INDEPENDENT LUNG ANAESTHESIA IN SEVERELY WET LUNG CASES

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SUMMARY

A technique of independent lung anaesthesia was used to control secretions in severely wet lung cases undergoing lung surgery. A Carlens tube was used and anaesthesia was separately delivered to each lung using separate connections. The two lungs could be independently inflated and aspirated, and dissemination of secretions could thus be prevented.

Because of the new antibiotics, the number of patients with copious amounts of secretions has diminished. Among our chest cases, however, the number of severely wet lung cases who come to operation is by no means low (El-Heneidy and Ashba, 1963). This is mainly due to the chronicity of these cases and the resistance of pre-operative infection to treatment. The result is that these patients, mainly suffering from bronchiectasis and lung abscess, still produce and retain excessive amounts of secretions. In some of these cases, secretions could not be controlled by any known method, and in a few instances we were compelled to abandon the operation. Therefore, we devised a method by which the severely wet lung was completely isolated from the sound lung.

METHOD

After induction of anaesthesia, bronchoscopic suction is carried out. A Carlens tube is inserted, connected to the anaesthetic machine using the standard Carlens connection, and ventilation is controlled. When the chest is opened, the standard Y-adaptor and connections are removed and each lumen of the Carlens tube is connected via a Cobb suction union and catheter mount to a separate Waters unit. The anaesthetic mixture is delivered to each lumen of the tube by two separate pieces of tubing coming from a Y-piece connected to the anaesthetic apparatus (fig. 1). When secretion accumulates, the connection leading to the surgical lung is clamped to prevent leak of anaesthetic gases, and suction is applied using a polythene catheter. Meanwhile, manual or mechanical inflation of the non-surgical lung continues. After resecting the affected lobes, the connections to each lumen are removed and the standard Carlens double adaptor, catheter mount and connections are applied. Anaesthesia and ventilation are then delivered synchronously to both lungs till the end of the operation.

Fig. 1

Each lumen of a Carlens tube is connected to a separate Waters unit. The anaesthetic mixture is delivered from the apparatus to each side by two long separate tubings. The small diagram shows the possibility of spillover of secretions when the standard Carlens connection is used.
APPLICATION

The method was used with success in severely wet cases of bronchiectasis and lung abscess.

Illustrative case.

The method was first applied in 1959 in a female patient aged 22 years suffering from bronchiectasis of the right lower and middle lobes. Her daily sputum was 300 ml. The pre-operative pulmonary function tests were: vital capacity 2,400 ml; inspiratory capacity 1,300 ml; expiratory capacity 1,100 ml; maximal breathing capacity 48 L/min; air velocity index 0.85. A thoracotomy was done on December 16, 1958. A bronchus blocker was inserted followed by endotracheal intubation. During surgical manipulations, the blocker slipped out and profuse secretions spread to both sides. Cyanosis developed and the blocker was removed, reliance being placed on posture and suction. Secretions were uncontrollable, necessitating closure of the chest. The postoperative chest radiograph showed multiple patches of pneumonitis.

The patient received treatment for a whole year. However, the sputum did not diminish and there was advanced restricted pulmonary malfunction as shown by the pulmonary function tests: vital capacity 2,550 ml; inspiratory capacity 1,700 ml; expiratory capacity 800 ml; maximal breathing capacity 45 l/min; air velocity index 0.6. Another thoracotomy was decided upon on December 12, 1959. A Carlens tube was inserted and its standard connection applied. Secretions were so copious that they poured through the connection of the right lumen, entered the canister and short-circuited to the left side as shown in the small diagram in figure 1. Therefore, the previously described method was used and the spread of secretions to the left non-surgical lung was prevented. The postoperative chest radiograph showed clear lungs.

DISCUSSION

Despite prolonged preparation, we still meet with severely wet lung cases in bronchiectasis, lung abscess, bronchopleural fistula and in degenerating new growths (Lee, 1959). Many of these cases do not respond to pre-operative measures aiming at reducing the quantity and infectivity of sputum. There is a risk of flooding of the healthy lung with large quantities of pus during operation. This may lead to mechanical obstruction and acute hypoxia (Evans and Gray, 1959).

The methods used to control secretions, namely posture, bronchial blockers and bronchial intubation, are inefficient when used in severely wet lung cases (Nassar, 1959). This was demonstrated in the illustrative case. The presented modification, using a Carlens tube, prevents any communication between the two lungs. Suction can be done through a Cobb union without any disconnection. For simplicity one anaesthetic machine can be used. When using two machines the anaesthetic mixture delivered to the surgical lung need have no relation to the mixture administered to the non-surgical lung. The method requires two anaesthetists to carry out independent inflation of both lungs. Middleton (1957) has applied a technique of independent lung anaesthesia to facilitate lung dissection.

REFERENCES


L'ANESTHESIE INDEPENDANTE DES POUMONS DANS LES CAS DE POUMONS TRES SECRETANTS

SUMMARY
On a utilisé une technique d'anesthésie indépendante des poumons pour contrôler les sécrétions dans les cas de poumons très sécrétant soumis à la chirurgie pulmonaire. On a employé le tube de Carlens, et l'anesthésie a été délivrée séparément à chaque poumon en se servant de connections séparées. Les deux poumons ont pu être insufflés et aspirés séparément, et on a donc pu empêcher la dissémination des sécrétions.

VON EINANDER UNABHÄNGIGE ANÄSTHESIE FÜR BEIDE LUNGEN BEI FÄLLEN MIT STÄRKER BRONCHIALSEKRETION

ZUSAMMENFASSUNG