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Management of a known difficult airway in a morbidly obese patient with gross supraglottic oedema secondary to thyroid disease

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We describe the use of awake fibreoptic intubation in the management of a patient with a known difficult airway, who presented with stridor resulting from supraglottic oedema. The aetiological factors contributing to this supraglottic oedema included coexisting thyroid swelling and congestive cardiac failure. Options for appropriate airway management in such cases are discussed.

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The appropriate management of the airway in otolaryngological surgery is often a challenge. This may be compounded by coexistent medical conditions and local pathology. Awake fibreoptic intubation is one of the methods to be considered to secure a safe, definitive airway in these circumstances. We present a case in which this technique allowed the safe management of a patient with a known difficult airway complicated by obesity, a short neck, thyroid swelling and congestive cardiac failure.

Case report

A 53-yr-old female presented to the accident and emergency department with a 2-week history of increasing stridor. She

denied any previous similar episodes. There was no history of dysphagia or exacerbation of stridor at night. There was no evidence of any weight loss in the recent past. She was known to have insulin-dependent diabetes mellitus, hypertension, congestive cardiac failure and carcinoma of the breast.

She had undergone a gastric polypectomy 4 yr before presentation, at which time examination had revealed a grade IV laryngoscopy. Further details of the drugs and method of tracheal intubation used at this time were unavailable. She was given a patient information sheet regarding this finding from the consultant anaesthetist involved, but had misinterpreted the advice given, believing that she should never again receive a general anaesthetic. This had influenced the treatment of her breast carcinoma, for which she was receiving chemotherapy rather than surgery.

On initial examination, inspiratory stridor was clearly audible. She was noted to be a short, very obese lady (body mass index 51) with a short neck, and was extremely anxious. Oxygen saturation measured by pulse oximetry was 95% on air. Arterial blood gas sampling confirmed she was not hypoxic, but was hypercarbic. On a $F_{I_{O_2}}$ of 0.6, pH was 7.405, P_{O_2} 16.7 kPa, P_{CO_2} 6.35 kPa and HCO_3 29.2 mmol litre^{-1}, with a base excess of 4.3. Her heart rate was 90 beats min^{-1} and in regular rhythm, with an arterial blood pressure of 176/96 mm Hg. Auscultation of the chest revealed conducted upper airway sounds. On palpation of the neck, a soft-tissue swelling, firm in consistency, was noted at the anterocentral aspect of the neck. The thyroid cartilage was barely palpable. Intravenous hydrocortisone and nebulized epinephrine were commenced, with slight improvement.

Lateral x-ray films of the soft tissues of the neck (reported by a consultant radiologist) suggested a swelling or mass over the arytenoids and posterior half of the glottis. The epiglottis appeared to be depressed over the glottis. The anteroposterior view showed possible compression and deviation of the trachea to the left. A CT scan or MRI of the neck was unavailable.

Flexible nasendoscopy by an ENT consultant showed excess redundant mucosal thickening with oedema over the arytenoids, which was prolapsing in and out of the glottis during inspiration and expiration. She was commenced on regular dexamethasone and told to have strict voice rest. The patient was admitted to the intensive care unit for airway observation, continuation of oxygen therapy, epinephrine nebulizers and continuous positive airway pressure (if required). Two days later, fibreoptic nasendoscopy was repeated, and although there was some resolution of the oedema a large portion of redundant mucosa was still being drawn into the glottis on inspiration and blown out with expiration. As her condition remained static, it was decided by the ENT surgeons that direct laryngoscopy, microlaryngoscopy and excision of the redundant mucosa were required. In view of her known grade IV intubation risk and the additional problem of soft-tissue overgrowth, early discussion took place between the consultant ENT surgeon and consultant anaesthetist to plan appropriate options. The main concerns from the anaesthetic point of view were her obesity, stridor at rest and the neck swelling, aside from the problems caused by her medical co-morbidity. These factors were complicated by a previous history of difficult intubation.

The safest way to manage the airway for the microlaryngoscopy and debulking was the important consideration. The options considered were: (i) retrograde passage of an epidural catheter with awake intubation, following the catheter as a guide; (ii) tracheostomy under local anaesthetic; (iii) inhalational induction and intubation without a muscle relaxant, with or without pre-placement of a cricothyroid cannula; and (iv) awake fibreoptic intubation.

The first three options would have been difficult considering her short neck, indistinct anatomical landmarks, neck swelling and the risk of losing the airway during inhalational induction. The redundant oedematous tissue could have acted like a ball valve. It was decided that awake fibreoptic intubation was the preferred method.

After a thorough assessment, the consultant ENT surgeon decided she could be discharged home safely with information to return immediately should she deteriorate. The lady was readmitted, as planned, 1 week later. Because of her multiple pathology, it was decided that the surgeon should be ready to perform a tracheostomy whatever the outcome of her airway surgery. She was fully counselled regarding the need for the tracheostomy and the technique of awake intubation via the fibrescope. Premedication with hyoscine 0.4 mg was given i.m. 1.5 h before the procedure. She was also given nebulized epinephrine 5 mg in oxygen during transfer to the operating theatre. After venous access had been secured, the patient was preoxygenated via nasal cannulae in the sitting position, as her size and condition precluded the supine position. Topical cocaine paste (25%) was applied to the nose and the fibrescope was inserted through the right nostril. Topical lidocaine (4%) 2 ml was sprayed into the oropharynx. When the vocal cords became visible, 4% lidocaine 1 ml was sprayed onto the glottis and the fibrescope was introduced gently into the trachea. The procedure was uneventful, though technically very difficult because of the excess tissue (Fig. 1).

The trachea was then sprayed with 4% lidocaine 1 ml before a 6.0 mm armoured tracheal tube was introduced into the trachea, sliding over the fibrescope using a 'railroading' technique. Once the tracheal tube position had been confirmed by capnography, general anaesthesia was induced with oxygen and sevoflurane. The position of the tracheal tube was reconfirmed by the fibrescope before fixation.

During direct pharyngolaryngoscopy after intubation, a view of the supraglottis only was obtained. The supraglottis was very oedematous but there was no obvious tumour seen. It had been decided that a tracheostomy should be performed before supraglottic surgery, in the hope that it

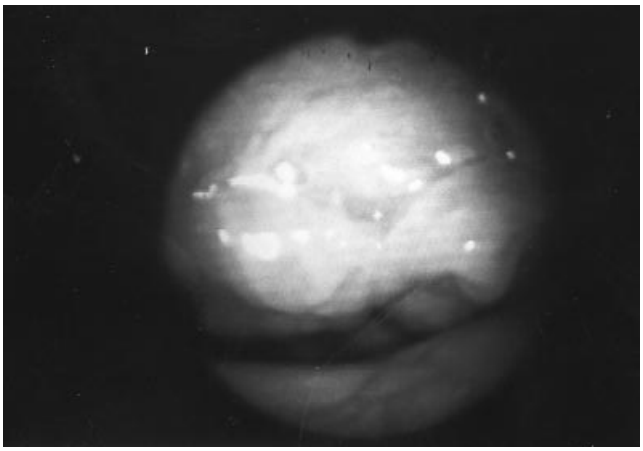

Fig 1 Oedematous supraglottic mucosa.

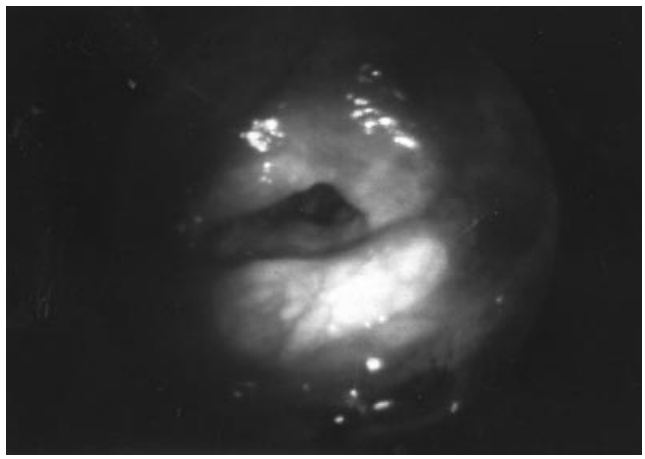

Fig 2 Mucosal oedema resolving after tracheostomy. Note tracheostomy tube *in situ*.

might allow the supraglottic oedema to settle. The mucosal overgrowth might have been worsened by turbulent airflow through the glottis. At tracheostomy, significant thyromegaly was confirmed and a large swelling of the thyroid isthmus was noted. A partial thyroidectomy was performed, resulting in marked decompression of the larynx and trachea. The tracheostomy was technically very difficult. The whole procedure took almost 4 h, resulting in a blood loss of approximately 1500 ml. An awake tracheostomy would have been impossible in this patient. She made a good postoperative recovery, requiring only overnight admission to the intensive care unit before transfer back to the high dependency unit. Histology confirmed the cause of the thyromegaly to be benign, multinodular goitre.

During the following week, repeated flexible nasendoscopy revealed a gradual but sustained resolution of both the oedema and excess mucosa (Fig. 2). The tracheostomy was decannulated at the patient's request and she was discharged 1 month after the operation. The delay in discharge resulted from attempts to improve her congestive cardiac failure and achieve weight control. It is expected that the stoma will remain patent for many months. It would be a relatively simple procedure to dilate the tracheocutaneous tract to reinsert a tracheostomy tube or tracheal tube should she require a general anaesthetic in the future.

Discussion

Appropriate airway management is an essential part of the anaesthetist's role. Airway difficulties are complicated by obesity, a short neck, thyroid swelling or a laryngeal mass. Sharing of the airway with surgeons, as in ENT procedures, makes the tasks more challenging.[1] A strategy needs to be developed in order to anticipate and manage patients with difficult airways. This includes identifying the potential problem, considering different options, and selection of an appropriate plan in the particular scenario of the individual patient. Regular and ongoing discussions with the surgeons regarding the plans are also important. The patient should be informed about the options and the advantages and disadvantages of each. Finally, there should be alternative plans in case of failure of the initial one.

This particular patient had acute stridor as a result of overgrowth of redundant laryngeal mucosa, the cause of which was unclear. Interference of the venous drainage resulting from the thyromegaly was a feasible explanation, but the coexisting congestive cardiac failure made it difficult to ascertain whether the venous congestion was caused only by the thyromegaly. The relatively large thyroid swelling appeared deceptively small on inspection and palpation of the neck, because of the short neck and morbid obesity. However, the fact that the supraglottic swelling started to go down after thyroidectomy and the high intraoperative blood loss would be in keeping with this explanation. The other possible causes of her stridor were a supraglottic tumour and laryngomalacia. A CT or MRI scan of the neck, if available, could have been helpful in identifying the extent of the airway obstruction.

The problems associated with fibreoptic intubation are failure to visualize the glottis, trauma, bleeding and laryngospasm.[2] However, compared with inhalation induction, the risk of losing the airway is minimal. Even sedative premedication can lead to an increase in severity of the stridor, precipitating total obstruction. But withholding sedative premedication can itself pose a problem when the patient is anxious, attempting to breathe through a narrowed airway. Anaesthetizing the airway with local anaesthetics can be suboptimal because of the local pathology.[3] These problems were anticipated, and back-up plans were also considered in detail in case of failure of awake fibreoptic intubation.

Tracheostomy under local anaesthetic was an option considered. A tracheostomy tray was open and ready in the event of any problem arising during fibreoptic intubation, but this could have been difficult because of her short neck, thyroid swelling and the indistinct anatomical landmarks. Retrograde passage of an epidural catheter through the

cricothyroid membrane and passage of a tracheal tube over the catheter from above, or introduction of a transtracheal cannula[4] would also have been difficult for the same reasons. Inhalational induction and intubation without muscle relaxants was another option considered, but the risk of losing the airway in a patient with known grade IV laryngoscopy presenting with acute stridor made this option inappropriate. This would have been further complicated as it was uncomfortable for the patient to lie down flat even when awake, because of stridor and her co-morbidity. The only viable option was awake fibreoptic intubation, which the patient tolerated well. Even though this was technically challenging, good planning and communication with the patient and surgeon allowed safe management of the airway in this case.

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