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ABDOMINAL TUBERCULOSIS
in Children.

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HEADINGS.

1. Introductory.
2. Varieties and Morbid Anatomy.
3. Frequency.
4. Etiology.
5. Symptoms and Signs.
6. Diagnosis.
7. Prognosis.
8. Treatment.
9. Bibliography.

ABDOMINAL TUBERCULOSIS

in Children.

A Study of 103 Cases treated in the Wards of

THE ROYAL HOSPITAL FOR SICK CHILDREN

EDINBURGH.

I. INTRODUCTION.

The subject of Abdominal Tuberculosis is one which at present occupies a prominent place in the minds of most Medical Men and especially of those who come in contact with the Children of the poorer classes, for it is among them that the Disease most frequently occurs.

This is not surprising when we examine the course of Tuberculosis during the last 50 years. The general mortality has diminished 45%, and the only type of the Disease in which there is an increased percentage is Abdominal Tuberculosis in Infants. Here we find an increase of 27% as against a general decrease, for the Disease as a whole, of 25%. (1)

Improved/

Improved Sanitary conditions and better Education have ameliorated the lot of the Adult, but until comparatively recently nothing had been done to remove what is without doubt a fruitful source of the Disease in Infants, viz., milk containing Tubercle Bacilli in quantity. In addition, Breast-feeding is becoming more and more uncommon and this has an important bearing on the Disease quite apart from the fact that cows' milk may contain Tubercle Bacilli. There is an undoubted tendency in bottle-fed babies to develop Intestinal Disorders, weakening the resistance of the Mucous Membrane generally. Thus when the Tubercle Bacillus does get into the Intestine, it has a much better chance of gaining a footing than it would, were the organ in sound condition. But of this I shall have more to say later on.

If the Past has been thus disastrous, what is the outlook in the Future? Is this great loss of life to continue?

The Answer to this is difficult but probably the outlook is brighter.

Legislation, directed towards the improvement of the conditions of life, and the sanitary surroundings of Milch Cows, and the prevention of the sale of milk from cows suffering from Tuberculosis of the Udder/

Udder, (2) has removed in part the danger of Infection by milk.

Tuberculosis Congresses are being held all over the World.

A Royal Commission has been appointed to inquire into the relations of Human and Animal Tuberculosis, and has already done much valuable work.

In many towns, Lady visitors are guiding mothers in the rearing of their children, and at the same time pointing out the dangers of the insanitary conditions under which many of them live.

Attention has been directed to the employment of young mothers in Factories and Workshops, and in some places an effort is being made towards making it possible for them to stay at home and nurse their Babies.

Lastly, a great improvement has taken place in Methods of Treatment. Fresh air has become a "sine qua non". Dieting is better understood, and the Treatment by Tuberculin, though still "sub judice" opens up a large field for investigation.

It is my intention in this Paper to deal particularly with three Diseases which have a very close relationship to each other, and frequently occur together/

together, viz:-

1. Tuberculous Ulceration of the Intestine.
2. Tuberculous Disease of the Retroperitoneal and Mesenteric Lymphatic Glands, and
3. Tuberculous Peritonitis.

It will be necessary, however, to refer occasionally to Tuberculous conditions found in other organs.

The Nomenclature in Abdominal Tuberculosis is at present most confusing. Such terms as Consumption of the Bowels, Tabes Mesenterica, Tuberculosis Peritonitis and many others are used to indicate the same disease, irrespective of the part which is affected.

The Term "Tabes Mesenterica" in this Paper will be used to indicate those cases in which Tuberculous enlargement of the Retroperitoneal and Mesenteric Lymphatic Glands can be detected clinically, without evidence of Tuberculous Disease elsewhere in the Abdomen.

The Term "Tuberculous Peritonitis" will be used in those cases in which matting by adhesion of the various Organs and Structures of the Abdomen can be detected clinically, irrespective of the condition of/
of/

of the Glands. To this, however, must be added the Proviso that in cases of death from General Military Tuberculosis, we almost invariably find Tubercles on the Peritoneum which have given no sign of their presence during life, and are undoubtedly a form of Tuberculous Peritonitis.

"Tuberculous Ulceration of the Intestine" will be used in cases in which, from Clinical signs and Symptoms, or from Post-mortem examination, this condition is undoubtedly present.

This method of Division may appear dogmatic, but, I think it will simplify matters when it is known exactly what the Terms mean when they are referred to in the Text.

The Average Duration of the stay of the cases in Hospital was $5\frac{1}{2}$ weeks.

7 cases were under 1 week. These were either removed by their Parents almost immediately or were Moribund on admission.

6 cases were in Hospital over 4 months. Many of the cases were kept under observation for months and sometimes years.

I have to acknowledge my great indebtedness
to/

to Dr Melville Dunlop for putting the cases, which have occurred in his Ward at the Royal Hospital for Sick Children, Edinburgh, at my disposal, and also to the other Members of the Staff for permission to use the Post-Mortem Records of their cases.

2. VARIETIES AND MORBID ANATOMY.

In considering the division of Tuberculous Peritonitis into varieties, it must be distinctly understood that for the most part, it is merely either a question of degree in the severity of the condition or in the prominence of one sign.

Thus for Clinical purposes we may conveniently divide the disease into two varieties, viz.,

ASCITIC.

PLASTIC.

These two are, to a certain extent, dependent on each other. In the Ascitic variety we may have the fluid absorbed leaving the ordinary Plastic variety, or in the Plastic variety we may have fluid thrown out and the Ascitic form produced.

1. ASCITIC VARIETY.

This Variety may be subdivided into two sections/

sections.

1. When the fluid is free in the Abdominal Cavity.
2. When it is loculated, i.e., confined by adhesions in some part of the Abdomen.

When this occurs there are usually several collections most frequently between the coils of Intestine.

The Peritoneum is usually studded over with fine Miliary Tubercles in great numbers, sometimes joining together to form masses on the Surface of the Bowel.

This variety is not very common. Theodore Fisher (4) in a series of 80 Post-mortem examinations found the fluid sufficient to justify the name Ascitic in only 8 cases. In 5 of these cases the fluid was encysted. Still (3) puts the proportion at 1 Ascitic to 10 Plastic. In 103 cases examined clinically, fluid was detected in 17, i.e., 16.8%. In 31 Post-mortem examinations of Children dying of Tuberculous Peritonitis, fluid in Quantity was found in 2, i.e., 6.4%. This is what we would be led to expect when we consider that the Prognosis in cases suffering from the Ascitic variety of Tuberculous Peritonitis is better than in other varieties.

The Fluid in these cases is usually greenish-yellow/

yellow. It is occasionally brownish when there has been Haemorrhage. It is sometimes purulent. There may be a faecal odour when infection with B. Coli has taken place, either from a perforation, or from its passage through the diseased intestinal walls.

2. PLASTIC VARIETY.

The simplest form of this variety consists in a dotting over of the surface of the Peritoneum with small pearly translucent nodules up to the size of a large pin's head. These are not easily seen in the folds of the Peritoneum, but are always well seen on the surface of the Organs, especially the Spleen and Liver. They are exceedingly common and occur in almost every case of a child dying from Tuberculosis. They are frequently very scanty and seldom give any sign of their presence during life. The patient dies of the primary disease before they have time to develop sufficiently to cause any Physical Signs.

These Tubercles are whitish yellow in colour, and are frequently in close relation with a small bloodvessel, and are sometimes also surrounded by a small zone of Hyperaemia. They are frequently present/

present on the Peritoneal surface of Tuberculous Ulcers of the Intestine.

The second stage is obvious clinically as Tuberculous Peritonitis, and consists in the formation of large numbers of these Tubercles over the surface of the Parietal and Visceral Peritoneum. There is a certain amount of sticky exudation, and the various surfaces coming together adhere to one another. More Lymph is thrown out, and this becoming organised, forms definite adhesions between the various loops of Bowel and also between the Bowels and the Parietal Peritoneum and other Organs. This is the true "Fibrous Form" and is common among children in whom a definite diagnosis of Tuberculous Peritonitis can be made. This formation of Fibrous Tissue with subsidence of active mischief is produced in all cases of Tuberculous Peritonitis which recover, and it is our aim in treatment to encourage its production.

We may, however, get the disease progressing a stage further. Large numbers of these Tubercles may coalesce, enlarge and produce caseous nodules and plaques on the surface and between the loops of Bowel. Large masses are frequently produced in this way, and, along with adhesions, the whole of the Abdominal contents are matted together into one mass. The various organs/

organs are with difficulty recognised. Adhesion to the Diaphragm is common, and this part is frequently studded with large numbers of Tubercles. This was found prominently present in 11 out of 146 Post-mortem Examinations on Children dying of Tuberculosis in the Edinburgh Children's Hospital, in whom some lesion in the Abdomen was found. In this variety we occasionally find the Omentum specially affected. It becomes infiltrated with Tubercle, shortened and frequently crumpled up. On examination this gives the feeling of a sausage-shaped swelling in the Epigastrium. Fisher,⁽⁴⁾ in his series of Post-mortem Examinations above referred to, found definite thickening of the Omentum 7 times, but in only 2 cases was there a definite Tumour. In the present series of 103 cases, it was found as a definite tumour on 5 occasions, so that it is rather uncommon.

In addition to Caseation in these Plaques and nodules, we may get the condition progressing a stage further, viz., actual breaking down and destruction of tissue. Thus we have abscess-formation, and as these occasionally rupture either externally or into the Intestine, this has been called the "Ulcerous Variety". Allchin⁽⁵⁾ has drawn attention to a characteristic feature of this variety, viz., the frequency/

frequency in development of Tubercle with Caseation and ulceration in the Connective Tissue round the Foetal remains (Urachus Obliterated Hypogastrics etc.) connected with the Umbilicus. This is the reason why, when the pus discharges externally, it almost invariably does so at the Umbilicus. This frequently leads to the establishment of a Faecal Fistula as the abscess Cavity may communicate direct with the Bowel.

We also find communications between adjacent pieces of Bowel caused by these abscesses rupturing into two parts of the Bowel with which they are in contact. The walls of this internal Fistula are usually thick and fibrous, and are formed by the abscess cavity.

Unbilical Fistula is an uncommon complication of the Disease. It was present only twice in 103 cases. Although the Umbilicus was reddened and inflamed in 7, this disappeared under the treatment in 5 cases.

In conjunction with any of these Varieties, we may, and almost invariably do have, Tuberculous Disease of the Mesenteric and Retroperitoneal Lymphatic Glands. They become enlarged and caseous and set/

set up a certain amount of Inflammation around them, and are usually involved in the general mass of adhesions. Not infrequently they overshadow in great part the co-existant Peritonitis. Carpenter,⁽⁶⁾ in a series of 25 Post-mortem examinations on children dying of Abdominal Tuberculosis, found the Tubercle limited entirely to the Peritoneum in only one case.

Clinically, the disease is most frequently evident on the right side of the Abdomen. Thus in 103 cases, the Zones on the right side were affected in 87 cases, the middle zones in 83, and the left zones in 61. Of all the areas, the Umbilical was most frequently affected - 39 times, the right Iliac being next - 32, and the left Lumbar was least frequently affected - 17 times.

INTESTINE.

Tuberculous Ulceration of the Stomach is a rare condition, as the Bacillus does not thrive in an acid medium. In 146 cases, it was only present twice, and these were very advanced and widespread cases of Tuberculosis. The ulcers were small and insignificant./

insignificant. A few cases have been recorded, and in almost every instance the condition was secondary to disease elsewhere. Ruge (11) reports a case of Primary Tuberculosis of the Stomach. The clinical course simulated Malignant Disease, in fact, this was the diagnosis before death. There was entire absence of Hydrochloric Acid.

The Duodenum is also seldom affected, but after this the ulcers become more and more frequent as we approach the Ileo-caecal valve. They become less frequent again in the large Intestine. Occasionally an Ulcer is found in the Appendix.

The Ulcers occur in all sizes and numbers. There is first a small yellow deposit almost always in a Solitary Gland or Peyer's Patch. This caseates breaks down and gradually enlarges. Like all chronic ulcers it tends to spread round the gut transversely. The edges become indurated and raised, but not undermined. It also extends in depth. The Peritoneum becomes thickened over it, and the ulcer can be distinguished from the outside. There is frequently a cluster of Tubercles over it.

This is not the only way in which Ulceration may be produced. We may get a Tuberculous mass or a Lymph Gland ulcerating through from the outside.

Healing/

Healing in these ulcers is very imperfect and is rarely complete. We may get a certain amount of puckering of the scar, but it seldom goes further. Thus the Prognosis becomes very bad. Stricture is uncommon.

Allchin (13) and Osler (14) notice a curious condition of the Intestine, viz., Hyperplastic Tuberculosis of the Ileo-caecal region. In this we get great thickening of the wall of the Intestine with narrowing of the Lumen and chronic obstruction.

I remember seeing a case of this variety some years ago. It was in a boy of about 8 or 9. There was narrowing of the lumen of the Bowel, until it would scarcely admit an ordinary pencil. There was tremendous Hypertrophy of the Gut above, in fact, the Intestines looked more like those of an ox than of a boy. He developed symptoms of acute obstruction and was operated on. The part was excised, and he did well afterwards. There was some enlargement of the Mesenteric Glands. This condition is rare. As a rule it is very chronic, and does not cause much constitutional disturbance.

3. FREQUENCY.

Abdominal Tuberculosis is a common disease in this country among the children of the poorer classes, but in the upper classes of society, it is rare.

Dr. John Thomson (15) found that during the last 10 years, the average number of patients admitted annually to the Edinburgh Children's Hospital was 1,532, and of these 3.57% were children suffering from Abdominal Tuberculosis. The percentage in the Glasgow Hospital was even higher 4.5%. In London it was less, being 1.67%.

But it is in Post-mortem records that we find how great is the frequency of the disease. That this is so is due to the Prominent Characteristic of Tuberculosis in children, viz., Rapid Generalisation. In 154 consecutive Post-mortem examinations in Tuberculous children, Tubercle in some form was found in the Abdomen in 146, or 94.8%. Still (3) found it in 88.3%. Cotton (16) found it in 70%.

In a large number of these cases, the condition/

condition gave no sign of its presence during life, and was secondary to some form elsewhere causing the death of the Patient.

The frequency, with which the various parts were affected, is as follows:-

Peritoneum including cases of		
Miliary Tubercle	-	63.6%
Retroperitoneal and Mesenteric		
Lymphatic Glands	-	83.6%
Ulceration of Intestine in		
122 cases	-	42.6%

In making up these statistics I have been careful to use only those cases in which the presence or absence of the various conditions was definitely stated.

These statistics compare more or less closely with those of other observers.

Sims Woodhead (8) found the Mesenteric Glands diseased in 78.7% of 127 patients dying of Tuberculosis.

Colman (9) found it in 60%.

Carr (10) found it in 65% of 120 Tuberculous children.

Chaffney/

Chaffney (7) found it in 50%.

A large number of observers on the Continent and in America have made similar observations.

The condition is practically always present when there is Ulceration of the Intestine. In 46 Post-mortem examinations in which there was Ulceration, it was present in every case except one. Chaffney (7) found the condition present in every case of ulceration.

Holt (12) in a series of 109 Post-mortem examinations found the Intestine involved in 37%, and in a 2nd series of 103 in 54%.

Thus then it is evident that the Lymphatic Glands in the Abdomen are the most frequently affected with Tuberculosis. This is explained by the fact that during childhood they are at their period of greatest activity, and are at the same time liable to irritation from bad feeding. In this way their resistance is lowered and Bacilli, ingested with the food or in Tuberculous sputum which has been swallowed, find a lodgment.

Dr. John Thomson (15) and Dr. Bovaird (16) call attention to a remarkable fact, that while Abdominal/

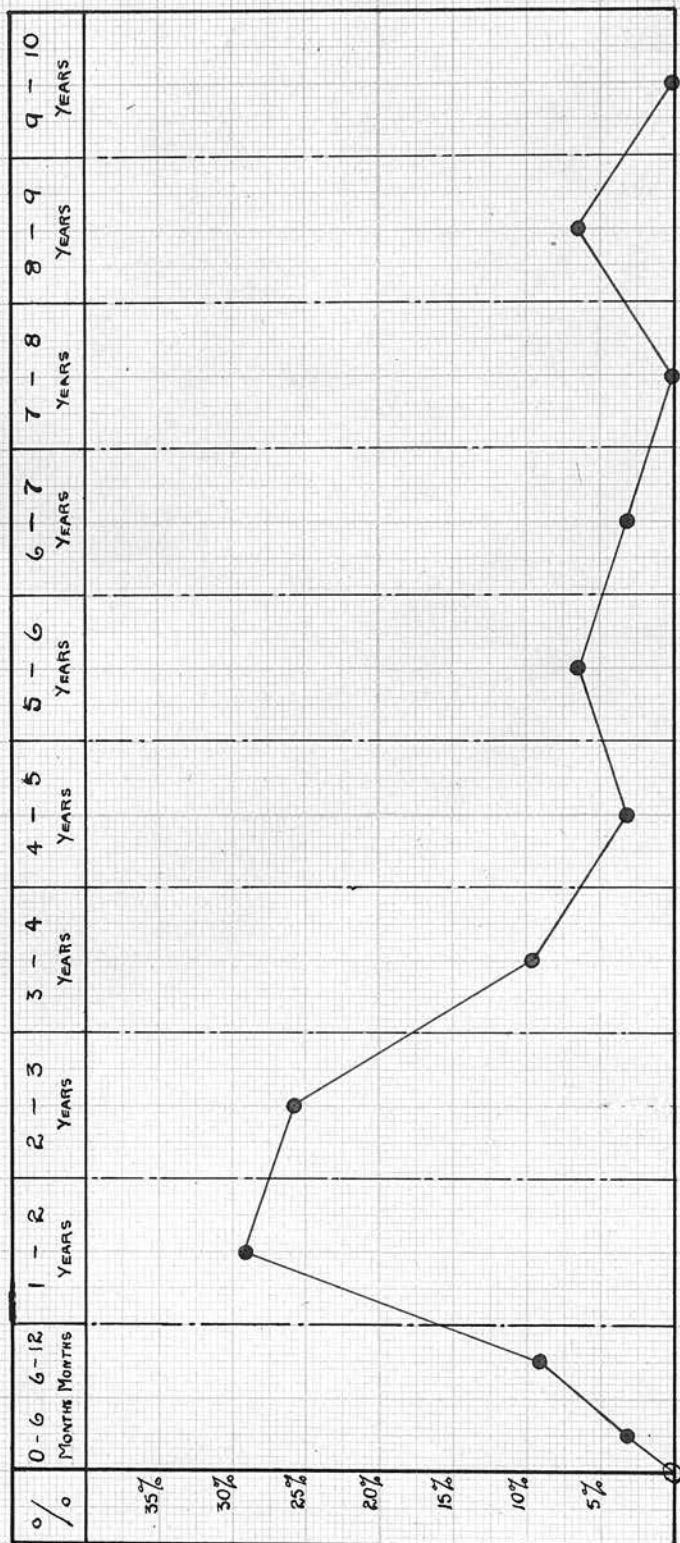
Abdominal Tuberculosis is a comparatively common condition in this country, in America it is a decidedly rare condition. In the Children's Department of the Mount Sinai Hospital, New York, only ~~one~~⁸ case ~~sw~~¹⁷² admitted in 7 years. The explanation of this is not at all clear.

The condition is also more uncommon in Germany than in this country.

The age incidence of Abdominal Tuberculosis corresponds more or less closely to that of Tuberculosis in other parts.

As will be seen from the accompanying charts (I, II, III, IV) few cases occur during the first six months of life, but after this there is a rapid rise until, by the end of the 2nd year, we reach the highest point of the curve, thus showing the great frequency of a fatal result in the early years of life. After this there is a fairly rapid fall in the frequency of the disease as met with in the Post-mortem Theatre until between the ages of 4 and 6, when we reach a point at which the curve tends to remain, and during the next 6 years, we get practically the same number of cases occurring each year at the different age./

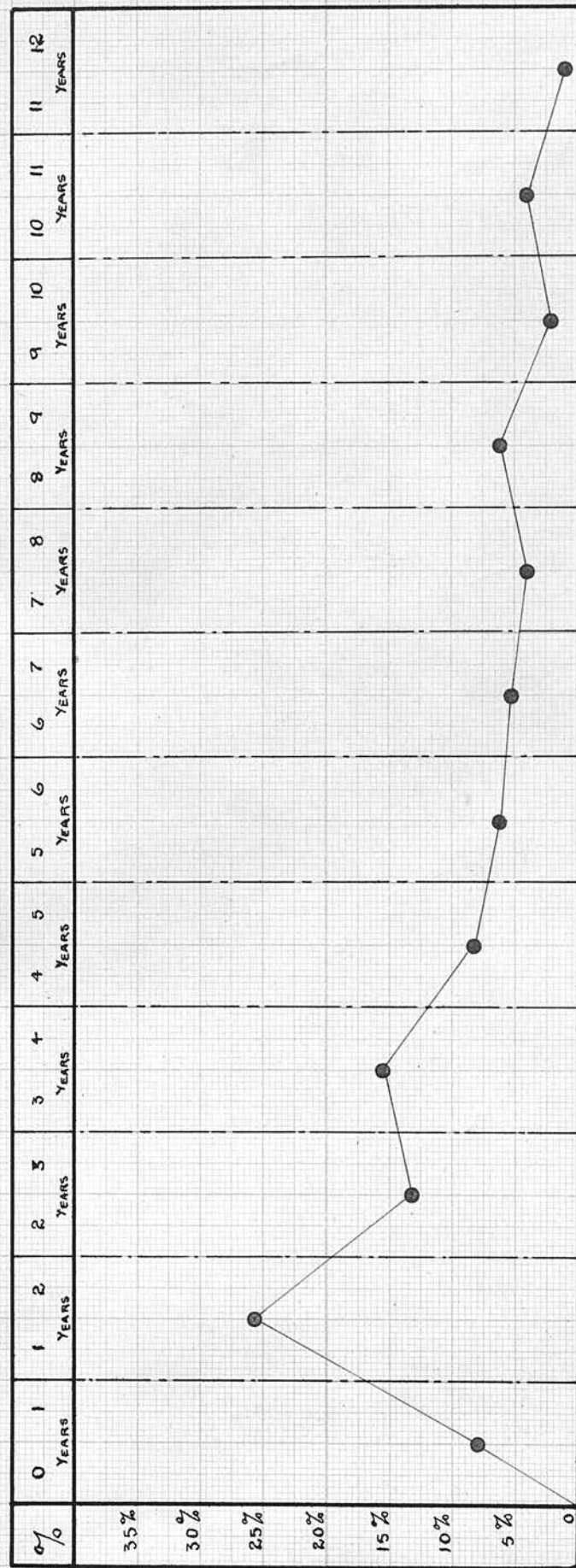
— CHART I —



— % AGE INCIDENCE OF 31 POST MORTEM EXAMINATIONS ON CASES OF TUBERCULOUS PERITONITIS —

— OCCURRING IN ROYAL HOSPITAL FOR SICK CHILDREN EDINBURGH —

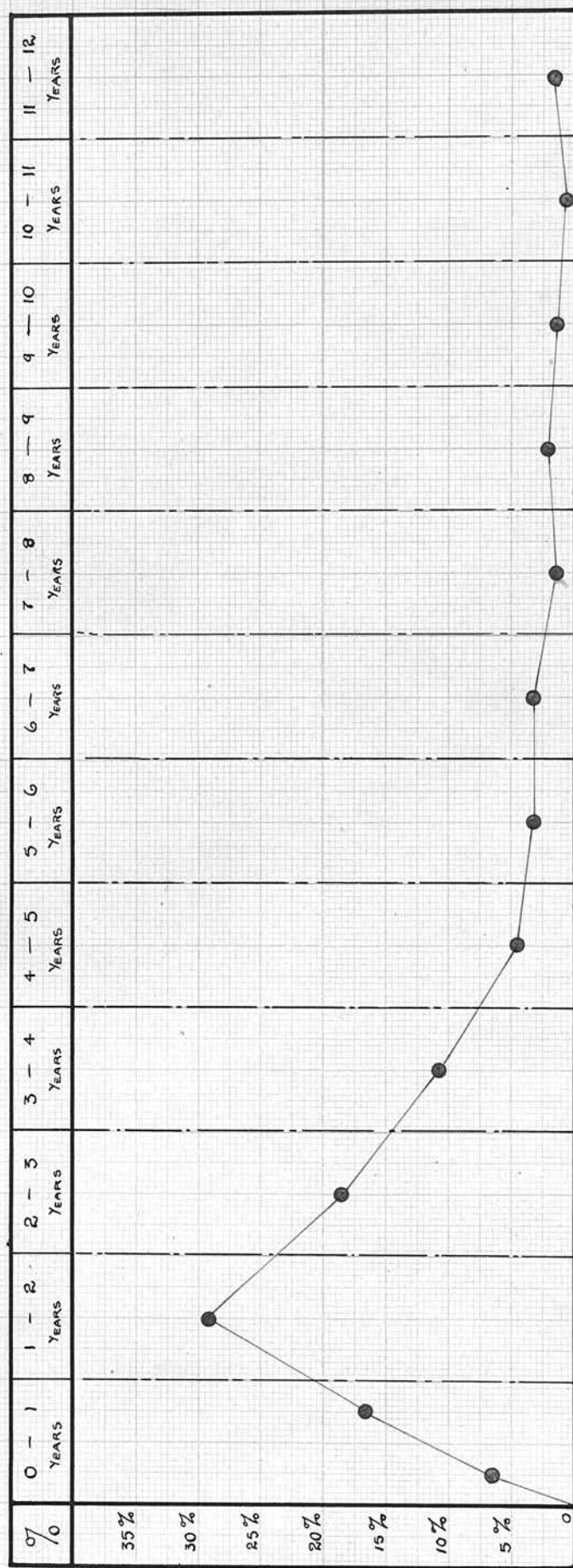
— CHART II —



— % AGE INCIDENCE OF 98 POST-MORTEM EXAMINATIONS ON CHILDREN —
— DYING FROM ABDOMINAL TUBERCULOSIS —

[Geo. F. Still M.D., Clin. Jour. Dec. II, 1901]

—CHART III—

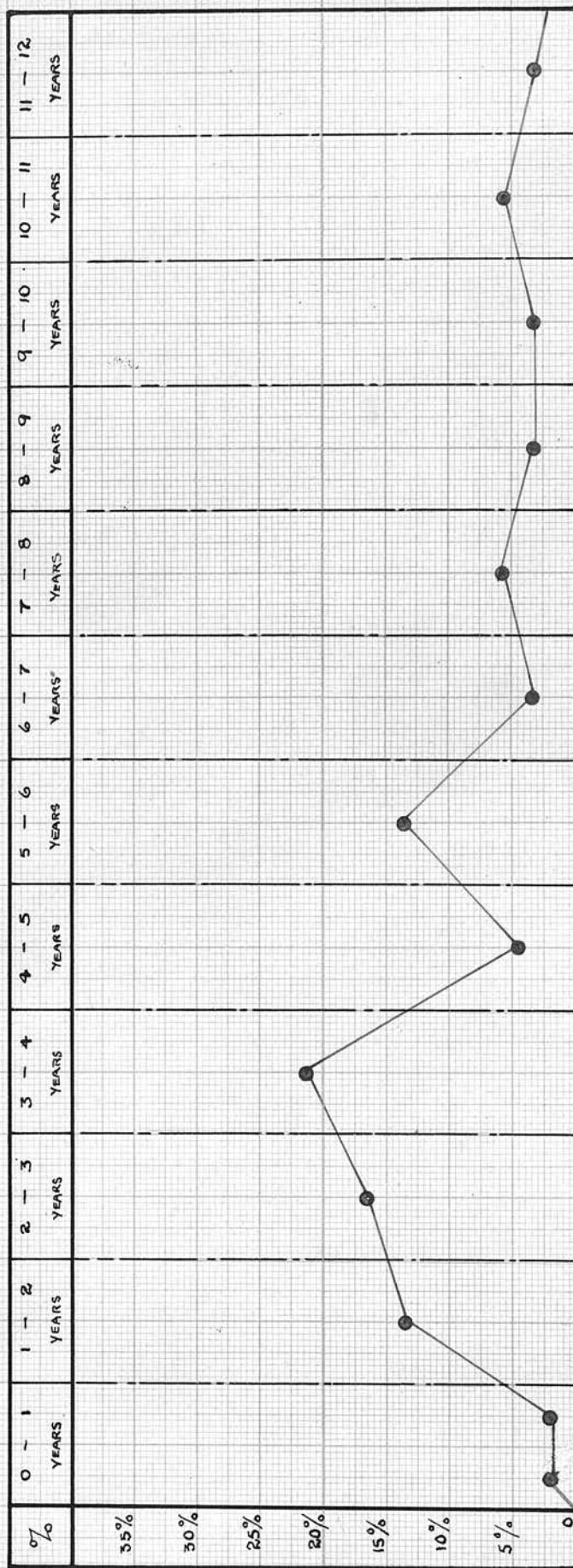


—% AGE INCIDENCE IN 137 POST MORTEM EXAMINATIONS ON—

—CHILDREN DYING OF TUBERCULOSIS IN THE—

—ROYAL HOSPITAL FOR SICK CHILDREN EDINBURGH—

— CHART IV —



— % AGE INCIDENCE OF 89 POST-MORTEM EXAMINATIONS OF CASES OF —

— ABDOMINAL TUBERCULOSIS —

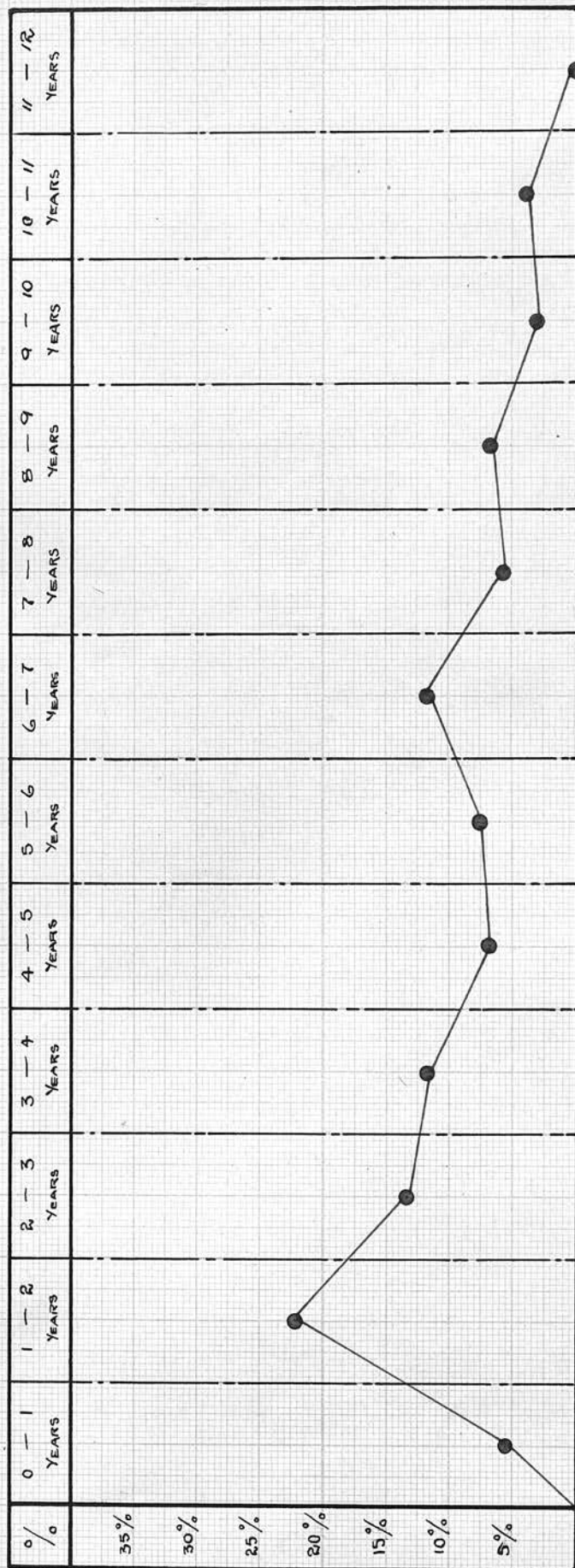
[GEO. CARPENTER M.D.]

age.

There is one slight difference between the age incidence of Tuberculosis generally and that of Abdominal Tuberculosis, and that is, that on the whole, relatively more cases of Abdominal Tuberculosis occur in the later ages than of Tuberculosis generally. The age incidence of Abdominal Tuberculosis as it is met with in the Wards, also bears out this fact, but we cannot, with any degree of accuracy, use it for comparison without, at the same time, finding the age incidence of Tuberculosis generally as it occurs in the Wards. In this chart (V), it will be seen that the curve is not so sharp, and that we again have a greater frequency of Abdominal Tuberculosis in the later ages. These charts will be referred to more fully in the study of the Etiology of the Disease.

In preparing these charts, I have reduced all the numbers to percentages, thus rendering comparison easier. This has also been done in tabulating and charting Still's (3) and Carpenter's (19) cases.

Both sexes are apparently equally subject to the disease. Of 103 cases, 51 were males and 52 females/

CHART V

— % AGE INCIDENCE OF 103 CASES OF ABDOMINAL TUBERCULOSIS —

— OCCURRING IN THE WARDS OF —

— THE ROYAL HOSPITAL FOR SICK CHILDREN EDINBURGH —

females. Still (3) found 48 males and 52 females in 100 cases. In this respect the disease in children differs from that found in adults. König (59) found in 131 cases 120 were women and 11 men, 70% being over 20 years of age. Osler (58) finds it to be twice as numerous in women as in men. This is explained by the frequency with which the Ovaries and Tubes are affected with Tuberculosis. In between 30 and 40% of the instances of Laparotomy for this condition the infection was from these organs.

4. ETIOLOGY.

"I should estimate the extent of Infection by the milk and flesh of Tuberculous Cattle and the butter made from their milk as hardly greater than Hereditary Transmission, and I therefore do not deem it advisable to take measures against it." (Koch ²⁰)

These words, spoken by Professor Koch in 1901, coming as they did from the discoverer of the Tubercle Bacillus and one of the recognised pioneers in the campaign against Tuberculosis to a gathering of the foremost Medical Men and Veterinary Surgeons of the World, drew attention, in a way that could never have been otherwise better accomplished to a subject of the most vital importance, at all events, in this country, in the war against the greatest scourge of our times.

Since that time more work has been and is being done on this Subject, both in Europe and in America, than on any other branch of Medical Science.

INHERITANCE./

INHERITANCE.

Prenatal Tuberculosis, though very uncommon, undoubtedly does occur. There is, as a rule, some disease in the Placenta of a Tuberculous Mother, and thus we get transmission of the Bacilli from the maternal to the foetal blood stream. The presence of Bacilli in the blood of an adult is very rare, and the combination of this with a diseased Placenta must be rarer still, so Prenatal Tuberculosis is necessarily very uncommon. Gärtner, by inoculating the mother, produced Tuberculosis in young white mice.

The Lesions, in cases of Prenatal infection with Tuberculosis, are very severe, and are usually in the Lungs. They have been compared to the prenatal manifestations of Avian Tuberculosis. (21)

Dr Ballantyne also draws attention to the fact that it is in mothers suffering from Tuberculosis affecting the abdominal organs and Peritoneum, that most cases of prenatal infection occur. We may have direct infection of the Placenta from the Tuberculous Peritoneum covering the Uterus.

If/

If Prenatal Tuberculosis is thus so uncommon, do the children of tuberculous Parents inherit a special vulnerability to the Tubercle Bacillus? This is rather a question in the General Etiology of the disease, but it is of interest to us at the present time, on account of the frequency of Abdominal Tuberculosis in Infants.

Maxon King (22) holds that these children have a natural immunity to Tuberculosis and that the case incidence, in spite of the fact that they are constantly exposed to infection, is lower than among other children.

In the 103 cases under consideration, there was a history of Tuberculosis in the mother and father in only 7 cases. Thus the influence of direct heredity was only evident in 6.8%, and as the average age of these cases was over 5 years, there is a much greater probability of it having been a direct infection.

In 12 cases, other children in the family suffered from Tuberculosis, and 8 of these suffered from Abdominal Tuberculosis. It is a very significant fact that 2 and sometimes 3 children in the same family developed this disease suggesting a common cause, but nothing definite could be made out. In only/

only one case had the children been brought up on Cows' milk.

In none of these cases was there the possibility of a prenatal infection as the children were over 2 years, and had been apparently healthy up to the time that they developed the disease.

From this evidence we may say that Heredity does not play an important part in the Etiology of Abdominal Tuberculosis, and that the cases that have a Tuberculous family history are more probably cases of direct infection.

ENVIRONMENT.

The environment of the patient is a most important factor, and it is probable that here more than anywhere else we find the explanation of the great frequency of the disease among the poorer classes.

The impure air of close and crowded rooms increases the tendency to Catarrhal conditions of the Bronchial Tubes, and in this important region weakens the resistance of the individual to the Bacilli. At the/

the same time this, in conjunction with lack of sunshine, favours the existence of Tubercle Bacilli.

Thus we have suitable conditions for the growth of the Bacillus and a weekly non-resistant child. Consequently it is not surprising to find the disease so common in this class of patient, in fact, it is a wonder the disease is not even more common.

Cleanliness is also often absent. The child is allowed to crawl about the dirty floors and passages, picking up anything it may come across, and as the natural tendency in a child of this age is to put everything it gets into its mouth, it must swallow large quantities of dirt which often contains the Tubercle Bacillus. At the same time it causes irritation in the Alimentary Canal which further reduces the resisting power of the patient.

At a later age these children play about in common stairs where there is frequently much expectoration. Thus again they stand a good chance of contracting the disease if they have escaped it in the earlier periods of life. It is at this time also that they begin to be confined for many hours every day in the schoolroom, and a further strain is put/

put upon them. I think it is this factor more than anything else that explains the sudden rise in the curve between the ages of 5 and 7 as brought out in Carpenter's cases, and also in the 103 at present under consideration. (Charts IV & V.) We have probably a child much weakened, perhaps already the Bacillus has gained an entrance and is for the time being quiescent. This fresh strain on the young life gives the Bacillus its opportunity to develop and the disease becomes Manifest. It is here that the Medical Inspection of School children will have a wide field, but it will only be of use if a thorough examination of each child is made, and not the slipshod method suggested in the present Order. (23)

MEASLES AND WHOOPING COUGH.

Dr Still (24) lays stress on Measles and Whooping Cough as etiological features in Abdominal Tuberculosis, but in few of the other books and papers I have been able to consult has the possibility been more than mentioned and then passed over as apparently/

apparently unimportant.

These conditions, in Scotland at all events, are frequently the precursors of Tuberculous Disease either in the Lungs or in the Abdomen. How frequently we hear the story from a mother that her child has never been well since it had measles or whooping cough, and on examination we find evidence of Tuberculosis.

In both conditions we have a catarrhal condition of the Pharynx Trachea and Bronchial Tubes leading to a swollen, congested condition of the Bronchial Glands. Here we have the old story of a weakened resistance and the omnipresent Tubercle Bacillus which settles down, and its spread to the Abdomen is only a question of time. It has been shown (28) that in whooping cough and measles the mesenteric glands are enlarged and congested, and so we may have a direct infection of them from the Alimentary Canal, but it is more common to have it from the Bronchial Glands.

In 103 cases there was a previous history of measles in 26%, of whooping cough in 10%, and of both in 25%. Thus in 61% of the cases there was a history of one or other or both of these Diseases.

In/

In 14% there was a direct reference of the disease in the Abdomen to one of these, and in these cases it was noticed that it was a severe form of the disease that the child was suffering from.

From these figures it will be seen that Measles and Whooping Cough play no mean part in the Etiology of the Disease, and call for careful treatment in weakly children, and especially in those who have already shown Tuberculous lesion elsewhere, such as Tuberculous Glands in the neck.

TRAUMATISM.

The possibility of the disease having its commencement in a fall or blow on the Abdomen is mentioned by Holt and several other writers, but it is uncommon. In most cases we cannot be certain that the disease was not present before and attention attracted to it by the blow.

There is only one case in the 103 which suggests this origin, and in view of the rarity of the condition, it is my intention to give it in full.

J./

J.H. aet. 4 $\frac{10}{12}$

Family History - Nothing to note.

Previous Health - Good. Has had Measles, Whooping Cough and Bronchitis, but recovered quickly from them all.

Present Illness.

Patient was apparently quite well until he received a severe blow on the Abdomen. Vomiting started almost immediately, and he was brought to the Sick Children's Hospital a few hours afterwards. He was admitted, but nothing could be discovered in the Abdomen and the vomiting quickly ceased. He was sent home in a day or two apparently quite well. Four weeks later he was re-admitted. The vomiting started again a few days after his dismissal from Hospital and had been troublesome at intervals. The Abdomen began to swell about one week after he went out, and had gradually increased. He had also had occasional attacks of Diarrhoea.

Examination.

The boy was pale and poorly nourished.

The Abdomen was prominent. There was no pain. The veins in the Abdominal walls were not distended.

on/

On palpation a solid elastic mass was felt in the Epigastric and Hypochondriac regions. This was dull on percussion. Under chloroform the mass was felt to be matted bowel. The rest of the Abdomen was normal.

Nothing abnormal was found in the other systems. He was kept in Hospital for seven weeks. His general condition improved, but the Abdominal condition remained much the same. The Temperature swung a little at the beginning, but settled to normal later.

He has since been lost sight of and I have failed to trace his subsequent history.

As the boy was seen immediately after the accident, and as particular attention would be paid to the examination of the Abdomen in view of the history and the possibility of rupture of some organ, I think we must conclude that the disease was not present at that time, but developed immediately afterwards, and as a direct result of the blow. Of course, it is possible that there might have been a small quiescent focus of Disease which was overlooked at the first examination, and which was roused into activity by the blow.

SPREAD/

SPREAD FROM DISEASE ELSEWHERE.

A common cause of Abdominal Tuberculosis is the spread from Tuberculous Bronchial Glands. In the Post-mortem examinations which showed primary Lung infection, it was possible in many cases to trace the spread along the Lymphatics to the Mesenteric and Retroperitoneal Lymphatic Glands, and from there occasionally to the Peritoneum setting up a general Tuberculous Peritonitis.

This is opposed to the view of Cantley (63) and many others who consider that Tuberculous Peritonitis is usually due to spread by the blood stream, but in these cases it was so evident that it must be of frequent occurrence.

Holt (26) and Allchin (27) are in favour of a direct spread from the Bronchial Glands, but Price Jones (25) is quite opposed to the view that organisms which are in the Lymph Glands in the Thorax can pass down and infect the Glands in the Abdomen without leaving some sign in the intervening glands and lymph channels. But it is a well known fact that this does occur and is frequently seen in cases of enlarged/

enlarged glands in the neck when the place of infection is evident, and the glands which it immediately drains into are unaffected, but those further down the chain show evidence of infection.

We may also get direct spread from the Pleura. We find the Peritoneum in relation to the Diaphragm thickly studded with small Tubercles and evidence of direct infection. In 11 cases out of 154, this was a marked feature. Two of these cases however, were cases of primary Abdominal Tuberculosis showing that we may get spread of the disease from the Peritoneum to the Pleura.

Many observers (Cattley, Osler, Holt) have found that Tuberculosis of the Genital Organs (Ovaries, Fallopian Tubes, etc.) may give rise to Tuberculous Peritonitis, but it appears to be a much commoner cause among adults than among children. Osler (58) found it in 30% of adults. Carpenter (19) found disease in the male genital organs in 5 cases, and in female genital organs in 10 cases in a series of 91 cases in children, but whether it was the cause of the Peritonitis or secondary to it is not stated.

In 146 Post-mortem examinations at the Edinburgh Children's Hospital, in no case was it noted/

noted that the disease had started from the genital organs.

Among children it is not a common cause. This is to be expected when we consider that these parts have not yet taken up their true function.

INFECTION FROM MILK AND OTHER FOODS.

Around the question of the possibility of infection by milk, much discussion and controversy has lately taken place. Until 1901, the opinion of most men was that milk containing Tubercle Bacilli was a frequent source of Abdominal Tuberculosis in children. Since Koch made his sensational statement with which this heading opened, there has been a great deal of confusion and much diversity of opinion. At one extreme we have Koch who thinks infection from milk is so infrequent as to be of no consequence; at the other we have Von Behring's (28) opinion that the true beginning of all Tuberculosis is the earliest period of childhood, though it may only become apparent in later life when some other condition, such as puberty, malnutrition or unsuitable hygienic surroundings, /

surroundings, kindle it into activity. He would put the source of all Tuberculosis in the milk jug, and in support cites the special study of 500 Post-mortem examinations made in Professor Ribbert's Institute in 'Zürick' by Naegali. In these cases a special search was made for Tuberculous lesions. Sections were made of all the organs, and individual Lymph Glands were particularly inspected. Tuberculous lesions were found in 97%, but up to the 15th year the disease was only found in 50%. A sudden rise then took place and by the 18th year it was found in 96%. After this there was a slow rise until by the 40th year a Tuberculous Focus was found in every body. From this it is apparent that one half of the children escaped infection in Infancy.

Koch, (20) from his experiments, stated that Human Tuberculosis differed from Bovine, and was not transmissible to cattle, and from the fact that he had only seen Primary Intestinal Tuberculosis twice, he deduced the fact that Bovine Tuberculosis was very rarely transmitted to man.

The first of his statements is borne out in a modified form by the work of the Tuberculosis Commission. (29)

This/

This Commission, by examining Tuberculous material, Human and Bovine, from different sources and growing it on various media, mostly Glycerine Agar and Glycerine Broth, have been able to divide the Bacilli from the various sources into 2 main groups. This has been done principally by comparing the rapidity of growth, and they have adopted the words Eugonic and Dysonic to denote respectively that a bacillus grows with readiness or with difficulty on a medium or on several media.

They have found that the Bovine Bacillus is Dysonic, and in all animals produces a general Progressive Tuberculosis on inoculation.

The Bacilli, from Human sources, are divided into 2 groups.

1. This group differs in no way from Bovine Tuberculosis, either in culture or inoculation. In these cases infection with the Bovine Bacillus had evidently occurred.

2. In this group the Bacilli differ from those in Bovine Tuberculosis in being eugonic. The inoculation characters also differ in that the Bacillus does not set up a general progressive Tuberculosis in all animals, but merely a local Tuberculosis at/
at/

at the point of injection, and perhaps a slight spread to adjacent lymph glands.

They insist that the difference is merely a question of degree, and to all intents and purposes it is the same *Bacillus* but of less virulence. The cause of this attenuation is not very evident, but is stated as probably due to prolonged stay in the human host.

In microscopical characters there is also a difference. The Bacilli in Group ii are on the whole longer and stain more irregularly than those in Group i.

Thus we see that the Bacilli of Human and Bovine Tuberculosis differ, but as has been shown, it is only a question of degree in virulence. The two organisms set up the same morbid changes, but in the one case severe and general, and in the other slight and local.

The Commission (30) have found the *Bacillus* of Bovine Tuberculosis in 14 out of 60 cases. Eleven of these cases were Abdominal Tuberculosis and the other 3 cases of Cervical Gland Tuberculosis.

40 of the remaining cases showed Bacilli of the Human Type. In only 8 of these was the disease Abdominal/

Abdominal Tuberculosis.

The Bacilli from the other 6 cases showed varying characters, and could not be classed along with either group. They were thought to be Bacilli which, though Bovine in origin, were in process of undergoing the change to the Bacillus of the Human Type.

This work entirely disproves Koch's second statement and proves conclusively that milk containing Tubercle Bacilli is a frequent cause of Abdominal Tuberculosis, at all events in this country. At the same time it opens up a large field for investigation along similar lines with a view to discovering the frequency of infection with Bovine Tuberculosis. Already observations are being made, using the characters of the different Bacilli as a guide to the source of infection. Beitzke,⁽³¹⁾ in 25 children dying of Tuberculosis, found the Bovine Bacillus present twice. In his cases the disease was in almost every instance in the Lung.

This low percentage (8%) is what we would expect when we consider the extreme infrequency of primary Abdominal Tuberculosis on the Continent, but it shows that milk is a more frequent source of infection/

infection than had been previously thought.

Von Behring (28) insists that in early life the Alimentary Canal is incapable of resisting the passage of various noxious substances including Tubercle Bacilli owing to the Epithelial lining being incompletely formed.

Many investigators (Cornil and Babes, (32) Sidney Martin, (33) Burdon Sanderson (34)) have shown that the Tubercle Bacillus can pass through an apparently intact mucous membrane. How much more easily then will it pass through a membrane already the seat of Catarrh, as is so frequently found in bottle-fed babies.

Thus given a milk containing Tubercle Bacilli, it is quite possible for them to pass from the Intestine into the Lymph Glands in the Abdomen, and there set up the Tuberculous process. Further spread is then only a matter of time and opportunity.

Professor McFadyean (34) says that 30% of cows in this country are Tuberculous in some degree.

The milk of all these cattle does not however contain Tubercle Bacilli. It is as a rule, only when the udder is the seat of the disease that the Bacilli are found in the milk. This, however, is not/

not always the case, as Adami (35) has shown a number of cases in which the milk of cattle prove virulent even when the most careful examination of the Udder, both Microscopically and Macroscopically, failed to show disease. Also Udder disease is unattended with pain in milking, and often physical signs are wanting. In this way Tuberculous milk may be supplied without the dairyman's knowledge, 2 to 3% of the cows are affected with Udder disease. Since the milk of the whole herd is, as a rule, mixed, one cow will infect the entire milk supply of a dairy.

Milk, if not chilled, keeps warm for several hours and forms an excellent culture medium for the Bacilli, and by the time it reaches the consumer they have multiplied greatly, and may be present in formidable numbers.

In addition, Von Behring (28) finds that the Bacilli are capable of multiplication in the Intestine.

From these facts it will be seen that the presence of Tubercle Bacilli in milk, no matter in how small quantity originally, is a constant source of danger, and one to be combated by all possible means.

Nocard/

Nocard (36) holds that milk is only dangerous when it contains a large number of Bacilli and is ingested in large amount. In practice thus the danger only exists in the case of individuals in whom milk is the exclusive or chief article of diet, i.e., in children.

Kanthack and Sladin (37) found that 50% of the Cambridge milk supply proved infective.

Niven (38) found that 18.5% of the samples of milk intended for the city of Manchester contained Tubercle Bacilli.

It is a well known fact that the milk in town byres is not so frequently found to be infective as the milk which comes from the country. This, at first sight, appears difficult of explanation, as the cows in the country are supposed to lead a much more open air life than those in the town. The explanation apparently lies in the fact that the inspection of cattle cannot be so thoroughly carried out in the country. In the town, the cow houses and dairies are constantly under the eye of the Sanitary Inspector and usually also of a Veterinary Surgeon, and thus most cases of Udder Disease are discovered early and the animals isolated. In the country this cannot be done/

done, and it is only when the disease is all too evident, and sometimes not even then, that the animal is isolated. But all this time it has been infecting the whole milk supply and carrying the chance of infection to a large number of families.

From these facts and statements we are forced to conclude that milk containing Tubercle Bacilli can and does cause Abdominal Tuberculosis, and that by taking measures against the possibility of its consumption, we will remove a frequent source of the disease.

Sidney Martin (39) tersely sums up the situation when he says:- "As soon as Tuberculous cattle are rigidly excluded from the dairy it can scarcely be doubted that there will be a great decrease in the cases of Abdominal Tuberculosis in children."

In the present series the method of feeding in infancy was stated in 92 cases. These I have divided into 2 groups, viz:-

1. Children under 2 years.
2. Children over 2 years.

In the 1st group 13 were bottle fed and 12 were breast/

breast fed.

In the 2nd group 17 were bottle fed and 50 were breast fed.

From these figures it will be noticed that 52% of the cases of the 1st group were bottle fed, while in the 2nd group only 25% were bottle fed.

To draw conclusions from these data would, I am afraid, be inaccurate because it will be seen that in the first group Abdominal Tuberculosis is almost as frequent among breast babies as among bottle babies. All we can say is, that of the children who develop Abdominal Tuberculosis, those under 2 years are much more frequently bottle fed babies than those over 2 years, but further than this we cannot go.

Most of what has been said as regards the danger of milk applies also in the case of butter.

In cheese the Tubercle Bacillus lives only 24 days, and as cheese is allowed to stand some months before it is eaten, there is no danger of infection from it.

With regard to meat we may say at once that it cannot be a frequent source of Tuberculosis. It is a well known fact that Tubercle seldom attacks the muscles, and it is only by coming in contact with a knife/

knife or other instrument used in removing Tuberculous Glands etc. from other parts, that infection of the meat takes place. In addition, the Bacilli are destroyed in the process of cooking. In an official order of the German Government (March 26th 1894) it is stated that after numerous experiments it has been proved that except for the rare cases in which nodules are found in muscle, the ingestion of meat from Tuberculous animals is powerless to transmit Tuberculosis.

Lord (40) insists on the danger of spread of infection by means of flies. By experiment he has proved that they may ingest Tuberculous sputum and excrete Tubercle Bacilli whose virulence may last for 15 days. There is thus danger of infection from Tuberculous fly specks on food and in milk. Therefore, he states the importance of protecting all food from contamination with flies.

PRIMARY ABDOMINAL TUBERCULOSIS.

The possibility of a primary infection in the Abdomen depends to a large extent on what has been/

been proved with regard to the danger of infection from milk. The literature on the subject is vast and it may be divided sharply into 2 groups.

BRITISH.

FOREIGN.

The writers in each group have made observations on the cases occurring in their country. A large number of statistics have been compiled, and on these the opinion of the men in the various countries has been founded.

On the Continent and in America where Primary Abdominal Tuberculosis is rare, the opinion of most men is that infection with Tubercle is almost invariably through the Respiratory system.

In Great Britain, on the other hand, where a large number of cases occur, the feeling among most men who have studied the subject is, that although infection through the Respiratory tract is the most common method, infection through the Alimentary tract does take place frequently.

With a view to discovering if the frequency of Primary Abdominal Tuberculosis was still great, I have examined 154 Post-mortem records of cases dying of Tuberculosis in the Edinburgh Children's Hospital from/

from August 1901 to January 1908. I have taken as my guide as indicating the point of entrance of the Bacillus:-

1. The absence of Tuberculous disease in other parts.
2. The presence of Calcereous degeneration in the part apparently first affected.
3. The presence of advanced disease in one system with obviously early disease in another.

By this method I was able to fix the point of entrance definitely in 80 cases. In 22 other cases the entrance, though fairly evident, could not be stated definitely. These I have classed as probable.

My results are as follows:-

Probably	Respiratory System	-	50 cases	-	62.5%
	" "	-	8 "		
Probably	Alimentary System	-	25 "	-	31.2%
	" "	-	9 "		
Probably	Mastoid	-	2 "	-	2.5%
	"	-	1 "		
Probably	Pharynx to Glands in neck.	-	3 "	-	3.8%
	"	-	4 "		

By comparison with the statistics of other men/

men in this country, these cases show an even greater frequency of Primary Abdominal Tuberculosis than usual.

From the literature which I have been able to consult, I have constructed a table showing the work that has been done in the various countries.

GREAT BRITAIN.

Name.	Percentage of Primary Abdominal Tuberculosis.
Woodhead (8)	11.03%
Carr (10)	16.2%
Batten (41)	13%
Still (42)	29.1%
Shennan (43)	27.8%
Price Jones (44)	28.5%

THE CONTINENT.

Beidart (52)	.5%
Kossel (45)	4.5%
Hamburger & Sluka (46)	0%
Hamburger (47)	0%

AMERICA.

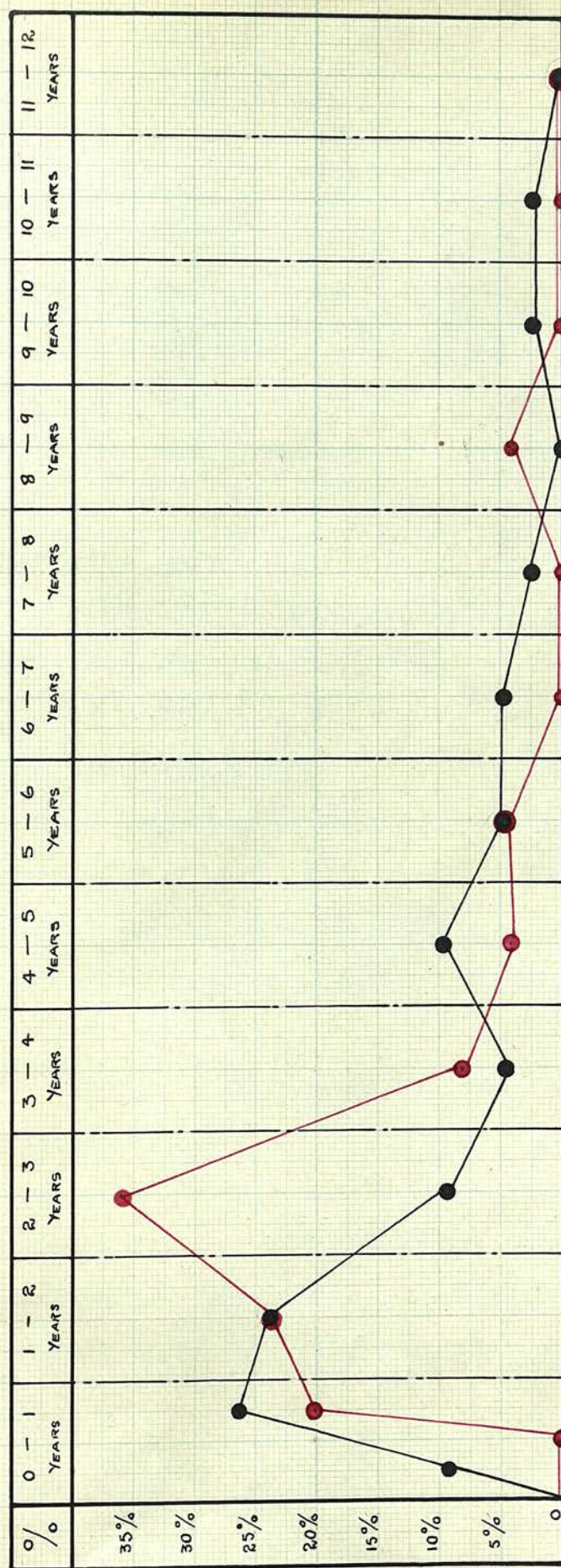
AMERICA.

Name.	Percentage of Primary Abdominal Tuberculosis.
Northrupp (48)	2.4%
Bovaird (50)	0%
Holt (49)	0%
Bovaird (17)	1%

From these statistics it will be seen how frequent is the condition in Great Britain and how rare it is on the Continent and in America. There does not appear to be any satisfactory explanation for this. Tuberculosis is apparently equally common among cattle in all the countries.

The age incidence of Primary Abdominal Tuberculosis is interesting as pointing apparently to the cause. I have drawn up a chart (VI) showing a comparison between this and primary infection through the Respiratory system. It will be noticed that the highest point in the curve is not reached until the 3rd year in Abdominal cases, while in Respiratory cases it reaches its highest point before the end of the first year of life. The explanation of this must, I think, be found in the fact that during the first year and often for a period afterwards, the children/

CHART VI



— % AGE INCIDENCE OF PRIMARY RESPIRATORY AND PRIMARY ABDOMINAL TUBERCULOSIS —

— IN 75 POST MORTEM EXAMINATIONS AT —

— THE ROYAL HOSPITAL FOR SICK CHILDREN EDINBURGH —

RESPIRATORY = —

ABDOMINAL = —

children are either breast or bottle fed.

Unless a mother is Tuberculous there is comparatively little danger of the breast-fed child developing Primary Abdominal Tuberculosis. In the case of bottle-fed babies while they are on the bottle, efforts, more or less effective, are made to sterilise the milk. But when these children reach a certain age they are given raw cows' milk, and thus are exposed to infection.

These facts explain the later age incidence of Primary Abdominal Tuberculosis.

As regards the Etiology of Intestinal Ulceration, little need be added to what has gone before. This condition is very frequently secondary to disease in the Lungs, and is due to the swallowing of sputum containing Tubercle Bacilli. Rolleston⁽⁵¹⁾ found it in 50% of fatal cases of Pulmonary Tuberculosis.

Holt (12) is of opinion that there is little Pathological support for the view that it is due to Tuberculous milk, but in the light of what has been proved above, it is evident that it must be a frequent cause. We may have the condition starting as the result of Bacilli from whatever source passing through/

through the canal or from the rupture into the Bowel of a softened Tuberculous mass, either a gland or a nodule in the Peritoneum.

The Etiology of Hyperplastic Tuberculosis of the Ileo-caecal region is obscure. It has been suggested (13) that it is due to an attenuated variety of the Tubercle Bacillus in conjunction with other organisms. The Bovine Bacillus has also been suggested, but in the light of the findings of the Commission this is not probable since we would expect an acute rather than unusually chronic form of Tuberculosis from so virulent a virus.

5. SYMPTOMS AND PHYSICAL SIGNS.

The Symptoms and Physical signs of Tuberculous Peritonitis and Tabes Mesenterica are to all intents and purposes the same. The only difference is that, in Tabes Mesenterica, they are neither so evident nor, as a rule, so severe. I shall therefore take them together.

In the variety of Tuberculous Peritonitis where the disease is part of a general Miliary Tuberculosis, there are seldom any signs to lead one to suspect that there is disease in the Abdomen. We may get slight tenderness on pressure, but this, as a rule, is no greater than we would expect from the general feeling of soreness that the patient has. There is no distension of the Abdomen and no clinical evidence of fluid.

In the common, more or less chronic variety of the disease, the symptoms and Physical signs are fairly constant and characteristic, and when the disease/

disease is at all advanced, the diagnosis is, as a rule, easy.

But if we are to give the patient the best chance, it is not at this time that the diagnosis should be made, but at a much earlier stage. Then it is by no means easy, in fact, in most cases it must be a matter rather of conjecture than of actual physical signs.

It is seldom, however, that a mother, except in the better classes of society, will bring her child to a Doctor unless there is something evident which directs her attention to a particular cause for the child not thriving. How often do we get the history that for some months the child has not been getting on. It has been peevish and not inclined to go out, its appetite is capricious, and there have been occasional attacks of diarrhoea, perhaps followed by constipation. There is seldom, at the beginning of the disease, loss of weight, unless the diarrhoea is a constant symptom. There may be occasional sweating at night, but this is not a prominent symptom so early. The cheeks may be rosy, in fact, rather more so than usual, but tend to change colour quickly. This is always suspicious.

When we get a child thus at the very beginning/

beginning of the illness, physical signs are usually wanting. A careful examination of the Lymphatic Glands in the neck should be made and, of course, the chest will be examined. Here we may or may not find the cause of the trouble. The Abdomen is then examined. There is as yet, none of the tumidity or great resistance that is found later in the disease, but we may discover some part of the Abdomen which the child tries to guard by stiffening its muscles whenever the hand approaches it. This is very suspicious and should suggest a further examination under chloroform. Some thickening may be felt, or more probably nothing at all, but we have been put on the line and we must not leave it until all doubt has been removed. The child is given suitable diet and fresh air and seen regularly. Very often nothing further will develop and the condition disappears, and one is left in doubt as to whether there has been any Tuberculous mischief present or only one of the simple Intestinal disorders so common in children.

Even thus early we may feel one or two small shotty glands and the diagnosis becomes even more probable though by no means certain, but the treatment should be carried out as if we had found a large/

large mass.

In Hospital cases, however, it is rare to get the children so early and, as a rule, the disease is all too evident by the time they come under observation.

The average duration of the History of 103 cases was 3.7 months. In 14 cases it was under one month, and in 7 it was over one year. From these figures it must be evident that the disease had got a firm hold before treatment was commenced. Parkinson,⁽⁵³⁾ in 19 cases during one year, found the average history $3\frac{1}{2}$ weeks, but he himself admits this to be exceptional. In 2 other cases in the same year, the history extended over 5 months and one year respectively.

I shall now take up the various symptoms and signs of the disease separately.

ONSET.

The onset, as will be gathered from the length of History, is as a rule, very insidious.

The/

The child gets out of health without apparent cause. It does not go out and play with its fellows, but sits about the house, often near the fire. This may continue for a few days and then the child gets well again. It may have attacks like this for some weeks or even months before any definite physical signs appear.

In a few cases the onset of peritonitis may be sudden from the bursting of a Tuberculous Lymph Gland. There is, in this case, a sudden attack of pain followed by distension and the condition simulates some acute septic infection of the Peritoneum or internal strangulation and in some cases, Laparotomy has been performed in this belief. (54 & 55)

This, however, is an unusual mode of onset and the diagnosis, as a rule, cannot be definitely made until some time has elapsed and the characteristic signs of Tuberculous Peritonitis appear.

THE CONDITION OF THE BOWELS.

In the great majority of cases, Diarrhoea has been present at some time during the illness. As a rule, the children have occasional attacks for a day/

day or two and are then better again. This is due to some indigestible substance getting into the Bowel which, in its weakened state, it is unable to digest. In this way they have irritation set up and diarrhoea results. When the irritant has been removed, the bowels settle down again. This must not be confused with the Diarrhoea due to Tuberculous Ulceration of the Intestine, as in this case the diarrhoea is a more or less constant symptom. It must be kept in mind, however, that the irritation produced by indigestible food is frequently the forerunner of ulceration and hence we must guard against it.

In 103 cases, diarrhoea was complained of at some time in the History in 64, but in the great majority it ceased shortly after the patient was admitted to Hospital and put upon proper diet. In fact, in 33 cases, the diarrhoea was never present at any time in Hospital, and in 10 it disappeared quickly after the patient was admitted. In the remaining 21 cases it was occasionally present in 12, and in the other 9 it was a constant feature.

Constipation is occasionally complained of, but in only 8 cases in this series was it a prominent symptom. The stools are pale and clay-like and have been/

been compared to those present in Jaundice. (56)

They are rich in fat as a rule. This has been explained by the fact that many of the lacteals become blocked with caseous matter and all the fat cannot be absorbed. (3)

Alternating constipation and diarrhoea is stated by most men, to be a frequent symptom of the disease, but in the present series it was only complained of in 5 cases.

The Bowels were stated to be regular in 10 cases.

Flatulent distension of the Bowels is fairly common in the early weeks of the disease and any enlargement of the Abdomen at this period is due, as a rule, to this cause. The condition is also present in Acute Tubercle of the Peritoneum when the disease is widespread, but in this case it is a paralytic distension.

The following case is characteristic of the condition.

M.K. aet. $\frac{7}{12}$

Complaint - Vomiting and Swollen Belly.

Duration - 3 weeks.

Family History - Good. - No Tuberculosis.

Previous/

Previous Health - Bottle-fed Baby, quite healthy till present illness started.

Present Illness.

The child was quite well 3 weeks ago. It began to vomit shortly after taking its bottle. The next day the Abdomen was noticed to be swollen. The vomiting continued and there was slight diarrhoea. After 10 days' illness the patient was taken to see a Doctor who ordered Peptogenic Milk. The vomiting was scarcely so bad after this, but continued off and on until the child was admitted to Hospital. The Abdomen had varied; sometimes it was quite soft and at other times it was tense and distended.

Examination.

The child was fairly healthy looking and of good development and nutrition. The Abdomen was large and tensely distended. Circumference at Umbilicus was $23\frac{1}{2}$ inches. The skin was shiny and there were a few dilated veins running over it. Nothing could be made out on palpation owing to rigidity, but with Chloroform some small glands were palpable in the Right Iliac region.

The percussion Note was Tympanitic all over. The Respiratory system was normal. The breathing 48 per/

per minute, was mainly Thoracic.

There was a trace of Albumen in the urine.

In Hospital the condition did not improve. The distension persisted in spite of frequent enemata. Vomiting continued. Constipation was severe and the patient only passed occasional small lumps with an enema. The Temperature was irregular and was always over the normal line.

Symptoms of obstruction developed and the patient became sunken and very dull, so it was decided to operate to relieve any obstruction that might be present.

When the Abdomen was opened, coils of distended small Intestine covered with Miliary Tubercles and somewhat inflamed presented at the wound and were allowed to escape. There were numerous thin adhesions and a few stronger ones which were ligatured and divided. All the Intestines were covered with Tubercles. There was very little fluid. The region of the Caecum and lower end of Ileum was explored for a definite obstruction, but none could be found. As the Bowel could not be returned, it was punctured with a trocar and cannula, and some of the gas squeezed out. This considerably lessened the distension/

distension and the bowel was with some difficulty returned and the wound closed.

The patient stood the operation well and had a fairly comfortable day, but towards evening the Temperature ran up to 102.6 F., and the patient became collapsed, and in spite of free stimulation, died early next morning. No Post-mortem examination was allowed. The condition was evidently one of Paralysis of the Bowel from Acute Generalised Tuberculous Peritonitis, and not a case of mechanical obstruction. There was no evidence of the condition being due to a ruptured Tuberculous Gland, but it was evidently the same as that produced by rupture as recorded in the cases quoted above. (54 & 55)

Occasionally Peristaltic waves and spasm patterns are seen in the Abdomen, but these will be dealt with fully under pressure symptoms.

VOMITING.

Vomiting is not a prominent symptom of the disease, although it is fairly frequent in the early stages. It occurs from time to time throughout the history, and is not looked on by the mother as anything more than that the child has taken something that/

that has disagreed with it. This is often the case as the stomach, like the rest of the bowel, is in a weakened condition and unable to digest heavy meals.

In the more or less Acute forms of Tuberculous Peritonitis, vomiting is usually a fairly prominent symptom and sufficient to cause the Mother to seek advice.

When in the course of the disease it becomes a prominent symptom, especially commencing suddenly and without apparent cause, it is always suspicious, and the prognosis becomes grave. This is due to the fact that it usually means one of two conditions.

1. Tuberculous Meningitis.
2. Perforation of the Bowel with a superadded acute infective Peritonitis.

Both of these conditions are almost invariably fatal.

Vomiting sometimes continues in ordinary cases in spite of treatment and this is a bad sign as indicating a very widespread infection. Of 9 cases in which it was present in Hospital, 5 died.

In this series of cases, vomiting was complained/

complained of in the history 36 times. In 23 of these it was only present occasionally and in 13 it was a prominent symptom. As in Diarrhoea, the condition was frequently not present at all during the patient's stay in Hospital. In fact, as stated above, it was only noticed in 9 cases. From these figures it will be seen that vomiting is not a frequent symptom of the disease "per se" but is usually the result of bad treatment.

URINARY SYMPTOMS.

Urinary Symptoms are occasionally present. Usually it is a decrease in the amount of water passed that attracts the mother's attention. This is probably due to the feverish condition of the patient. Occasionally there is real difficulty in the passage of water, and in these cases the disease is, as a rule, marked in the Pelvis. The difficulty is due to the pressure of a mass on the neck of the bladder. Painful micturition is also occasionally present, and must be put down to the same cause unless, of course, cystitis is present.

Difficulty in making water was complained of in 4 cases, and actual pain in 2. From this, it will/

will be seen that it is of infrequent occurrence.

The urine in ordinary cases shows nothing characteristic. When there is fever present it is high coloured and often there is a copious deposit of urates, but this is probably due to the rise in Temperature.

Albumen is occasionally present in the urine. It was present in 3 cases in the present series, and in each only a trace. It is said to be due to the pressure of a Tuberculous Mass on one or other of the Renal veins (26) but it may indicate some waxy change in the Kidney.

The urine frequently gives the Diazo reaction.

PAIN.

Pain is a frequent symptom, but is usually not severe. It is of colicky character due to indigestible articles of food, and is relieved by Diarrhoea. It was present in 46 cases. Occasionally, however, the pain is severe and becomes a prominent symptom. We must be careful in these cases to exclude the possibility of a localised perforation, as this is what it most usually means. The diagnosis in/

in this case is very difficult and, especially in very young children, may not be made until the Post-mortem examination.

Bier (60) has drawn attention to the occurrence of paroxysms of agonising pain which may occur when the glands are affected. The cause is not at all clear.

Tenderness to touch is also frequently present, not severe, but sufficient to make the patient stiffen the muscles of his Abdomen, and render palpation difficult. There is seldom actual shrinking from the touch. The tenderness is, as a rule, localized to the places where the disease is present, and is a valuable guide in distinguishing between faecal and Tuberculous masses. The former are never tender, the latter almost invariably are.

Tenderness on palpation was a marked feature in 17 cases of this series.

LOSS OF WEIGHT.

This is a fairly constant symptom of the disease when it has become at all advanced, but in the very early stages is not prominent. It becomes a very marked feature as the disease progresses, and the/

the patient is, as a rule, very emaciated before death. The wasting is rendered much more evident by the prominence of the Abdomen, and the appearance of patient in the later stages is very characteristic. The Ribs and Clavicles stand out prominently in the emaciated chest wall in marked contrast to the plump and rounded Abdomen. The bones of the knees, ankles and elbows look large in comparison with the thin emaciated legs and arms, and present the condition so frequently seen in the famine children in India.

Loss of weight was complained of in 58 of 103 cases. This is what we would expect when we consider that it is only in the later stages of the disease that it becomes a prominent symptom.

As the cases came under observation, the nutrition was noted as moderate or good in 44, and poor in 59.

FACIES.

There is nothing very characteristic in the facies of children suffering from Abdominal Tuberculosis to indicate that it is the Abdomen specially that is affected. The face is, as a rule, rather pinched and wan. Pallor is very frequently marked, but/

but this is due to the moderate degree of anaemia that is almost invariably present when the disease is at all advanced. Pallor was present, as a marked sign, in 66 cases in the present series.

There is occasionally slight yellowness of the skin from Jaundice.

Bronzing of the skin has been noticed by Colman (57) and was found to be due to pressure of swollen glands on the Left Suprarenal body without implication of its structure. This, however, must be of a very rare occurrence.

THE SKIN.

In addition to what has been said above with reference to colour, little need be added.

Often, however, the skin is dry and harsh, and it may be scaly. This is due to the child perspiring at night. It is not so common a symptom as in other cases. In the advanced stages and in the more acute forms, it becomes more prominent and is often very distressing.

The skin over the Abdomen is usually smooth and is frequently glossy.

Tache Cérébrale is often present and therefore/

therefore cannot be used as a sign of developing Meningitis.

PULSE AND RESPIRATION.

In the early stages there is nothing characteristic about the pulse, but as the disease advances it becomes soft and quick especially if there is fever present.

Barr (61) and other writers lay stress on the fact that the respirations are mainly Thoracic, the Abdomen moving little. We would expect some limitation of movement of the Abdomen, especially in the more advanced forms, but I am unable to confirm their observation in the cases under consideration. The form of respiration was stated in 80 cases, and in only six was it distinctly Thoracic. These were cases of the more acute Types and usually severe.

The Respirations are quicker than normal, and in ordinary cases are about 30 per minute, but in the advanced forms they often go as high as 40 or even 50 per minute.

TEMPERATURE.

The Temperature gives a very valuable indication/

indication of how a case is progressing.

In the ordinary chronic variety, which is doing well and is without complication, the temperature is subnormal with usually a marked morning fall often below 96°F. But in addition, the temperature in these cases occasionally, perhaps once a week, rises to the normal line and may go as high as 99°F. This will very frequently be missed on a daily temperature chart, but will be seen on a 4 hourly chart. One of these should always be used, as it is a valuable indication of the result of treatment. This small rise means that the disease is still active, and puts us on our guard.

This variety of Temperature occurred in 34 cases.

The next most frequent variety in this series was a swinging temperature. It does not, as a rule, go very high, 100° to 101°F. being the average, but there is always a marked fall at some time during the day. This condition may mean some complication. It is frequently present when there is diarrhoea. Of the 31 cases referred to above in which there was diarrhoea, in 19 the temperature was swinging during their whole stay in Hospital. In the absence of Complication a swinging temperature usually/

usually means that the disease is rapidly progressing and that probably the masses are breaking down and the patient is being poisoned by Toxin.

It is an ominous sign and should make us guarded in our prognosis. It was present in 32 cases. 12 of these died in Hospital. Of the others I have managed to trace 13. 9 of them had died, 1 was still suffering from the disease 1 year after leaving Hospital, and 3 were cured. The other 7 I have failed to trace.

The next most common variety was a persistently subnormal Temperature. This occurred in 23 cases, and is a good sign as indicating that the mischief is quiescent.

12 Patients had a swinging temperature on admission which gradually settled to subnormal, and they became cases similar to those mentioned in Group i and Group iii.

In 2 cases the temperature was on the normal line throughout their stay in Hospital.

From these figures it will be seen that a subnormal temperature is the most common in the disease, viz., over 50%, and that a moderate swinging temperature/

temperature is the next most frequent.

PRESSURE SYMPTOMS.

These symptoms may take almost any form in the Abdomen. Pressure on the Vena Cava may cause oedema of the lower limbs. Pressure on the portal vein may cause ascites if it is not already present. Pressure on the renal veins may cause Albuminuria. Pressure on the suprarenal bodies may cause a Pseudo-Addison's Disease. Obstruction of the Thoracic Duct may hasten the wasting. But these are all rare conditions. The commonest of all pressure symptoms is obstruction of the bowel by the growth of a mass round it and by adhesions. It is a chronic obstruction and we get Hyperthrophy of the Gut above it. Peristaltic waves become evident and later we may get actual patterns of rigid spasm produced.

This condition was present in 7 cases, but in only 1 had it gone the length of giving a pattern.

The Bladder symptoms are usually due to pressure and have been already referred to.

EXAMINATION/

EXAMINATION OF THE ABDOMEN.

Enlargement of the Abdomen is the commonest symptom complained of, and is what most frequently causes the mother to seek advice. It was complained of in 94 cases in this series. There is general prominence of the whole Abdomen, but the measurement is greatest as a rule, about 1 inch above the Umbilicus. In young children the lower ribs are everted over the swollen Abdomen. The Umbilicus is frequently flattened out and may even form a prominence instead of a hollow. This latter condition was present in 25 cases, but it does not necessarily mean that the Ulcerous variety of the disease is present. The Umbilicus, however, occasionally becomes red and indurated and may burst and discharge pus. This only happens in the severe and more advanced cases. Although it becomes inflamed, it does not always burst. The condition may die down under appropriate treatment. This, as has been stated, happened in 5 out of 7 cases. The superficial veins in the skin are frequently dilated. This condition is more marked/

marked in the later stages. It was present in 28 cases, and usually means that some of the Tuberculous masses are pressing on the great veins in the Abdomen and causing a partial obstruction to venous return. The same condition is produced by contraction of fibrous tissue.

The movements of the Abdomen have been already referred to under respiration.

PALPATION.

In the early stages, little can be made out except a general resistance. As the disease progresses, we often get the resistance localized specially to one place, and although we cannot detect any lump without an anaesthetic, it is probable that here we shall find the seat of the mischief. Later when we have a number of masses and the bowel matted by adhesion, until the whole forms an adherent mass in the Abdomen, we get the characteristic feel of Tuberculous Peritonitis. This sensation is most difficult to describe. It has been compared to the feeling one would expect if the Abdomen was packed full of some soft material such as wool, but it has to be felt to be appreciated.

It/

It is, as a rule, very difficult to define Tuberculous Masses accurately without Chloroform as they are so carefully guarded by the rigid muscles. They can sometimes be felt per Rectum, but Still (3) has not found this a very useful addition to the means of diagnosis. Carpenter (19) on the other hand, places Rectal Examination before any other method. It should never be omitted when there is the least doubt. With an anaesthetic masses can be accurately defined, and it is very useful in watching the progress of a case to know definitely what was present before treatment was started.

It is most usual to find masses, but frequently we find only matting of the Intestine giving a marked feeling of resistance at one point. This was found 27 times in the present series.

When the Omentum is specially affected, it, as a rule, easily felt. The swelling is very characteristic, lying transversely across the epigastric region, often extending into one or other of the Hypochondriac regions. There is always a tympanitic note above it distinguishing it from an enlarged Liver.

The Spleen is occasionally enlarged. This in/

in the present series was not a prominent feature and was only noted as occurring on 4 occasions. Carpenter (19) found it 13 times out of 66. It most frequently occurs in the early periods of life.

The Liver was found enlarged on 17 occasions. In the great majority of these it was about a finger's breadth below the costal margin. The difference in frequency between the enlargement of the Spleen and the Liver is probably explained by the difficulty in diagnosing slight enlargement of the Spleen in children, whereas it is very easily done in the case of the Liver.

The presence of fluid when free in the Peritoneal cavity and in some quantity, is easily made out. The fluid wave is, as a rule, well marked. In children it is very necessary to have some barrier intervening on the surface of the Abdomen to check actual movement of the Abdominal contents "en masse". This is especially needed in very young children. When the fluid is loculated, it is very difficult to diagnose accurately, especially when it is between coils of Intestine. When it is superficial, we may detect fluctuation, but it is unusual.

PERCUSSION./

PERCUSSION.

At the beginning of the case the percussion note is Tympanitic all over. Then, as we get adhesions and masses forming, we may get areas of dullness here and there over the Abdomen. This is very characteristic of the later stages of the disease. As a rule, percussion is not very useful except in the case of fluid. Here the dullness in the flanks, disappearing when the patient is turned on his side, is characteristic and always present when there is free fluid in any quantity. When the fluid is small in amount, Parkinson (53) suggests turning the patient on to his hands and knees. We then get a dull note in the most dependent part, usually about the Umbilicus.

COMPLICATIONS AND SEQUELAE.

I think the conditions which complicate the disease can, with profit, now be considered, since they frequently complete the Clinical picture.

Pleurisy/

Pleurisy is a very frequent complication. It is usually a chronic dry Pleurisy very often giving no sign of its presence. It may easily be overlooked unless specially looked for.

Effusion is not uncommon.

Dry Pleurisy was present in 13 of the cases and Pleurisy with effusion in 5.

Phthisis Pulmonale is also a common complication and it may overshadow the Abdominal disease altogether.

Chronic Phthisis was present in 7 cases and recent fresh Phthisis in 9 cases in this series.

Ulceration of the Intestine is the most frequent complication. Still (3) is of opinion that probably in even the mildest cases this condition is present in some degree.

Perforation of one of the ulcers is not uncommon. It occurred 3 times out of 103 cases.

Enlarged Glands in other parts are common, most frequently in the neck. These glands were enlarged in 22 cases.

Rickets/

Rickets is not a very frequent concomitant to the disease, and it is probable that the two have no relation.

Tuberculous Meningitis is a fairly common ending to Abdominal Tuberculosis, and may occur some years after the patient is apparently well.

It was the cause of death in 6 cases in this series.

In cases that get well, constipation often becomes a marked feature and may be very severe. It is probably due to limitation of movement of the Abdominal contents by adhesions.

INTESTINE.

The symptoms and signs of Tuberculous Ulceration of the Intestine are not very definite and, as a rule, the Diagnosis is rather a matter of conjecture. Of course, the finding of Tubercle Bacilli in quantity in the stools is very strong evidence of Tuberculous Ulceration, but their absence by no means excludes/

excludes it.

Diarrhoea is the most prominent symptom, but many cases die with extensive ulceration who have had no diarrhoea during life. It has been said that it is only when the large bowel is affected that we get this symptom. (62) Haemorrhage is of fairly frequent occurrence. Osler (14) has seen several cases of death from large Haemorrhage due to Tuberculous ulceration. The stools are thin and watery and often very offensive.

When Diarrhoea is severe during a case of Lung or Abdominal Tuberculosis and does not yield to the ordinary forms of treatment, there is a strong presumption that it is due to Tuberculous Ulceration of the Intestine.

6. DIAGNOSIS.

Chloroform is of very great use in the diagnosis of Abdominal Tuberculosis, and in all cases in which there is the least doubt, it should be given. It is wonderful sometimes, how it clears up a case. Even when the Abdomen is quite soft and flaccid and nothing can be detected with an apparently complete examination, under the anaesthetic a small lump is felt which has been so carefully guarded by the muscles as to be undetected.

In Dr Melville Dunlop's Ward at the Edinburgh Children's Hospital, it is given in almost every case.

In 51 of the 103 cases nothing beyond general resistance could be detected without chloroform; while with it in 46 of these cases Tuberculous masses of various sizes were found.

Rectal Examination under Chloroform is often very useful, and it is frequently possible to explore the whole of the lower part of the Abdomen by this/

this menas.

The use of Tuberculin and the Opsonic Index must now be regarded as established as an almost infallible test for Tuberculosis, but the time, special apparatus and cultures required, are seldom at the disposal of the general Practitioner on whom the early recognition of these cases devolves.

Sidney Martin (64) recommends the use of Koch's Old Tuberculin (T) injected in doses of 1/10 to 1/2 milligram with a proportionately smaller dose in children. The Temperature is observed for some days before and it is not advisable to use the test when it exceeds 100°F. A Positive reaction is indicated by a rise of 2.5°F., it occurs in 8 to 12 hours after the injection. 95% of Tuberculous patients give it. The danger of giving the injection of Tuberculin without knowing the Opsonic Index will, however, make many men avoid the test, as Cotton (65) tersely remarks, "A blow with a hammer will demonstrate the true nature of dynamite."

Lately what appears to be a useful aid to diagnosis has been devised by Professor Calmette. (66) The test consists in placing a drop of 1-100 solution of Calmette's dry Tuberculin in the eye. In healthy/

healthy subjects no reaction follows, but in Tuberculous subjects a local reaction called the "ophtharmoreaction" takes place. In from 3 to 6 hours the Caruncle becomes red and the eye congested, and a more or less acute catarrhal conjunctivitis is produced. This attains its height in 6 to 10 hours and disappears in 18 hours in children. Occasionally the Conjunctivitis becomes purulent and lasts longer sometimes a week, but this is unusual. There is no relation between the amount of disease and the severity of the reaction.

The test was applied in over 1000 cases in Paris and all observations went to prove that it could be elicited in all forms of Tuberculosis, unless the patient was moribund or nearly so. Since then a large number of cases have had the test applied and the results, though for the most part bearing out Professor Calmette's work, show that it is by no means infallible. It has been shown that quiescent or healed Tubercle frequently does not give the test, and that healthy people who have much eye strain, especially in artificial light, may give a positive reaction.⁽⁶⁷⁾ Crying in children may prevent a reaction by washing away the Tuberculin at once/

once. (71) Any ocular lesion has been said to contraindicate its use, as the reaction should be compared with a sound eye, (68) but this has been disproved and the test found useful in the Diagnosis of Tuberculous conditions in the eye. (69-70) Dr Squire (72) is of opinion that the "Ophthalmo-reaction" is the best method of using Tuberculin for diagnostic purposes.

It should be noticed that Koch's old Tuberculin (T) gives the test as well as Calmette's Tuberculin, but that the new Tuberculin (T.R.) does not give satisfactory results. (71)

This method of diagnosis has the great advantage that it can be made use of by the general Practitioner. Already manufacturing Chemists are sending out Tuberculin suitably diluted and ready for use, so that all the Doctor has to do is to instil the drop into the eye in the morning and see the patient in the evening, by which time the reaction, if positive should be manifest.

Holt (74) recommends an exploratory laparotomy in all cases in which there is doubt.

The Diagnosis of Tuberculous Peritonitis in children, when the disease is at all advanced, is usually/

usually comparatively easy. The presence of solid masses in the Abdomen in combination with a history of failing health for some weeks or months, loss of weight and diarrhoea, is almost pathognomonic of the condition.

Occasionally in the acute forms, the Diagnosis, in the early days, may be difficult.

As has been shown, it may simulate closely some acute infective condition of the peritoneum, or even internal strangulation of the bowel. In these cases, a careful inquiry into the history may reveal the fact that the child has been ailing for some weeks. There may be other evidence of Tuberculosis. The collapse is not so severe as in acute infective conditions and the distension not usually so marked. Examination under Chloroform may clear up the condition at once by showing the presence of Lumps in the Abdomen. There is none of the profuse Indicanuria in Tubercle.

Appendicitis may simulate the condition.

I saw a case lately that had been treated for a fortnight as Tuberculous Peritonitis. The onset was insidious. There was vague pain and moderate distension in the Abdomen. The child was rapidly falling off/

off in condition. On Palpation of the Abdomen, little could be made out beyond general resistance more marked in the R. Iliac fossa, but under Chloroform bimanual examination with the finger in the Rectum revealed the presence of an abscess in this region. When this was opened, a large quantity of foul smelling pus, which contained B. Coli, was evacuated, and the appendix was found to be the seat of the mischief.

Acute Tuberculous Peritonitis may simulate Typhoid fever closely. In both we have the general malaise, elevation of Temperature and symptoms referring the condition to the Abdomen, such as Diarrhoea.

Distension is more prominent in Tubercle and pain is more frequently present. The spleen is seldom enlarged.

As the case progresses the Temperature gives a valuable indication. In acute Tubercle it reaches its maximum in a few days and is usually markedly remittent and reaches the normal line frequently. While in Typhoid the rise is usually gradual and continuous for 2 or 3 weeks, and it does not commonly come down to the normal line at any time. In Tubercle the maximum Temperature is often early/

early in the day, seldom in Typhoid. The Intelligence in Tubercle is rarely so markedly blunted as in Typhoid.

Absence of a rash favours Tubercle. Later the Widal reaction makes the diagnosis certain.

In the Chronic forms of the disease the diagnosis is easier.

The enlarged Abdomen of Rickets especially when, as frequently happens, there is dyspepsia present, may simulate the condition. Many cases are sent to the Children's Hospital as Tuberculous Peritonitis which turn out to be this condition. There is frequently anaemia and sweating about the head in both, but wasting is not very marked, as a rule, in Rickets, in fact, the children are often plump. The other characteristic signs of Rickets will be evident. As regards the distension of the Abdomen, it is more variable in Rickets, and of course, under Chloroform no lumps or matting of the bowel will be felt. Enlargement of the Spleen is in favour of Rickets.

A Chronic Non-Tuberculous Peritonitis is very rare in children, and its occurrence is doubted by some men. The diagnosis is a matter of the greatest difficulty. Holt is of opinion that if we have a good/

good family history, no other signs of Tuberculosis, Tenderness slight or absent, no Nodular Tumours, no fever or marked emaciation, and the amount of fluid excessive, the condition is probably one of simple inflammation. The pathogenic test with the fluid would make the diagnosis certain.

From Splenic Anaemia the diagnosis is not difficult, as the anaemia in this condition is much more profound, and the great enlargement of the Spleen is very rarely seen in Tuberculous Peritonitis. When, however, cirrhosis of the Liver is superadded and there is ascites, the diagnosis is more difficult. The enlarged Spleen gives a useful guide and friction fremitus may be heard over the Liver. The accumulation of fluid is much greater than in Peritonitis. The examination of the fluid will not, as a rule, give much information as the Tubercle Bacillus is very seldom found in it, but an increase in the number of Lymphocytes favours Tubercle. Innoculation of guinea pigs with it will at once clear up the diagnosis.

A History of Syphilis or Jaundice is usually present in cirrhosis.

Parkinson (53) and Carpenter (19) state the difficulty/

difficulty in diagnosis from Colloid Cancer of the Peritoneum. This appears to be very difficult and, as a rule, time is the best indication. Tuberculin and the Opsonic Index may throw some light on the condition. Osler lays stress on ~~the~~ prolonged sub-normal Temperature as indicating Tubercle. a

Encysted collections of Fluid may simulate Ovarian cysts (73) and the diagnosis without Laparotomy may be impossible.

Lastly, Tuberculous lumps must be distinguished from hardened faeces. The presence of Tenderness usually indicates Tubercle, but the most certain plan is to give the child a series of enemata and repeat the examination.

INTESTINE.

The Diagnosis of Tuberculous Ulceration of the Intestine is a matter of great difficulty, and in many cases is impossible.

When in the course of Tuberculosis in the Lungs or Peritoneum, diarrhoea becomes a severe and constant symptom, the probability is that there is Ulceration, but there is always the possibility that it is due to Lardaceous disease of the Intestine.

The/

The occurrence of large Haemorrhages always suggests Tubercle.

The diagnosis of the Condition from the chronic Ileo Colitis, that so frequently occurs in children, is very difficult.

In the latter condition the History of an acute attack preceding the Chronic, is common. Wasting is more severe in Tubercle, but is common to both, and it is, as a rule, impossible to be certain until we see how the condition behaves under treatment.

As has been noted above, Tubercle Bacilli in quantity in the stools, indicate Tuberculous Ulceration.

7. PROGNOSIS.

The Prognosis in Tuberculous Peritonitis and Tabes Mesenterica must always be difficult to state with accuracy. This is due to the chronic nature of the disease and the class of people who are affected by it. The poorer classes of society are constantly moving about mostly in accordance with where they can get work. Thus during the course of the disease, they have frequently changed their abode two or three times. This makes it very difficult to trace them. By means of a circular letter enclosing reply Postcard, I was able to trace 50 of the cases. I visited nearly all of those who had survived and were within reach. The result is very interesting as showing how a small detail will alter a result greatly. I shall state the results in full giving the date when the patient was in Hospital, and the Result as found now.

Date/

<u>Date.</u>	<u>Death.</u>	<u>Cure.</u>
1899	4	2
1900	-	5
1901	-	2
1902	-	1
1903	1	6
1904	3	5
1905	2	6
1906	-	(2 cured. (1 doing well.
1907	<u>6</u>	<u>4 doing well.</u>
	16	34

It will be seen that the death rate in these cases was 32%, but if this calculation had been made last year, it would have been 25%, and this would have reduced proportionately the estimated number of deaths in the cases which I have been unable to trace.

We must, however, take the figures as they stand.

Nineteen deaths occurred in Hospital, thus leaving 34 cases unaccounted for. I am in doubt how to treat these cases, but a careful comparison with the/

the other cases shows that they were not cases of milder severity, but apparently much the same as those who reported themselves. Therefore, I think, we must estimate the percentage of deaths in the same proportion. This gives us 10 more deaths, making a total of 45 deaths out of 103 cases, or 43.7%.

This death-rate is, I am sure, too high. It certainly is higher than we would expect when we consider how quickly these cases improve while in Hospital and while they are reporting themselves regularly. Sutherland (77) in 41 cases had a death rate of 26.8%, but most of his cases were only under observation for 6 months; 19 were for a year or longer.

But the Prognosis of Abdominal Tuberculosis in many cases, as in all forms of Tuberculosis, depends on the patient's purse and education. I think it is not too much to say that given a case of well marked Tuberculous Peritonitis without complication in which proper treatment can be carried out, the Prognosis is favourable. The proper treatment, however, is expensive and requires constant care and attention over a long period. This can very rarely be got, as the mother probably has several other children/

children to look after and may require to go out and work. It is very seldom that the child can be taken into the country or to the sea-side as is necessary.

In spite of all this, however, we have seen that over 50% of the cases get well.

In the cases which I have stated as cured, nothing whatever could be felt in the Abdomen to indicate that there had ever been anything wrong. It was quite flaccid and all distension had disappeared. I saw no retracted scaphoid Abdomens such as are said to occur from the contraction of the fibrous adhesions to the abdominal walls. For the most part, the children were healthy looking and fat. Many of them had started to work and two had gained prizes for regular attendance at school.

But even with an apparently cured case, we must be on our guard for although the disease is quiescent in the abdomen, there is always the chance of a Tuberculous Meningitis developing. This happened in 2 cases in this series. One had been away from Hospital for 3 years and the other for 4 years, and both had apparently got well, but developed meningitis and died.

As to the signs that guide us in making the Prognosis/

Prognosis in a given case, we may say at once that as in Broncho-Pneumonia, no case is hopeless. When everything is looking as black as it apparently can, suddenly the child takes a turn for the better and gets well. One of the cases in this series is a good example of this. The child did not do well in Hospital. She was sinking fast and was sent home apparently dying. I saw that child lately. She is strong and healthy and is one of the two who gained a prize for regular attendance at school. The Abdomen is, so far as one can make out, quite normal, although when she was in Hospital, it was full of Tuberculous masses. This case is, of course, exceptional, but it shows that however bad the patient looks we should never give up hope.

The prognosis of a case depends chiefly in the Temperature, amount of disease, and the presence of complications. We might add to these that in an ordinary uncomplicated case, it depends to a great extent on the Mother. If she is careful, intelligent and willing to devote time and attention to the child, it is, as a rule, good, but if she is casual about it, the prognosis becomes increasingly grave in proportion to the severity of the case.

In/

In a child with a subnormal temperature a moderate amount of disease in the Abdomen and no complications, the prognosis is usually favourable. Even when complicated by Pleurisy, Sutherland (76) holds that the prognosis is good. This is to a certain extent borne out by this series. Eighteen cases had Pleurisy in addition to Abdominal Tuberculosis. Only 2 of these were among the deaths recorded and in both effusion was present. I have been unable to trace any special fatality in cases complicated by Phthisis Pulmonale. This disease was present in 16 cases and only 4 of these are among the recorded deaths.

Cases of an apparently mild type in which we have frequent relapses are unfavourable, as we have a fresh infection with the disease and each time it is lowering the patients resisting power.

The Temperature gives probably the most useful guide in stating the prognosis.

As long as it remains persistently subnormal, the prognosis is good. Any slight rise, even if only to 99°F. must make us suspicious and hence more guarded. This rise especially if it occurs regularly, say once in 4 days or even once a week, means/

means that there is still active mischief present, and given an opportunity it will develop. Nevertheless, the prognosis even here, other symptoms being favourable, is good. A swinging Temperature is a very ominous sign. It means either some complication or a wide infection in the Abdomen and active mischief. As has been stated before, 21 out of 25 cases with this sign, in which the result is known, died. But even here there is some hope, and the Temperature may gradually settle to normal, but it is a matter for constant watchfulness, and often takes many weeks or even months. A swinging Temperature for a few days and then settling to normal is not so serious a condition, but nevertheless, it should make us guarded in our prognosis.

Diarrhoea is a most dangerous complication and if a constant symptom, no matter how mild, is almost invariably followed by a fatal result. In 9 cases it was a constant symptom in Hospital, and every one of these died. Of the 35 deaths that I have been able to trace, it was a prominent symptom in 24. In the other 9, it was not present. The complication of Diarrhoea with a swinging temperature is very fatal, even when the Diarrhoea is not severe./

severe.

Vomiting is a bad sign as indicating some complication, and at the same time preventing proper feeding of the patient on which the result depends.

The weight of the patient gives us a good indication as to how a case is going. In many of the cases the weight remained stationary for some time after they came under treatment. This, I take it, means that the disease is active, but the patient is holding his own against it. Often after two or three weeks' treatment, it begins to increase, and in all cases that do well there is a steady increase. Any loss of weight means that something is wrong, and we must find out what it is. It may mean a ~~recan-~~ *recu* descence of the disease, but more usually it is found that there has been some diarrhoea. Failure to gain weight after treatment has had a good trial even if there has been no loss is an unfavourable sign even when the patient is doing well otherwise.

Steady loss of weight is a bad sign, and renders the prognosis grave as it means that the disease has got the upper hand locally or is becoming generalised.

Umbilical Fistula is said by several men not to particularly influence the prognosis, but I think/

think it must be looked on as grave since it indicates the ulcerous variety of the disease which Holt (26) says is absolutely hopeless. There is the danger of communication with the bowel and as this means that the child loses a large part of its nourishment, it is apt to be starved. In the present series it was present twice and both cases died.

Perforation of the Bowel is an almost invariably fatal complication. It occurred four times in each with a fatal result.

Sutherland (77) holds that when there is extensive caseation in the mesenteric glands of Tuberculous masses the prognosis is impaired, since we have the constant danger of a fresh infection of the peritoneum, also the risk of the case going on to abscess-formation.

Tuberculous Meningitis is, of course, a fatal and fairly frequent complication.

The presence of Ascites is, as a rule, favourable and according to Still (3), these cases rarely die. I am, however, unable to confirm this, as out of 17 cases in which this condition was present, 2 died in Hospital, and 3 have since died outside giving a death rate of 29%. This, though less than/

than for the disease itself indicates that ascites in these cases is not as favourable a sign as was thought. It must be added that in one case there was Pleurisy with effusion as well. I think the immediate prognosis is good, but the ultimate prognosis is similar to that for the Fibrous form of the disease as when the fluid is absorbed we have this variety left and along with it all the dangers from relapses, etc.

To form an opinion, however, from so few cases must, I know, tend to inaccuracy, nevertheless these cases show that the prognosis in the ascitic variety is not always so good as has been thought.

Cotton (64) states that the presence of Albumen in the urine increases the gravity of the Prognosis as suggesting the presence of Lardaceous disease in the Kidney. In this series, of the three cases which showed the sign one died, one is now quite strong and healthy, and the last I have failed to trace.

The duration of the disease, as seen in the 35 deaths which have been recorded, is interesting since it gives us an idea as to how long the cases must be kept under observation before a definite/

definite result can be stated. They were as follows:-

<u>Duration of Disease.</u>		<u>Number of deaths.</u>
0 - 3 months	-	7
3 - 6 "	-	11
6 - 9 "	-	6
9 -12 "	-	1
12 -18 "	-	5
18 mos. - 2 years	-	2
2 " - $2\frac{1}{2}$ "	-	1
over $2\frac{1}{2}$ "	-	2

Five of the cases were under 2 months and the shortest was 1 month. Most of these were acute cases occurring in young children.

From these cases it will be seen that we cannot say with certainty that a case is cured until at least $2\frac{1}{2}$ years have elapsed. The two cases over $2\frac{1}{2}$ years were the ones that developed Tuberculous Meningitis after being apparently cured.

The duration of the disease in the cases that were cured we cannot state with accuracy, because/

because the process goes on so slowly that it is impossible to say when it ceased and the patient was free of disease.

The Prognosis in Tuberculous ulceration of the Intestine is bad and practically corresponds with that of Diarrhoea as mentioned above. Seldom does the condition once started improve since the healing of the ulcers is very imperfect if it occurs at all. The ulceration "per se" seldom kills, but the diarrhoea produced so weakens the patient that Tuberculous conditions elsewhere get the upper hand and produce the fatal result.

8. TREATMENT.

PROPHYLAXIS.

The Prophylaxis of Abdominal Tuberculosis resolves itself into that of Tuberculosis generally with one or two important additions.

In regard to Tuberculosis generally much is being done in almost every country to deal with the condition.

In Germany, country homes have been established in which children of Tuberculous parents are kept under suitable hygienic conditions; also holiday camps have been established, similar to those in this country where the children of the poorer classes have an annual holiday. In addition, this institution does good work in teaching the children the value of fresh air and cleanliness. Near Berlin, a forest school has been established. Weakly children, recommended by the school doctors and others, are kept for months at a time and educated under advantageous conditions./

conditions. Medical Inspection of School children is also carried out by qualified men.

In America also, steps are being taken to provide Sanatoriums in which the Consumptive poor are taken care of, especially advanced cases, which are a constant danger to others. Dispensaries have been established for the treatment of Tuberculosis specially. There is a large number of organisations, such as the Charity Organisation Society, which are doing valuable work in enlightening the people on the prevention and curability of Tuberculosis. In addition, four journals, largely devoted to spreading information concerning the prevention of Tuberculosis, are published.

In this country similar steps are being taken, though scarcely so advanced, to deal with the scourge. Beds are provided in many municipal Hospitals where advanced cases of Tuberculosis of the Lungs are treated, thus removing a dangerous source of infection. Dispensaries have been and are being formed for the treatment of Tuberculosis. These institutions do valuable work in teaching the patients the danger of infecting others by their sputum. They/

They often supply bottles into which the patient may spit, and also direct them how to dispose of their sputum. In some towns, e.g., Glasgow, a doctor is employed by the Corporation whose duties have special reference to feeding and hygienic conditions of infants and young children, and classes have been formed for the instruction of mothers in the care and feeding of their children. The National Association for the Prevention of Consumption is spreading knowledge by means of lectures and leaflets, on the prevention of the disease.

The question of notification of consumption is one of great importance, but also of great difficulty. Compulsory notification of all cases appears to be impossible, but this should not prevent advanced cases being reported. In this way many dangerous cases would be discovered, and if proper precautions were not being taken in the disposal of sputum and otherwise preventing the spread of the disease, it should be made possible to remove the case to a suitable institution in the same way as is done with the infectious diseases which come under the Public Health Act.(95)

Medical Inspection of School Children has been/

been successfully practised in Germany for some years. It has now been introduced into the Statute-book in this country, and will undoubtedly lead to an improvement in the condition of the School children. By its means attention will be directed to all weakly children and special care will be taken of them. Also any case of Tuberculosis will be discovered, and a source of infection to other children will be removed. The early stages of Tuberculosis are in most cases difficult to discover and therefore, the examination will require to be careful and complete. It is to be hoped that when the Act gets in proper working order and the results seem to warrant it, special schools will be established, preferably in the country, similar to the forest school of Berlin, in which weakly children will receive special education under better hygienic conditions than is possible in schools in towns.

The subject that has more special reference to Abdominal Tuberculosis is that of infant-feeding on cows' milk. It has been shown that this is a fruitful source of the disease and therefore demands special attention in this paper.

If 30% of the cows in this country are Tuberculous/

Tuberculous, it is obvious that all these cattle cannot be slaughtered since it would lead to the complete disorganisation of the milk trade, and would reduce the supply of milk to a dangerous extent. In addition, the expense would be enormous. But it has been found that for the most part, it is only in the case of Udder disease that milk contains Tubercle Bacilli, therefore, Professor ^aMcFadyean (34) suggests that a periodic inspection of the udders of herds should be made by a qualified man. He also suggests Compulsory Notification of all Udder disease.

The Dairies, Cowsheds and Milkshops Orders as they at present stand, provide in Section 15 that "if at any time ----- in the case of a cow, disease of the udder certified by a veterinary surgeon to be Tubercular exists, the milk of that cow

- a. Shall not be mixed with other milk; and
- b. Shall not be sold or used as human food;
and
- c. Shall not be sold or used for food of
swine or other animals unless and
until it has been boiled."

The penalty for breach of this order is £5.

Thus/

Thus we see that the sale of milk from a cow suffering from Tuberculosis of the Udder is prevented, but unless the udders are regularly inspected by a veterinary surgeon, many cases of the disease will go unnoticed since the dairyman will not report a case himself until the disease is fully developed and evident. The Sanitary Inspector may visit the byres at any reasonable time and may take with him a veterinary surgeon to inspect the cattle, but this is expensive, and as the expenses have to come out of the rates, it is seldom done. This is borne out by the amount of milk containing Tubercle Bacilli which comes into the market. (37 & 38)

In this country, in many large towns, depôts have been established at which Sterilised and Pasteurised milk is sold in bottles containing enough for one feed at practically the cost of ordinary milk. In Germany, the "Fürsorgestellen", and in France, the "Gouttes de lait" are doing similar work, but there, advice is given in rearing the children as well. These institutions have undoubtedly done a great amount of good, but it is often difficult to get people to use sterilised milk on account of its cooked taste, and from the fact that it frequently produces constipation/

constipation and other intestinal disorders since the enzyme has been destroyed. Dr Kossel (78) says that milk must be heated to 90°C . to get efficient sterilisation. Professor Delepine (79) however, considers that 100°C . is necessary. By experimental inoculation, it has been shown that the lower temperatures only caused delay in the symptoms of Tuberculosis becoming manifest.

Lately a new process for sterilising milk has been discovered by Dr Budde of Denmark. The process consists shortly in heating the milk to 120°F . and adding Hydrogen peroxide 10°C to the gallon. After this has been allowed to act for some time in vacuo, a ferment is added and the milk run into sterilised bottles. It is claimed that this kills all pathogenic organisms, though possibly not spores, and also does away with the cooked taste. But the fact that the enzyme is a secret militates against its general acceptance. It is found that babies can take the milk without dilution, and this suggests the possibility of the enzyme being some form of pepsin. Should this be so, it will be dangerous, since we know that in children fed for long periods with peptonised milk atrophy of the digestive glands in the stomach/

stomach is apt to take place with subsequent marasmus.

Calmette and Breton (80) draw attention to the fact that the use of boiled Tuberculous milk is similar to giving repeated injections of small doses of Tuberculin, and has a similar effect in already Tuberculous patients. It may be very dangerous to them and not altogether harmless to healthy people.

From these facts, it is evident that fresh legislation is necessary to prevent the sale of milk containing Tubercle bacilli, and though we cannot hope to stamp out absolutely, Tuberculosis in cattle, we can prevent in great part its transmission to man by means of certain regulations efficiently carried out.

Another point of importance in reference to this disease is the question of breast feeding. It is undoubted that if this practice were to become more common, Abdominal Tuberculosis, in the early periods of life, say the 1st two years, would become rare. Therefore, it is necessary to do everything in our power to encourage breast feeding. One of the first points for consideration is the prevention of young mothers, working in factories and workshops, leaving their children in charge of a neighbour.

This/

This will be difficult, but it has been already tried in some towns and has been successful. Till now, it has been a Charity affair, but the sooner it becomes a State institution and compulsory the better. Again the question of expense will arise, but this will be met by the rearing of a strong race and all the benefits that will accrue from that.

In addition, lady-visitors should be attached to every corporation whose duties would be to go round among the poorer classes and advise mothers in the rearing of their children, and point out the advantages of breast feeding.

CURATIVE TREATMENT.

Up till recently this heading could have been divided in

1. Medical Treatment,
2. Surgical Treatment,

but lately the latter method has fallen into disuse, and, except in rare cases, is not now used.

It/

It is interesting, from an historical point of view, however. During the first half of the last century Abdominal Tuberculosis was looked on as an invariably fatal condition, and nothing could be done to stop its progress once it was started. In 1862, Sir Spencer Wells opened an abdomen for the removal of a supposed Ovarian Tumour, but found the peritoneum studded over with Tubercles, and a large quantity of opalescent fluid. The condition was evidently one of Tuberculous Peritonitis. The fluid was allowed to escape and the wound stitched up again. The patient made a rapid recovery and got quite well. This case drew the attention of the Profession to a new method of treatment and after that almost every case of Tuberculous Peritonitis was operated on, often with success. But gradually it became evident that it was mostly in cases in which ascites was present that the cures took place. Other methods of treatment came into force and surgical treatment was gradually dropped except in ascitic cases. Its necessity, even in these cases, is now doubted, and Sutherland (76) cynically sums up the situation when he says "as regards the results of Laparotomy in ordinary uncomplicated cases, I have seen/

seen no changes follow which cannot be seen under medical treatment save perhaps the formation of a Tuberculous Sinus."

There are still, however, many men who recommend the operation, at least in ascitic cases, and in certain complications. Holt (81) considers that the only local treatment that can be considered in any way curative is surgical. Guthrie (82) is of opinion that caseous mesenteric glands should be removed, as being the chief source of fatal dissemination. Watson Cheyne at the same discussion, gave it as his opinion that "while even now he would not refuse to perform Laparotomy on any case of Tuberculous Peritonitis where the long continuance of medical treatment had failed to ameliorate the condition, he did not feel that he could strongly advocate the use of Surgery in this condition till further statistics indicating the real prognosis had been collected."

The opinion of the profession in this country appears to be that in ordinary cases laparotomy is not good treatment, unless there is fluid present in quantity, and that even here, it is unnecessary, unless the fluid persists, after medical means such as tapping and general treatment have failed./

failed. The presence of complications, such as perforation of the Bowel or strangulation by means of fibrous bands, indicates treatment on general surgical principles, as for such a condition in any ordinary abdomen.

Many explanations, for the cures effected by simple Laparotomy, have been given, such as the admission of air or light (Laurenstein⁽⁸³⁾) of putrifiactive Bacteria (Morris⁽⁸⁴⁾), but probably the correct explanation is that given by Professor White⁽⁸⁵⁾. He states that the fluid is poor in opsonins, and when it is removed, it is replaced by fresh exudation containing a large amount of opsonin and other protective substances. Also, as a result of the operation, the opsonic index rises, due to the autoinnoculation which takes place from the disturbance in the infected area. I was much interested to find that in 1899 Arcangeli⁽⁸⁶⁾ published a paper suggesting that the curative action of Laparotomy was due to some of the fluid being absorbed and acting as an immunising substance due to the dead bacilli modified by the organism. Here we have what is probably the correct explanation given nearly 10 years ago, and scientific proof of it has only been forthcoming/

forthcoming lately. Arcangeli, in the same paper, gave results of cases which he had treated by injection of the ascitic fluid (2^{cc} or more) and it appears to have been satisfactory, but I can find no further mention of it in the literature. These injections would probably be similar to very small doses of Tuberculin as practised now.

From the cases under consideration we cannot, I am afraid, draw any conclusions. Eight cases were operated on, five died in Hospital, four shortly after the operation, and one, nine months after. Of those that left Hospital, one was seen lately and was cured. One was going downhill rapidly when she left, and the last was not doing well when he developed Measles. He has not been heard of since.

All these cases were severe and had, for the most part, resisted medical treatment, so that it is scarcely fair to draw conclusions from them as to the value of the operation.

MEDICAL/

MEDICAL TREATMENT.

In view of the weakened state of the Bowel the primary object in the treatment of Abdominal Tuberculosis must be to reduce all sources of irritation in the Alimentary canal to a minimum. Therefore diet must be our first consideration.

It has been proved that the peristaltic movements in the Herbivorous Animals are more active than in Carnivorous Animals. (87) This is explained by the fact that cellulose is one of the chief constituents of the food of Herbivora since it forms part of all plants and is always present as an envelope to their seeds. Cellulose during digestion is broken up into, among other things, Carbonic Anhydride and Methane. (92) These two gases have been proved to act as stimuli increasing the movements of the Intestine. (93) In addition, it is bulky and stimulates by producing tension. Also a vegetable diet leaves a large undigested residue which acts as a mechanical stimulus to the bowel. It has been estimated that with a vegetable diet, the average weight of/
of/

of the faeces in 24 hours amounts to, 400 to 500 grammes, while in a mixed diet, it only amounts to, 170 grammes, (94) and that fish, meat and eggs, the food of Carnivora, leave less than 5% undigested residue. (87)

These facts give us valuable indications as to the lines along which we are to move in prescribing the diet in this disease. It is evident that we must avoid all starchy foods since these contain a large amount of cellulose, and also because carbohydrates are the most frequent source of fermentation in the Intestine. Therefore, we must confine ourselves as much as possible to proteid diet.

In Dr Melville Dunlop's Ward at the Edinburgh Children's Hospital, this has been done for many years. The diet given is as follows:-

Breakfast:-

Toasted bread with extra butter. Cocoa.

A lightly boiled egg and plenty of milk and cream.

Dinner:-

Minced meat or fish with crumbled rusk, (no potatoes or vegetable). Stewed fruit, (provided/

(provided there are no pips or seeds in it)
with cream.

These cases always have a custard at 11 a.m., and at 2 to 3 p.m., a mixture of milk and cream and Raw Meat Juice.

They are not allowed puddings of any kind except the custard.

This diet though it contains a measure of Carbohydrate, is found to agree with these cases, and they, as a rule, do well on it.

Sutherland (88) does not allow fats to be given at the beginning of a case, therefore he does not give cream or much milk. He recommends the giving of a dose of castor oil at the commencement to remove any irritating matter that may be present in the bowel.

The patient must be kept outside in the fresh air as much as possible, in fact always, if it can be managed. Sea air appears to be especially useful in these cases. Allchin (73) suggests that this is due to the atmosphere being charged with Iodine.

They should be kept in bed as long as there is active mischief as evidenced by any rise of Temperature./

Temperature. It is often found that as long as a patient is in bed, he does well, but as soon as he gets up, the temperature goes up. When this occurs, it is better to err on the safe side and keep the patient in bed for a long period.

Constipation should be met by means of enemata and not by purgatives, because of the danger of setting up Ulceration.

A large number of drugs have been used from time to time, but for practical purposes, we confine ourselves to a small number, since it is not so much to them that we look for a cure, but rather to dieting and general treatment.

The most important drug in the treatment of the condition is really a food, viz., Cod Liver Oil. It must be regarded as indispensable, and should be given in one form or another in all cases. On account of the risk of setting up diarrhoea, we start with small doses and gradually increase them. It may be rubbed into the Abdomen. In cases where diarrhoea is severe, Thomer (89) suggests giving it as an enema combined with creosote. Children who will not take the pure oil often take it in the form of an emulsion. Dr Carmichael (90) finds Petroleum Emulsion/

Emulsion efficient when the bowels are lax and Cod Liver Oil Emulsion cannot be taken.

Next in importance stands Iron. As we have seen a moderate amount of Anaemia is almost always present, therefore we must supplement our treatment by giving this drug. The most satisfactory form in which to give it is probably the Syrup, Ferri Iodid. as we have in addition the alterative action of the Iodide. In addition, we may give some form of Arsenic to supplement the action of the iron, and at the same time act as a Tonic.

Iodoform is recommended by Burney Yeo in doses of $\frac{1}{4}$ of a grain three times a day.

Mercury in various forms is recommended by most men, especially rubbed into the Abdomen. At the Edinburgh Children's Hospital a 5% ointment of Hydrarg. Oleat. is used and is a valuable aid in the treatment of the disease. Carpenter gives Hypodermic injections of Perchloride of Mercury, $\frac{1}{30}$ grain once a day, with success. Leonard Guthrie (82) states that most of the cases at Paddington Green Hospital treated with mercurial inunction or Biniodide of Mercury given internally, recovered.

The use of mercury given internally is due to/

to its antiseptic action in the Intestinal canal, thus reducing irritation. Therefore, we must be careful to give it in small doses.

Lately Calcium Chloride has been recommended. Treatment with Tuberculin is bound to bulk largely in the future and probably it is in this that we have the most effective cure for the disease.

In the ascitic form inunction with mercury is the best treatment, but if it has had a fair trial and the fluid still persists, the Abdomen should be tapped by means of Southey's Trocar and cannula, and a tight binder applied. Guthrie (82) recommends that a small incision should be made in the skin and a blunt Trocar used, owing to the danger of wounding the bowel which may be adherent to the abdominal wall.

Should the fluid reaccumulate, it may be again removed by tapping, but if it again reaccumulates, the Abdomen should be opened freely and the fluid allowed to escape. No drainage is necessary unless the fluid is purulent. Flushing out the abdomen with sterile water is not required, and the use of antiseptics is of doubtful value.

The Treatment of Tuberculous Intestinal
Ulceration/

Ulceration is very unsatisfactory, and when once thoroughly established, no method of treatment appears to do more than temporarily ameliorate the condition. Diet is again of prime importance. It should be on the same lines as in Tuberculous Peritonitis, but principally the fluid parts, e.g., Raw Meat Juice. Of the drugs that have been used, Bismuth and opium, are probably the most useful. Bismuth may be given in large doses, 20 grains every 4 hours, and opium, 1 minim of Laudanum for each year of the child's life, may be given 3 times a day.

Creosote has been given with success.

When there is much Ulceration low down in the large Bowel, enemata are useful, either simple or medicated with silver nitrate.

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