

EMERGENCY PERCUTANEOUS TRACHEOSTOMY IN A SEVERELY BURNED PATIENT WITH UPPER AIRWAY OBSTRUCTION AND CIRCULATORY FAILURE

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SUMMARY. Airway inaccessibility is one of the most dreaded situations in emergency medicine. Surgical tracheostomy is not indicated in emergency situations because it takes a long time and can result in death if respiratory support cannot be provided during the procedure. Emergency percutaneous tracheostomy (PCT) was widely regarded as absolutely contraindicated. Recently, however, a number of studies have appeared on the safety and feasibility of PCT in situations regarded as presenting relative contraindications. We describe the life-saving action of Griggs' PCT in a patient with upper airway obstruction resulting from burns, smoke injuries, and unsuccessful tracheal intubation attempts. Emergency PCT using the Griggs technique was immediately performed without aseptic care, and a 9-mm internal diameter tracheostomy tube was successfully inserted in less than one minute. Griggs' PCT is a quick technique that secures an airway when tracheal intubation fails. The feasibility - in selected cases - of using an emergency Griggs' PCT, in experienced hands, rather than cricothyroidotomy or surgical tracheostomy, is recommended.

Introduction

Tracheostomy is one of the commonest procedures performed in critically ill patients. Surgical tracheostomy is commonly performed, but in recent years percutaneous tracheostomy (PCT) has become more popular as an alternative technique. Neither technique is recommended for emergency settings because they are both time-consuming and require hyperextension of the patient's neck, which may aggravate any existing spinal cord injury. Also, a surgical open tracheostomy is not recommended in life-threatening emergencies, because it takes much longer than cricothyroidotomy and can result in death due to the absence of respiratory support during the procedure. In cases of complete airway obstruction, when cricothyroidotomy is impossible, the only way to establish an airway is based on PCT. Obviously, invasive procedures are performed more quickly and with greater safety in experienced hands, even in an arrested patient.

Case report

We report the life-saving use of Griggs' PCT in a patient with upper airway obstruction as a result of burns, smoke injuries, and failed tracheal intubation attempts. A 54-yr-old patient was admitted to the intensive care unit with severe burns, smoke injuries, and acute respiratory

and circulatory failure. Sixty per cent of the total body surface area was burned and the respiratory tract was affected by smoke inhalation, resulting in severe acute respiratory distress syndrome. On admission, the patient was tachypnoeic (>40 breaths/min), with the use of accessory muscles, retraction of intercostal spaces, inspiratory stridor, and thoracoabdominal discoordination. Blood pressure was 85/35 mm Hg, and the pulse rate was 60 beats/min. Oxygenation was poor (SpO₂ 70%), manual ventilation through a self-inflating bag was not effective, and severe bradycardia (40 beats/min) and hypotension (65/30 mm Hg) developed. Orotracheal intubation was attempted twice but unsuccessfully. There was obviously no time to use a flexible fibroscope for re-intubation at this stage. At this point an emergency PCT, using the Griggs technique, was immediately performed without aseptic care and a 9-mm internal diameter tracheostomy tube was successfully inserted in less than one minute. Mechanical ventilation was immediately reinstated and the haemodynamic parameters improved.

There were no procedure-related early or late complications. There were no signs of local infection at the tracheostomy site. The patient's hospitalization was protracted because of ventilator-associated pneumonia and he was discharged from hospital two months later. The tracheal cannula was removed without further complications.

Discussion

In recent years, PCT has become a routine practice in many hospitals. Different PCT techniques have been developed over the years (Ciaglia, a technique using multiple dilators; Griggs, using guidewire-dilating forceps; Blue Rhino; Perc Twist; and Fantoni). PCT is an established, safe, time-saving and cost-effective option for most patients. Bedside PCT has been shown to be as safe and effective as the surgical technique, but with the added advantage of also being technically straightforward and cost-efficient. In early publications, adverse conditions such as a short, fat neck or obesity were regarded as relative contraindications, and cervical injury, coagulopathy, and emergency situations as absolute contraindications. More recently, several reports have demonstrated the feasibility of PCT in patients with some of these contraindications. The PCT procedure has become routine in many centres. A significant number of articles have been published comparing various PCT techniques to open surgical tracheostomy as also one to another. The majority of comparisons of PCT to open surgical tracheostomy have demonstrated either lower complication rates associated with PCT or no statistical differences between the two. However, in the emergency setting, the role of PCT is less clear. An open tracheostomy is the gold standard for establishing long-term airway access. However, as this procedure is time-consuming and often difficult in an emergency setting, it is not generally recommended for emergency cases.

A cricothyroidotomy can provide rapid airway access in an emergency and remains the standard treatment, but ventilation may be difficult, particularly in patients who have pulmonary oedema with decreased pulmonary compliance. Although not widely investigated in the emergency setting, PCT can be applied quickly and easily by experienced hands. The techniques can be performed blindly at the patient's bedside. In the Griggs technique dilatation of the tracheal aperture is achieved by passing a dilating forceps over the guidewire, into the trachea. Opening these

forceps, which resemble a nasal speculum, forcibly dilates the tracheal aperture and any intervening tissue. The tracheostomy tube is inserted over the guidewire catheter. The guidewire is removed and replaced by the tracheostomy tube inner cannula, and then the patient is ventilated through the tracheostomy tube. Although the use of bronchoscopy is helpful in several situations in the intensive care setting, the time taken to perform a difficult intubation using a flexible fibroscope, as also the procedure's effectiveness and complications, have not been sufficiently well investigated in life-threatening situations to be recommended at this stage. The choice of the Griggs technique instead of other percutaneous devices in our patient was supported by the reduced time taken to perform the procedure, compared to other forms of percutaneous techniques. Although the average time required is about 5 min in most reports, it can be performed more rapidly in experienced hands. All emergency procedures can be characterized by their effectiveness, potential complications, and the time taken to perform them, but the choice of the right technique in the right patient depends on a variety of factors, including the operator's experience, the patient's anatomical condition, and the range of devices immediately available. We describe the use of the Griggs technique to establish an airway in a burn patient with circulatory failure and complete upper airway obstruction, in addition to altered neck and tracheal anatomy.

Conclusion

In conclusion, bedside dilatational percutaneous tracheostomy is a safe, cost-effective, and time-saving alternative to standard open tracheostomy or cricothyroidotomy in emergency situations. Although not widely investigated for urgent airway access, the feasibility of the Griggs percutaneous technique in experienced hands, as opposed to emergency cricothyroidotomy, is suggested in selected cases, even in arrested patients. Proper patient selection and attention to technical detail are essential elements in maintaining low complication rates.

RÉSUMÉ. L'inaccessibilité des voies aériennes constitue une des situations les plus redoutées dans le secteur de la médecine d'urgence. La trachéostomie chirurgicale n'est pas indiquée dans les situations d'urgence parce que cette technique nécessite beaucoup de temps et peut même être fatale s'il n'est pas possible de fournir un support respiratoire pendant la procédure. La trachéostomie percutanée (TPC) en émergence a été généralement considérée une méthode absolument déconseillée. Cependant, depuis quelque temps, diverses études ont été publiées qui ont soutenu la fiabilité et la praticabilité de la TPC dans certaines situations que l'on considérait exposées à des contre-indications relatives. Nous décrivons une intervention de la TPC (technique de Grigg) qui a sauvé de la mort un patient atteint d'obstruction des voies aériennes supérieures causée par les brûlures, de lésions dues à l'inhalation de la fumée et des conséquences des tentatives infructueuses d'effectuer l'intubation trachéale. Nous avons immédiatement pratiqué une TPC d'urgence, en employant la technique de Grigg, sans les soins aseptiques, et en moins d'une minute nous avons inséré avec succès une canule pour la trachéostomie (diamètre interne, 9 mm). La TPC de Griggs est une technique rapide qui crée une voie aérienne quand toutes les autres méthodes ne sont pas réussies. Nous recommandons donc les avantages pratiques - dans certains cas sélectionnés - d'utiliser la technique de TPC de Grigg, confiée à des mains expertes, plutôt que la cricothyroïdotomie ou la trachéostomie chirurgicale.

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