

tion of this observation. If in time of danger from epidemic poliomyelitis, adequate supplies of human convalescent serum were available, they could doubtless be employed for purposes of passive immunization.

There remains one more matter of practical importance to touch upon. As you will learn from Dr. Aycock's presentation, the specific serum treatment of early poliomyelitis is carried out by injecting the serum into the subarachnoid space and into the blood of patients. It is customary to make a second intraspinal injection when practicable. The question which Stewart and I undertook to answer is whether the effects of the serum so injected passed off quickly or endured for a time. We found that when 2 cubic centimeters of convalescent serum are injected by lumbar puncture, monkeys are protected against intracerebral inoculation of the virus for at least four days. I am, therefore, of the opinion that while the first intraspinal injection is essential, the second may not be so, and that the continued presence of immune serum in the nervous tissues may be sufficiently provided for by the convalescent serum which has been injected into the blood.

SALPINGITIS *

CHARLES E. FARR and ROBERT E. FINDLAY

A detailed study has been made of all the cases of salpingitis admitted to the First Surgical (Cornell) Division of the New York Hospital from January, 1914, to December, 1927, inclusive. The cases number 545. A simple classification has been adopted as follows:

1. Acute
2. Acute exacerbation
3. Chronic
4. Tuberculous

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Of all the cases of salpingitis admitted, 545 as above stated, 115 or 21 per cent were acute, 114 or 21 per cent were acute exacerbation, 293 or 54 per cent were chronic, 26 or 5 per cent were tuberculous.

AGE

Salpingitis occurred in this series in individuals as young as eleven and as old as sixty. The average age was 29. Four patients were under 16 years of age. Three of them had never menstruated. Even in these, however, it is doubtful if the tubal infection followed on a juvenile vulvo-vaginitis. A careful study of the incidence at various ages reveals no data of significance.

The marital history was investigated but without results; 420 patients claimed the marriage state; 83 were single; 37 were widows and 5 were divorced. It would not be wise to place too much credence in these data.

The occupations of these 545 women were studied carefully but nothing of any great interest was found; 308 women claimed to be house-wives or were engaged in house work; 59 were domestic servants; 36 were factory workers; 10 were actresses; 9 were telephone operators; 7 were dressmakers; 7 were stenographers; 6 were clerks; 4 were school teachers and the others were scattered.

The symptomatology and laboratory signs of salpingitis were next investigated as follows:

LEUCOCYTOSIS

A leucocytosis was present in practically all cases on admission, the general average count being 14,500 with 80 per cent polymorphonuclears. The highest was 45,000; the lowest 4,500. The highest polymorphonuclear count was 98, and the lowest, 34.

In acute salpingitis the highest count was 45,000; the lowest, 7,000; the average, 17,000, with the polymorphonuclear percentage ranging from 98 to 61, and giving an average of 84.

Acute exacerbation gave a leucocytosis from 36,000 to 8,000, with an average of 17,000. The polymorphonuclear percentage ranged from 95 to 64, with an average of 83.

Chronic cases yielded a leucocytosis ranging from 28,000 to 4,500, with an average of 11,000. The polymorphonuclear percentage ranged from 90 to 34, with an average of 74 per cent.

Tuberculous salpingitis also showed a leucocytosis ranging from 23,000 to 6,000, with an average of 12,500. The polymorphonuclear percentage ranged from 88 to 67, with an average of 79.

From a combined study of these figures it is seen that there is a leucocytosis in practically all instances of salpingitis, even of the chronic and tuberculous type. This leucocytosis seems relatively high for the amount of pyrexia present in the average case. It is also in our opinion somewhat higher than that seen in similar types of appendicitis. The polymorphonuclear count is high in all forms, even the tuberculous.

FEVER

It is noteworthy that nearly all salpingitis patients whether acute or chronic have some fever. In our series the highest was 105.2, the lowest 97.6, average 99.5. Average for acute cases was 101.3. For the acute exacerbation the average was 101.1, for the chronic cases the average was 98.1. In the tuberculous types the average was 100. These are all initial temperatures. We believe that a comparison of a similar series of appendicitis in women for corresponding ages would show that salpingitis as a rule gives a higher temperature reaction than appendicitis.

HISTORY, SYMPTOMS AND PHYSICAL SIGNS

The history, while of the utmost importance in salpingitis, is also extremely hard to obtain accurately. Many of these women are ignorant, many are careless, and not a few are distinctly adverse to giving an accurate history.

It is important to gain the confidence of the patient and by tactful questioning obtain any history which directly or indirectly would indicate an infection of the tubes. In our series the average remote onset was four and one-half months before admission to the hospital, while the duration of the present illness varied from a few hours to three months with an average of twelve and one-half days.

Considerable stress should be laid upon the chief complaint as stated in the history, especially if the history be well taken. It is noteworthy that nearly 44 per cent of all patients complain of their nausea or vomiting or both. Nearly 10 per cent more complain distinctly of indigestion, that is complaints of heaviness in the epigastrium, heart-burn, gastric distension, belching of gas and sour material. These complaints strongly simulate peptic ulcer or cholecystitis rather than appendicitis.

An interesting complaint was that of headache, which occurred in 14 per cent of our salpingitis series. This was a distinct complaint and evidently of ovarian origin.

Dysuria was found in only 18 per cent, while urinary frequency was present in only 12 per cent. This is an interesting contrast to what we are generally taught; that dysuria and urinary frequency are cardinal signs of infection of the genital tract.

A history of gonorrhoea could be obtained in only 3 per cent of the series. This was almost invariably blamed on the husband.

A complaint of vaginal discharge was found in 64 per cent. In many instances this was but a slight leucorrhoea but, of course, a majority had a considerable amount of yellowish discharge, with occasionally a foul odor. It is interesting to note that 36 per cent gave no history or manifestation of vaginal discharge. This again is contrary to the usual teaching.

Dysmenorrhoea was present in only 22 per cent and as other pelvic pathology in the same cases could easily account for the dysmenorrhoea it could hardly qualify as a

cardinal symptom of salpingitis—indeed irregular menstruation is considerably more frequent, being found in 31 per cent.

THE LOCATION OF THE COMPLAINT OF PAIN

No points of especial interest or value were found in a careful analysis of this series. The pain was in both lower quadrants in 48 per cent, in the right lower quadrant in 31 per cent, in the left lower quadrant in 17 per cent. It was present also in the back in 32 per cent. An interesting observation was the presence of pain in the epigastrium in 4 per cent. This is quite a marked point in differentiation from appendicitis in which a very great majority have initial pain in the epigastrium. In appendicitis these gastric pains quickly radiate to the right iliac fossa and disappear from the epigastrium, while in salpingitis, if the pain is in the epigastrium, it usually remains there without radiation.

Other interesting factors obtained from the history were vaginal bleeding in 43 cases; chills in 74; the complaint of fever in 73; sweats in 9; menorrhagia in 9; metrorrhagia in 11; occurrence after the menopause in 3, before puberty in 3, during pregnancy in 3, and associated with syphilis in 9.

In only 72 of our series was there a history of immediately preceding operation, miscarriage or delivery. Thus 13 per cent of the series may be puerperal but even in these it was impossible to determine the presence or absence of gonorrhoea.

TYPE OF PAIN

An attempt was made to elicit from the patients a descriptive word or two as to the type of pain. Nothing of special value was brought out however. The pain was called "cramplike" in 17 per cent. In 6 per cent it was intermittent. It was stated to be distinctly worse on exertion in 8 per cent, and was described as "sharp" in 3 per cent. Painful defecation was mentioned in 2 per cent and

a falling sensation in 1 per cent. Many other descriptive terms were used but not in sufficient numbers to have any clinical significance.

Many other complaints were mentioned such as loss of weight, flatus, hot flashes, diarrhea, green stools, urinary retention, sterility, constipation, hemorrhoids, etc.

PHYSICAL FINDINGS

The most important physical sign in salpingitis is abdominal tenderness. This was present in 83 per cent, being present in both lower quadrants 41 per cent; in the right lower quadrant 28 per cent; in the left lower quadrant 16 per cent; the others were scattered. In marked contrast to this and also in very marked contrast to the signs of appendicitis, abdominal rigidity was noted in only 25 per cent in the entire series.

Vaginal examination revealed tenderness in the fornices—bilateral 40 per cent; right fornix 16 per cent; left fornix 11 per cent.

Masses were found by vaginal examination in 38 per cent. These were situated as follows: Both lateral fornices 8 per cent; right fornix 15 per cent; left fornix 11 per cent; cul de sac 7 per cent.

An interesting observation was the presence of abdominal distension in only 9 cases. This is hardly credible and must be due to lack of careful observation. However, it is quite probable that abdominal distension is much less marked in salpingitis than in appendicitis.

Abdominal masses were found in over 8 per cent. This is an important finding as one does not ordinarily expect to feel abdominal masses in salpingitis.

DIAGNOSIS

The diagnosis of salpingitis can be made in a very large percentage of cases with great ease both from the history and the physical signs but a considerable percentage offers

much difficulty. We would emphasize the importance of the history and the fact that it must be taken with great care and with tact in order to obtain anything like a true picture. Fifty-four per cent of our series were easily diagnosed; 13 per cent more were fairly easy; 5 per cent were in doubt, but probably were salpingitis; 14 per cent were difficult, but were classed as salpingitis eventually, while 7 per cent were wrongly diagnosed either through carelessness or indefinite or incomplete histories and physical examinations, or what is far more probable, because the symptoms and physical signs did not give a clear indication of the real pathology.

DIFFERENTIAL DIAGNOSIS

The chief difficulties in differential diagnosis are to distinguish salpingitis from appendicitis, ectopic gestation, and cystoma of the ovary. Many other pathological conditions may also simulate salpingitis and are not infrequently a complication of it.

Naturally appendicitis in one of its many forms offers the chief difficulty in diagnosis. In 19 per cent of all our cases this had to be considered, whereas the possibility of ectopic gestation was considered in 7 per cent; cystoma of the ovary in 7 per cent; fibroid of the uterus in 6 per cent; retroversion in 5 per cent. Many other possible complications were also considered. Endometritis and ureteral colic were not uncommon in this series.

INDICATIONS FOR OPERATION

Eighty per cent of all our cases were operated upon. Of the acute cases 70 per cent were operated upon and of the acute exacerbation, 83 per cent; 82 per cent of the chronic cases were subjected to operation, and all but one of the tuberculous.

From a careful survey of our results and those of other operators it may be stated with considerable surety that acute salpingitis should never be operated upon; that acute exacerbation should not be operated upon; that

chronic salpingitis, except the tuberculous, should be operated upon; and that the tuberculous should never be subjected to surgery until every other therapeutic resource has been exhausted.

OPERATIVE PATHOLOGY

There was no special enlightenment from the exhaustive study, from the findings at operation, nor the methods of operative surgery; nor did we obtain any great amount of knowledge from the cultures and smears from the tubes. This is readily understood because the tubes become sterile within a few weeks of the onset of the infection.

The question of drainage is quite important. Our records show that drainage is used much more rarely in recent years—the average being 20 per cent for the entire period. It is believed that drainage can be dispensed with in all cases except those with oozing surfaces or with large accumulations of fibrinous exudate.

Involvement of the ovaries was present in a very large proportion of our cases. This caused partial oophorectomy many times. It was rare indeed that both ovaries were removed.

The appendix was removed in 287 instances but only in a small proportion was there a definite acute disease of the appendix. A few showed acute appendicitis in addition to the salpingitis and one was tuberculous. Many other incidental complications were found but none of any special etiological significance. The most common were endometritis, retroversion, fibromyoma and ectopic pregnancy.

Wound healing in general proceeded normally but a moderate infection occurred in 14 cases. General peritonitis was present in 28. A fecal fistula formed in 7 and peritoneal adhesions were noted in 16. Many other incidental complications were noted.

Pulmonary embolism occurred in 2 cases; lobar pneumonia in 2; broncho-pneumonia in 2; pulmonary tuberculosis was present in 4 instances.

There were two deaths on the table from ether narcosis.

MISTAKES IN DIAGNOSIS

In 70 per cent of our cases salpingitis was correctly diagnosed. In 3 per cent diagnosis was not made, or at least not posted on the chart. In 27 per cent the diagnosis was incorrect. The proper diagnosis in these latter cases should have been: Appendicitis—53; retroversion—18; ectopic gestation—15. In 13 cases the tuberculous nature of the salpingitis was not recognized.

WHEN TO OPERATE

The rules for operation in salpingitis on the Cornell Division of the New York Hospital are as follows:

1. Acute cases should never be operated upon. This, of course, is subject to an exception where there is a reasonable doubt as to the diagnosis, and particularly when appendicitis or ectopic gestation are possibilities. In case of doubt, we usually operate, but frequently if we find very acute salpingitis, we close the abdomen without attempting to remove the tubes. This may cause a later operation but the mortality is much lower.

2. Operation is not indicated even in a general peritonitis following salpingitis. Practically all cases will recover under conservative treatment.

3. If the salpingitis is not a very severe process it is advisable to remove the tubes even though they are acutely inflamed. The only exceptions are in young girls and those who are especially anxious to have children.

4. In acute exacerbation it is unwise to operate just as in the acute cases. It is better to wait five days after the temperature has reached normal.

5. It is wise to remove all chronically inflamed tubes if there are no contra-indications. This is especially true when tubes are closed.

6. Tuberculous tubes in general should be allowed to quiet down and then be given every possible hygienic care before operation is advised.

MORTALITY

In this series there were 15 deaths, giving a general mortality rate of 2.75 per cent and a post-operative mortality rate of 3.42 per cent. This includes all fatal issues while the patient was still in the hospital. Twelve of the fifteen deaths were in patients operated upon during active infection. This gives a mortality rate of 9.45 per cent for the acute cases. When one considers that the mortality rate in acute appendicitis is about 5 per cent it is readily seen why operation in acute salpingitis is most unwise.

Causes of death were as follows: 9 from general peritonitis; 4 sudden deaths on the operating table (a comparison of one sudden death on the operating table in 1500 cases of acute appendicitis); 1 of intestinal accident obstruction; 1 acute dilatation of the stomach; 1 cerebral; 1 lung abscess.

There were only 22 (5 per cent) secondary operations in this series during the hospital stay. They were almost entirely for the relief of residual abscesses. There was one intestinal obstruction and one ectopic pregnancy. There was one immediate post-operative hernia and one fecal fistula.

The post-operative results are very interesting but our data are not as accurate as could be desired. These women did not coöperate to anything like the extent that other similar groups did in our service.

Three per cent developed post-operative ventral hernia. Nine of these herniae followed abdominal drainage. The

question of post-operative pregnancy was studied as carefully as our records permitted but we are unable to give any light on this subject. Sixteen reported pregnant, but of these three only had living children; 4 developed ectopic gestation; 2 had miscarriages; 6 were too early in pregnancy at the time of examination to be sure of the result. Forty per cent of our series returned and were judged as giving satisfactory results. A further 20 per cent were considered satisfactory but with complaints of a minor character; 18 per cent were not traceable; 13 per cent were re-admitted for one complaint or another, usually of a pelvic nature. Ten per cent were uncoöperative and no post-operative records were made.

CONCLUSIONS

Salpingitis is a serious disease. Its diagnosis is not easy and treatment requires much surgical skill and judgment. Acute cases should never be operated upon. There should practically be no mortality in chronic cases. The end results are fairly good, considering the nature of the disease and the many complicating factors.

LUNG ABSCESS

SOME ASPECTS OF ETIOLOGY AND MEDICAL TREATMENT *

JAMES ALEXANDER MILLER

ETIOLOGY

The generally accepted idea of the etiology of pulmonary suppuration has been that it follows certain cases of pneumonia in which, because of certain conditions in the lung little understood, necrosis and suppuration result instead of the more usual process of resolution.

* Delivered before the Sections of Laryngology and Rhinology, and Medicine, November 28, 1928.