental Distance (TMD; <5 cm) has been correlated with difficult direct intubation in adult patients. Differences in patient characteristics may influence the incidence of difficult airway intubation, especially in patients with a reduced mandible dimension. We report a case affected by Goldenhar's syndrome treated for mandibular hypoplasia with difficulties in intubation.

Methods: A 25 years old caucasian woman was referred to the Unit of Maxillofacial Surgery of the University of Salerno, with bilateral Goldenhar's syndrome, planned for a sandwich osteotomy as "chin-wing" mentoplasty following Triaca technique with the aid of the tongue traction maneuver in combination with fibroscopy at intubation time.

Following Mallampati classification anesthesiologists, before surgery, classified the airways as easy or difficult according to specified criteria.

Discussion: The anesthesiologist's prediction changed from difficult grade 3 to difficult grade 4 at the time of operation, this because the patient had showed a severe reduction of the mandibular length with the tongue position of the tongue which overlapped the epiglottis making very difficult laryngeal glottis view at the intubation time. Efficacy of the "Tongue traction maneuver" in combination with a planned fibroscopy is reported. High risks of dispnea in short mandible patients at the extubation time after mandible surgery for tongue and pharyngeal swelling are also underlined.

Conclusions: Anesthesiologists can derive useful information from facial appearance and facial skeleton, by panoramic X-rays of the jaws, X-ray cephalograms and CT scan analysis that enhances the prediction of a difficult airway intubation. Particularly mouth opening limitations and mandibular operations planning with post-operative tongue and pharyngeal swelling and consequent airway obstruction at the extubation time, have to be carefully evaluated.

In craniofacial surgery importance of some maneuvers like "tongue traction" in short thyromental distance alone or in addition to fibroscopy for limited mouth opening cases and a "double step intubation" for narrow nasal airway's are reported.

Keywords: Thyromental distance; Tongue traction maneuver

Introduction

The difficult airway access is one condition in which the anesthesiologist predicts difficulty at the intubation time and in securing an airway flow after surgery at the extubation time. Several anatomic and pathologic conditions (obesity, large tongue, short neck, small mandible, cervical immobility, bleeding, vomit, airway edema, facial or neck trauma) have been identified that, if present, can reliably predict a difficult airway access and securing at the extubation time [1,2]. The significance of a predicted difficult airway access is that it may require alternative management strategies based on how well the patient can be oxygenated and ventilated through alternative means, and the physician's confidence in securing the airway with paralysis after drugs sub ministration. If oxygenation cannot be maintained, the airway becomes a crash, or failed airway [3,4].

Difficult laryngoscopy (poor glottis visualization) is considered a surrogate indicator of difficult intubation. Preoperative assessment of various anatomic and clinical features helps in identifying potentially difficult laryngoscopy [5,6]. Short thyromental distance (TMD; <5 cm) has been correlated with difficult direct intubation in adult patients [7,8]. Moreover, most studies do not provide a measure of difficult intubation in patients with difficult laryngoscopy. Differences in patient characteristics due to race or ethnicity disfunctions or malformations may influence the incidence of difficult airway intubation, especially in patients with a reduced mandibuar length. Unfortunately, even careful examination does not predict grade of difficult intubation in each case, so that unexpected problems may occur [9,10].

In this study, we report a case affected by bilateral Goldenhar's syndrome planned for mandibular hypoplasia surgical treatment with difficulties at the intubation time and some useful maneuvers to manage these difficult situations.

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Methods

A 25 years old caucasian woman was referred to the Unit of Maxillofacial Surgery of the University of Salerno, with bilateral Goldenhar's syndrome, who presented for elective surgery requiring tracheal intubation. Goldenhar syndrome is characterized by abnormalities of the face, particularly in this case we had a short thyromental distance with unilateral facial hypoplasia, grade III on the right side and grade II on the left side (following Pruzansky and Kaban classification [11]) (Figures 1 and 2). Following Mallampati classification [12], anesthesiologists classified the airways as easy or difficult according to specified criteria (classes I and II are associated with relatively easy intubation, classes III and IV are associated with increased difficulty). In this case grade 3-4 of difficulty was evaluated.

The airway of the patient was assessed in the sitting position and the following measurements were recorded: thyromental distance, interincisor distance, sternomental distance, neck circumference. To the patient an appropriate premedication was given. She was placed the supine position with her head in the classic 'sniffing position' that the operator felt was optimal for intubation. The height of the operating table was adjusted such that the plane of the patient's face was at the level of xiphisternum of the anaesthesiologist performing intubation. Routine non-invasive monitoring (non-invasive blood pressure measurement, ECG, pulse oximetry, tidal carbon dioxide analysis) was applied. Patient was classified as difficult grade 3 and the aid of a second anesthesiologist using fibroscope appliance was planned. Because of insufficient antrum visualization even with the fibroscopy aid, a "tongue traction maneuver" was needed.

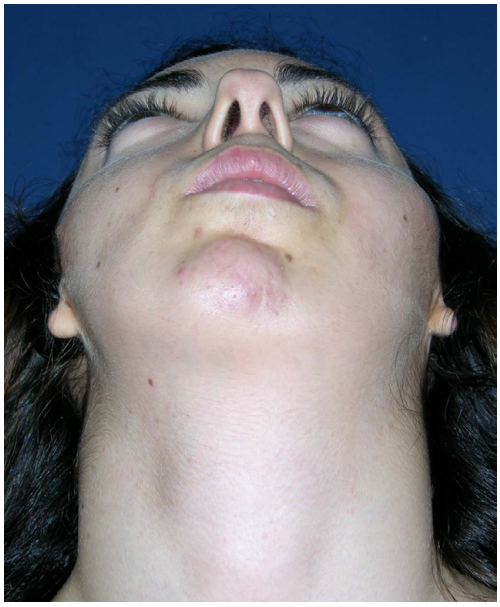

Figure 1: Image showing unilateral facial hypoplasia of patient with Goldenhar's syndrome, grade III on the rigt side and grade II on the left side (following Pruzansky and Kaban classification).

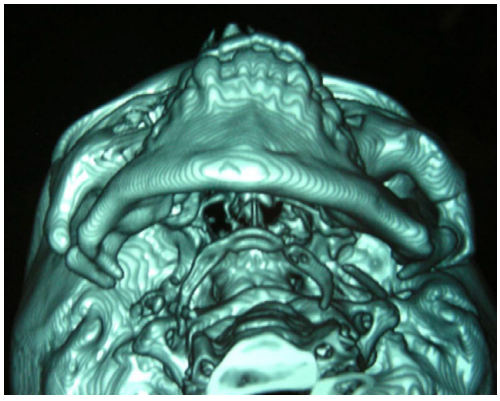

Figure 2: The patient's syndrome showed at 3D CT.

Figure 3: Correct tracheal tube placement with a subsequent gentle direct laryngoscopy after tongue traction maneuver.

At the intubation time the aid of a third anestesiologist performing decide traction on the tongue by his dominant right hand with gauze for better grip was needed to obtain a sufficient view of the glottis to perform a safe intubation.

Correct tracheal tube placement was confirmed by capnography, fibroscopy and by auscultation of the chest for bilateral equal airflow entity entry. After tracheal intubation, a gentle direct fibro laryngoscopy was performed to assess the pharynx and larynx safety for any trauma (Figure 3). A sandwich osteotomy as "chin-wing" type following Triaca technique was performed and used successfully [10].

The patient was first examined one week later and then 3 months after the surgical operation. She was quite satisfied and had no clinical issues.

Discussion

The anesthesiologist's prediction changed from difficult grade 3 to difficult grade 4 at the time of operation; this change happened because the patient had a severe reduction of the mandible length with the tongue position which overlapped the epiglottis making very difficult the intubation [2,12,13].

Most studies have considered difficult laryngoscopy as indicative of difficult intubation [12,14,15]. Although, difficult laryngoscopy is an important component of difficult intubation, the two conditions may not always be necessarily correlated [5,16]. The tongue and epiglottis fall back in an anesthetized person, obstructing the natural passage of gases from the upper airway into the glottis [14]. The tongue traction maneuver has been widely practiced as a means of overcoming this problem. In our study, we placed the head in a slightly extended position and used the jaw lift maneuver. This maneuver lifts the tongue

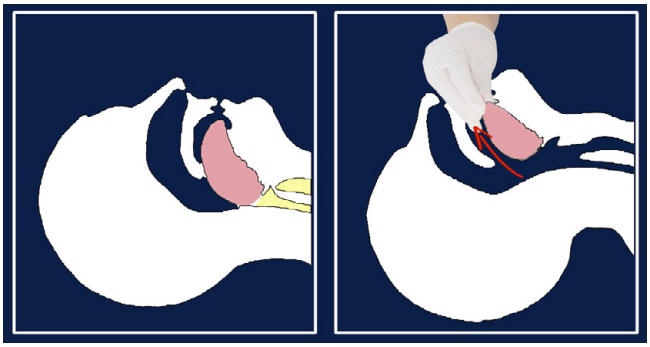

Figure 4: The tongue traction maneuver. The head is placed in a slightly extended position and the jaw lift maneuver is used. This maneuver lifts the tongue and epiglottis away from the posterior pharyngeal wall, thereby creating some space for the passage of gases.

and epiglottis away from the posterior pharyngeal wall, thereby creating some space for the passage of gases [17] (Figure 4).

In some cases of severe short mandible jaw lift maneuver cannot be sufficient. Association of mandible lift and tongue traction is indicated even if fibroscopy aid is used [17,18].

Craniofacial and maxillary malformations frequently request extensive surgical operation using new surgical techniques as maxillary distraction and sandwich osteotomies of jaw bones. Because of mandible hypoplasia and TMJ malformations, with short thyromental distance and mouth opening reduction, hard and unpredictable difficulties at the intubation time are often encountered. So, a close-knit team is needed with skilled maxillofacial surgeons and anesthesiologists with a good knowledge of particular maneuverws useful for proper management of this situation. To promote the nasotracheal intubation when needed for mouth opening limitations or occlusal relations checking during orthognatic surgery, a double step intubation can be performed.

The oral intubation is carried out for first and the nasal intubation subsequently, while maintaining the oral intubation in order to preserve ventilation, reducing and taking under control the apnea time much better then in nasotracheal intubation in performed in a single time in patients with nerrow nasal cavity. This will reduce the risks of direct nasotracheal intubation for prolonged apnea time and nasal airway uncontrolled bleeding. This method is useful in cases where nasal intubation is needed for particular surgical methods that require dental occlusion control without the interposition of the anesthetic tube like in orthopedic, orthognatic, malformative and reconstructive surgery.

Because these patients frequently show nasal airway narrowing, a double step intubation is useful.

Patients with congenital craniofacial malformations often have associated severe mandibular hypoplasia causing obstruction of the hypopharynx by retroposition of the base of the tongue into the posterior pharyngeal airway [13,19].

In agreement with Greenland et al. [16], in the case of an overlap of the tongue on the epiglottis, the chin lift and jaw thrust are important maneuvers to improve the view of the airways, but often not sufficient, so the correct maneuver is the traction of the tongue because direct forward displacement of the body tongue .

Difficulties in intubation may be advised to short neck or reduced mandibular length with short tyreo-mental distance and pharingeal space narrowing [5].

In our experience difficult intubation results from tongue overlapping on the epiglottis which is often worsened by mouth opening at the intubation time for thyromental distance shortening during this maneuver. Also fibroscopy is often insufficient in this condition because unable in overpassing tongue overlapping obstacle. Chin lift and mandibular protrusion cannot achieve sufficient result because of TMJ limitations; only tongue traction can achieve sufficient glottis view by forward direct displacement of the body tongue.

The advantages of tongue traction maneuver can be listed as follows:

1) Efficacy for adequate laringeal cord view. In fact, in short mandible patients the epiglottis is at a much higher (more cranial) position than the posterior cartilages and these ones are more cranial than the vocal cords, which are localized very deep within the larynx. With tongue traction, base of tongue and epiglottis are lifted forward, so a full visualization of larynx is possible; 2) safe (not invasive). There is no need of invasive maneuvers on neck skin, oro-pharingeal mucosa or internal cavities; 3) full control by a simple direct maneuver. This is possible because tongue traction is under sensitivity of the operators in the ratio applied force/effect without any need of any device; 4) unexpensive simple manual maneuver without any device need such avoiding every cost.

The anesthetist has full control with this kind of operation with no need of the fiberscope use and is therefore not dependent on it, even if an association of the two maneuvers is possible in particularly difficult cases when fibroscopy alone is not sufficient for intubation. Furthermore, tongue traction is a totally non-invasive maneuver which applies semplicity and safety qualities, while both the fiberscope and laryngoscope methods can cause damage in difficult intubation and a subsequent tracheostomy is required [17].

The tongue traction maneuver is optimal in malformated or short mandible patients with subsequent short thyromental distance where classically tongue covers the larynx. Moreover, the tongue traction maneuver is useful at the extubation time because of improving control and safety by a better view and access to the larynx.

Conclusions

The purpose of this work is to point out the importance of tongue traction maneuver in patients with short thyromental distance with the aid of a second anesthesiologist in equipe, even if a fibroscopy aid is planned. We experienced that, even with fiberoscopy aid, intubation in these patients is very difficult because of tongue position overlapping laringeal antrum; only with tongue traction maneuver it is possible to achieve substantial aid in intubation. Fibroscopy aid is very useful in patient with mouth opening limitation not in tongue dislocation for short thyromental distance: in complex maxillo-facial and cranio-facial malformations with mouth opening limitation and tongue dislocation, an association of fibroscopy and tongue traction maneuver is needed for successful intubation.

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