MANAGEMENT OF ANAESTHESIA IN AN INFANT WITH AN ANOMALOUS LUNG ARISING FROM THE OESOPHAGUS

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SUMMARY
The anaesthetic management of a 19-month-old male infant undergoing pneumonectomy for a rare congenital anomaly is discussed. The trachea communicated solely with the left lung and there was an abnormal communication between the oesophagus and the right main-stem bronchus. Gross infection of the right lung was present. Our experience suggests that the following points are of importance: (1) There is a substantial risk in intubating deeply into the trachea because of the possible existence of a bronchial pouch at the bifurcation. (2) Since the stomach may be full of pus, aspiration of pus before induction of anaesthesia and before extubation is essential. (3) Pneumonectomy with the patient in the supine position is advised.

The ectopic origin of the main-stem bronchus from the oesophagus is a rare congenital abnormality. The medical management of this condition has been described previously (Keeley and Schairer, 1960; Warner et al., 1961; Thompson and Aquino, 1962; Hanna, 1964; Nikaidoh and Swenson, 1971). However, no detailed report of the anaesthetic management is available. The present case history describes our experience of anaesthesia in a patient with an anomalous lung arising from the oesophagus.

CASE REPORT
The patient was born at full term following an uneventful pregnancy. The body weight was 2520 g. Multiple congenital anomalies were present, but no lung anomaly was noted at the time of birth. Shortly after birth, the baby began to cough when milk was fed. At 4 months, he was admitted to a hospital with complaints of intermittent fever and cough. Pneumonia was diagnosed and he was treated successfully with antibiotics. However, at age 19 months he was admitted to Hiroshima University Hospital with complaints of cough, intermittent high fever and pallor.

On admission the physical findings were severe emaciation (weight 6.7 kg), nasal alar breathing, pallor, auricular deformity, cleft palate, transverse cleft of the lip and hare lip. Breath sounds were absent over the right side of the thorax and the lung was dull to percussion. Chest x-rays revealed complete atelectasis of the right lung, and the oesophagram indicated an abnormal communication between the oesophagus and the right main bronchus (fig. 1).

Laboratory data obtained before operation are presented in table I. On the 9th day after admission, the patient was anaesthetized for right pneumonectomy. Details of the anaesthetic are shown in figure 2.

<table>
<thead>
<tr>
<th>RBC (cells/litre)</th>
<th>2.73 × 10¹²</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC (cells/litre)</td>
<td>1.16 × 10¹⁰</td>
</tr>
<tr>
<td>Hb (g/dl)</td>
<td>7.2</td>
</tr>
<tr>
<td>Ht (%)</td>
<td>23.5</td>
</tr>
<tr>
<td>Serum electrolytes</td>
<td></td>
</tr>
<tr>
<td>K (mmol/litre)</td>
<td>3.8</td>
</tr>
<tr>
<td>Na (mmol/litre)</td>
<td>133</td>
</tr>
<tr>
<td>Cl (mmol/litre)</td>
<td>98</td>
</tr>
</tbody>
</table>
Halothane, nitrous oxide and oxygen were administered by a mask, and shortly after commencement expiratory difficulty and cyanosis were noted. Regurgitation and aspiration of a small quantity of pus into the trachea were suspected. However, pus was not obtained on endotracheal suction. The patient was resuscitated by administering 100% oxygen. The trachea was intubated and general anaesthesia was continued with halothane in oxygen; respiration was assisted. Sixty-five minutes after the induction of anaesthesia, the patient was placed in the left lateral position. Cardiac arrest occurred following acute and severe bradycardia. The patient's general condition improved upon returning him to the supine position and administering 100% oxygen by IPPV. In order to maintain satisfactory cardiopulmonary function, it was decided to operate with the patient in the supine position. The decreased compliance of the lung, as a result of the development of severe pyothorax was improved dramatically by the surgical removal of the pus. A considerable amount of pus was regurgitated during the operative procedure and was removed by the surgeon. Progressive blood loss occurred in the course of the pneumonectomy, because of dense adhesions between the lung tissue and the parietal pleura. In spite of controlled hyperventilation, the patient remained cyanosed because of the continuous blood loss. Improvement was obtained by the proportional replacement of fresh blood.

A total of 30 ml of Ringer's lactate solution and 340 ml of glucose 5% in water were injected i.v. during anaesthesia. Further improvement in the patient's general condition was observed when the chest was closed and the cavity drained continuously with a pressure of 5 cm H₂O. Three hours after the induction of anaesthesia a cooling blanket was used because the body temperature was 39 °C, although room temperature had been maintained at 25 °C throughout.
Following pneumonectomy, a gastrostomy was performed. The operations were completed successfully 5 h after induction of anaesthesia. A large amount of pus was vomited just before the tracheal tube was removed but there was no further incident.

The postoperative course was uneventful with the exception of an occasional increase in temperature to 39 °C. The patient was discharged 10 weeks after operation.

**DISCUSSION**

Since the oesophagus and the respiratory tract originate from the same embryonic structures, it is not strange that anomalous communications between these two systems, such as tracheo-oesophageal fistula and broncho-oesophageal fistula develop.

This case report is the sixth of congenital anomalous communication between the oesophagus and the mean-stem bronchus. Similar anomalies have been reported by Warner and his co-workers (1961), Thompson and Aquino (1962) and Hanna (1964). In all these patients the ectopic bronchus was on the right side and respiratory distress with pulmonary infection was present.

In the case reported by Keeley and Schairer (1960), endotracheal intubation was attempted with open drop ether but was unsuccessful because of an obstruction encountered a few millimetres beyond the larynx. Maximal ventilation was obtained by withdrawing the endotracheal tube slightly. Postmortem examination revealed narrowing of the trachea.

Hanna (1964) reported that cardiac arrest occurred during the procedure and was attributed to hypoxia and an overdose of diethyl ether. The patient was resuscitated 10 min later.

However, the anaesthetic management for this anomaly has not been described in detail in any of these reports. Neither bronchography nor bronchoscopy were performed in the present patient before the operation. However, in the case reported by Nikaidoh and Swenson (1971), the tracheobronchogram revealed the existence of a blind end of proximal pouch of the right main bronchus. Consequently, a substantial risk may be involved in intubating deeply into the trachea because airway obstruction would occur if the endotracheal tube was advanced into this pouch or, at worst, penetrated the pouch.

Despite pre-anaesthetic fasting, the patient should be considered always to have a full stomach since pus will pass through the fistula from lung to stomach. Pre-anaesthetic suction of this pus through a stomach tube is essential. Similarly, the stomach should be emptied of pus before removal of the tracheal tube.

In the present patient, the acute cardiovascular collapse, noted on turning the patient into the left lateral position, may have been a result of compression of the large amount of pus present in the right side of the chest. Pneumonectomy in the supine position is advised to maintain cardiopulmonary function.

**REFERENCES**


**CONDUITE DE L’ANESTHESIE SUR UN ENFANT AYANT UN POUMON ANOMAL PROVENANT DE L’ŒSOPHAGE**

**RESUME**

On décrit dans cette communication la conduite de l’anesthésie sur un jeune enfant de 19 mois du sexe masculin, subissant une pneumonectomie à cause d’une anomalie congénitale rare. La trachée ne communiquait qu’avec le poumon gauche et il existait également une communication anormale entre l’œsophage et l’arbre bronchique principal droit. Il y avait une infection sérieuse du poumon droit. Notre expérience nous permet de suggerer que les points suivants sont très importants: (1) Il est relativement dangereux de procéder à une intubation profonde de la trachée en raison de l’existence possible d’une poche bronchique à la bifurcation. (2) Du fait que l’estomac pourrait être rempli de pus, il est essentiel de procéder à l’aspiration du pus avant le commencement de l’anesthésie et avant l’extubation. (3) Il est recommandé que le malade soit en position couchée pour subir la pneumonectomie.

**DIE NARKOSEHANDHABUNG IN EINEM KLEINKIND MIT EINER VON DER SPEISEROHR HERRÜHRENDEN LUNGENABNORMITÄT**

**ZUSAMMENFASSUNG**

Es wird die Narkosehandhabung eines 19-Monate alten, männlichen, sich einer Lungenresektion für eine rare, angeborene Abnormität unterziehenden Kleinkindes besprochen. Die Luftrohre kommunizierte alleinig mit dem linken Lungenflügel, und zwischen der Speiseröhre und dem rechten Hauptbronchus bestand eine abnorme Verbindung. Der rechte Lungenflügel war stark infiziert. Nach unserer Erfahrung sind die folgenden Punkte von
Wichtigkeit: (1) Es ist sehr riskant, tief in die Luftöhre zu intubieren, da möglicherweise an der Bifurkation eine Bronchialtasche bestehen könnte. (2) Da der Magen voller Eiter sein kann, ist die Eiteransaugung vor der Narkoseeinleitung und vor dem Extubieren unerlässlich. (3) Es ist ratsam, dass der Patient bei der Lungenresektion auf dem Rücken liegt.

REGULACION DE LA ANESTESIA EN UN LACTANTE CON ANOMALIA PULMONAR ORIGINADA EN EL ESOFAGO

SUMARIO
Se comenta la regulación de la anestesia en un lactante de 19 meses de edad, varón, sometido a neumonectomía a causa de una infrecuente anomalía congénita. La tráquea comunicaba únicamente con el pulmón izquierdo y existía una comunicación anómala entre el esófago y el bronquio derecho de la rama principal. Existía infección macroscópica del pulmón derecho. Nuestra experiencia sugiere que los siguientes puntos son importantes: (1) Existe un riesgo substancial de intubar profundamente en la tráquea debido a la posible existencia de una bolsa bronquial en la bifurcación. (2) Como el estómago pudiera estar lleno de pus, resulta esencial la aspiración del pus antes de la inducción de anestesia y de la desintubación. (3) Se aconseja practicar la neumonectomía con el paciente en posición supina.