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A Case Of Tracheal Obstruction During Oesophageal Removal Of A Foreign Body

M K Shah, Y C Lim

ABSTRACT

A patient was admitted with an impacted foreign body in the oesophagus. Repeated attempts to remove it during oesophagoscopy proved difficult and caused obstruction of the trachea during manipulation of the foreign body. A smaller endotracheal tube was subsequently placed in the trachea relieving the obstruction.

Keywords: oesophagoscopy, obstruction, trachea

CASE REPORT

A 61-year-old woman was admitted after swallowing a foreign body, a duck gizzard. Her only complaint was difficulty in swallowing. There was no significant past history. Physical examination was unremarkable. The lateral neck radiograph showed gross widening of the prevertebral space at the level of C7 and T1 vertebrae with a small area of lucency. There was also an opacity seen at the level of T1 vertebra which was likely to be a foreign body (Fig 1). On indirect laryngoscopy, the foreign body was visualised and there was no collection of fluids above it.

An intravenous cannula was placed under local anaesthesia. Monitoring (electrocardiography, indirect arterial blood pressure, pulse oximetry and end-tidal capnography) was then instituted. Preoxygenation for 5 minutes raised the oxygen saturation from 97% to 99%. Anaesthesia was induced with fentanyl 75 mcg and thiopentone 250 mg. Esmolol 20 mg and suxamethonium 75 mg were given to facilitate intubation. A 7 mm diameter cuffed polyvinyl chloride endotracheal tube was inserted into the trachea without difficulty and anchored at the left-hand side of the mouth at the 19 cm marking. The position of the tube was checked by observation of the chest movements, auscultation of bilateral breath sounds and observation of the end-tidal capnograph. The minimum peripheral oxygen saturation during induction was 95%. The blood pressure rose from 160/95 pre-induction to 190/110 post-intubation while the pulse rate increased from 90 beats/minute pre-induction to 105 beats/minute post-intubation. Anaesthesia was maintained with isoflurane 0.5%-1% in oxygen and nitrous oxide while relaxation was maintained with intermittent intravenous doses of suxamethonium and atropine. Peak airway pressure was 20 cmH_20. Thirty-two minutes following induction, after a total of 112.5 mg of suxamethonium, atracurium was administered because of the difficulty in passing the rigid oesophagoscope distal enough to visualise the foreign body.

Eight minutes later, the peak airway pressure rose to 60 cmH_20. Manual ventilation was difficult. The oxygen saturation had fallen to 90% and the end-tidal capnograph read 58 mmHg. The endotracheal tube marking was still 19 cm at the left-hand side of the mouth. It was not kinked in the pharynx. Cuff inflation volume was unchanged at 5 mLs. On auscultation of the chest, both inspiratory and expiratory rhonchi were heard. The surgeon was informed and requested to stop the procedure. Intravenous aminophylline 250 mg was also given slowly to relieve the rhonchi. The rhonchi cleared and the peak airway pressure returned to 24 cmH_20 within 5 minutes. However, as the surgeon continued to manipulate the foreign body through the oesophagoscope, the peak airway pressure was noted

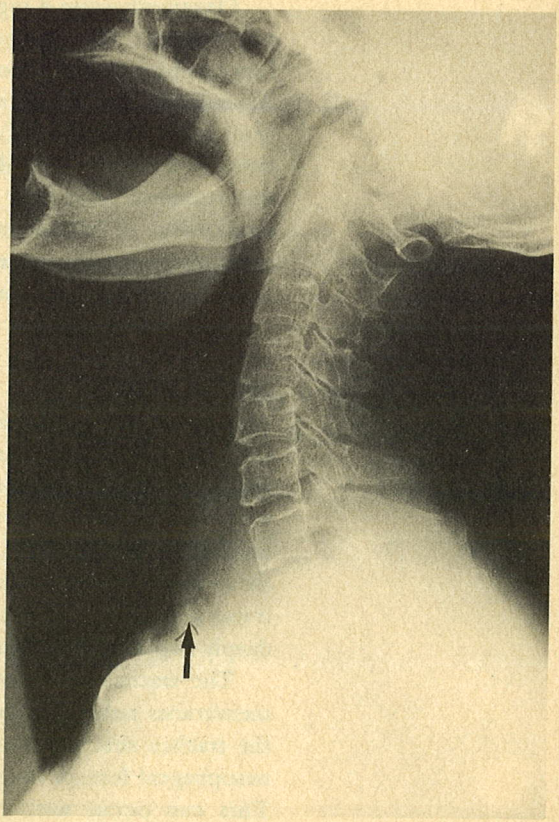

Fig 1 - A case of tracheal obstruction during oesophagoscopic removal of a foreign body

Department of Anaesthesia
Kandang Kerbau Hospital
Hampshire Road
Singapore 219428

M K Shah, MBBS, M Med (Anaes)
Senior Registrar

Department of Anaesthesia
Singapore General Hospital
Outram Road
Singapore 169608

Y C Lim, MBBS, FFARCS
Senior Registrar

Correspondence to:
Dr M K Shah

to rise again and the rhonchi recurred. A suction catheter was passed down the endotracheal tube this time but could not be passed down the trachea much beyond its tip. Also, nothing could be aspirated via the suction catheter. The length of the catheter corresponded to the distance of the foreign body from the front teeth. Obviously, manipulation of the foreign body was causing tracheal obstruction. The blood pressure during this period ranged between 170/105 and 175/120 while the heart rate was about 110-120 beats/minute. The oxygen saturation hovered between 85%-90%. There were no cardiac arrhythmias, however. An attempt was made to pass the endotracheal tube gently beyond the site of the obstruction but failed. A smaller, cuffed endotracheal tube, 6.5 mm in diameter, was inserted successfully past the obstruction. The marking on the endotracheal tube at the left-hand side of the mouth was 22 cm. Ventilation became easy, peak airway pressure was now 25 cmH_20 and the rhonchi disappeared. The oxygen saturation went up to 97% while the blood pressure and heart rate settled down to 140/90 and 80 beats/minute respectively. The end-tidal capnograph read 38 mmHg now.

Surgery was then allowed to continue. There was mucosal oedema in the laryogopharynx at the 18 cm marking on the oesophagoscope. A paediatric rigid oesophagoscope was then inserted and through it, a Jackson dilator was used to dilate the oesophageal passage. There was oesophageal stenosis noted at the 20 cm marking on the oesophagoscope where the foreign body was impacted. It was dislodged completely with the aid of the dilator after another 1 $^1/_2$ hours. The oesophagus was unable to be examined beyond the site of the stenosis.

Dexamethasone 4 mg was given intravenously to reduce the mucosal oedema in the laryngopharynx, oesophagus and trachea. Anaesthesia was not reversed and the patient was sent to the Intensive Care Unit where she was extubated uneventfully the next day. Oral feeding was resumed a day later without any difficulty in swallowing. A barium swallow investigation was scheduled two days later to which she did not consent. She also did not return for follow-up.

DISCUSSION

The patient was comfortable and not in respiratory distress which was indicative of possible tracheal impingement. The radiolucent foreign body, though was seen radiographically to be small, was visualised on indirect laryngoscopy. As the patient presented for oesophagoscopy on the same day of swallowing, it was felt that the foreign body could not have been deeply impacted to pose difficulty in removal.

The trachea and oesophagus are separated by membranes rather than by rigid cartilage, rendering the trachea susceptible to compression by a large oesophageal foreign body or an oesophagoscope[1]. This can occur with rigid as well as flexible instruments, particularly when the latter are used in children. Even in the absence of a large foreign body impinging on or obstructing the trachea, a one-sized smaller endotracheal tube is used. An endotracheal tube can also be compressed, so the use of an armoured endotracheal tube, which resists compression, is recommended.

Intraoperative bronchospasm in a patient with no previous history of bronchospastic disease results from conditions inducing or mimicking bronchospasm[2,3]. Induced bronchospasm follows tracheal intubation or surgical stimulation under light anaesthesia or inadequate relaxation, pulmonary aspiration of gastric contents, an allergic reaction to anaesthetic drugs, carinal irritation from the endotracheal tube and pulmonary embolism. Airway obstruction from a kinked endotracheal tube, an overinflated occlusive cuff, secretions or airway oedema can mimic bronchospasm. It was felt that the depth of anaesthesia and degree of relaxation were adequate during the episode. Carinal irritation was ruled out on checking the endotracheal tube marking at the lips. Although there were no crepitations heard together with the rhonchi over the lungs and that the cuff seal appeared adequate then, pulmonary aspiration could not be ruled out. An allergic reaction to atracurium administered eight minutes prior to the episode was unlikely. Pulmonary embolism is rare. Tension pneumothorax would be generally associated with rapid, progressive desaturation, progressive inability to ventilate, hypotension and absence of breath sounds on the affected side of the chest. The endotracheal tube was not kinked, its cuff was not overinflated and there were also no secretions on manual ventilation. Although pulmonary oedema can present as bronchospasm in its early stages, very little intravenous fluids was given and the patient had no previous history of heart disease.

Tracheal obstruction distal to the endotracheal tube mimicked bronchospasm and was not relieved by aminophylline. The improvement in the airway obstruction was related to the cessation of manipulation of the foreign body via the bronchoscope. A suction catheter was not passed down the endotracheal tube during the first episode of "bronchospasm" while the oesophagoscope was still in place. Otherwise, the diagnosis of tracheal obstruction would have been clinched. On having suspected tracheal obstruction, fibreoptic bronchoscopy would have allowed visual confirmation if it was ready at hand. It could then aid in positioning the endotracheal tube beyond the obstruction.

An awake fibreoptic intubation allows identification of any tracheal narrowing and enables the anaesthetist to precisely place a small endotracheal tube below the level of obstruction and inflation of the cuff at a point below this, if possible. If not, the cuff may be inflated above the site to provide airway protection while the oesophagus is carefully aspirated. The cuff was then deflated prior to attempted removal of the foreign body. As tracheal obstruction is uncommon, awake fibreoptic intubation is generally done away with. Use of this method in this patient would have obviated the problem of unsuspected

tracheal obstruction. However, local anaesthesia required for awake intubation does not ensure against coughing and the associated risk of oesophageal perforation. The addition of narcotic sedation sufficient to prevent coughing also obtunds reflexes necessary for protection of the airway from regurgitation of oesophageal contents.

Rigid oesophagoscopy under general anaesthesia is the preferred method for removal of foreign bodies as it has been found to be effective and eliminates the likelihood of coughing and bucking which can lead to oesophageal perforation. Oesophageal perforation is of particular concern, since it is associated with a high incidence of morbidity and mortality. Rapid sequence induction with cricoid pressure application is generally thought to be safe if: (1) airway access is deemed adequate; (2) the foreign body is small, not sharp and not rigid, and (3) there is no retention of food or fluids suspected or seen above the site of impaction. It is known that a large foreign body such as a chicken bone or a sharp foreign body such as an open safety pin can cause an oesophageal perforation during application of cricoid pressure. When a rigid foreign body is impacted in the oesophagus and impinging on the tracheal anteriorly, introducing an endotracheal tube into the trachea can also result in perforation. When there is retention of food or fluids proximal to a site of unsuspected oesophageal obstruction, cricoid pressure application may actually cause dislodgement of the retained food or fluids with resulting tracheal aspiration.

Nashef et al in 1992 described 12 patients gathered over an 11-year period with foreign body perforation of a previously normal oesophagus[4]. The foreign body was most commonly a bone (10 patients); 5 patients had chicken bones. In the remaining 2 patients, the foreign body was a swallowed denture. Foreign body perforation of the oesophagus, though rare, is an important subentity of oesophageal perforations. It also responds well to surgical treatment.

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