TRACHEAL CYLINDROMA: ANAESTHETIC MANAGEMENT

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SUMMARY

A tracheal cylindroma in a lady aged 56 yr was excised. The problems of tracheal and carinal resection, and an anaesthetic technique which obviates the use of cardiopulmonary bypass are described.

CASE REPORT

A 56-year-old Caucasian female developed stridor approximately 9 months before admission to hospital. Six months before admission bronchoscopy performed at another hospital demonstrated a circumferential tumour which was shown by biopsy to be a cylindroma.

The patient had withstood three previous general anaesthetics without complications. She had a 1-year history of moderate arterial hypertension for which she was taking hydrochlorothiazide 500 mg four times daily and diazepam 5 mg twice daily. The patient was an occasional smoker without known allergies.

Physical examination showed a thin (42.75 kg) Caucasian female with stridor but no acute distress. On auscultation of the chest, breath sounds were distant, with prolonged inspiratory and expiratory phases and mild expiratory stridor. There was no mass in the neck and the remainder of the examination was unremarkable.

Routine laboratory studies, including prothrombin time, partial thromboplastin time, liver function tests and urinalysis, were all within normal limits. The chest x-ray showed clear lung fields with a vague soft tissue shadow involving the right side of the trachea just above the bifurcation, the main bulk of which was located approximately 3 cm above the carina and about 10 cm distal to the vocal cords.

Tomograms of the trachea demonstrated a smooth broad-based mass arising from the right side of the trachea approximately 3 cm above the tracheal bifurcation (fig. 1). E.c.g. showed non-specific ST changes but no other evidence of cardiac disease. Respiratory function studies were consistent with upper airway obstruction.

One hour before operation the patient was premedicated with morphine 8 mg, diazepam 10 mg and atropine 0.6 mg i.m. The arterial pressure of 160/90 mm Hg was considered a reflection of her known hypertension rather than an indication of unusual anxiety before the start of anaesthesia. After pre-oxygenation with 100% oxygen, anaesthesia was induced with sodium thiopentone 250 mg i.v. followed by pancuronium 5 mg i.v. to facilitate endotracheal intubation. Simultaneous endoscopy and endotracheal intubation was accomplished to place the endotracheal tube above the tumour. The diameter of the trachea at the site of the main bulk of the tumour was approximately 3-4 mm. This level was just within the thoracic inlet. A specially fashioned

FIG. 1. Tomogram demonstrating lesion approximately 3 cm above tracheal bifurcation.
8-mm short-cuffed endotracheal tube was used and the bevelled tip was cut to reduce any trauma to the tracheal tumour (fig. 2c). Anaesthesia was maintained with enflurane 0.5-1% in a mixture of nitrous oxide 2 litre/min and oxygen 2 litre/min for the entire procedure. Manual artificial ventilation was employed at a rate of 12-16/min and a tidal volume of 450-600 ml as measured with a Wright respirometer.

After the endotracheal tube was secured in place, the patient was positioned with the right side up and the right groin and the neck exposed so as to permit the use of cardiopulmonary bypass, if necessary, and possible entry into the neck for dissection of the trachea and laryngeal release. A right posterolateral thoracotomy was performed through the bed of the resected fourth rib.

During the second hour of surgery, despite the fact that the tube had not moved, there was a sudden tracheal obstruction, precipitated by dissection in the area of the tumour. This required a prompt transverse incision into the trachea distal to the tumour and approximately 1 cm above the carina. Immediate intubation of the left main-stem bronchus (fig. 3a) through the operating field was carried out with the use of another specially adapted, short-cuffed 8-mm endotracheal tube (fig. 4d) which had been prepared for this eventuality. A separate set of sterile corrugated tubes (fig. 4a) was attached to the endotracheal tube and thence to the anaesthetic machine. These manoeuvres were accomplished without a significant period of hypoxia and without hypotension. The trachea was then transected and dissection was continued cephalad. After performing a laryngeal release procedure and with the bronchus entirely free, an end-to-end anastomosis was performed (fig. 3c). After completing the posterior row of this anastomosis, the oral endotracheal tube, which had been left in place originally, was advanced into the trachea beyond the level of the anastomosis, the endotracheal tube in the left bronchus was removed, and the anastomosis
TRACHEAL CYLINDROMA: ANAESTHETIC MANAGEMENT

FIG. 3. A: Left intubated main-stem bronchus; B: Resected lesion; C: End-to-end anastomosis.

was completed. No leaks were noted at the anastomosis. Throughout the operation the arterial pressure remained between 120/80 and 150/90 mm Hg with a heart rate of 80–100 beat/min. At the end of the operation, the oral endotracheal tube was left in place and a plaster body dressing was placed to maintain the head in a flexed position. The patient was returned to the intensive care unit in satisfactory condition where assisted ventilation was achieved with an MA-1 volume respirator. The total dose of pancuronium bromide for the operation was 13 mg, the last dose of 1 mg being given 2½ h before the end of surgery. The estimated blood loss was approximately 750 ml, and the patient received fluids to the total of 2600 ml composed of 2000 ml of Ringer’s lactate and 600 ml of 5% dextrose in water.

The day following operation, the patient suffered a massive cerebral vascular accident as a result of a severe hypertensive episode (arterial pressure 220/120 mm Hg). She became apnoeic and unresponsive, with fixed, dilated pupils. Neurological examination and e.e.g. showed no evidence of cerebral activity and the patient died on the 4th day after operation.

Necropsy showed haemorrhagic infarction of the left cerebellar hemisphere, anaemic infarction of the medulla and diffuse ischaemia.

DISCUSSION

Double-lumen tracheobronchial dividers such as the Carlen’s tube are not useful for carinal or tracheal lesions. If they are introduced blindly extensive bleeding from trauma to the tumour may occur. Even when there is severe stenosis, ventilation during the initial phase of the operation depends on the existing lumen of the trachea. Therefore, a specially made short-cuffed and short-stumped endotracheal tube (Rusch model) was inserted above the tracheal lesion initially. Gentle dissection of the distal segment of the trachea may be accomplished in an unhurried fashion, but the team must be prepared to proceed quickly to divide the trachea below the lesion to relieve the obstruction. This was necessary in our case; lesser preparation might have had disastrous consequences early in the operation.

The distal tracheal segment was intubated through the operating field with a sterile, short-cuffed Tovell endotracheal tube which was selected from various sizes which had been prepared previously. This circuit (fig. 4c) bypassed the original endotracheal tube. The tube should not be advanced further into the bronchus being ventilated, nor should it be pulled...
out of the bronchus. Changes of tubing may be required during operation. It should be possible to change tubes within an interval of 30 s. The distal endotracheal tube may have to be moved from time to time to provide surgical access to the area involved. Manual ventilation was preferred to mechanical ventilation since the former provides breath-to-breath monitoring of resistance to air flow.

Following resection of the affected segment, the trachea was reanastomosed, with the distal endotracheal tube acting as the airway until its presence hampered further suturing of the cut ends (fig. 3c). Its removal at this point allowed the anastomosis to be continued, and the operation to be completed with the original orotracheal tube now advanced beyond the suture line and reconnected with the anaesthetic machine. Once the end-to-end anastomosis was completed the orotracheal tube was moved above the completed suture line and both lungs were ventilated adequately while the operation was being completed. This may have minimized tube cuff injury to the tracheal circulation in the region of the anastomosis.

After operation, these patients should be nursed in a respiratory care unit. In some instances, laryngeal release procedures are required and the neck may be maintained in a flexed position for approximately 1 week by means of a plaster neck brace to minimize tension on the tracheal suture lines (Mulliken and Grillo, 1968). We elected to leave the endotracheal tube in place after operation because the neck was flexed. Oxygen was delivered by assisted ventilation to achieve PaO2 in the range 75-100 mm Hg, and humidification and chest physiotherapy were administered to keep secretions loose and the chest clear.

Tracheal cylindroma is characterized by slow growth, local invasion and recurrence, and metastasis may occur (Clark, Clagett and McDonald, 1953; Jieta and Maier, 1957; Baldwin and Grimes, 1967; Boyd, Spencer and Lind, 1970). Tracheal surgery for this disease requires accurate preoperative assessment of the patient by both anaesthetist and surgeon, which should include the precise location and extent of the tumour. Endotracheal tubes must be tailor-made to meet the needs of the surgery and be ready in the operating room at all times. Although others advocate the use of cardiopulmonary bypass during resection for this lesion, especially when it occurs at the carina (Woods, Nepture and Palatchi, 1961; Adkins and Izawa, 1964; Neville et al., 1966), we believe the need for bypass may be avoided. However, we urge that cardiopulmonary bypass be available as a standby.

REFERENCES


CYLINDROME TRACHEAL: CONDUITE DE L'ANESTHESIE

RESUME

On a excisé un cylindrome trachéal sur une dame de 56 ans et on décrit dans ce rapport les problèmes dus à la résection trachéale et en carène ainsi que la technique d'anesthésie qui permet d'éviter de procéder à une dérivation cardiovolumaire.

NARKOSEHANDHABUNG BEI TRACHEALEM ZYLINDERZELLENTUMOR

ZUSAMMENFASSUNG

Aus einer 56-jährigen Dame wurde ein trachealer Zylinderzellentumor entfernt. Es werden die Probleme der trachealen und carinalen Resektion und ein Narkoseverfahren, das die Anwendung einer pneumokardialen Überbrückung erübrigt, beschrieben.

CILINDROMA TRAQUEAL: TRATAMIENTO ANESTÉSICO

SUMARIO

Se extirpó un cilindroma traqueal en una mujer de 56 años. Se describen los problemas de la resección traqueal y de la carina, y una técnica anestésica que hace innecesaria la desviación cardiopulmonar.