CASE REPORTS

CONGENITAL ATRESIA OF THE OESOPHAGUS

AN ATTEMPT AT SURGICAL TREATMENT

BY

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The commonest congenital abnormality of the oesophagus is atresia of the upper third, the lower two-thirds springing from the trachea at its bifurcation or from the right bronchus. So far no successful treatment had been devised, but experience with a case gave some hope that the difficulties can be overcome.

An infant weighing 4 lb. 3 oz. was born at the thirty-sixth week of pregnancy on Oct. 31, 1943. It was placed in the premature nursery in an oxygen tent and, according to the usual practice of the hospital, was disturbed only for changing during the first twenty-four hours. The baby seemed lively and cried well. Next day it was given its first feed of one drachm of glucose saline. This was vomited and the child became slightly cyanosed. Successive 2-hourly feeds were vomited, and on a few occasions the child went blue. Feeds were accordingly stopped and the baby was given subcutaneous saline 20 c.c. by syringe. After some hours a further feed was attempted with the same results. An abnormality of the oesophagus was now suspected and appeared to be confirmed by the failure of an attempt to pass a catheter for gavage. Feeds were suspended and subcutaneous saline resumed 4-hourly. On Nov. 2, lipiodol 2 c.c. was put into the oesophagus by tube over the tongue and x-ray confirmed the presence of a blind sac. The baby had passed no meconium, so that it was felt necessary to run lipiodol into the rectum to exclude the presence of atresia of the colon. The colon appeared quite normal and the injection caused the evacuation of meconium. The baby stood the manipulation very well. No evidence of aspiration pneumonia had so far been discovered, and it was decided that an effort should be made to reconstitute the oesophagus. On the evening of Nov. 2 when the infant was 72 hours old, the following operation was performed:

Operation. Local anaesthesia (procaine 1 per cent.). With the infant lying on the left side and with the right arm drawn well forwards, an incision was made from near the midline in front to the angles of the ribs behind. This incision was made

over the intercostal space just below the angle of the scapula. The pleural cavity was opened and a mastoid retractor introduced to hold the ribs apart. The right lung collapsed and did not appear to have undergone pneumonic consolidation.

A good exposure of the oesophagus was obtained. The upper portion ended as a blind sac at the level of the vena azygos arch. The lower portion of the oesophagus was half the diameter of the upper portion and, passing upwards from the stomach, rapidly narrowed at the level of the azygos arch and entered the termination of the trachea. It was apparent that division of the azygos arch would facilitate further procedures and this was carried out between two catgut ligatures passed with an aneurysm needle. Particular attention was paid to the condition of the infant during this procedure and no untoward effects were noticed. The upper end of the lower portion of the oesophagus could now be seen more clearly passing to the inner side of the upper blind sac and communicating with the trachea at about its bifurcation. The arrangement of the parts was seen to conform to what is commonly found in these cases; a favourable feature was the close approximation between the upper and lower portions of the oesophagus. The decision was made to tie off the tracheal fistula and attempt a direct restoration of the oesophagus as had been done in a previous unreported case in which the infant died some 17 hours after operation. The condition of the infant improved somewhat after the tracheal fistula had been tied off.

The parts to be anastomosed were controlled with stay sutures. The anastomosis was effected by making a vertical incision in each portion of the oesophagus and suturing them together transversely. Two mattress sutures were used to approximate the parts, and the anastomosis was completed by a running through and through suture. After completing the first half of the anastomosis, a nasal catheter was passed through the mouth and down into the stomach—this step greatly facilitated the completion of the anastomosis. No. 75 linen thread was used throughout for the anastomosis.

Sulphanilamide powder was sprinkled around the anastomosis and the chest closed without drainage. A little air was aspirated from the pleural cavity after the chest wound had been closed. The operation lasted for an hour and did not appear to have produced any deterioration in the infant's condition.

After-treatment. (Nov. 2.) The child was returned to the premature nursery and placed in an oxygen tent. The oesophageal catheter was left in position and 2 drachms of glucose water were given through it without difficulty. Thereafter feeds of expressed breast milk (E.B.M.) and glucose water (G.W.) in equal parts, 3 drachms were given 2-hourly.

Nov. 3. The baby's condition was poor. It was jaundiced and pale. The temperature was 105°F. , with rapid respiration. This was apparently due to overheating in the oxygen tent which was an improvised apparatus, and the child improved rapidly when taken out of the tent. Feeds of 3 drachms of E.B.M. were given 2-hourly and, as the child appeared a little dehydrated, two subcutaneous injections of 40 c.c. normal saline were given in the day.

Nov. 4. Condition fair. Tube feeds continued but respiration became progressively more laboured during the day. Expiration seemed difficult. Hyperextension of spine eased matters. $T. 101^{\circ}\text{F.}$; bowels open twice, once with meconium and once with brownish motion; forty-eight hours after operation it was decided to remove the oesophageal tube. The child immediately took 2 drachms of E.B.M. from a feeder and went to sleep. Two hours later the chest was examined and found to be moving fairly well, the left side showing better expansion than the right. It took 2 drachms of feed well and then refused. Two hours later it again refused its feed and became cyanosed. The colour was poor and the breathing difficult. Mouth feeding was stopped and subcutaneous drip saline infusion was started.

Nov. 5. Condition poor with laboured respiration. Fontanelle sunken; breathing stopped once during the morning. It was decided to find out if the oesophagus was patent; 2 c.c. of lipiodol were injected. Respiration ceased and the child almost died. Aspiration with a mucus catheter produced some oil and—more important—thick mucus from the pharynx. Respiration restarted and became regular and much easier than previously. The picture taken showed that the lipiodol had passed successfully down the oesophagus, but that some had been aspirated into the lungs (fig. 1). Moist sounds were audible over both lung fields. The aspiration of mucus was repeated every two hours, with the result that the previously laboured breathing entirely disappeared and the moist sounds also cleared up. Attempts at mouth-feeding had to be abandoned, however, on account of inability to swallow. Saline infusions were continued.

Nov. 6. General condition fairly good, but the legs became oedematous following salines. In the afternoon oesophageal feeds were started, the tube being passed $4\frac{1}{2}$ inches from the line of the gums. In spite of some misadventures due to attacks of cyanosis this method of feeding was successful, the food being E.B.M. fortified with soluble calcium caseinate. The aspiration of mucus was continued every two hours. The respiration remained fairly satisfactory after the feeds and quite good between feeds. A rectal saline was also given and retained.

Nov. 7. General condition much improved. Taking feeds well without misadventure. Passed a normal yellow motion. The baby had its best day since operation.

Nov. 8. During night respirations increased in rate and became shallow and grunting in character. $T. 104^{\circ}\text{F.}$ The feeds were taken fairly well until 7 a.m., but the colour was less good. Mucus extraction and oxygen improved things, but the child was clearly very ill. Its condition deteriorated

FIG. 1.

FIG. 2.—Arrow points to the leak in the reconstructed oesophagus.

and it died about midday, having survived operation for over 5½ days.

A **post-mortem examination** was performed. The operation scar was found closed, but there was evidence of low-grade infection around the sutures and under the skin. The sutures closing the thoracic wall were intact, but again there was evidence of damage by sepsis to the parietal pleura immediately underlying each stitch.

On removing the sternum and opening the right pleural cavity about 1 oz. of greenish purulent fluid escaped. The right lung was comparatively well expanded and there was no evidence of any residual air in the pleural cavity. On retracting the right lung forwards as at operation, it was found that one of the sutures holding the oesophageal anastomosis had given way and that some milk curd was exuding through the aperture into the right pleural sac. There was evidence of sharp inflammatory reaction around this leak and the lung was already becoming bound to the parietes in an effort to wall it off. While the thoracic viscera were being dissected away from the vertebral column, more oesophageal contents were pushed through the gap, and in spite of the utmost care in handling, another suture gave way. Examination showed that the stitch holes were septic and were very frail. Section

through the suture line revealed that there had been little attempt at healing. The heart appeared quite normal.

The lungs did not appear grossly abnormal. On section, apart from congestion, there was little abnormality.

The abdominal viscera showed no abnormality, but the stomach was very much of the 'inverted retort' shape commonly seen in the young baby. No other abnormalities were found. Fig. 2 shows the post-mortem specimen.

Comment

Attempts at reconstitution of these cases of congenital atresia of the oesophagus have been made previously, but complete success has yet to be obtained. This case was most instructive for several reasons which may be summarized as follows:—

(1) The incidence of the abnormality is probably somewhat greater than is realized. This case is the third diagnosed by one of us (J. N. O'R.), within twelve months. Two other previous cases have been operated upon by another (R. H. F.).

(2) It has been shown that a new-born and even

premature baby can survive the severe operative procedure involved.

(3) Early diagnosis, planned operation and careful after-treatment are essential. There must be the closest co-operation between the obstetrician, the paediatrician and the surgeon.

(4) The problem of the post-operative feeding is perhaps the most difficult one to solve. It is concluded that mouth-feeding should be avoided in a future case. The oesophageal tube cannot be kept clean and its presence caused such trauma in the pharynx as prevented swallowing after its withdrawal, and gave rise to the mucous secretion which so greatly impeded breathing. Gastrostomy is probably the

method of choice, but is difficult to be dogmatic about the time at which it should be performed. It is suggested that twenty-four hours after the thoracotomy is the optimum time, the oesophageal tube being left in place until this time.

(5) It will be unnecessary in a future case to subject the child to the stress of a lipiodol x-ray which nearly proved fatal on the third day after operation. The reconstructed oesophagus has been shown to be an effective passage.

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