

CURRENT COMMENT AND CASE REPORTS

CURRENT COMMENT is a section in ANESTHESIOLOGY in which will appear invited and unsolicited professional and scientific correspondence, abbreviated reports of interesting cases, material of interest to anesthesiologists reprinted from varied sources, brief descriptions of apparatus and appliances, technical suggestions, and short citations of experiences with drugs and methods in anesthesiology. Contributions are urgently solicited. Editorial discretion is reserved in selecting and preparing those published. The author's name or initials will appear with all items included.

FATAL AIR EMBOLISM UNDER GENERAL ANESTHESIA: REPORT OF CASE

A woman, aged 28 years, was admitted to hospital for bilateral superior thoracic sympathectomy as treatment for Raynaud's disease. The concomitant findings were as follows: repeated attacks of bilateral headache for several months, and periods of disturbed consciousness, with or without residual numbness of the left hand. On electroencephalography the presence of a superficially placed organic lesion in the right posterior frontal region was suggested. Pneumoencephalography was suggestive of an atrophic rather than an expanding lesion.

The thyroid gland was diffusely enlarged. Signs or symptoms of hyperthyroidism were not present. The basal metabolic rate was -15. Electrocardiography showed generalized low voltage in all leads. The tracings were normal otherwise. The blood pressure was 110 mm. systolic and 70 mm. diastolic, pulse 68, and respirations 20. Leukocytes numbered 8050 with 64 per cent polymorphonuclear cells, and the erythrocytes numbered 4,280,000, with 12.5 Gm. of hemoglobin.

On March 9, 1948, a left superior thoracic sympathectomy was done with the patient in the prone position. An orotracheal catheter was inserted under curare-pentothal anesthesia. Pentothal, oxygen and nitrous oxide were used for maintenance. Some depression of respiration was noted. Cyclopropane-ether was given in a closed system, with good results. The operation was unduly long, lasting three and one-half hours, because of

troublesome bleeding from an intercostal vein. The patient was returned to the ward in fair condition. The only postoperative complication was fluid in the left pleural cavity. On March 22, 1948, a roentgenogram of the chest showed slight density of the left base with no definite fluid level. The heart shadow was enlarged.

On March 27, 1948, the patient was given morphine sulfate, grain $\frac{1}{8}$ and atropine sulfate, grain 1/100 at 7:00 a.m. in preparation for a right superior thoracic sympathectomy. At 8:00 a.m. she received intocostin, 5 cc., intravenously, followed three minutes later by 0.5 Gm. of pentothal. Oro-tracheal intubation was easily performed. The pharynx was packed with 3 inch vaseline impregnated gauze. She was placed in the prone position. Anesthesia was maintained with nitrous oxide, 50 per cent, and oxygen, 50 per cent, in a fractional system and procaine, 1 per cent, intravenously at a rate of 60 drops per minute. The decrease in tidal volume because of the prone position was lessened by placing pillows under the shoulder girdle and anterior superior iliac spines. The respiratory excursion was considered to be satisfactory. The blood pressure remained at 100 mm. systolic and 70 mm. diastolic. The pulse was regular and varied from 84 to 92.

At 9:10 a.m. the pleura was torn; 6 cm. of water positive pressure was used to prevent paradoxical respirations. At 9:20 a.m. apnea occurred. Artificial respiration was carried out by manual compres-

sion of the rebreathing bag. The pulse was imperceptible for a short period. Spontaneous respirations returned but they were very noisy. It was noted that the noise was coming from the wound. At 9:30 a.m. apnea occurred again and the pulse could not be palpated at the wrist. At 9:50 a.m. the patient was turned supine and a left perivertebral upper abdominal incision was made through which cardiac massage was performed. Cardiac injection was attempted. However, straw-colored fluid was aspirated instead of blood so the injection was not made. Cyanosis increased progressively and the patient was pronounced dead at 10:30 a.m.

The surgeon was unable to account for the fatal outcome. Very little hemorrhage had been encountered. The sympathetic chain had been sectioned without a change in the patient's condition. He did not believe that the right pneumothorax in itself could be the cause of death. The patient became pulseless and apneic just prior to starting the closure.

The anesthesiologist had been very pleased with the patient's vital signs before the appearance of the apnea. It was thought that the anesthetic agents which had been used were not the cause of the patient's death. The pneumothorax was apparently well controlled by positive pressure.

Necropsy was performed. A summary of the findings is as follows: Near the apex of the right lung, posteriorly, at the level of the second and third ribs, at the costovertebral junction, two tears were observed in the parietal pleura. Each tear measured about 1 cm. in diameter. There was slight hemorrhage into the soft tissues about the margins of the tears.

Upon opening the pericardial sac, it was found to contain about 150 cc. of clear yellow fluid. The heart was lying free in

the pericardial sac. It appeared enlarged owing to dilatation of the right chambers. On nicking the right ventricle, large amounts of fine, frothy fluid welled from within. The appearance was typical of air embolism. Inspection of the superior vena cava, superior intercostal vein and the vena azygos major showed the presence of fine bubbles of air. Similar frothy blood was present in the upper part of the inferior vena cava. The point of entry of the air was evidently through the tears in the parietal pleura in the upper right chest by way of the superior intercostal vein.

The pulmonary artery contained large amounts of fine frothy blood. The cut surfaces of the lungs were pink in color and quite dry. The rest of the examination including the brain did not reveal any abnormal findings. A possible explanation appears below.

The air embolism was probably the result of the following mechanism. Openings were made into both the superior intercostal vein and the parietal pleura. A partial pneumothorax occurred. When a moist sponge was placed in the wound a closed system resulted. During inspiration the air in the pleural cavity was forced through the tear in the pleura, raising the pressure in the wound. The air entered the superior intercostal vein easily because of its low venous pressure. Probably a large amount of the air found at autopsy was forced into the veins during the attempt at resuscitation.

This case history records an unusual manner in which air embolism may occur. It also illustrates the importance of performing a necropsy in all cases of sudden death occurring during anesthesia.

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AIRWAYS—A NEW MAKE AND A NEW TYPE

We wish to introduce airways made of a plastic material, cellulose acetate butyrate, and a new type of intubating airway.

The advantages of a plastic airway are its transparency, easy insertion and removal in case of spasm of the jaw muscles,

the ease with which it can be cleaned, a tensile strength of 800 pounds, its permanency and low cost. The disadvantage of these airways is that they cannot be boiled or autoclaved. They are maintained sterile in bichloride of mercury solution.