APPENDICITIS.

AN ANALYSIS OF 157 CONSECUTIVE CASES WITH SPECIAL REFERENCE TO THE PATHOLOGICAL & CLINICAL VARIETIES.


by


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INTRODUCTION.

During the last decade no subject has been more discussed among medical men than that of Appendicitis. It has been aptly described as the most treacherous of diseases, & not withstanding the vast amount of time which has been given by many eminent men to solving the causes, diagnosis, & best line of treatment to adopt in each individual case, there still remains a great amount to be demonstrated, which will give all medical men, & especially the general practitioner - who sees the early cases definite & reliable guidance on the lines of treatment, either medical or surgical, the results of which will be more in unison than they are today.

The history of Appendicitis is very voluminous, a resumé of which need not be given here, but it is only during the last 25 years that operative interference has been the chief form of treatment, & the disease recognised as a distinct entity.

Sir Frederick Treves who did most of the pioneer work in this country, writes in the First Edition of Allbutt's "System of Medicine" the article on Appendicitis, & there uses the title of "Perityphlitis" although recognising that in most cases of inflammation in the right iliac fossa, the appendix was the principal source of infection.

For centuries medical men had noticed while performing autopsies that the Appendix was the seat of inflammation in a great many obscure abdominal diseases, but no-one had removed the Appendix by a deliberate laparotomy until 1848 when
Hancock operated on a woman for peri-appendicular suppuration, with a good result.

Prior to this however many surgeons incised & drained abscesses in this region, also with good results, but in no case was the abscess recognised to be rising from the inflammation of the appendix itself.

The number of cases operated upon has increased rapidly from 1890, until now it is the most frequently performed major operation in surgery.

The importance of appendicitis is undoubtedly increasing every day, chiefly from the clinical point of view, because the diagnosis of such a condition demands treatment along very different lines from the diseases with which it is so apt to be confused, & unless the disease is recognised early, the results will, in the majority of cases, be disastrous to the patient.

The number of people who suffer from Appendicitis is also rapidly increasing, & although cases are now being recognised which hitherto were not, yet that factor does not account for the whole of the increase.

There are many medical men living today seeing & treating cases of Appendicitis frequently, who inform us that this disease was not seen 30/40 years ago to anything like the extent it is today. Therefore, there must be something in the present mode of life, which will account for this state of affairs; but in spite of all the researches under taken in connection with Appendicular disease & the
various theories advanced as to its causation, we have yet very little knowledge regarding the true cause of this very common & dangerous disease.

In the present thesis, I propose to deal chiefly with the Pathological & Clinical varieties, utilising the notes of 157 consecutive cases which have come under my care at the Doncaster Royal Infirmary, in private practice, & during the period I was on active service in Mesopotamia.
General Etiology.

The various factors concerned in producing an attack of Appendicitis may be considered under three headings.

1. Predisposing.
2. Exciting.
3. Final or Essential.

Predisposing.

The predisposing causes may be local or general. The appendix is a blind sac of relatively great length & small calibre, with a narrow opening at the caecal end. The amount of lymphoid tissue which is present resembles in structure the tonsil, & this gives the various micro-organisms which abound in the alimentary tract a convenient harbour in which to set up inflammatory mischief. Much has been written on the analogies existing between the appendix & the tonsils, & I have been struck, in eliciting histories prior to operation, by the large number of people who have been subject to tonsillitis prior to the onset of the appendicitis for which I have had to operate. This will be further referred to in considering the pathology.

Age.

Appendicitis is distinctly a disease of early life. It is most common between 10 & 30 years of age, & after this period there is rapid decrease in the number of cases as age advances. It is also
fairly common in children under 10 years of age, & the cases then are almost invariably rapid in onset, severe in character, & very frequently fatal. Chronic Appendicitis on the other hand is more associated with advancing age, & the majority of cases occur in persons over 25 years of age. The table below shows the ages at which the cases under discussion occurred.

Table 1. showing the ages at which the cases occurred.

<table>
<thead>
<tr>
<th>Age</th>
<th>Total</th>
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<tbody>
<tr>
<td>1 - 10</td>
<td>12</td>
</tr>
<tr>
<td>11 - 20</td>
<td>44</td>
</tr>
<tr>
<td>21 - 30</td>
<td>62</td>
</tr>
<tr>
<td>31 - 40</td>
<td>28</td>
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<tr>
<td>41 - 50</td>
<td>10</td>
</tr>
<tr>
<td>51 &amp; over</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>157</strong></td>
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</tbody>
</table>

I have found that the susceptibility of young people to appendicitis is much more dependent on the proneness to inflammation in the lymphoid tissues throughout the body generally, than to indiscretions in diet, the latter however accounts for the larger number of cases which do occur in persons between the ages of 10 & 30. On the other hand the reason for the fewer number of cases occurring in advanced life does not so much depend on a more judicious mode of life, but from the fact that the lymphoid tissues of the body atrophy as age advances & have not the same tendency to become inflamed.
Sex is a predisposing cause of considerable importance & my experience has been that it is more common in males. The table below shows the numbers with the ages.

Table 2, showing the sex & the ages at which the cases occurred.

<table>
<thead>
<tr>
<th>Ages</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>11-20</td>
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<td>21-30</td>
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<td>31-40</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>41-50</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>51 &amp; over</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>86</td>
<td>71</td>
</tr>
</tbody>
</table>

In two cases I have found that the appendix was definitely inflamed in cases where pelvic disease was also present, & where the operation was performed for the latter condition. This undoubtedly accounts for a certain number of cases in females which is not so in males. In two of the cases the appendix was definitely adherent to the structures around the right tube, & in one case the inflammation of the appendix most probably arose from the salpingitis present via the lymphatics of Clado's ligament. I have not observed that a diseased appendix lying in the pelvis has caused any definite disease of the tubes or ovaries.
Nationality.

This is not considered such an important aetiological factor by some authorities as others, but while I was acting during the war as surgeon to a hospital in Mesopotamia which only included Indians, I was very much struck with the comparatively small number of cases of appendicitis which occurred amongst them compared with the British, although all were practically living under the same conditions. Out of many hundreds of operations performed I only saw 10 cases, all of which I operated upon, & although the clinical symptoms were practically identical with what one finds in this country, these cases were all of a severe type. On the other hand recovery from the inflammatory processes was much more rapid than in the British, which I attributed largely to the condition of their tissues as their food consists largely of vegetable matter. Further, Indians very seldom show any indiscretion in diet, & they seldom hurry their food or insufficiently masticate it; their teeth are invariably in excellent condition, & the fact that they do not eat meat must have some bearing on the relative small number of cases which do occur.

Exciting Causes.

Constipation.

A history of constipation is very frequently given especially in females suffering from appendicitis, & I have been often impressed when opening an abdomen to find in the bowels faecal
masses in spite of the fact that the patients stated that their bowels were quite regular. I think the percentage of patients especially females, who suffer from concurrent appendicitis, is much larger than is usually stated in books. Constipation with all its effects such as auto-intoxication from the bowel, the slowing of peristalsis & the resulting catarrhal condition which must inevitably follow, all tend to produce a condition which is favourable for the development of appendicitis & if more appropriate treatment was given to such a condition, I venture to think that it would be a means of considerably curtailing the number of cases of appendicitis which is undoubtedly at present increasing. I have not found diarrhoea at all a common factor in the history of the cases under review.

Gastro Enteritis & Chronic Intestinal Catarrh.

Especially among the more chronic forms of appendicitis a history has been elicited of a feeling of discomfort after food. In such cases a catarrhal condition of the whole alimentary tract exists, & the mucous membrane of the appendix participates in this mild catarrhal condition. Should this condition go on for some time the appendix gradually becomes inflamed & a chronic catarrhal condition results, with or without clinical symptoms. Therefore chronic intestinal catarrh must be looked upon in many cases to be the forerunner of appendicitis.
Dysentery & Typhoid Fever.

These two diseases, much more common in the East, frequently cause inflammation & ulceration of the appendix in association with the ilium & caecum. I did not however have any cases which showed either of these conditions to be the cause.

Trauma.

There is considerable speculation as to whether a blow can be a direct factor in the cause of appendicitis or not. The literature is not voluminous on the subject, but I have seen one case where a miner received a blow on the abdomen from a fall of coal, & on the abdomen being opened, the appendix, caecum, & ilium, though not ruptured, were all very red & inflamed, therefore one can quite easily imagine that the appendix, once being congested, may reach such a degree as will require operative interference to relieve the condition.

Infectious Fevers.

Several writers have been able to attribute appendicitis definitely as following such conditions as Measles, Chicken-pox, Mumps, Scarlet Fever, Typhoid Fever & Acute Rheumatism. Rheumatism has been much discussed of late, & it is quite easy to understand the relationship between the diseases, owing to the large amount of lymphoid tissue which is present in the appendix & which so closely resembles the tonsil, & especially when the tonsil is said to be the port of entry in most cases of acute.
rheumatism.

Lead Poisoning.

In this area I have been greatly struck by the relative frequency of lead poisoning concurrent with appendicitis. I have seen several cases & in each case the blue line on the gums has been present together with the colicky pains which are so pathognomonic of the disease. This is a matter which I will refer to more in detail under diagnosis as I feel quite certain it is frequently overlooked especially in industrial areas where lead is more frequently used. Most probably the lead affects the appendix in such a manner as to favour infection by organisms.

Foreign Bodies, Thread worms & Concretions.

A great deal has been written about the presence of foreign bodies & concretions as a factor in the cause of appendicitis, but now it is generally accepted that they play rather a subsidiary role in the production of the disease. Foreign bodies such as pins, seeds, etc, do undoubtedly find their way into the appendix & set up inflammatory mischief as they would do in any other part of the body.

In one case under review on removing the appendix, I discovered thread worms, the mucosa being ulcerated, but it was difficult to say whether the thread worms were the direct cause or not, as thread worms often lodge in the appendix without causing symptoms. It is conceivable however that they might be the cause & several writers are able to quote
cases in which they definitely prove that they were the cause. It would be much easier however to understand how worms might cause ulceration of the coats first & then perforate the appendix causing a localised abscess around the appendix.

A great deal has been written on the question of faecal concretions as the cause of appendicitis & when they reach such a size as to be unable to be extruded into the caecum by peristalsis they must cause erosion of the mucous lining. This erosion affords a favourable focus for the invasion of bacteria & it is a most significant fact that perforation most frequently occurs in that part of the appendix where they are situated.

Loekwood on the other hand states that Bacteria are the chief factor in the formation of concretions, & that bacterial growth within the appendix precedes the growth of the concretion, & that this preliminary stage is associated with ulceration of the mucosa.

In the majority of instances however there is evidence that the foreign body excites a chronic inflammatory action which ultimately results in an acute process or leads to abscess formation.

Final Causes.

The immediate cause of appendicitis is always microbic infection. The normal appendix contains in its canal the necessary infective agents such as Bacillus Coli Communis which, although innocuous in the healthy bowel, only awaits the
appearance of favourable circumstances to exercise its activities. It has been shown by experience that it is not necessary to introduce virulent bacteria into the appendix to produce an inflammation, an asceptic ligature around a loop of bowel forming a closed tube increases the virulence of the contained microorganisms, and in time will produce an inflammation sufficient to give clinical symptoms of an acute nature. Moreover it has been demonstrated that micro-organisms which are incapable of affecting healthy tissue may easily invade tissues altered by traumatism. By far the commonest organism found in cases of appendicitis is the Bacillus Coli Communis, being generally present in over 90% of cases. Its virulence varies considerably, and the toxins elaborated vary much according to the inflammation present in each individual case. The other organisms which are most commonly found with or without the Bacillus Coli Communis are
1. Staphylococcus Pyogenes Aureus.
2. Staphylococcus Pyogenes Albus.
3. Streptococcus Pyogenes.
4. Bacillus Pyocyaneus.

These organisms may occur in a small percentage of cases alone, but are generally mixed with Bacillus Coli Communis. The frequent association of appendicitis with Rheumatism and other constitutional diseases have impressed many recent observers with the idea that there is an etiologic relationship between general infections and inflammation of the appendix, some writers going as far as to regard all cases as a
local expression of a general infection. Some writers consider inflammation of the appendix as a disease "Sui generis." On the other hand others consider that appendicitis is produced by various causes, some more of a local, others more of a general character. In all cases however the predisposing influences existing in the appendix are important.
Summary.

1. A previous inflammation of even a mild type renders the appendix more susceptible to further attacks.
2. Appendicitis is distinctly a disease of early life.
3. Appendicitis is more common in males than in females.
4. Appendicitis is more common in those races that eat meat.
5. The most important cause of appendicitis is digestive disturbances, such as constipation, indiscretions of diet and enterocolitis.
6. Trauma may cause appendicitis.
7. The clinical evidence is in favour of an intimate relationship between Appendicitis and Rheumatic Fever.
8. Most general infections may be the exciting cause of acute appendicitis.
9. Lead is a factor in the etiology either directly or by affecting the mucous lining and thus producing a suitable soil in which bacteria may become more active.
10. Enteroliths and foreign bodies usually play a passive role.
11. The immediate cause is always Microbic Infections.
12. It has not yet been conclusively demonstrated whether general infection merely acts as an exciting factor by preparing a suitable soil in which the intestinal bacteria may become more active, or whether the specific micro-organisms are the direct cause of the inflammation of the appendix.
Varieties of Appendicitis.

The classification of Appendicitis has, since the disease was recognised as a distinct entity, always been a very difficult subject.

Many classifications have been made by the leading authorities on this subject, and they all differ according to whether the classification adopted is from an Etiological, anatomical, or clinical point of view.

Etiologically, Appendicitis is an infectious process associated with bacterial infection, and it is at present impossible to give a clinical differentiation of the different varieties which may occur from the organisms associated with the disease.

Anatomically and clinically, two varieties of Appendicitis can be recognised, namely: Acute and Chronic.

The Chronic form may be chronic from the beginning, or it may be the result of an acute exacerbation which has settled down after an interval of time.

Having consulted many classifications, I have found that from a pathological and anatomical point of view, the following classification seems to me to be the most rational:

Acute Appendicitis.

1. Catarrhal.
2. Interstitial.
3. Ulcerative. (a) Non-perforative.
   (b) Perforative.

Chronic Appendicitis.

1. Catarrhal.
2. Interstitial.
3. Obliterating.
4. Tuberculosis of the Appendix.
5. Actinomycosis of the Appendix.

While the above classification covers all the varieties of Appendicitis which may occur, it is such a classification where all the varieties which may occur cannot be diagnosed clinically, & it has been my experience that Appendicitis — certainly in all the acute varieties, & in a considerable number of the chronic ones — is only to be diagnosed clinically from the manner in which the inflammation affects the peritoneum in the immediate neighbourhood, & not from the condition present in the Appendix.

In other words, Appendicitis, per se, is not a disease which gives rise to a complete clinical picture, & until our observations on clinical manifestations greatly improve, either by means of serum reactions or with laboratory methods, the classification of the varieties of Appendicitis must remain a debatable point.

In the above classification, any of the varieties may follow any of the preceding mentioned varieties, i.e. a Catarrhal condition of the
appendix may go on to affect all the coats & thereby become interstitial; further inflammatory process may cause ulceration of one or more coats, & at any time any part of the appendix may become gangrenous.

A chronic appendicitis may follow an acute attack which has settled down, or it may be the seat of chronic infection with recurring attacks of more or less severity, & this has been clinically designated as Recurring or Relapsing Appendicitis.

The usual classification which is given in text-books of Surgery from a clinical point of view such as "Acute," "Mild," "Chronic," "Perforating," "with Localised Abscess," etc. merely indicates the severity of the clinical manifestations & is hardly any indication of the condition of the Appendix.

Acute Catarrhal Appendicitis.

By this variety is meant any inflammation which only affects the mucous lining of the appendix, & the term is strictly limited in its pathological sense.

This condition gives rise to very few clinical symptoms, & is undoubtedly very difficult to diagnose, & probably seldom is, until the condition has gone further, giving clinical manifestations which draw the attention both of the patient & the doctor.

This variety can only be diagnosed with certainty in the laboratory by microscopic examination though in some varieties the mucous membrane may be
seen to be swollen macroscopically. The lumen of the appendix may be partially or completely occluded, & the fluid in the appendix may be clear, greyish in colour, & inspissated, & may, or may not, contain faecal matter.

Microscopically, the crypts of Lieberkühn are swollen & the contents may be muco-purulent in character. The epithelial cells of these crypts are swollen & translucent. Leucocytes are present between the cells, & there is the usual congestion of the vessels in the mucosa. If this continues, the infiltration becomes more marked, the sub-mucous layer also becomes infected, & the distinction between acute catarrhal & acute interstitial appendicitis is one of degree only.

The fluid exudes from the serous surface of the appendix in a similar manner as it exudes from any other serous surface, & the character of the fluid resulting depends on the severity of the inflammatory process present.

Two things may happen in an acute catarrhal appendicitis:—
1. It may be completely restored to its former condition.
2. The acuteness may subside & become a chronic inflammatory process, & at any time this may light up again with symptoms quite acute, which may immediately require interference.

Acute Interstitial Appendicitis.

By this variety is meant an inflammation
of the appendix where all the coats of the organ are affected.

This is the most common form of appendicitis & gives rise to definite clinical symptoms, & was found to be the variety of appendicitis present in 43 cases under review.

To the naked eye, the appendix is swollen, reddened & the organ is usually firm to the touch. The mucous membrane is swollen & may show haemorrhagic patches throughout its length.

The inflammation may cause obstruction of the lumen in one or two places, & concretions may be found in this variety.

Microscopically the crypts of Lieberkühn are practically obliterated, & there is much cellular infiltration throughout the coats. In the sub-mucous & muscular coats there is dilatation of the vessels, & round cells abound throughout the layers. The lymphoid elements are also involved with the lymph spaces distended & filled with leucocytes & other blood corpuscles.

These lymphoid follicles following inflammatory infection may become necrotic, and by many of these coalescing, an ulcer ultimately develops in the wall of the appendix involving two or more coats.

As a result of this, strictures may form, obstructing the lumen of the appendix, & it is quite possible for the stricture to completely shut off the appendix into two separate compartments.

The tip of the appendix is most usually
filled with turbid fluid or pus.

This condition of a closed cavity within the appendix full of pus, is called "Empyema of the Appendix".

Wilkie has shown that in obstruction of the appendix the changes vary greatly according to the nature of the diet previous to the onset of the disease, & that a rich protein diet is associated with much more rapidly destructive changes in the appendix than a carbohydrate diet. Further that the changes occurring in an appendix the lumen of which is completely obstructed depend on the presence or absence of faecal matter within its lumen.

This condition may be brought about by a twist of the appendix caused by bands of adhesions outside, the result of previous inflammatory mischief.

On the other hand, Empyema of the appendix may occur without any appreciable ulceration of the appendix, & may result from a simple catarrhal condition where the inflammation present tends to narrow the lumen in any one part.

This interstitial variety of appendicitis can never return to its previous healthy condition, & in the majority of cases which are not operated upon, the condition subsides & some variety of chronic appendicitis remains.

On the other hand, if the condition is not removed, & the inflammation does not subside, the result must ultimately be necrosis & ulceration with all its sequelae.
Acute Ulcerative Appendicitis.

By this variety is meant necrosis of more or less of the wall of the organ in common with its lumen, & is obviously an aggravation of the previously described forms.

It may, however, occur directly without being preceded by the interstitial variety.

Depending upon whether the resulting ulcer is deep or not, the condition may be non-perforative or perforative, & the one is but an aggravation of the other.

This is a common variety of appendicitis, & there were 22 cases of this variety under review, 18 non-perforated & 4 perforated.

Macroscopically, the appendix is swollen & much congested, & the area where the ulcer is, is generally softer than the surrounding tissues.

I have always found the appendix was very much thicker, & that the ulcer was practically always on the side of the appendix farthest removed from the mesentery, & therefore, the blood supply.

The peritoneal covering is always red, & the redness may be so intense as to be of a deep reddish blue.

If the perforation is about to take place, the area surrounding may be almost green.

The perforation is usually round & ovoid, & the edges are invariably ragged.

The ulcers are generally round & ovoid, & they have sloping edges, & the question as to whether
an ulcerative appendix perforates or not, depends greatly when the operation is performed.

Fecal concretions are very common in this variety, & I found them present in 9 cases.

Of these 8 had not perforated & calculi were found in all. I was perforated & calculi were found in the peritoneal cavity.

Perforation of the appendix results from the necrosis following the invasion of bacteria & their toxins, or it may be from the mechanical action of fecal concretions, or the combined action of both.

Perforation may also follow, as stated above, from twists or flexures of the organ, & an external band causing adhesions in the presence of bacteria, will be quite sufficient to set up perforation.

Microscopically, there is marked dilatation of the blood vessels, with marked exudation of leucocytes, & as necrosis advances, the various coats are affected, until the peritoneum gives, & perforation results.

Gangrenous Appendicitis.

By this variety is meant an inflammation of the appendix attended by gangrene.

This may arise in many ways:

1. By following on any of the preceding varieties where the inflammation progresses, & it usually follows the more severe forms of inflammation of the appendix. In fact it almost always follows a sudden severe inflammation of the appendix where there has
been previous disease.

2. On the other hand it may occur in quite a healthy appendix provided the virulence of the bacteria & the toxins are strong enough, & in this case a rapid & fatal gangrene ensues before the tissues have any time to set up a counter-inflammation. This occurred in 12 cases under review.

3. Gangrene of the appendix may be caused by the withdrawal of the blood supply from thrombosis of the vessels or a twist in the mesentery, causing an obstruction to the arterial flow.

Macrosopically, the entire organ may assume a dirty greenish black colour. It is usually swollen, mal-odourous & softened, & if the gangrene is sufficiently far advanced, the appendix may become detached from the caecum, or from the remainder of the appendix which is not gangrenous.

There is generally ulceration present as well, & in the portion of the appendix nearest the caecum, the coats are much reddened & haemorrhagic, and generally present the appearances already described in the interstitial & ulcerative varieties.

In this variety the pathological and clinical manifestations may develop so rapidly as to merit the designation of "fulminating appendicitis."

This was only observed, however, in two cases under review.

Perforation is very common in this variety, & depending on whether the disease develops rapidly or not, the pus which escapes from the appendix and develops around about it, is either
localised in the form of an abscess, or spread throughout the peritoneum.

Concretions are often found in this variety, and may be present either in the lumen of the appendix, or in the cavity of pus in the region of the appendix.

Gangrene of the appendix may cause the affected part to be cast off, and a line of demarcation forms which in some cases heals in due course.

One case under review, at the time of operation, showed this to have occurred. The appendix was very small about 3/4" in length, being all that remained from obvious previous inflammatory mischief.

A fibrous cord connected the extremity with the posterior abdominal wall, and from the adhesions present, I was of the opinion that this patient had had, on a previous occasion, gangrene of the appendix, which had sloughed off and had been absorbed in course of time.

He gave a history of attacks of pain in the right side for a period of ten years, and on one occasion, he was confined to bed for over six weeks.

He decided to have an operation because he was still suffering from obscure pains in the right side, which were very much worse in damp weather, and the condition above described was what was found at the operation.

The patient made an uninterrupted recovery, and has had no pain since the operation.

Microscopically in the gangrenous part
one is quite unable to make out with any certainty any definite structure, and the other parts of the appendix not gangrenous show similar characteristics to those which are found in the interstitial and ulcerative varieties. The entire tissues are slowly broken down into a semi-fluid débris. Haemorrhages ensue from erosion of the vessels.

In cases where the whole appendix is suddenly affected so that gangrene supervenes, then there is evidence of a diffuse breaking down of the whole organ, the deeper layers being just as much affected as the more superficial.

A gangrenous appendicitis may cause peritonitis, and most often does, but the varieties of peritonitis and their mode of production, will be referred to at a later period.

**Chronic Appendicitis.**

By this variety is meant a condition that commences chronically and insidiously, and where the condition has not progressed long enough to light up an acute exacerbation.

These conditions do not show much macroscopically, and in fact not a great deal microscopically, but the fact remains, that by excision of the offending organ, the aggravated and persistent clinical symptoms disappear in the vast majority of cases.

**Chronic Catarrhal Appendicitis.**

By this variety is meant a chronic inflammation in which the mucous membrane alone is
This is a very uncommon variety of appendicitis, because the causes of an inflammation that will give this variety, invariably affect other parts of the appendix as well.

Macroscopically, the appendix may be thicker and a little firmer than normal. The mucous membrane is also thickened. There is a thick mucus in the lumen, and there may or may not be faecal matter, or even a calculus.

Microscopically, the crypts of Lieberkühn are distended with mucus and the mucosa may contain a few round cells and connective tissue elements.

If this condition persists, then sooner or later, chronic interstitial appendicitis must follow. Four cases of this variety occurred in the cases under review.

**Chronic Interstitial Appendicitis.**

By this variety is meant a chronic inflammation where all the coats of the appendix are involved, some of the coats being more affected than others.

This is the common variety of chronic appendicitis, in fact, excluding Tubercular conditions, practically all cases of Chronic appendicitis are of the Interstitial variety, and are clinically spoken of as "Relapsing" or "Recurring" Appendicitis.

At any time an acute exacerbation may develop, and then one of the acute varieties already described may occur.

Macroscopically the organ is thicker and
firmer than normal. The lumen may be reduced in size and may contain one or more concretions.

Of the cases under review 38 were of this type and only one case showed concretions.

In some of the acute varieties where the inflammation subsides, a chronic interstitial condition follows, and it is easily understood that constrictions in various parts of the appendix must be frequently found in this variety.

Depending on the degree of partial or complete stenosis that occurs, faecal concretions are very liable to be encountered.

Should there be complete obliteration of the lumen, then obliterating appendicitis results, but if only one part of the lumen is obliterated, then a cystic dilatation or mucocele of the appendix results.

In this condition the distal part of the appendix becomes distended and filled with fluid. It is then always swollen and may be more or less conical. The extreme tip is most likely to show this condition. In size they vary very much but are very exceptionally bigger than a walnut.

The contents of these cysts vary very much, and they may be anything from a clear gelatinous fluid to thick pus.

This cystic condition may also follow old peritonitis where the appendix is bent by a contraction from peritoneal adhesions, thus preventing the escape of the secretion, which is naturally given off by the mucous membrane.

When this does occur, if there are
bacteria in the affected portion of the appendix, an empyema must result, but should there be no bacteria, a cystic dilatation or mucocele occurs.

Macroscopically the mucous membrane in a cystic condition, is found to be smooth and generally atrophied, and the other walls of the appendix are generally slightly hyper-trophied as a compensatory measure.

Microscopically, similar catarrhal alterations of the mucous membrane are to be made out, as previously mentioned, and there is hyperplasia of the sub-mucous and muscular coats. Round celled infiltration is present, and there may or may not be atrophy of the mucous lining, with cicatricial contraction of the connective tissue, which has previously formed during the chronic process. Granulations and newly formed blood vessels are to be made out, and this also tends to cicatrization and to the formation of fibrous tissue.

Obliterating Appendicitis.

By this variety is understood a form of interstitial inflammation of the appendix attended by obliteration of the lumen. There were 4 cases under review.

Macroscopically, this does not differ very much from the last variety. Generally the part obliterated is very much narrower, and may only be represented by a fine filamentous thread. The obliterated part may occupy any part of the appendix, and the whole appendix may, on occasion, be affected
in this manner.

Should the obliteration be near the caecum and the part near its tip still patent, then cystic dilatation very frequently occurs.

When complete obliteration is present, adhesions are common, and this may quite easily lead to intestinal obstruction.

When complete obliteration of the appendix occurs, which is distinctly rare, then the opposing surfaces of the lumen of the appendix are firmly united to one another.

Microscopically, the appearances are similar to those of Chronic Interstitial Appendicitis, only more extensive.

Tuberculosis of the Appendix.

This may be primary, secondary and may be of the miliary or caseous variety.

Primary tuberculosis is very rare. I found tuberculosis disease present in 7 cases under review, but in every case, the ileo-caecal region was also involved.

Macroscopically, tuberculosis of the appendix may convert the appendix into a caseous mass with ulceration. On the other hand there may be greyish tubercular nodules beneath the peritoneum and in the floor of the ulcers in the appendix walls, but no case that I have seen has shown any tendency to perforate. Cases where tuberculosis of the appendix has caused perforation, have however been recorded.

Microscopically there are formations of
epithelioid cells, giant cells, and round cell infiltration with a varying amount of caseation depending on the length of time the disease has been developing.

The lymphoid follicles are most commonly affected, and with appropriate staining, tubercle bacilli may be detected.

Actinomyososis of the Appendix.

This is a rare condition, but it does occur in a small number of cases.

When the appendix is affected, the infection generally comes direct from the intestinal tract.

On the other hand, it may extend from the thoracic cavity through the diaphragm.

The fungus is generally carried to the appendix by some infected grain or corn. This causes ulceration and necrosis of the mucous membrane, and by the fungus proliferating, it gradually eats through the whole of the coats. Suppuration follows, with the formation of fistulas, and thick hard connective tissue develops, in which several small foci of pus are present.

The pus contains the characteristic greyish nodules, which, upon microsopical examination, show the streptothrix actinomyces.

Appendicular Peritonitis and its Consequences.

Although the dissociation of the lesions found in the appendix from those of the peritoneal covering is artificial, I think it better to discuss
this matter separately as lesions in the appendix, similar in character to each other do not give rise to the same peritoneal lesions in every case.

For example, an ulcerative appendicitis may cause only sero-fibrinous exudate on the peritoneal surface, or it may cause a localised abscess, or, if left long enough, a general peritonitis.

Further, in a fulminating case of appendicitis, the gangrene may be so rapid in onset that death may ensue before any affection of the peritoneum manifests itself.

It is generally the rule, however, that all acute cases of appendicitis with the exception of Catarrhal varieties implicate the peritoneum as well, in some form or other.

This is easily understood when one considers the rich lymphatic supply which runs between the various coats, thus making it easy for the spread of the bacteria and the toxins to the peritoneum.

The severity of the peritonitis, when it is present, is not due so much to the amount of the fluid present, as to the power of the toxins given out by the various bacteria; and the shock which follows the rupture of a diseased appendix, is not so much due to the development of symptoms, as to the absorption of the toxins which are suddenly let loose in the general peritoneal cavity.

The varieties of peritonitis which may occur from inflammation of the appendix may be acute or chronic and the following varieties may occur.
1. Acute Appendicular Peritonitis.
   (a) Sero-fibrinous Peritonitis.
   (b) Circumscribed Purulent Peritonitis.
   (c) Diffuse or General Peritonitis.

2. Chronic Appendicular Peritonitis.

Acute Sero-fibrinous Peritonitis.

By this is meant the formation of an exudate in the peritoneum of a serous or sero-fibrinous character. This is not a common variety and is usually associated with the milder forms of Appendicitis—chiefly Interstitial.

Macroscopically the peritoneum is inflamed and hyperaemic. The peritoneum loses its lustre and may be viscid to the touch. It seldom implicates any structures beyond the appendix, though the caecum may be affected as above stated, if the condition becomes more aggravated.

Should this condition continue then a sero-fibrinous condition results. The peritoneum in this region is then covered with a fibrinous deposit which to the naked eye appears greyish-yellow in colour, viscid to the touch, and is generally adherent to the peritoneum. If it is recent in formation it can be easily stripped off.

Microscopically this condition shows dilatation, and over-filling of the blood vessels, with round-celled infiltration in the lesions. Fibrin is present in varying amount. Should this condition not progress to suppuration, then organisation begins, and fibrous connective tissue adhesions develop,
which may or may not by contraction, change the shape of the appendix and its mobility.

Acute Circumscribed Purulent Peritonitis.

This is the most important peritoneal form of an acute Appendicitis unless it is dealt with early, it is fraught with grave results. This may follow on the sero-fibrinous variety just described, and is found most often in association with Interstitial or Ulcerative Appendicitis without perforation, and must always follow where perforation does occur.

The peritonitis of a gangrenous appendix, should it occur, is also purulent.

This circumscribed purulent peritonitis is the result of suppuration developing at the site of infection, and it is walled off from the general peritoneal cavity.

It may form rapidly or slowly, and the quantity of pus developing varies in each individual case. Pockets of pus may be present and these if not communicating, may give rise to complications in the after treatment. The pus is generally of a yellowish-green colour and creamy in appearance. If it is bluish in colour, it may mean that the Bacillus Pyocyaneus is present, and the odour is penetrating and disagreeable. Faecal concretions may also be found along with necrosed pieces of the appendix.

The situation of the abscess depends upon the situation of the appendix, and may be found in many different parts around the Ileo-caecal region.
The abscess may grow, and should it not be removed, it may burst into practically any organ in the abdominal cavity, and cases have been reported where it has burst into the kidney, liver, gall bladder, duodenum, uretha, rectum, urinary bladder and ureter.

The mesenteric artery and vein may also be affected and thrombosis or phlebitis occur.

If the abscess is small, it may be absorbed, but this must rarely happen, and when it does occur, the abscess ultimately becomes a huge mass of adhesions matting down all the structures in the region in which it occurs.

Owing to the early operative treatment of such cases, one does not now have the opportunity of seeing so many complications as used to be recorded, and statistics on this matter are of little or no value seeing so many surgeons operate immediately inflammation of the appendix is detected.

**Acute Diffuse or General Peritonitis.**

By this variety is meant an inflammatory process which involves the whole peritoneum though chiefly the lower part of the abdomen.

Like the preceding variety, it may follow Interstitial or Ulcerative Appendicitis with or without perforation, and gangrene of the appendix.

This form may progress by degrees from a sero-fibrinous peritonitis, slowly spreading from one part to another, or it may become rapidly diffuse without any fibrinous exudate having intervened, and in the latter case, there are few adhesions between the coils of the intestines or the abdominal organs.
This variety however most frequently follows a sudden rupture of the appendix before the peritoneum has had time to form a plastic exudate and the degree of peritonitis depends on (a) the virulence of the organisms, (b) the amount of fluid which escapes from the ruptured appendix, (c) and the rapidity with which they are evacuated.

Macroscopically, the whole peritoneum is inflamed and hyperaemic. Exudate may be present over the various layers of the intestine, and depending on the length of time they have been forming, may cause adhesions of a loose nature between the various loops of bowel.

The fluid present in the peritoneal cavity varies very much and may be small or large in amount. Should the adhesions continue to form, then localised pockets of pus may develop anywhere in the peritoneal cavity, and unless a very thorough search is made for these at the time of operation, post-operative ileus is very apt to occur, with fatal results in many cases. There were 24 cases of this variety under consideration, and 4 cases died.

If the infection is very intense, the peritonitis may show haemorrhages, but this condition is very rare, as few cases are allowed to get to this stage nowadays.

Chronic Appendicular Peritonitis.

This variety, is generally the result of a sero-fibrinous peritonitis which has settled down and an operation has not been performed. Bands of
adhesions unite the appendix to various parts of the intestine, mesentery, or parietal-peritoneum in the immediate neighbourhood, and the more severe the attack of appendicitis has been, the more numerous will these adhesions be.

Macroscopically the appendix is usually firmly united to the caecum, colon, omentum, intestine or mesentery, or some of the viscera by means of bands.

In one case under review, a band extended from the tip of the appendix to the under surface of the liver, and only when this band had been divided was it possible to remove the appendix.

It is frequently bound down to the caecum and this was observed most frequently in the cases under review.

These bands may also cause intestinal obstruction by loops of bowel passing underneath them and one case was operated on for intestinal obstruction, the band of which arose from the appendix and was adherent to the parietal-peritoneum.

Summary of Varieties.

Having now described the various varieties of Appendicitis from a pathological point of view, the following table gives a resumé of the various varieties in my series of cases.
<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Interstitial</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Catarrhal Appendicitis</td>
<td></td>
<td>25</td>
<td>16</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>Interstitial</td>
<td></td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Sero-fibrinous peritonitis</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Abscess</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>General peritonitis</td>
<td></td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1m</td>
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<tr>
<td>Ulcerative Appendicitis</td>
<td></td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>-</td>
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<tr>
<td>Non-Perforative</td>
<td></td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Obstruction</td>
<td></td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Perforative</td>
<td></td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Sero-fibrinous peritonitis</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Abscess</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>General peritonitis</td>
<td></td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>-</td>
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<tr>
<td>Gangrenous Appendicitis</td>
<td></td>
<td>9</td>
<td>6</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Non-Perforative</td>
<td></td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Obstruction</td>
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<td>1</td>
<td>1</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Perforative</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Sero-fibrinous peritonitis</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Abscess</td>
<td></td>
<td>24</td>
<td>14</td>
<td>10</td>
<td>4(3m)</td>
</tr>
<tr>
<td>General peritonitis</td>
<td></td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Chronic Catarrhal Appendicitis</td>
<td></td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Interstitial</td>
<td></td>
<td>38</td>
<td>14</td>
<td>24</td>
<td>-</td>
</tr>
<tr>
<td>Sero-fibrinous peritonitis</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
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<td>4</td>
<td>2</td>
<td>2</td>
<td>1f.</td>
</tr>
<tr>
<td>Sero-fibrinous peritonitis</td>
<td></td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>1f.</td>
</tr>
<tr>
<td>Tubercular Appendicitis</td>
<td></td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Actinomycotic</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
In the above table is shown the varieties of cases which occurred in the 157 cases under review.

Clinically, of course, all these varieties cannot be diagnosed prior to operation, and as Wilkie has pointed out, only two varieties as far as the appendix itself is concerned can be distinguished clinically. These are:-

1. Acute Appendicitis.
2. Acute Appendicular Obstruction.

By acute Appendicitis is meant an inflammation of the walls of the appendix where the temperature and pulse are both raised practically from the beginning of the onset of the disease. Other symptoms of tenderness, pain and vomiting are also present, but the temperature and pulse in this variety are the most distinguishing clinical features which can be relied upon with any degree of certainty.

On the other hand, in a case of Acute Appendicular Obstruction, the clinical features are, more or less, sudden abdominal pain and tenderness over the right iliac region, but the temperature and pulse remain normal, and show very little deviation from it.

In the latter variety, the most disastrous results occur from delay in operation, as the obstruction means an inflammation inside the lumen of the appendix, which, any hour, may rupture and set up a localised or diffuse peritonitis with all its dangers.

For some time now, I have paid little or no attention to the question of temperature and pulse
DISEASE.

Name: R. B
Age: 18 years

Notes of Case:

Date of admission: Jan 26, 1920
Result: cured

Temperature (Fahrenheit):

<table>
<thead>
<tr>
<th>Day of Dis.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
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</thead>
<tbody>
<tr>
<td>Pulse</td>
<td>86</td>
<td>88</td>
<td>88</td>
<td>90</td>
<td>90</td>
<td>88</td>
<td>90</td>
<td>88</td>
<td>90</td>
<td>88</td>
<td>90</td>
<td>88</td>
<td>90</td>
<td>88</td>
<td>90</td>
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<td>90</td>
<td>88</td>
<td>90</td>
<td>88</td>
<td>90</td>
</tr>
<tr>
<td>Def.</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
<td>32</td>
<td>33</td>
<td>34</td>
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<td>39</td>
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<td>41</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
</tr>
</tbody>
</table>

Entered at Stationer's Hall. Printed and Published by W. C. C., 37, E, Gate St., Kingsway, W.C. 2. Gould's Clinical Chart.
in appendix cases, as frequently I have operated on cases showing no change in temperature and pulse from the normal, and found a gangrenous condition in the appendix - some non-perforated and others perforated.

As an illustration of this, attached are two charts which demonstrate typically the cases referred to. The first one Mr E.C. age 18 was admitted into the Infirmary with a history of sudden onset of pain and tenderness in the right iliac fossa with slight sickness. He did not remember having had any previous attack. Examination. Tongue furred, teeth were very carious, bowels had not moved for two days. On admission the patient complained of no pain except when deep pressure was applied over the appendix region. There was no rigidity. Temperature 98.6, Pulse 86. At the operation the appendix was found gangrenous in the distal half and distended with pus. No peritonitis was present and the wound was stitched up without drainage. Patient made uninterrupted recovery and was discharged 15 days later.

Mr R.B. age 18 was admitted into the Infirmary with a history of colicky pains for the past 24 hours which on admission had somewhat subsided. There was no vomiting but a history of constipation. He had had no previous attack. Examination revealed tenderness over the appendix region only on deep pressure and there was no definite rigidity. Patient felt quite comfortable. Temperature 98.6, Pulse 96. At the operation the appendix was found to be gangrenous in its terminal
half. On section and at the distal end the appendix was distended with pus being obstructed $\frac{1}{2}$" from caecal end. A faecal concretion was present. There was no general peritonitis. No drainage was inserted and patient made uninterrupted recovery being discharged 17 days after operation.

In these cases, the chief clinical feature was the tenderness over the appendix region, and in several cases the tenderness was only elicited on deep pressure.

Wilkie, in his illuminating article on "Acute Appendicular Obstruction" has shown the reason for this by experimental evidence and I have observed what he describes in many of the cases under review.

While this clinical division enables us, with very few exceptions, to diagnose most cases of Acute Appendicitis, it does not enable us in any way to discover exactly what is the pathological condition present in each individual case.

It enables us to discriminate between an inflammation of the appendix wall and an obstruction of the appendix lumen, and if these distinctions were more fully appreciated, and probably more widely recognised, I do not think that we should have so many serious cases with complications to treat, with which we are confronted daily in the general hospitals.

Clinically, the varieties of peritonitis which may follow either Acute Appendicular Obstruction or Acute Appendicitis are easily diagnosed and call for no further discussion.

I have been unable to come to any
symptom complex which will inform the medical man confronted with a case of Appendicitis as to the variety he is dealing with.

I lay most stress on the history and the presence of local tenderness over the appendix region, and although the temperature and pulse may be of great use as referred to above, they cannot be relied on to decide whether interference is necessary or not.

It is possible in some cases to diagnose clinically a perforation of the appendix, but as all cases of localised or general peritonitis do not necessarily require a perforated appendix before they form, the clinical evidence of a fallen temperature and rapidly increasing pulse cannot be relied on too much.

Analysing the acute cases from a clinical point of view the accompanying table shows the number of cases male and female which occurred in my cases with the deaths.
<table>
<thead>
<tr>
<th></th>
<th>Acute Appendicitis</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Death</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td></td>
<td>37</td>
<td>26</td>
<td>11</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>&quot; Appendicular Obstruction</td>
<td>18</td>
<td>8</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>&quot; (Appendicitis is localised) (abscess formation)</td>
<td>12</td>
<td>11</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>&quot; Appendicitis is general) peritonitis</td>
<td>18</td>
<td>8</td>
<td>10</td>
<td>5(4m 1f)</td>
</tr>
</tbody>
</table>
Chronic Appendicitis.

From a clinical point of view, the diagnosis of Chronic Appendicitis presents more pitfalls than almost any other abdominal condition, chiefly because the clinical symptoms may be referred to so many other parts of the body, and practically to every abdominal organ.

This factor has been observed by so many leading authorities that now most surgeons do not consider an operation upon the gall-bladder, liver, stomach or pelvic organs complete without examining the condition of the appendix.

I have found that Chronic Appendicitis is more common in women than in men, and that the majority of cases were associated with what has been called by Moynihan "Appendix Dyspepsia" or "Gastralgia".

In some cases the tenderness is most marked over the appendix region, but in a great many cases I have found it referred to the epigastrium, and very closely simulating gastric or duodenal ulcer. In cases where a chronic appendix has been removed with a subsidence of dyspeptic symptoms, the term "Surgical Dyspepsia" has arisen. In practically all of these cases I have found that concurrent with the chronic appendicitis, there has been caecal stasis from inhibition of peristalsis associated with constipation.

Hurst has shown that it is possible to see spasm of the middle of the stomach when the diseased appendix is manipulated under the X-ray.
Even when an appendix is removed, it may require microscopical examination to reveal the evidence of past inflammation in its wall, which is quite sufficient to set up all the reflex symptoms.

It is much easier to understand how a chronic appendix with adhesions causes intestinal stasis, and therefore from the toxaemia which follows, gastric or duodenal symptoms. This frequently occurs in patients who do not know that there is anything the matter with their appendix at all, and the operation of gastro-enterostomy has been frequently performed with little or no relief of the symptoms, which have been subsequently cured by an appendicectomy.

The chief symptoms are pain and tenderness over the epigastrium with flatulence, the pain coming on after an interval as in duodenal ulcer. Heartburn with vomiting are also common symptoms, and these may be of long duration and may resist medical treatment in every form. Further, the patient is very apt to become neurasthenic after a period of time.

Fenwick shows that hyperchlorhydria follows irritation in chronic appendicitis cases with concretions, and the symptoms may closely resemble those of chronic gastritis, whereas in a merely thickened or kinked appendix there may be a diminution of hydrochloric acid. The hypersecretion may be reflex, but on the other hand it may be due to a spasm of the pylorus, leading to the retention of food and an accumulation of hydrochloric acid.

I have seen one case in which
haematemesis occurred in a chronic appendix, and in this patient, constipation and intestinal stasis was well marked.

To diagnose a chronic appendix with symptoms of dyspepsia, presents many difficulties, but an X-ray bismuth meal will help considerably to clear up the difficulty as a gastric or duodenal ulcer will be seen if present.

Some authorities lay great stress on X-ray bismuth meals with reference to a chronic appendix, but in those cases in which there is stenosis, it is just possible that none of the meal will enter the appendix, and therefore will not show very much.

That Chronic Appendicitis is more common in women where constipation is present is easily understood from the consideration of the pathological conditions found, as referred to previously.

I found Chronic Appendicitis present in 53 cases, and of those 4 gave gastric symptoms, 3 of which were relieved after operation.

Review.

From the accompanying table, the clinical varieties which occurred in the series of Appendicitis cases under review, are set forth.

The death rate was 4.4%, there being seven deaths, 4 of which were moribund from prolonged suppuration and toxaemia on admission. One case died from pulmonary infarction 8 days after operation; one from tuberculosis and 5 from Ileus.
Below is a table showing the varieties of Appendicitis from which the fatal cases suffered.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Age</th>
<th>Sex</th>
<th>Cause of Death</th>
<th>No. of days after operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Obliterating Appendicitis</td>
<td>35</td>
<td>F.</td>
<td>Pulmonary Infarction</td>
<td>8</td>
</tr>
<tr>
<td>Tubercular Appendicitis</td>
<td>13</td>
<td>M.</td>
<td>Septic Absorption</td>
<td>4</td>
</tr>
<tr>
<td>Acute Ulcerative Appendicitis &amp; General Peritonitis</td>
<td>58</td>
<td>M.</td>
<td>Ileus</td>
<td>3</td>
</tr>
<tr>
<td>Acute Gang. Perf. General Peritonitis</td>
<td>31</td>
<td>M.</td>
<td>Ileus</td>
<td>4</td>
</tr>
<tr>
<td>Acute Gang. Perf. General Peritonitis</td>
<td>45</td>
<td>F.</td>
<td>Ileus</td>
<td>4</td>
</tr>
<tr>
<td>Acute Gang. Perf. General Peritonitis</td>
<td>45</td>
<td>M.</td>
<td>Ileus</td>
<td>1</td>
</tr>
</tbody>
</table>

In all localised and non-localised cases free drainage was provided, and in all cases except one the appendix was removed.

In all the quiescent and acute cases including the gangrenous variety with no definite peritonitis, the abdomen was closed at the time of operation.

The average duration of stay of each of the chronic cases was 19 days; and the average for the acute cases 28 days.

The only complication met with was one case which developed a faecal fistula, and the condition was not cured until the abdomen was opened, the
adhesions between the caecum and abdominal wall dissected off, and the fistula stitched up by Lembert Sutures.

Three cases developed pneumonia following the anaesthetic, but all recovered.

The great thing which operative interference in Appendicitis has impressed upon me is the necessity for early operation, and no matter what view is taken to the contrary by some authorities, in my opinion every day's delay means a much more serious illness to the patient and a greater risk to life.

In the 5 acute cases which died, each case had been left for over a week, and the toxaemia present when they came under my care was so great as to make operation practically hopeless from the beginning.

Ileus Duplex is a very serious condition when it occurs, but in no case that I have seen was the patient in a fit state to stand the length of time necessary to perform short circuiting, and therefore this was not attempted in any of the cases which showed this complication.

One case was five months pregnant when she was operated upon and although the condition was acute, she did not abort, and went on to full time without any complications arising.

The condition of the teeth in patients operated upon has impressed me very forcibly, and in 50% of the cases, well marked caries with pyorrhoea were present.

Further, the caries and pyorrhoea were
much more common in the acute varieties than in the chronic.

**Diagnosis.**

In the diagnosis the acute cases have not given rise to much difficulty, but 3 cases which came under my care having been sent in as appendicitis, turned out to be pneumo-coccal peritonitis, intussusception, and pleurisy respectively.

All were children, and in the case of the child suffering with pleurisy, I am glad to say no operation was performed.

In one case of Chronic Appendicitis, I removed the appendix thinking that was the cause of the trouble, but at the operation the patient was found to be suffering from visceroptosis, and the condition was not relieved in any way by the operation performed.

Visceroptosis is much more common than is generally diagnosed, and I have thought a great many failures in chronic cases are due to this condition remaining, and instead of the appendix being removed, an abdominal belt would do more to relieve the condition.

In 3 cases under review Lead Poisoning was present along with the general symptoms of Appendicitis. In 2 cases the appendix was removed, but for some considerable time afterwards the clinical symptoms continued very much in the same way as they did prior to operation, and on examining the cases more fully it was only then discovered that a
degree of lead poisoning was present, which cleared up under appropriate treatment. In the other case lead poisoning was diagnosed, and medical treatment only was given with a subsidence of the abdominal symptoms. In the two cases operated upon, the appendix in each case was chronically inflamed and bound down with adhesions behind the caecum. On section both the appendices showed interstitial changes and one considerable narrowing of the lumen. All of the patients were workers among lead, and I think that more attention should be given to this condition than is usually done, as the constipation and intestinal stasis which follows in all cases suffering from lead poisoning, favour the development of appendicitis.

I have found adenitis present in very few cases - not more than 5% of the acute varieties - and could find no pathological reason why these cases caused enlargement of the glands around the ileo-caecal region where other cases did not.

Further, none of the cases which showed glands gave rise to any difficulty afterwards. Possibly enlarged glands are associated with different varieties of organisms present in certain cases, and either the organisms themselves or their toxins have special affinity for the glands in this region, or on the other hand it may be that the glands enlarge in certain individuals affected with appendicitis as a barrier against the invasion of certain organisms causing the disease.

In no case was I able to diagnose the
glandular swelling before operation.

Diagnosis in Children.

In children I have found Appendicitis a very treacherous disease, and one much more difficult to diagnose than in adults.

The reasons for this are many, the chief being that the majority of children do not complain until the peritoneum is infected and then the disease tends to progress very rapidly.

One gets a history that the child has been "peevish" for two or three days and generally "out of sorts," and when seen by a doctor is invariably in an advanced state of inflammation.

Further, frequently in the teaching of Appendicitis in children I think that more stress is laid on the symptoms of peritonitis than on the important early clinical sign, namely: tenderness on deep pressure which does occur before the peritoneum is affected.

The inflammation of the appendix per se causes visceral lesions and a general toxaemia. The localising symptoms may be slight and the diagnosis in such cases should not depend upon infection of the peritoneum for the following reasons:

1. It is frequently a late complication of the disease, and before it develops, irreparable damage is done to the organism.

2. Many cases never develop peritonitis and being unsuspected, give rise to more danger and invalidism than those with acute infection of the peritoneum.
following closely the affection of the appendix.

In children one has to be particularly careful to examine the lungs, as several times I have found a pneumonia present with referred pain over the appendix region through the lower dorsal nerves, and although some low forms of pneumonia may not show very much in the way of physical signs in the chest, still there is always sufficient, if care is taken, to guard one against making this very often fatal error in such cases.
Summary and Conclusions.

In trying to summarise the chief points of the cases under review I have been impressed with the great increase in the number of cases occurring nowadays from 20 years ago, and although a certain amount of the increase is due to the better diagnoses of the medical profession in general, still there are a large number of cases consequent on what I think is the result of a larger protein diet, especially in the industrial classes, consequent on the general rise of wages which has occurred during the past 10 years and made it more possible for meat to be procured whether frozen or otherwise. This was impressed on me very forcibly during my sojourn in India and Mesopotamia where there were comparatively few cases among the Indians who do not eat meat.

Appendicitis is more common in males than in females and this may be accounted for in two ways:

a. Because the average male eats more meat than the female.

b. That by performing heavy work he may by strain favour the occurrence of appendicitis in a way females do not.

Caries of the teeth, and pyorrhoea alveolaris have a distinct bearing on the number of cases which occur, and that more attention to teeth would considerably curtail the number of cases.

The most important etiological factor in appendicitis is digestive disturbances associated with constipation, and that the immediate cause is always
More attention from a clinical point of view in the teaching of the different varieties of appendicitis should be paid to the pathology of the condition in the appendix, and not so much to the end results.

The clinical features may give very little indication of the pathological condition present and that of all the clinical features the most constant is tenderness of a varying degree on deep pressure. That there is a distinct difference between Acute Appendicitis and Acute Appendicular Obstruction from an etiological, pathological, and clinical point of view, and that with care these varieties can be distinguished.

Primary tuberculosis of the appendix is a very rare condition.

Peritonitis following appendix cases should be looked upon more as the end result of appendicitis, and that the teaching should be to endeavour to diagnose the condition before peritonitis develops, as still many cases are watched from 24 to 48 hours before operation is advised, during which time peritonitis very frequently develops.

Acute Appendicular Obstruction generally does not cause any rise of temperature or pulse in contra distinction to Acute Appendicitis where both temperature and pulse are elevated from the beginning. As gangrene rapidly follows the obstructed varieties it is important that operation should be early before perforation and peritonitis with all its sequelae arise.
In chronic cases there is a distinct pathological link between dyspepsia and gastric ulcer. X-ray bismuth meals should be more frequently given to determine the exact pathological condition before the operation is resorted to.

Lead Poisoning is a distinct factor in appendicitis and from a diagnostic point of view it is a disease which must be kept in mind.

Visceroptosis is much more common than is generally diagnosed, and the removal of the appendix even if chronically inflamed will not cure this condition.

That in children appendicitis generally runs a very rapid course and far too many cases are left until peritonitis has developed, which is especially in children a very dangerous and frequently fatal complication.
1. Barling. Appendicitis and Perforation of Gastric Ulcer.
8. Kelly. The Vermiform Appendix.
9. Lansdown & Williamson. The Etiology of Appendicitis and Gastric Ulcer.