

Dr. E. W. CUSHING, of Boston: I do not know whether I understood the reader correctly as saying that the common dysmenorrhea of young women was to be attributed largely to disease of the ovaries. If I did so understand correctly, I beg leave to differ with that view, for it is evident that the simple dilatation of, and putting a stem in, the uterus will in the great majority of cases cure that dysmenorrhea without opening the pelvis. Where there are adhesions following inflammation, it is a very different class of cases. In regard to the removal of cystic ovaries, not ovaries with a cystoma, but with many little cysts in them, I should be very loath certainly to remove both. We have found good — in fact, excellent — results by resecting, but the old method of simply opening the cysts — letting the fluid out by puncture with a needle — is often all that is required. These little cysts are caused presumably by a thickening of the outer wall of the ovary, which does not allow the exit of the ovum and the fluid which accompanies it.

It is a sad and serious thing to remove both ovaries in a young woman. "*Crede experto.*" Menstruation is to her the sign of her womanhood. She soon forgets the pains which seemed to justify the operation, and she grieves over the loss of potential motherhood, and yearns for the baby which she cannot ever have, and often refuses the offer of marriage she would otherwise gladly accept.

I have been through the different stages of which the writer speaks — of the removal of ovaries that should be saved, of the saving of ovaries that should be removed, until I have got to the middle course. But I am persuaded that at present there is a vast number of ovaries removed unnecessarily, a vast number of operations done which do not need to be done, where there is dysmenorrhea. With a heavy subinvolved uterus and all the suffering that goes with it, the tendency now is to lay the blame immediately to the ovary, and, instead of curing the subinvolution and endometritis, and supporting the ovaries, many enthusiasts remove the ovaries and are as proud as Jack Horner of their deed.

In regard to surgery of the tubes, I believe in it. I believe in opening the tubes where there are adhesions around the end of the tube, sometimes removing the end of the tube and splitting it open in order to form a new ampulla and provide for conception. In repairing tubes in that way I have had a number of cases where conception has occurred, although in one or two cases I have been given to understand that the patients wished I had not opened the tube, as conception was unwelcome.

#### POST-OPERATIVE PNEUMONIA WITHOUT MORTALITY IN TWO THOUSAND CONSECUTIVE SURGICAL OPERATIONS AT THE FREE HOSPITAL FOR WOMEN.

BY W. P. GRAVES, M.D., BOSTON.

RECENT reports by Risley and Munro on the frequency of post-operative pulmonary complications at the Massachusetts General and Carney hospitals respectively has suggested a compilation of the following statistics from the Free Hospital for Women, partly for the sake of comparison, and partly to make some further inquiry into the possible factors that may enter into the causation of these complications. The present series of cases dates from a time when accurate anesthesia records were instituted, and the number 2,000

was chosen for the sake of convenient comparison with the two reports mentioned above. Of these cases, 550 were uncombined laparotomies, 539 were laparotomies combined with vaginal and plastic operations, 65 were breast operations and the remainder were mostly plastic. This gives, therefore, a total of 1,089 laparotomies to serve as a basis of comparison with the statistics of Risley and Munro, each of whom analyzes 1,000 laparotomies; while it gives 911 cases not laparotomies as a basis of comparison with 920 cases not laparotomies reported by Risley.

The methods of administration of the anesthesia were as follows:

Gas and ether with the Bennett inhaler 259 times, anesthol with the open cone 6 times, ether by the drop method 124 times, ether with the open cone 1,591 times. The anesthetic, though for the most part given by medical students, who had short terms of service, was in every case under constant skillful supervision, so that in a partial sense its administration may be regarded as expert. Malinekrodt's ether was used in all cases. Of the 1,089 laparotomies, 20 developed pulmonary complications, of which 8 were bronchopneumonia, 3 were pleurisy and 9 were bronchitis. Of the 911 cases not laparotomies, 2 developed pulmonary complications, 1 being a pleurisy and 1 a bronchitis. The following is an analysis of the Free Hospital cases.

#### BRONCHITIS.

1. Resection of ovaries. Open cone. Bronchitis beginning third day after operation and lasting twenty-four hours.

2. Curettage, myomectomy, ventral suspension. Bennett inhaler. Bronchitis beginning second day after operation and lasting five days.

3. Amputation of cervix, vaginapexy, appendix. Open cone. Bronchitis beginning day following operation, lasting three days.

4. Appendectomy and internal shortening of round ligaments. Open cone. Bronchial cough starting immediately on recovery from ether and lasting through convalescence. (This patient had a small area in the right apex on entrance which indicated an old tuberculosis.)

5. Anterior and posterior colporrhaphy, ventral hernia. Open cone. Bronchial cough started four days after operation, lasting through convalescence, with slight evening temperature. (This patient had evidence of an old tubercular process of the right apex.)

6. Ventral and left inguinal hernias, appendectomy, Whitehead's operation. Open cone. Bronchitis starting three days after operation, cough lasting ten days. Stitch abscess in abdominal wound.

7. Internal shortening of round ligaments, appendectomy. Open cone. Bronchitis starting day following operation, lasting four days.

8. Fistula in ano. Open cone. Bronchitis beginning day following operation, lasting two days. Sepsis in wound.

9. Double salpingectomy, appendectomy, myomectomy, ventral fixation. Bronchial cough

beginning day following operation, lasting four days. Open cone.

10. Inguinal hernia, appendectomy, ventral suspension. Open cone. Bronchitis starting up on ninth day. (Previous tubercular history.)

#### BRONCHOPNEUMONIA.

1. Hysterectomy for pelvic inflammation. Bennett inhaler. Poor recovery from ether. Bronchopneumonia starting fourth day following operation lasting ten days. Sepsis of wound.

2. Hysterectomy and perineorrhaphy. Open cone. (Patient cyanotic and vomiting during operation.) Bronchopneumonia starting on third day and lasting two weeks.

3. High amputation of the cervix, ovariectomy, vaginapexy. Open cone. Bronchopneumonia beginning seven days following operation and lasting eighteen days. (Patient sixty-eight years old.)

4. Appendectomy, Gilliam's operation. Open cone. Bronchopneumonia started day following operation, lasting seventeen days. Sepsis of wound eleven days after operation.

5. Hysterectomy and appendectomy. Open cone. Bronchopneumonia beginning day following operation, lasting five days.

6. Inguinal hernia, myomectomy, salpingectomy. Open cone. Bronchopneumonia beginning day following operation, lasting thirteen days.

7. Anterior and posterior colporrhaphy, appendectomy, ventral fixation. Open cone. Cyanotic and vomiting during operation. Bronchopneumonia beginning three days after operation, lasting six days. Parotiditis on seventh day after operation.

8. Amputation of cervix, resection of ovaries, appendectomy, vaginapexy, perineorrhaphy. Open cone. Bronchopneumonia beginning two days after operation, developing into empyema. (Patient very sick.) Operation for empyema. Eventual recovery.

#### PLEURISY.

1. Double salpingo-oöphorectomy. Open cone. Pleurisy beginning day following operation, lasting two days.

2. Ovariectomy, myomectomy, appendectomy. Open cone. Pleurisy beginning day following operation and lasting four days.

3. Internal shortening of round ligaments, appendectomy. Open cone. Pleurisy beginning six days after operation, lasting three days.

4. Cervical operation for antelexion. Open cone. Pleurisy beginning four days after operation, lasting three days.

A comparative table of figures from the three reports follows.

In the Massachusetts General and Free Hospital series each includes 3 previously tubercular cases which had post-operative flare-ups. In the Carney Hospital series, previously tubercular cases are excluded. It will thus be seen that the actual percentage of occurrence of post-operative lung complications does not differ very greatly in the three reports, although the Carney and

Free hospitals appear to have some advantage over the Massachusetts General. This shade of difference is undoubtedly accounted for by the fact that in the Massachusetts General series a considerably larger number of cases were oper-

	No. Cases.	Total Pulmonary Complications.	Pneumonia.	Bronchitis.	Deaths.
Massachusetts General:					
Laparotomies,	1,000	22	15	7	9
Not laparotomies,	920	5	Not stated		2
Carney:					
Laparotomies,	1,000	15	11	4	4
Free Hospital:					
Laparotomies,	1,089	20	8	12	0
Not laparotomies,	911	2	0	2	0

ated on in the presence of pus, or were desperately ill before operation. The higher percentage of mortality in the Massachusetts General may also be accounted for in the same way. A comparative study of the three series cannot but convince one that cases previously septic or desperately ill before operation are somewhat more susceptible to pulmonary complications, and, in case they do contract such complications, are decidedly more subject to a fatal termination. The absence of mortality in the Free Hospital cases confirms Risley's observation that post-operative pneumonia or bronchitis in clean cases is of shorter duration and of a less serious nature than in septic cases, the majority of the Free Hospital cases being clean cases.

In order to compare the results of the three Boston hospitals mentioned in this report with the results in some of the foreign clinics, I have extracted some figures collected by Dr. John Homans and published in an article by him in the *Johns Hopkins Bulletin*, April, 1909.

Reference.	No. of Laparotomies.	Mortality Due to Lung Complications. Per Cent.
Korte (Bibergeil),	3,909	3.5
Czerny,	1,302	3.9
Von Angerer (Gebele),	1,196	6.43
Kümel (Grimm),	1,754	2.5
Von Mikulicz (Henle),	1,787	8.0
Von Mikulicz (Kausch),	1,881	2.4
Krönlein,	1,409	0.56
Trendelenberg (Läwen),	1,829	5.4
Lexer (Wolff),	976	12.5

It will thus be seen that the figures of the three Boston clinics have a decided advantage over those of the foreign clinics with the exception of Krönlein's. As Homans points out, Krönlein took extraordinary precautions of all kinds to avoid post-operative complications. The ether in all his cases was given by an expert anesthetist by the open method. Another set of figures also taken from Homans's article, the source of which is not stated, is shown in the table on the following page.

The last item in this table quotes 3,280 gynecological cases, and presumably represents in general the class of cases reported in the present article from the Free Hospital for Women. It, therefore, presents an opportunity to compare the Free Hospital cases with at least one other clinic of a similar nature.

Operations.	No. of Cases.	Died.	Died of Lung Complications.	Percentage of All Deaths Due to Lung Complications.
Stomach,	2,176	623 (28.63%)	181 (8.31%)	29.05
Bile passages,	1,042	132 (12.66%)	20 (1.92%)	15.15
Hernia,	1,601	60 (3.74%)	15 (0.93%)	25.00
Goiter,	3,526	34 (0.96%)	15 (0.42%)	44.00
Gynecological,	3,280	257 (7.83%)	50 (1.53%)	19.45

In order to make a more specific comparison between the Free Hospital cases and the cases designated as "gynecological" in the last item of the above table, I have analyzed 2,000 other cases from the Free Hospital for Women operated on consecutively before the beginning of the series which forms the subject of this paper. I find in this set of 2,000 cases that post-operative pulmonary complications occurred 15 times, of which 6 were pneumonia, 2 were pleurisy and 7 were bronchitis, figures which show a percentage of occurrence very similar to that of the other series of 2,000. In this second series, however, there were 2 deaths from pneumonia. One of the cases which had a pleurisy following the operation is reported in the records to have died some time after of tuberculosis of the lungs. Although I have not included this in the number of deaths, as the patient's physical examination was negative when she left the hospital, yet there is certainly some reason to suppose that the operation might have had some influence on the process. If we combine the two Free Hospital series, we will find that, out of 4,000 consecutive cases, 37 contracted post-operative pulmonary complications, from which 2 died, giving a 0.05% mortality from lung complications in the entire series. It is also of interest to note that the total mortality from all causes in the 4,000 cases, over half of which were laparotomies, is 0.97%. A comparison, then, with the gynecological cases quoted from Homan's article is as follows:

	No. of Cases.	Died.	Died of Lung Complications.	Percentage of All Deaths Due to Lung Complications.
Gynecological cases quoted by Homans,	3,280	257 (7.83%)	50 (1.53%)	19.45
Free Hospital cases,	4,000	39 (0.97%)	2 (0.05%)	5.4

It is of interest to study the present series of cases with reference to some of the more commonly assigned predisposing causes of pulmonary complications.

Operative shock has been suggested as a predisposing cause of post-operative pneumonia. A glance at the list of operations in the present series shows that few of them were of a very serious nature; in fact, only one of the cases (No. 1, bronchopneumonia) suffered shock from the operation. The operations of extreme gravity and those in which profound shock took place were singularly free from lung complications.

The method of administration of ether is claimed to have an important bearing on the occurrence of post-operative complications, many writers, among them Munro, claiming great advantages for the drop method. By far the greater majority of the cases in the Free Hospital series were anesthetized by the open-cone method, and the resultant figures of occurrence and absence of

mortality go to show that the method of administration is not an important factor in causation.

The length of time of anesthesia administrations does not seem from this series of cases to be an important causative element. The majority of the 2,000 operations were long cases involving, usually, several operations under each anesthesia, 539 of them being combined abdominal and vaginal operations.

The average length of time per operation would undoubtedly exceed that of a large general surgical hospital; nevertheless, the occurrence of lung complications is not greater.

The age of the patient apparently is of little importance in calculating the chances of post-operative pneumonia, unless the age be considerably advanced, in which case the patient, of course, would be more susceptible to whatever may be the real causative element. Of the 22 cases, one patient was sixty-seven years old and one was sixty-eight. As the total number of operations on patients of this approximate age was not great, the occurrence of the two lung complications constitute a fairly high percentage and confirms the obvious apprehension that in operating on elderly people the danger of post-operative pneumonia must always be considered. On the other hand, there was no case of lung complication between the ages of forty-nine and sixty-seven, although a large number of patients of that period of life are included in the series. Fifteen of the cases suffering lung complications were

under forty, while the average age was thirty-seven, which is approximately the average age of the entire series of the 2,000 cases.

The physical type of the patient is something which every surgeon naturally takes into consideration. The stout, short-necked patient, who is difficult to etherize, inspires a certain amount of apprehension as to post-operative pneumonia. An analysis of the 22 cases gives the following: Only 6 were large and fat, 8 were of medium physique, and 8 were small and thin, thus leaving the fat cases considerably in the minority.

Bad behavior under ether, such as cyanosis and vomiting, which depends sometimes on the physical characteristic of the patient, but more often on an unskillful administration of the anesthetic, does not seem to play an important part. Only 2 of the 22 cases are recorded as having taken ether badly.

Risley lays considerable stress on the preparation of the mouth as a preventive measure. Prac-

tically all of the 2,000 cases in this report had a thorough preparation of the mouth before operation. This fact may possibly account to some extent for the less severity of the lung complications in this series.

Wound sepsis in conjunction with post-operative lung complications is sufficiently common to attract serious attention. Of the 22 cases, 4 had sepsis in the wound, while one had parotiditis. This gives a 20% occurrence of wound sepsis. As the percentage of wound sepsis in the entire 2,000 cases is approximately 5%, some definite relationship between lung complications and wound sepsis is at least suggested. Septic embolism from infected wounds to parts of the body other than the lungs is occasionally seen where there is no doubt as to the process, the most striking example being the occasional occurrence of acute endocarditis following local sepsis. It seems, therefore, probable that some of the cases of post-operative pneumonia are caused by the lodging of septic emboli in the capillaries of the lungs, starting from a local sepsis of the wound. This theory, however, can account for only a small number, as in the majority of cases of lung complications there was no local sepsis, while in most of the cases of sepsis in this report the pulmonary complications antedated the appearance of the local wound infection; moreover, post-operative pneumonia is rare during the summer months, while wound sepsis is more apt to occur in hot weather than in cold.

Homans, in his article cited above, classifies pulmonary complications in three groups, namely: Ether pneumonias, hypostatic pneumonias and embolic pneumonias. All of the 22 cases of pulmonary complications reported in the present article were examined by me personally, and I was able to make no distinguishing classification between the various forms that appeared; in fact, the process seemed to me similar in every one of the cases, the more severe cases going on to a bronchopneumonia, the less severe stopping with a temporary bronchitis or pleurisy. The onset was similar in all the cases. The average time of onset was three days, whether all the cases be taken collectively or each of the three separate types individually. There was no case which resembled an infarction, and I did not observe the close resemblance to thrombosis and embolism pointed out by Homans in some of his cases.

One of the cases which died of pneumonia in the series of 2,000 cases cited above taken from the Free Hospital records previous to the present series closely resembled the type of case described by Homans as embolic. I did not see the case personally, but from the history I should unquestionably classify it thus. An additional reason for this case to be regarded as of the embolic type is that pneumonia occurred in a very septic patient during the month of June at a time when post-operative pneumonia of the ordinary type is comparatively rare.

One of the most striking factors that appears in the study of these cases, and one that is observed by all writers of the subject, is the occurrence with

rare exception of post-operative pneumonia only in the cold weather months, that is, from November to April. The possible bearing of this factor on the causation will be referred to later. Another constant observation in the study of post-operative pneumonia is that, in patients having a tubercular or bronchitic focus in the lungs, the process is almost invariably lighted up. This is a most important fact and is at once suggestive of the possibility that the irritative action of ether on the normal respiratory tract has little, if any, deleterious effect, but that where there exists at the time of operation an inflammatory focus in some portion of the bronchi or lung, the irritative action of the ether may be sufficient to light it up into a more extensive and serious process. This theory has considerable support in the fact that post-operative lung complications occur almost universally in the cold weather months at a time when non-operative bronchitis and pneumonia are most common. Dr. Munro states in his article that the post-operative lung complications may be merely a matter of chance. Is it not reasonable to agree with him that it is a matter of chance, and that this chance is a pre-existing focus of infection, which might or might not have developed into a more extensive process, but which receives an added stimulus from the irritative effect of the ether? It is not unlikely that many of the cases of post-operative pneumonia had local foci, which might have been detected by expert examination before operation. It must be conceded that the physical examination of the lungs in public hospitals made as a routine before surgical operations is not usually of the expert or even of the careful type. The number of hospital cases who during the winter months develop bronchial colds while waiting for operation supports also to some extent the reasonableness of this theory. These cases, if operated on immediately on entrance to the hospital, before the bronchial affection had made itself evident, would be recorded as cases of post-operative lung complication when the bronchial cold did develop. Considering the effect which ether has on a previously tubercular or bronchitic process, it may well be conceded that in a case like the one just cited, especially if the patient were septic or old and feeble or desperately sick from some other cause, with a resultant lowering of resistance, ether might stimulate to a serious condition of bronchopneumonia a local focus of infection which might under other circumstances terminate only in a bronchial cold.

The theory that post-operative lung complications are commonly caused by the stimulation of pre-existing foci of infection in the lungs is well illustrated by two cases taken from the series of 2,000 cases preceding the series which forms the subject of this paper. The first case is one whose entrance examination of the lungs is recorded as negative. This patient developed a pleurisy soon after the operation. Several months later she died of tuberculosis of the lungs, though apparently well when she left the hospital. One is

inclined to believe that this patient's death was ultimately due to the lighting up of a pre-existing tubercular focus, which might possibly have been detected before the operation. The second case was one who on entrance to the hospital had a well-marked bronchitis. Operation was deferred until it was supposed that she had recovered. A lobular pneumonia developed two days after the operation, from which the patient recovered. This is a most striking example of the way in which an ether anesthesia may light up a pre-existing bronchitic infection, for it is perfectly obvious that the patient had not completely recovered from the bronchial cold from which she was suffering on entrance to the hospital.

There is still one other important factor which appears in all reports on this subject, namely, the greater occurrence of post-operative complications in abdominal operations. The Free Hospital series shows a difference of 10 to 1 in frequency over non-abdominal operations, while Risley's report shows a difference of more than 4 to 1. Operations which require considerable handling of the gut figure prominently in all the post-operative pneumonia reports, especially in that of Risley. This greater frequency of post-operative pneumonia in cases of abdominal section may be used as a further argument in our theory of causation. It is sufficiently well known that the reflex respiratory irritation from ether is much greater during laparotomies than during other operations not laparotomies, and especially in cases where there is considerable handling of the gut or injury to the peritoneum. Abdominal cases not only require more ether, but a more forced administration. In a case, therefore, of a pre-existing focal infection in some part of the bronchial tract, a greater irritative effect by the ether on this infected focus would be exerted during a laparotomy than during an operation elsewhere.

A comparison of the Free Hospital cases with the classified cases taken from Homans's article would show that post-operative pneumonia is less frequent following pelvic operations than it is after operations performed higher in the abdomen. The highest percentage of occurrence seems to be following operations that are performed near the diaphragm. The theory has been advanced that the greater occurrence of pneumonia after these operations is due to an infection which takes place directly through a system of lymphatics which has been demonstrated as existing between the abdominal and pleural cavities. It seems to me more reasonable to assume that in operations near the diaphragm there is greater irritation of the respiratory tract.

It is possible that the excellence of the Free Hospital figures may partly be due to the extremely careful preparation which all laparotomies receive before operation. By this preparation, which begins two days before the operation, every patient, unless an emergency case, comes to the operating table with the intestines almost completely collapsed, and the packing off of the intestines necessary for pelvic operations is com-

paratively simple and can be done with a minimum amount of gauze. In this way there is no forcible handling of the intestines, and only a small part of the intestinal peritoneum comes in contact with the irritating surface of the gauze sponges. Etherizers are instructed to have their patients deeply anesthetized immediately before the packing off of the intestines, a process which, if done with the patient partially anesthetized, causes a great amount of reflex irritation and much violent handling and pushing of the intestines. In order to insure the perfect anesthesia of the patient before the surgeon makes his incision, all the table preparation is done with the patient in the Trendelenberg position. If this is not done, the sudden turning of the patient into the Trendelenberg position is liable to start up an irritating reflex of the respiratory tract.

#### CONCLUSIONS.

1. Post-operative lung complications occur somewhat more frequently and are more fatal in cases previously septic or desperately sick or in the aged and feeble.
2. Operative shock, method of administration, length of time of the anesthesia, age of the patient unless extreme, physical type of the patient, bad behavior under ether, wound sepsis, pulmonary embolism, do not seem to bear any constant relationship to the causation of post-operative pneumonia.
3. Post-operative pneumonia and bronchitis occur with great constancy during the cold weather months, and are rare during the summer months.
4. Pre-existing foci of infection in the lungs are almost invariably lighted up or aggravated by operations under ether anesthesia.
5. The following theory of causation is suggested by the writer. Most of the cases of post-operative lung complications are caused by the lighting up or the aggravation of pre-existing focal infection.
6. Many post-operative pneumonias might be avoided by a more careful and more expert pre-operative examination of the respiratory tract.

### AN ANALYSIS OF SEVENTY-TWO CASES OF PNEUMOTHORAX.

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IN 1900 the cases found in the medical catalogue of the Boston City Hospital for the previous eighteen years were analyzed,<sup>1</sup> and it is instructive to compare these cases with similar cases from the same services during the succeeding ten years, from which I have collected in a similar manner 55 cases, and have added 17 others from the surgical, x-ray, contagious and autopsy records.

As the services are not greatly larger now than when Dr. Morse's statistics were collected (averaging about 150 on the medical services), it is evident either that the condition of pneumothorax occurs

<sup>1</sup> John L. Morse: *An Analysis of Fifty-One Cases of Pneumothorax*. Am. Jour. Med. Sci., May, 1900.