POST-OPERATIVE CHEST COMPLICATIONS IN GASTRIC SURGERY

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The purpose of this communication is to draw attention to the frequency of post-operative pulmonary complications in gastric surgery and also to assess the importance and severity of such complications. With this object, the post-operative chest condition of 100 consecutive patients on whom partial gastrectomy has been performed is reviewed. In submitting figures of the incidence of pulmonary complications for an operation such as partial gastrectomy it is necessary to give some information about the condition for which the patient was advised to undergo operation, together with the operative mortality. Also, the standards by which the pulmonary complications have been assessed must be stated.

Condition and Operative Mortality

It is generally recognized that the operation is more difficult if it is done for a peptic ulcer for which a previous operation has been performed, and more severe if it is done for an ulcer which is bleeding or for malignant disease. We have therefore classified our patients into four groups, stating the number of patients in each group, with the fatalities. (1) Those suffering from peptic ulceration on whom surgery had not previously been employed, apart from the suture of a perforation. In this group were 78 patients, one of whom died. (2) Those suffering from peptic ulceration on whom surgery had previously been attempted. There were 11 patients in this group, two of whom died. (3) Those suffering from peptic ulceration complicated by acute haemorrhage: 5 patients: one death. (4) Those suffering from carcinoma of the stomach: 6 patients; no fatalities.

It will be seen, therefore, that these operations were performed for the usual indications and were not confined to any special group of patients; and that of the 100 patients four died.

Assessment of Pulmonary Complications

Our practice has been to rely upon physical examination of the chest as a routine during the first two or three post-operative days. When any abnormal physical signs have been found, or a rise in temperature, pulse, or respiration rate suggests the possibility of a pulmonary complication, radiography has been carried out. In fact, 45 of our 100 patients have been x-rayed within the first few days of operation.

The primary types of immediate pulmonary complication encountered have been: (1) bronchitis, (2) lobar atelectasis, and (3) lobular or patchy atelectasis. We have diagnosed bronchitis in patients who after operation have had a productive cough with moist sounds in the lungs, but who on x-ray examination have shown no abnormality. The term "lobar atelectasis" is used when the whole of one or more lobes is atelectatic—a fact which can be well demonstrated on a radiograph.

The frequency of the diagnosis of lobular or patchy atelectasis, as Brock (1936) has pointed out, depends very much on whether or not the surgeon is looking out for this condition. In our experience it is by far the most common complication after operation. In most cases physical examination showed that the lower part of the chest on one or both sides was expanding somewhat less fully than normal, and auscultation revealed a poor air entry with some adventitious sounds. The temperature would be raised, often not more than to 100°, and the patient would feel that he wanted to cough but had some difficulty in doing so. He was encouraged to cough during the first or second day, bringing up some mucopurulent sputum. Following this the pulmonary condition rapidly improved and returned to normal. A radiograph of the chest in a patient of this type has shown slight elevation of the diaphragm together with slight patchy increase in density of the lung at one or both bases. In none of our cases in

this group was any mediastinal shift detected either by examination or by x rays. In a few patients this condition progressed to some more serious complication, such as bronchopneumonia; a fuller description of these patients is therefore given.

Incidence of Post-operative Pulmonary Complications

Working on the lines indicated above, we find that 34 of our 100 patients are classified as suffering from a post-operative pulmonary complication. Of these, 4 had bronchitis, 1 lobar atelectasis, and 29 lobular atelectasis.

Acute Bronchitis.—All these 4 patients were suffering from chronic bronchitis and had an exacerbation after the operation. In three the complication was not serious and did not prolong their stay in hospital; but in a man who had chronic fibroid phthisis of both apices together with chronic bronchitis the exacerbation of the bronchitis led to reactivation of tuberculosis and prolonged hospital treatment. In only one of these four patients, therefore, was the complication serious.

Lobar Atelectasis.—We recognized complete atelectasis of the lobe in only one patient. He was a man of 45 who had a collapsed right lower lobe which failed to re-expand rapidly. Twenty-eight days later a radiograph still showed that the lobe was not fully expanded. Bronchoscopy and aspiration of the secretion were carried out, and after this the lobe re-expanded. This complication prolonged his stay in hospital by some weeks, and must be considered a serious one.

Lobular or Patchy Atelectasis.—Of the 29 patients in this group, the right lower lobe was involved in 12, the left lower lobe in 10, and both lower lobes in 7. In 25 the complication was a mild one and for several days they suffered the discomfort associated with a post-operative cough; but the condition rapidly cleared, the lung re-expanded, and the cough and sputum ceased. In none of these cases was the stay in hospital prolonged owing to this complication, and it seems that the post-operative lobular atelectasis amounted to an uncomfortable nuisance rather than a dangerous complication. In the remaining four cases, however, this initial complication was attended by more serious sequelae, and was responsible for the death of a patient. These four cases are reviewed in detail:

Case 1.—A man of 69 who had a patchy atelectasis of the left lower lobe following an operation in the winter, when respiratory infections after influenza were frequent. He proceeded to bilateral septic bronchopneumonia and died on the eighth post-operative day. His death must be attributed to the pulmonary condition, as necropsy showed that there was no trouble below the diaphragm.

Case 2.—A man of 57 in whom operation was followed by a patchy atelectasis of the left lower lobe. This subsided rather slowly and his cough had not entirely settled down on the tenth day, when an urgent operation for the removal of a gangrenous appendix with spreading peritonitis was carried out. He made a satisfactory recovery from this second operation, but his pulmonary condition was made much worse and consolidation of the left lower lobe followed. This proceeded to an empyema, for which surgical drainage was done. His stay in hospital was prolonged by many weeks, but he ultimately made a satisfactory recovery. He was unfortunate to suffer from an attack of appendicitis so soon after a major abdominal operation.

Case 3.—A man of 59, known to have a large chronic lesser-curve and posterior-wall ulcer, was operated on as an emergency case on the fourth day of a severe haemorrhage. His condition was very bad in spite of repeated transfusions. Patchy atelectasis of the right lower lobe was present after operation, and he died on the eighth post-operative day from peritonitis and bilateral bronchopneumonia. Necropsy showed that the primary cause of death was a spread of peritonitis from the floor of the ulcer; the persistence and exacerbation of the pulmonary condition were almost certainly due to this peritonitis. His death therefore cannot really be attributed to a chest complication.

Case 4.—A man of 47 with a very high posterior-wall and lesser-curve ulcer for which two previous attempts at cure had been carried out elsewhere. A very high partial gastrectomy was performed. The surrounding tissues were indurated, and it seemed impossible to obtain a satisfactory anastomosis between the cardiac end of the stomach and the jejunum. A drain was therefore put down to the anastomosis and the floor of the ulcer. He developed a patchy atelectasis of the left lower lobe and also a left subphrenic infection, and died on the tenth post-operative day. Necropsy showed bilateral bronchopneumonia and subphrenic infection round

the anastomosis. It seems that in this case death was due to the inflammation round the anastomosis, which was largely responsible for the pulmonary complication.

It will be seen, therefore, that in only one of these four cases in which lobular atelectasis proceeded to bronchopneumonia was this sequel unconnected with the trouble in the peritoneal cavity.

To sum up: in the whole series of 100 patients there were 34 whose post-operative progress was complicated by a pulmonary abnormality. Of these, 28 suffered from a mild and transient complication, but six had severe pulmonary disease. Three died, but only one death was directly due to the chest complication. Of the three who recovered, the severity of the pulmonary condition was in one case due to peritonitis following an attack of appendicitis. It will be seen, therefore, that in this series of 100 patients, six developed a serious pulmonary complication—three being attributable to post-operative peritonitis and three occurring in patients whose condition was otherwise satisfactory.

Notes on the Series

The factors influencing post-operative pulmonary complications were excellently reviewed by Brock in 1936, and we will only comment on a few points which we have noted in our series.

1. The Operation

It is, of course, well known that upper abdominal operations are chiefly responsible for post-operative pulmonary complications in that diaphragmatic respiration is embarrassed. This embarrassment is likely to be accentuated by local peritonitis or post-operative distension of the stomach. Probably the most certain way to produce a post-operative pulmonary atelectasis is to do an operation which gives rise to a severe peritoneal inflammation. As we have just noted, necropsy showed that two of our patients had septic bronchopneumonia, and in our opinion this was secondary to peritoneal inflammation. We avoid any chance of post-operative distension of the stomach by the use of an indwelling Ryle's tube for at least the first post-operative day.

It has been suggested that a transverse abdominal incision allows the patient either to cough or to breathe deeply after the operation with less discomfort than is the case when a vertical incision has been employed. On 35 occasions we have made a transverse incision, and 12 of these patients suffered from post-operative pulmonary complication, while 23 remained clear. It does not seem, therefore, that a transverse incision, as employed by us, has any influence on the incidence of complications. What is much more important, in our opinion, is that whatever incision is made should be very well and strongly sutured: it is then easier for a patient to cough after operation. At the close of the operation the dressing is held on by elastoplast, applied so that it does not restrict respiratory movement.

2. The Anaesthetic

Our view is that the type of anaesthesia influences the severity of these complications rather than the incidence. A patient who develops lung complications after two and a half hours of third- or fourth-plane narcosis will be less able to combat them than a patient who has been in the second plane for a similar period.

In order to provide the requisite relaxation for gastric surgery and at the same time maintain the patient in the first or second plane, some sort of regional block is necessary. We use bilateral intercostal block of the sixth to the eleventh nerves inclusive. The solution employed is 1/1,000 anethaine with adrenaline. No splanchnic block, in our opinion, is necessary with inhalation anaesthesia, and for some time now we have discarded it. Premedication is by omnopon-scopolamine, the average dose being omnopon gr. 1/3, scopolamine gr. 1/150. The narcosis is induced by pentothal and is maintained with cyclopropane, administered by a large-bore endotracheal tube and to-and-fro absorption. The second plane is quite deep enough for the whole of the operation, except for intubation and for traction of the stomach to free the upper end; the third plane is entered for these two procedures. This technique enables good ventilation to be maintained throughout, and since breathing is mainly intercostal in character this does not embarrass the surgeon.

Nosworthy (personal communication) has pointed out that the bronchial spasm following intubation in light anaesthesia should be avoided in patients in whom pulmonary complications are feared. It was our practice to give a decalcin lozenge 20 minutes before operation and to intubate after a pentothal induction. This process gives rise to considerable reflex bronchospasm and can be avoided by deepening the anaesthesia to the third plane with cyclopropane and ether if necessary. Up to now the results of this method have been encouraging, but the cases have been too few for conclusions to be drawn.

Under the technique described above the patient is as fit as possible after the operation; fall in blood pressure and sweating do not occur. Aeration has been maintained throughout with a mixture containing a large percentage of inert gas (either air or helium). We are of the opinion that the agent employed for the narcosis is not of paramount importance; a few of these cases were done with ether, and the post-operative condition was satisfactory. We prefer cyclopropane because of its flexibility and the lack of toxicity when used in the lighter planes, but we have no hesitation in supplementing with ether should necessity arise.

3. The Post-operative Condition of the Patient

If the surgery and anaesthesia are of good quality the patient's post-operative condition should be good and he should be reasonably comfortable. This obviates the need for frequent injections of morphine and therefore avoids subsequent depression of respiration. We have tried to keep our patients both lively and comfortable after operation and to avoid the use of morphine as much as possible. It is, however, a fact that of five patients operated on for haematemesis only one developed a post-operative chest complication; yet these five patients received much more morphine, both before and after operation, than the average patient. We are now trying the effects of giving more of that drug after operation.

4. Effects of Sex

Of the 100 patients admitted for operation, 14 were females, four of them suffering from pulmonary complication. This shows no striking alteration in incidence compared with that in the male patients; but the figures, of course, are not large enough to enable one to draw any conclusion. As most of our patients have been on medical treatment for some time and their smoking has been reduced or stopped altogether, it is possible that this may explain why in our series the incidence has been about the same in both sexes.

5. Seasonal Incidence of Chest Complications

Of four patients with post-operative bronchitis, three were operated upon in the winter and one in the summer. Of 29 with post-operative lobular atelectasis, 16 had their operations in the winter and 13 in the summer. Of the 66 who had no pulmonary complication, 32 were operated upon in the winter and 34 in the summer.

It is, of course, well recognized that a patient suffering from chronic bronchitis is a better operative risk in the summer than in the winter. Apart from this, we do not think that in this country the incidence of complications is to any extent affected by the season; but the presence of an epidemic, such as influenza, seems to increase the severity of any pulmonary complication which may appear, and may lead to a troublesome infection in a partially atelectatic lobe. It is also very important, of course, to postpone operation should a patient show any evidence of respiratory infection.

6. Treatment of Pulmonary Complications

Prophylactic Treatment.—Satisfactory prophylactic treatment, of course, is what one wishes to obtain. We aim to keep the patient active and his lungs fully aerated during the post-operative period. With this end in view we give pre-operative breathing exercises to each patient so that he will know what is expected of him after the operation. We endeavour to keep his condition good by the performance of a sound operation under a well-administered anaesthetic and to have him in as fit a condition as possible shortly after the operation.

is completed. This enables one to avoid heavy or prolonged sedation. Post-operative breathing exercises are restarted the day after operation, and in most cases heavy percussion of the thorax is allowed to be carried out by the masseuse during the first post-operative day. Movements in bed are encouraged, and our patients are rolled for washing purposes during the first post-operative day, unless their condition is unusually poor. Clinical examination of the chest is carried out daily as a routine for the first few post-operative days, for both diagnostic and therapeutic purposes. We believe that the movement and the activity involved in the clinical examination of the chest have a useful therapeutic effect. Coughing is encouraged by all those who deal with the patient. We endeavour to avoid infection in a collapsed lobe by postponing operation in any patient who has an upper respiratory infection or is in any way unfit. We have also been giving 3 g. of sulphathiazole by mouth three hours before operation, followed by 1 g. four-hourly after its completion, for 24 hours. There is no evidence whatever that this measure is of any use, but it seems reasonable to suggest that it may lessen the risk of infection in a lobe which has some stagnant secretion in the air passages.

Curative Treatment.—Should a pulmonary complication be diagnosed, we rely on frequent breathing exercises and heavy percussion of the chest to assist coughing and expectoration of sputum. We try to keep the patient as active in bed as possible, as movement often forces an unwilling patient to cough. We have occasionally used suction through a tracheal catheter, both as a prophylactic at the end of operation and as a therapeutic measure, when there appears to be difficulty in coughing. It certainly seems to assist subsequent expectoration. Up to date we have not subjected patients on whom a partial gastrectomy has been performed to bronchoscopy within the first few post-operative days. We have, however, used this for patients who have undergone rather less severe operations, and are prepared to consider it in suitable cases in the future.

Discussion

One of the great difficulties in discussing post-operative pulmonary complications is to draw a line between what is a complication and what is not. Hypoventilation, as described by Beecher (1933) and others, is probably universal in patients after this operation. Henderson (1935) refers to "collapse without symptoms" as almost a normal sequel to major surgical operations.

In this series we x-rayed only those who showed some signs on physical examination. In a second series we are now x-raying every patient as a routine during the first or second post-operative day. It seems likely that in assessing this second series we shall find a rather higher percentage of mild patchy atelectasis, which was almost symptomless but was apparent on a radiograph if looked for. Probably few patients have a post-operative course entirely free from cough and sputum, and if one watches carefully enough some slight pulmonary abnormality can be detected. One's complication rate may therefore rise as time goes on, but this should be of little importance if the awareness of these slight abnormalities leads, as it should, to a reduction in the incidence of the more severe post-operative complications. In a second series we rather expect to show a greater incidence in the mildest type of patchy atelectasis.

We believe, however, that the avoidance of the more severe types of post-operative chest complication depends largely on the satisfactory post-operative condition of the peritoneal cavity. No amount of post-operative treatment will prevent those severe chest complications which are due to an unsatisfactory post-operative peritoneal condition.

Summary

The post-operative chest complications in 100 consecutive cases of partial gastrectomy have been reviewed.

A pulmonary complication was detected in 34 cases.

The influence of various factors is discussed.

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TWO VARIETIES OF LEUKAEMIA IN ONE FAMILY

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The aetiology of leukaemia is so obscure that all facts which might ultimately be of value in solving this problem seem worth recording. Leukaemia occurs sporadically, and familial incidence is rare (Whitby and Britton, 1942); hence the presentation of the following notes of the disease, which apparently involved different types of white blood cell, in a brother and sister of middle age. The two patients lived in the same house; there were no other members in the family, and there was no family history of other cases of leukaemia.

Case I

Mr. A., aged 46, was admitted to hospital on Jan. 20, 1942, complaining of a sore throat of six weeks' duration, with loss of weight and general weakness, slowly developing for a number of months. The chief clinical features were marked pallor, tonsillar enlargement with yellowish exudation but no obvious ulceration, cervical adenitis, and slight enlargement of the liver; the spleen was not palpable. Fever up to 100° F. was noted. The pulse rate was 120 to 140 a minute. Death occurred five days after admission, but a necropsy was unfortunately not permitted.

Case II

Miss A., aged 43, entered hospital on April 22, 1944, some two years after her brother, complaining of sore throat, spontaneous bruising over forearms and abdomen, a single epistaxis, and menorrhagia; there were also fatigue and headache of four months' duration. The chief clinical features were a sallow colour of the skin, ulceration of the throat with yellowish-white sloughs on the soft palate and tonsils, a single enlarged lymphatic gland at the right angle of the jaw, subcutaneous haemorrhages on the forearms and abdomen, and microscopic haematuria. Neither liver nor spleen was enlarged. There was fever up to 105° F., with rigors every evening. Pulse rate, 110 to 160 a minute. This patient died in coma six days after admission, and again no necropsy was possible.

Haematology

In Case I only a single blood count was done and a supply of films was taken for staining. The following figures were recorded: erythrocytes, 2,000,000 per c.mm.; haemoglobin, 55%; colour index, 1.4; leucocytes, 201,000 per c.mm. Differential count (1,200 cells): monocytes, 86.8%; monoblasts, 2.5%; lymphocytes, 7.4%; polymorphs, 1.7%; myelocytes, 1.6%. Nucleated red cells were also present, numbering 16 per 1,000 w.b.c.

It is to be noted in the differential count that there was a great preponderance (86.8%) of cells regarded as monocytes. These are contrasted later with the abnormal white cells found in the sister's blood. No sternal puncture was carried out.

In Case II two blood counts were done—on admission and again five days later. Sternal puncture was also performed. Blood examination (April 22, 1944): erythrocytes, 3,110,000 per c.mm.; haemoglobin, 51%; colour index, 0.8; leucocytes, 88,000 per c.mm. Differential count (1,000 cells): myeloblasts, 92.6%; lymphocytes, 6.6%; polymorphs, 0.8%. No promyelocytes or myelocytes were noted. On April 24 sternal puncture was performed; examination of the marrow confirmed the findings in the peripheral blood. Leucoblastic cells greatly exceeded erythroblasts in number, and again 92% of the marrow cells were regarded as typical myeloblasts.

Discussion

Apart from the interest of leukaemia of acute type occurring in middle age and affecting brother and sister living in the same house, the question whether both suffered from the same or from different haematological varieties of the disease requires discussion.

In the blood film of Case I 86.8% of the cells were undoubtedly typical monocytes, the majority of which, however, contained a convoluted nucleus, and were, in fact, identical with blood histiocytes as described by Levine (1934). One of these was seen to have ingested a red cell. The 2.5% of cells regarded as monoblasts contained large, round, densely staining nuclei, some of which showed one or two nucleoli; the cytoplasm, Leishman-stained, was blue and relatively small in amount. It is to be remarked that myelocytes and mature polymorphs together accounted for only 3.3% of the white cells.