ESOPHAGORESPIRATORY COMPLICATIONS OF TREATMENT OF NEUROSURGICAL PATIENTS

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This paper is a report of 2 neurosurgical cases in which the clinical features of esophageal fistula developed postoperatively during a period when a Levine tube and tracheal cannula were concomitantly in use. We have failed to find reports of this complication in the literature up through November, 1952.

Case 1. §53-5366. G.A.G., a 22-year-old white female, in September, 1949 had headaches, occasional nausea, vomiting, and intermittent diplopia without lethargy or signs of meningitis. She recovered after several weeks and remained well for over 2 months. In January, 1950 hyperkinesia first appeared in the head and hands. This increased in severity so that by late Summer, 1951 she exhibited extensive, non-patterned, involuntary movements of all members of the body, defective balance, ataxia, and dysarthric speech.

She was admitted to the University Hospital on May 19, 1952.

1st Operation. A mesencephalic pedunculotomy of the lateral two-fifths and medial two-fifths of the right crus was performed under endotracheal general anesthesia.

Course. A transnasal Levine tube through which fluids, food and anticonvulsant medication were passed was in place from the 2nd to the 9th postoperative day. She made an uneventful recovery and was discharged 15 days after operation.

She was readmitted on Sept. 27, 1952.

2nd Operation. On Oct. 1, 1952 a similar mesencephalic pedunculotomy was performed on the left side.

Course. A Levine tube was passed on the 3rd postoperative day. On the 8th day signs of respiratory obstruction developed. Roentgenogram of the chest taken with a portable machine revealed no evidence of atelectasis or pneumonia. However, the patient continued to manifest signs of respiratory difficulty. A tracheotomy was therefore carried out on the same day. From the 14th to the 18th day tarry stools were passed. On the 16th day some bloody material was aspirated through the Levine tube. Transfusions of 500 cc. whole blood were given on the 16th and 17th days. After the 18th day no signs of gastrointestinal bleeding were observed. On the 21st day the patient coughed some formula through the tracheotomy tube. The Levine tube was promptly removed and fluid intake was maintained by hypodermoclysis for the next few days.

An otolaryngologic consultation was obtained on the 24th day. A swallow of water containing methylene blue was coughed out of the tracheotomy tube after 10 seconds. This was considered presumptive evidence of an esophagorespiratory fistula. Several unsuccessful attempts at bronchoscopy and esophagoscopy were made. On the 33rd day these procedures were successfully carried out under general anesthesia. At 35 cm. from the upper teeth an erosion was demonstrated on the posterior and lateral esophageal wall. Here the mucosa bled easily. On bronchoscopy, "a redness but no fistula or erosion" was noted at the level of the carina. At this time a swallow of lipiodol failed to reveal evidence of a fistula. The tracheotomy tube was removed on the same day and a Levine tube was reinserted. By the 41st day the patient took very small amounts of food by mouth without difficulty. The Levine tube was then removed. By the time of her discharge from the hospital on the 45th day she was taking a regular diet.

Case 2. §53-892. J.D.L., a white man aged 56 years, was transferred to the Neurosurgical Service in a comatose condition. Pneumoencephalography had revealed evidence of a mass in the right parietal region.

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Operation. A right postcentral craniotomy was carried out on Jan. 27, 1952 and a meningioma measuring 8 × 8 × 1 ½ cm. was removed under endotracheal general anesthesia.

Course. On the 3rd postoperative day a Levine tube was passed. On the 6th day the patient began to show signs of respiratory obstruction secondary to hypopharyngeal relaxation. At first this could be readily relieved by altering his posture, but by the 8th day it was deemed necessary to perform a tracheotomy.

The Levine tube was changed from one side of the nose to the other about every 7th day. Frequently, several attempts were necessary in order to pass the tube. On the 18th day the tube feedings were supplemented by small amounts of oral fluids. On the 25th day the patient coughed violently each time he attempted to swallow liquids. Roentgenogram of the chest showed signs of bilateral pneumonitis. All oral feedings were discontinued.

An otolaryngologic consultation was obtained on the 27th day, and the tracheotomy tube was removed. The opinion was expressed that an esophagorespiratory fistula had developed “secondary to friction from both the Levine tube and tracheotomy tube.” It was also thought that irritation from the Levine tube and consequent edema of the mouth of the esophagus and arytenoids with spillover into the trachea might be responsible for the signs exhibited by the patient. Indirect laryngoscopy on the same day revealed moderate edema of the epiglottis, arytenoids, and true and false vocal cords. The Levine tube was removed and fluid intake was maintained by hypodermoclysis. On the 31st day, oral liquids in small amounts were tolerated without difficulty. Thereafter, the diet was progressively advanced until the patient was discharged on the 42nd postoperative day, able to take a full diet.

DISCUSSION

The majority of cases of esophagorespiratory fistula recorded in the literature are ascribable to congenital atresia and carcinoma of the esophagus. A less frequent causative factor is aortic aneurysm. In 1950 Coleman reviewed the literature on nonmalignant acquired esophagotracheobronchial fistula reported during the previous 32 years. Of 75 cases, 21 were caused by the swallowing of foreign bodies, instrumentation, and other “trauma.” The remainder were imputed to esophageal diverticulum and infectious agents, including syphilis. In 16 instances the etiology was undetermined. Lukens and Ono alluded to 2 cases of esophagorespiratory fistula secondary to the pressure of tracheal cannulae described by Sirot in his thesis of 1898.

The use of tube feedings to insure adequate nutrition for the comatose or recalcitrant patient is a familiar and highly valuable procedure. The use of a tracheotomy in the patient with respiratory obstruction or otherwise threatened with hypoxia is likewise familiar and frequently a life-saving measure. The use of either tube alone is not without danger. Esophagitis has been described following the use of Levine tubes, and standard texts in otolaryngology warn of the dangers of necrosis and stricture of the trachea caused by poorly placed and improperly selected tracheotomy cannulae. The combination of Levine and tracheotomy tubes is less frequently necessary than either tube alone, but its use has been growing, especially in the field of neurosurgery. The complication herein reported is rare in our experience and in no sense suggests that the combined use of the measures referred to should be abandoned. We wish merely to point out the potential dangers inherent in the procedure. Marked coughing and/or the appearance of food particles in the tracheotomy tube during the act of deglutition strongly suggests but does not conclusively establish the existence of an esophagorespiratory fistula. Incompetence of the deglutitory mechanism may on occasion be associated with edema of the gullet and/or laryngeal apparatus. The only certain criteria of
the diagnosis of esophagorespiratory fistula are (a) radiographic demonstration and (b) direct visualization by bronchoscopy and esophagoscopy. Measured in terms of these criteria it cannot be conclusively asserted that our patients suffered from esophagorespiratory fistula. The diagnosis in each case was reached by inference. However, irrespective of the existence or nonexistence of such fistulae, the complications presented above in connection with combined use of Levine and tracheotomy tubes were characterized by aspiration of food into the lower respiratory tract. They carry every potential for morbidity and mortality that attaches to the existence of esophagorespiratory fistula.

In view of the potential pressure necrosis occurring along the apposed surfaces of the lower respiratory tract and esophagus in consequence of the presence of two mechanical agents (tracheal cannula and Levine tube), the following recommendations seem warranted: (1) Awareness and unerring vigilance on the part of the clinician and nursing staff of the possibility of the complication here described and its clinical signs. (2) Replacement of the Levine tube by a tube of smaller caliber. (3) Care in the selection and placement of the tracheal cannula. In order to reduce the bulk of the intraesophageal mass, we have recently adopted a transnasal polyethylene tubing (external diameter 2.5 mm.) in place of the Levine tube.

SUMMARY

1. Two cases of esophagorespiratory complications which developed during the concomitant use of Levine and tracheotomy tubes are recorded.
2. A review of the literature failed to demonstrate previous similar reports.
3. The use of transnasal polyethylene tubing in place of the standard Levine tube is recommended.

REFERENCES