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A THESIS.

The Classification of Intestinal Obstruction, together with some special references to certain intestinal parasites.

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Th. D. 1915

The Classification of Intestinal Obstruction.

The term ileus was associated by the ancients with varying abdominal pains and maladies; ascites, and meterorism in typhoid fever, even having their place in the then known classification.

Ileus was, according to Hippocrates[3], accompanied with inflammation of the bowels due to flatus, while Galen associates it with, and due to, material within the intestine, to abscess in the intestinal wall, to the obstruction by dry fæces, and to "scirrhus." He stated further, that the inflammation resulted in peristaltic arrest or in a reversal of peristaltic action, which was accompanied with the vomiting of fæcal matter.

For centuries this classification held its ground, the Arabians alone attempting an improvement into a fanciful and arbitrary sub-division of five degrees.

It was, indeed, not until the sixteenth century, with its impetus to anatomy, that the exact pathological nature of the affection began to be ascertained. During the seventeenth and the early part of the eighteenth century post-mortem observations added still further to the knowledge of the subject, until in the middle of the latter century most varieties of intestinal obstruction had been recognised.

Even at this late date, disregarding the "ileus inflammatorius, ileus a stercoro arido" and "a skirrho" of Hippocrates and Galen, dynamic ileus was named as the principle factor in the etiology;

and, we can estimate the knowledge of the pathology of our subject, when we find this form of ileus being affirmed as due to a change of the humores acres mordentes, biliosi, pituitosi, or of a materia febrilis or of gases; and although Dunt in 1550 had declared that gases were formed within the intestine, Gorter two centuries later still believed that the gas formed in ileus was developed from the mesentery.[3]

Moreover, as intestinal worms was the only universally recognised affection of the intestine, these parasites were asserted to be the great etiological factor of the disease, until Davaine and others, in the third quarter of the last century, expelled them as a possible cause of ileus. In this he was erroneous.

By this rapid review, we have seen how from a position of speculation due to a lack of opportunity for post-mortem observation, we arrive at the period where preconceived ideas were to be replaced entirely by observation, and at a time when the old term ileus was regarded as divisible into peritonitis, coprostasis, typhlitis, occlusions and constrictions of the gut. Ileus was then pronounced to exist, on the one hand, when stercoraceous vomiting occurred, or, on the other, when there was simple occlusion.[3]

Observation was restricted at Davaine's time to post-mortem research, since which, and gradually, there has opened the field of abdominal surgery, and the question of intestinal obstruction is being increasingly and intimately studied during the life of the individual.

The result is that the evolution of the classification of intestinal obstruction is approaching completion—the very varying groupings as is represented in the following table demonstrates, however, the present-day's dissatisfaction with its ideal.

Recent Classifications of Intestinal Obstruction.

Author.	Date.	Classification. A	B	C	D
Leichtenstern [3]	1875	1. Congenital 2. Acquired	1. Compression 2. Obturation 3. Stenosis	1. Acute 2. Sub-acute 3. Chronic { *a* Terminating acutely; *b* Terminating fatally }	
Jessett [6]	1892		According to the pathological causes		
Treves [2]	1899		1. Strangulation 2. Torsion 3. Invagination 4. Obturation 5. Stenosis	1. Acute 2. Chronic 3. Chronic, terminating acutely	
Boas [4]	1904				1. Intestinal stenosis 2. Intestinal obstruction
Reed [8]	1905	1. Congenital 2. Acquired	{ 1. Dynamic 2. Mechanical }	1. Acute 2. Sub-Acute 3. Chronic	
Barnard [1]	1907		1. Mechanical. 2. Organic (includes dynamic)	1. Acute 2. Chronic 3. Chronic terminating acutely	
Nothnagel [20]	1907		1. Stenosis 2. Occlusion 3. Stricture 4. Constriction 5. Obturation 6. Compression and incarceration 7. Strangulation		1. Stenosis 2. Acute Intestinal obstruction { 1. less severe; 2. severe }
Mummery [11] (on the colon)	1910			1. Acute 2. Partial 3. Chronic	
Sawyer [19] follows Leichtenstern	1912			1. Acute 2. Sub-Acute 3. Chronic	

Boas,[1] in an endeavour to include cases of narrowing of the lumen of the bowel without symptoms of obstruction, has given prominence to the term "intestinal stenosis," a subject which he largely treats as Treves deals with his two forms of chronic obstruction: under such circumstances, "stenosis" is a form of nomenclature entirely misleading. Obstruction, moreover, he only employs to designate what most authorities would define under the heading of "Acute Obstruction," and in this respect he follows Nothnagel.[20]

The fact that all writers on the subject have to describe the state of obstruction according to its clinical aspect, would suggest that this should be the most advantageous mode of classification. This, however, is hampered by the fact, that, under existing classifications, it is difficult to include—

1. Those congenital forms of stenosis or occlusion which are met with in the small and large intestine as well as at the anus.
2. Those cases of chronic obstruction which do not, in the modern acceptation of the word, produce symptoms of obstruction.
3. Those cases of stenosis which produce no symptoms.

Without violently disorganising the modern method of classification, these types can easily be included within the *chronic* variety of the affection, which it is usual to describe, as either having a fatal issue by exhaustion or an accident such as a perforation, or to terminate in an acute obstruction.

The following sub-division of this class allows of the inclusion of the types 1 and 2, mentioned above. With regard to the third type, viz., those cases of stenosis which produce no symptoms—as there is no obstruction, it is doubtful if such a class should have been mentioned: in any case, they have no claim to classification. I arrange the division of *chronic obstruction* thus:—

Class I.—Those which tend to a fatal issue:—

1. Due to exhaustion, &c.
2. Due to a *complete* occlusion.
3. With an existing occlusion.

Class II.—Those which do not tend to a fatal issue.

Returning to the modern existing classifications, we would notice also that, clinically, most authors describe intestinal obstruction as either to be acute or chronic; particularly is this the case with British writers. Some few have included the term sub-acute or partial, Leichtenstern, Mummery, and Sir James Sawyer among them. This latter group of cases has been, however, so generally set aside, that it behoves us to emphasize its inclusion in our modern lists.

Such then is the object of the first section of this paper, namely, a justification for the inclusion of the sub-acute variety in the modern classification; this will contain, in its latter part, a discussion on certain nematode affections. The final part of the Thesis will be a somewhat brief emphasis on the need of enlarging the borders of the chronic division of our subject.

A—The question of the sub-acute form of Intestinal Obstruction.

In dealing with this condition we must first of all produce our testimony from the literature of the subject; secondly, our testimony of one's own observations; and lastly, discuss the needs and advantages of its inclusion.

I. The testimony of literature to the sub-acute obstruction.

Leichtenstern,[2] and Sawyer,[12] deliberately include this variety in their classifications; Mummery,[12] in his work on diseases of the colon, recognises partial occlusion, whilst Reed,[16] though dividing his cases into the congenital and dynamic types, speaks clinically of the acute, sub-acute and chronic manifestations. It is not, however, to the supporters of the classification that we turn, but also to those who systematically exclude the condition under consideration from their classification. Thus denying its importance, these writers have repeatedly, in their descriptions, to refer to a sub-acute type of the disease. Not only so, but, in my opinion, they include in their acute types many cases which primarily were sub-acute, but which, later, presented the clinical picture of an acute obstruction.

Before considering the matter further, we will approach the usual definition of an acute obstruction.

Barnard says,[1] Intestinal obstruction is a condition in which the intestinal contents are more or less hindered in their passage along the bowel, the acute variety leading to

Collapse as one of the earliest manifestations.

Pain at first sudden and intense.

Vomiting half to twenty-four hours after the commencement of the attack and usually after a short interval.

Diminution of the quantity of urine passed. . .

Treves says that an acute intestinal obstruction is to be defined as an obstruction together with acute severe abdominal pain, accompanied with collapse and early vomiting.[2]

By the symptoms, says the former of these authorities, the case of intestinal obstruction can readily be classified[1]; such is not the case, however, for in speaking of obstruction produced by matting of the intestines, he says, "In the majority of cases there are symptoms of chronic stenosis with visibly contracting coils of intestines and partial constipation. In a number of cases these symptoms arise in attacks, more or less spontaneously relieved, and are much influenced by diet. . ." Of these various forms of obstruction he adds, "The method of lateral anastomosis is applicable to *sub-acute* and chronic forms."[1] Here, therefore, is evidence that cases of obstruction cannot readily be classified into his division of acute or chronic, and that there are a number of cases of obstruction due to matting of the intestines which he regards as sub-acute. About ten per cent. of the 669 cases of intestinal obstruction which were seen in the London Hospital, during a period of thirteen years, were due to bands. Barnard again goes to some length in the description of this variety, but there is nothing more striking than the following assertion: "The obstructions due to bands are often more sub-acute than is generally supposed . . . when, however, the intestine is incarcerated over or under, or even when it is snared by a slack cord, the symptoms may be so far *sub-acute* as to lead to procrastination from day to day with drugs and enemas before surgical aid is invoked." He continues, "*Sub-acute cases form about fifty per cent. of those due to bands.* . . The patient is

usually a young adult, the onset is as sudden as in the acute form, but much less severe, and may readily be controlled by small doses of opium—collapse is slight and often absent, vomiting is irregular and chiefly occurs after attempts to take food or after the administration of purgatives. Flatus is passed per anum for the first day or two, and enemas may give a poor result. Pain does not amount to agony, but attacks of colic are more marked and are accompanied with vomiting. . . There is then no doubt that a *partial* obstruction is present, but the gut is often seriously damaged at the point of strangulation. The important points appear to be the absolutely sudden onset in a patient previously in perfect health and the continuance of vomiting and colic with almost complete constipation."[1]

Of the 669 cases of intestinal obstruction collected in the London Hospital over a period of thirteen years, seven were due to slits in the mesentery. Of these only one, says Barnard,[1] was sub-acute ; we must observe, however, that this is a percentage of fourteen.

Volvulus also may be divided into three classes, chronic, sub-acute or acute, and many of those usually regarded as acute have a comparatively mild though sudden onset. The normal course of acute volvulus of the sigmoid is thus outlined by Barnard. A sudden severe pain with colicky exacerbation, early tenderness due to peritonitis; vomiting but little marked and sometimes absent; eructations common. Constipation as a rule is absolute, but considerable variations occur. Tenesmus is frequent. Collapse is later in its appearance and not nearly so well marked as in strangulation by bands.[1]

Such a normal course does not at all tally with the definition of an acute obstruction, viz., "collapse as one of the earliest symptoms, pain at first sudden and intense, and vomiting half to twenty-four hours after the attack." One does not endeavour to prove that volvulus of the sigmoid cannot be and is not often of an acute nature, but that its symptoms are frequently sub-acute is not to be denied, and volvulus forms about 4 per cent of all forms of intestinal obstruction. Barnard supports this conclusion saying that, "although volvulus of the sigmoid usually produced an acute obstruction, in not a few cases the onset may be gradual and attended by colicky pain

and the passage of flatus or even of faeces in fair quantity . . . it is even probable that incomplete degrees may either spontaneously untwist, or if they remain, may only partially obstruct the bowel and its vessels. . . ." Dealing with the subject of ileo-colic volvulus, usually, he says, the obstruction is *sub-acute*, while *sub-acute*, chronic and acute varieties of volvulus of the small intestine are found.[1]

With cases of chronic stenosis of gut, one of the features often so striking in the history, is the attacks of sub-acute obstruction, through which the patient is skilfully steered or from which he spontaneously recovers. These repeated attacks of sub-acute obstruction are indeed landmarks in the course of some cases of this variety, and should call for operative treatment at the time or when the patient improves.

It is not, moreover, generally realised that there is no mean proportion of cases of intestinal obstruction which were sub-acute in onset and later revealed the symptoms of the acute variety.

For example, Treves describes a case of an incarcerated hernia through the Foramen of Winslow. The patient had been for one month complaining of constipation, he later was found with a tense and slightly tender swelling in the epigastrium; this was followed two days later by vomiting and pain, and more obstinate constipation set in, the symptoms thus becoming those of more acute obstruction, the vomiting became stercoraceous, the pains continued, the abdomen was more distended and the patient died on the 12th day of the illness. This case showed signs primarily of a simple constipation, it then passed through the sub-acute stage and ended with the signs and symptoms of an acute obstruction.[2]

Another case reported by him of a sub-acute condition terminating acutely, was that of a boy upon whom Mr. Maylard operated on the fifth day. This patient for the first three days only manifested symptoms of colic. The operator resected a portion of gangrenous gut which had passed through a slit in the mesentry.[2]

Or again in a case of stenosis above the origin of Meckle's diverticulum, a boy had sudden colicky pains, retching and purging. The diarrhoea was soon replaced by constipation; vomiting came

on later, and on the sixth day was stercoraceous, this was copious and at long intervals.[2]

In these cases there is evidence of the condition at first being sub-acute and then sooner or later revealing a complete and acute obstruction. Treves appreciates that in the following case there "is evidence of an incomplete obstruction."[2] This was a woman aged fifty-eight who three months previously had had a femoral hernial reduced. She developed symptoms of an intestinal obstruction of which the onset was not sudden, the pain was paroxysmal ; there was vomiting, which was at first at long intervals and later more frequent, ultimately becoming stercoraceous. The constipation was then absolute, though during the first three days slight fluid motions were passed. On the seventh day a laparotomy was performed, the gut was still healthy though the ileum was greatly distended and adherent near the femoral ring. The adhesions were released and a perfect recovery resulted.[2]

In another case of sub-acute obstruction in a young married woman, a lump as large as the fist could be felt in the abdomen. This was the seat of much pain and tenderness, of much visible intestinal movement, and of many bubbling and gurgling noises suggesting a retroperitoneal hernia. This latter diagnosis was excluded on account of the consistency of the mass. The trouble in her abdomen was almost incessant and had existed some weeks, the main complaint being colic, griping after food, constipation and frequent and fairly copious vomiting. At the laparatomy a coil of small intestines was rolled up in a mass around a bunch of tubercular mesenteric glands.[2]

Though in all, I have found that Sir Frederick Treves, in the second edition of his work on intestinal obstruction, reports at length twelve cases which have a genuinely sub-acute stage in the history, I will conclude the examination of individual cases by this last, in which the author evacuated a perityphlitic abscess, a procedure which was followed by " intestinal obstruction of a sub-acute character." He re-opened the abdomen and found the small intestine adherent to the wall of the abscess cavity, the evacuation of which had led to a kinking of the small intestine by collapse of that cavity. The coil was released and a cure attained.[2] Moreover, of the twenty-two cases of obstruction by compression

from tumours reported by Treves, two were sub-acute, a percentage of nearly ten.

It is especially instructive to note some of his convictions and experience regarding intussusceptions and kinkings of the gut.

Of the former he accepts generally, the division of Rafinesque.

Namely:	Acute Intussusception,	48 per cent.
	Sub-acute ,,	34 ,,
	Chronic ,,	18 ,,

Of kinking, he says, "The symptoms due to kinking of the bowel are in the main very similar to those which attend strangulation under a band" (of which Barnard says 50 per cent. are sub-acute). "The onset is usually less abrupt, very often there have been minor attacks (*i.e.*, sub-acute attacks) or the final attack may have been preceded by colic, constipation, and vague intestinal uneasiness. The progress of the case is less acute than in strangulation by a band; patients living eleven, fifteen and twenty days in some instances. The symptoms also are such as would suggest that the occlusion is not absolute. The pain, although severe, will present very unequal degrees of intensity, the vomiting, although often incessant, distressing and stercoraceous, may abate, the metecrism even in cases of a long duration may be quite slight. The constipation, moreover, although usually complete, may yield a little and the bowels be opened by an aperient even when the symptoms of obstruction have lasted eight days . . . in some of the more chronic *or rather less acute cases* I have seen evidence of some little hypertrophy of the bowel."[2]

In other words, Sir Frederick Treves recognises that a large number of cases with varying degrees of symptoms are of a sub-acute character. He, in fact, states that an acute, *sub-acute* or chronic aspect will differ according to whether the occlusion produced by isolated bands or adhesions is situate in the large or small intestine.[2]

That retroperitoneal herniae may be or become sub-acute is also evidenced by the same writer. We have previously quoted one of a hernia into the lesser sac of the peritoneum, but retrocaecal herniae are also sometimes sub-acute. He relates of a patient, who, while scrubbing the floor was seized by a pain in the right side of the

abdomen which was accompanied with some collapse and vomiting. This pain and vomiting continued and was associated with very obstinate constipation; some relief was obtained by enemata and later by lavage of the stomach. The abdomen became distended and the patient very ill, the coils of the intestine were visible, and the case was considered to be a chronic obstruction by stenosis of a malignant nature at the splenic flexure. On the twenty-first day of the illness a laparotomy was performed and a strangulated retrocaecal hernia liberated.[2]

In volvulus of the small intestine Treves agrees with Barnard that "the cases are often associated with evidences of incomplete obstruction."[2]

Here then we have the two great advocates of the simple subdivision of intestinal obstruction into the acute and chronic types of the disease. They admit a large percentage of cases due to bands and intussusceptions are sub-acute. That many cases of volvulus, kinking of the gut and matting of intestines are also sub-acute. They also agree that obturation by foreign bodies,[1],[2] stenosis, compression of the gut, have all their quota of sub-acute cases of intestinal obstruction.

Thus we find that in all cases of Leichtenstern's[3] second mode of classification.

1. Compressions,
2. Obturations,
3. Stenosis ("Causes starting from or encroaching on the wall and narrowing the lumen of the gut,")

and in all the great first classification of Treves,[2]

1. Strangulations,
2. Torsions,
3. Invaginations,
4. Obturations,
5. Stenosis,

we have a good representation of cases with sub-acute symptoms.

It is further interesting to record, that, of 1,541 cases of obstruction collected by Leichtenstern, 442 were due to intussusception;[3] of these therefore, about 150 would, according to Rafinesque's tabulation, be of a sub-acute nature, this giving a 10 per cent. proportion of all cases of intestinal obstruction as sub-acute.

Boas,[4] though dividing his types into "intestinal stenosis" and "intestinal obstruction" (subjects which he discusses largely as Treves deals with chronic obstruction on the one hand, and the acute variety on the other), in all the cases in the which Leichtenstern states sub-acute symptoms exist, admits that such conditions persist. Amongst the cases "not necessarily violent" or where the obstruction "is more gradual," and the beginning of an obscure clinical picture leads to a more difficult diagnosing of the case, he[4] mentions partial intussusception, gall stones impaction, obstructions due to enteroliths, large intestine obstruction, and volvulus of the small intestine.[4] He further quotes Nothnagel, Treves and Naunyn to substantiate his position. Thus he says that Treves notes that cases due to

1. Obstruction over a band,
2. Acute kinking due to traction upon an isolated band or adherent diverticulum,
3. Obstruction from adhesions which retain the bowel in a bent position,
4. Obstruction by means of adhesions of intestinal coils to each other,
5. Obstruction due to traction upon the intestinal wall by a diverticulum,
6. Narrowing of the bowel by shrinking of the mesentery after inflammation,
7. Compression of the bowel from without,

reveal symptoms which are generally less severe than in strangulation, incarceration, or volvulus. The exceptions to this are very numerous.[4]

Leichtenstern,[3] in his treatise on occlusion and constrictions of

the gut, has as his second great or *sub-acute* class of obstruction, those in which the cause appearing acutely produces notable disturbances in the permeability of the intestinal tract, leading, sooner or later, to definite occlusion or death in some other way; such is the case in intussusception, in incomplete incarceration, in acute incomplete compression, and lastly, in many cases due to gall stones and foreign bodies.

Without labouring the subject further, we may say that all the other authors I have read on the subject, be they European or American, realise that there is a vast number of intestinal obstructions with symptoms lying between, on the one hand, those in which collapse is one of the earliest symptoms, pain first sudden and intense, in the which vomiting comes on within half to twenty-four hours, and usually after a short interval, and in which there is marked scantiness of urine; and, on the other hand, those cases in which there has been a history of chronic obstruction.

II. The testimony of one's own observations.

I have had association with but comparatively few cases of the more acute varieties of this affection, and I have found but ten of these cases, of which eight occurred in Jerusalem. But of that number the evidence for the sub-acute variety is striking.

1. Femoral Hernia Strangulation ... ?
2. Tubercular Stricture of Intestine ... ?
3. Dysenteric Stricture of Sigmoid ... Sub-acute Termination.
4. Due to Worm ... ... Sub-acute.
5. Due to Paresis Ileus ... ... Sub-acute.
6. Due to Kinking ... ... Sub-acute.
7. Due to kinking of the Ascending Colon ? ... ... Sub-acute.
8. Due to Faecal Impaction ? ... ?
9. (In England) Due to Carcinoma of Sigmoid Colon ... . Sub-acute.
10. (In England) Gallstone Obturation ... Sub-acute.

That is to say, that in all cases in which a good history was obtainable the symptoms were sub-acute.

Incidentally, it reveals that intestinal obstruction is exceedingly

rare in Syria, as the eight cases are all of the acute forms that were seen over a period of five years in connection with British General Hospital work in Jerusalem, where annually about thirty thousand visits are paid by patients.

To this list I will later add certain other cases of the acute varieties due to worm habitation, the majority of which again reveal sub-acute symptoms.

The first of the cases to be described with some detail is that of a woman, aged forty, a Christian, who had had fever, probably malarial, seven days prior to her admission into Dr. Thwaites' Hospital, Jerusalem. Two days later, having some *vague* abdominal pains, the patient "took a purge," which was promptly vomited; the pains were then localised to the epigastrium, but the following day were hypogastric and the constipation was absolute. *On the fifth day* after the commencement of the vague abdominal pains she was admitted into hospital; there was no evidence of a particularly tender area in the abdomen, nor of fæcal accumulation. *The patient's general condition was good, there being no suggestion of an abdominal facies*, the pulse was 100 per minute and the temperature 99·4° F. Vomiting was incessant, the distension marked and peristalsis noticeable. Per rectum and per vaginam no light on the case was thrown. On the evening of the sixth day of her illness the patient received two large soap and water and olive oil enemata, containing one hundred and three ounces of fluid. This resulted in the passage of some fæces and flatus. Two enemata the following day were still more successful, and the patient recovered. Within one year she returned with a marked enteroptosis; her former illness, possibly being in the early stage of this affection, was probably an acute kinking of the transverse colon with sub-acute symptoms.

Another case of great interest and of a sub-acute nature is that of a lady of fifty-six, generally in good health, who drove to a picnic some miles outside Jerusalem. The following day there was a dull ache with tenderness in the right lumbar and lower hypochondriac regions of the abdomen, there was constipation, and on the second day vomiting sét in. *There was, however, no collapse*, and the abdominal facies did not present itself till the fourth day. The pain was marked over the lower part of the ascending colon; the distension

increased daily, the vomiting became persistent, but as in the former case the *pulse was of good tension*, not more rapid than 100 per minute, the temperature had risen to 99·4° F. and the vomiting became stercoraceous in character. There had been no history of previous constipation and no fæcal mass was palpable. The patient received a lavage of the stomach and was brought into hospital, being driven from her house nearly a mile away. Jerusalem roads are exceedingly rough, and the lying down in a jolting carriage had the salutary effect of reducing the kink or the incarcerated gut, resulting, on arrival at the hospital, in an unaided evacuation of the bowels.

This may have been a case of an herniation into the internal retro-colic fossa, or a kink of the colon, when the patient had been lying down at the picnic. The actual effect was not experienced by the lady till the following day, and there was no collapse as late as five days after the herniation.

At the same time in this history we would not lose sight of the rare possibility of a volvulus of the cæcum due to an existing mesentery of it and the ascending colon. Supporting such a means of reduction of an hernia, we would refer to a case of a strangulated femoral hernia of probably a sub-acute nature, which journeyed some hours from a village to the Church Missionary Society's Hospital at Jaffa. The patient was recommended an operation; this she refused, and was taken on camel-back to her village. The peculiar motion of the camel on the patient, who would perforce lie down, performed, what the surgeon had failed to achieve by taxis, a complete and satisfactory reduction of the strangulated bowel; the woman returned in a week to report her sound health to her medical adviser.

The above cases have been those due to kinking or strangulation of the bowel; our next case for study, however, has the special interest of being associated with a severe paresis of the ileum, allied to the much discussed question of paralyticus ileus.

The patient, a nurse, aged about 36, was thrown from a horse and received a resulting fracture of the horizontal ramus of the left pubic bone. There was no evidence of a lacerated gut, the patient suffering, for the most part, from the pain and bruising. Twenty-

four hours later, however, she commenced to vomit and an abdominal distension gradually set in, till on the morning of the second day, forty-two hours subsequent to the accident, the flatulent distension of the abdomen was marked and oval in outline, being most pronounced in the umbilical and lower epigrastic regions, and tapering down towards the pelvis. There was no other local sign. The patient was still vomiting, there was great difficulty in the passage of any flatus at all, and the constipation was absolute. The contour of the abdomen suggested an obstruction at or near the ileocaecal junction. Our patient had quickly recovered from the shock of the accident, and she had had no previous history of constipation. The vomiting, the increasing and oppressive distension, the great difficulty of the passage of flatus, the absolute constipation, unrelieved by enemata or purgatives, rendered the case on the fourth day an anxious one. Regarding the condition as a semi-acute obstruction due to paresis ileus, or possibly to paralyticus ileus, a mildly and continuously irritant purgative, calomel, was administered in small repeated doses, thus stimulating muscular action. The result was entirely satisfactory, and the patient, save for a day or two of malarial fever progressed favourably.

In noting that this was an example of sub-acute obstruction due to paresis or paralysis of the wall of ileum, we would recall, that this portion of the gut is naturally most easily paralysed by such an accident, its muscular coat is thinner than that of the jejeunum, whilst its position is not so favourable to peristalsis. In the above case, moreover, the subject fell severely on her back and left buttock, such a shock would naturally pull upon the ileum, which is the most dependent part of the intestine and that which has the longest and shortest part of the mesentery attached to it. The nature of such a fall would also produce a tearing at the caecal or fixed end of the ileum, as well as a bruising of the bowel over the brim of the true pelvis.

Sir Frederick Treves had a somewhat similar case of an old man who sustained a fractured femur and a contusion over the liver. He died on the tenth day after the accident from obstruction due to paralysis of the colon, produced, says the author, by a very slight amount of peritonitis.[2]

Again, a young married woman of thirty-two summers who was seized on Friday, December 3rd, 1914, with severe abdominal "spasms," she also vomited and had complete constipation. *One week after* the commencement of her illness this patient was admitted to the Royal Hospital, Richmond, with marked abdominal distension, visible peristalsis of the small intestine, and pain around the umbilicus. She was vomiting, at long intervals, a greenish vomit with a sour taste. Neither flatus nor faeces could be passed, there was some anxiety about the month, *no collapse at all*, per rectum nothing was noted save an increase of tension on right side of Douglas's pouch, possibly due to a distended cæcum. The pulse was of good tension, it's rate 100 per minute, her temperature was 98.8° F., while her respiration was 28 per minute.

She was operated on, the cause being found in a carcinomatous stricture of the sigmoid. She had had no previous history of obstruction or of constipation, both she and her husband giving separate evidence on this point.

Finally, an old man, aged eighty, four years ago had a slight attack of obstruction. He was admitted to the Royal Hospital, Richmond, at the end of the last year with a history of six days' obstruction. During the first three days he had had some vomiting, not excessive, he had felt some abdominal discomfort and there was constipation. During the latter three days the vomiting had ceased and on admission there was some slight distension, he was constipated, but there was no vomiting. There was some evidence of visible peristalsis. The patient's condition, considering his age, was good, he had no distress whatsoever. The following day, however, he vomited slightly, the distension was marked, peristalsis was very visible, but apart from the general discomfort there was no really localising sign or symptom, save that, the previous day, the small intestine in his left inguinal hernia was, on palpation, found to be collapsed.

At the operation, which was necessarily a rapid one, only a small mass of hardened faeces in the caecum could be found as a possible etiological factor. The patient died the same night, the following morning I found the cause in a medium sized gall stone lying in the ileum.

Nematodes and Intestinal Obstruction.

We have here to report further cases of sub-acute obstruction, but as the type of the affection is not generally accepted among modern physicians and surgeons, we must first obtain a concise idea of the historicity and the public opinion of the subject. As the evidence I have to produce belongs to all the types of intestinal obstruction, it must be pardoned if, for purposes of a better viewing of the matter, in some instances I trespass from the section of the affection with which we are immediately concerned. The particular nematode with which we have to deal is the Ascaris Lumbricoides.

The ancients were more or less exact in their appreciation of three of the intestinal parasites—threadworms, tapeworms and round worms. Galen actually described the three, giving their respective positions in the alimentary canal. The Arabians did not consider the Cestodae as worms, but regarded the segments as a separate species termed "cucurbitines." Later observers included all the varieties mentioned by Galen, Aristotle and others, while some added to these three the "cucurbitines" of the Arabs.[5] It became the fashion to attribute to these parasites all kinds of maladies, including apoplexy, fever, pleurisy, &c.; but one of the especial diseases that was judged to have its etiology in these parasites was ileus, or, as we would say to-day, intestinal obstruction.

So convinced was the world upon this subject, that it led to, with regard to abdominal conditions, an anti-verminous group of physicians, which reached its maximum of strength and ability in Davaine. His works have so influenced the minds of his successors that the belief in the possibility of intestinal parasites causing obstruction, is practically only recognised by those who have had actual experience of the same. Considering that the condition is not infrequent in the warmer climates where our colleagues are and will be increasingly in practice, it is necessary to establish conclusively and emphatically in the minds of medical teachers the existence of the phenomenon.

To this end we must, perhaps at a little length, examine the conclusions of recent observers. All I have read, Leichtenstern, Treves,[2] Barnard,[1] Manson,[9] Ritchie,[10] Heller,[12] and others, draw, in

the main, conclusions similar to those of Davaine[5]; and it is for this reason that I select the latter's exhaustive work for review.

Treves[2] describes a reported case of intestinal obstruction due to worms in the following words : " M. Martignon describes the intestine as being sometimes blocked by a mass of worms which form a definite tumour that is dull on percussion and can be felt through the abdominal parietes. The nature of the mass he asserts can be recognised by " une sorte de mouvement vermiculaire sensible à la main."* "Many less recent writers describe this variety of intestinal obstruction and lay stress upon the characteristic movement which can be felt in the occluding mass." He continues, "*I can find no trustworthy illustration of this somewhat improbable form of intestinal obstruction.*"

He further quotes Heller to support his statement, and then sums up the argument by remarking that " Davaine very properly considers this an erroneous idea."

Leichtenstern,[3] whom Sir Frederick Treves so closely studied, says: " At a time when it was the fashion to consider intestinal worms responsible for every possible disease and symptom of disease, we cannot be surprised to find recorded innumerable examples of an ileus verminosus, supposed to be due to occlusion of the intestinal canal by masses of worms. After a careful examination of the literature bearing upon this point, I must consider the occurrence of fatal obstruction of the intestines by masses of worms as not proven, without, however, wishing to deny that they might aid in producing definite occlusion when constriction was already present." He continues with a criticism of autopsies made by earlier observers.

Jesset,[6] in 1892, states that Heydenreich reported a case of intestinal obstruction which was diagnosed as being an intussusception, but at the operation was found to be due to a bolus of worms. He says, however, that neither in this, nor in three other cases found by him, was the relationship between the obstruction and the round worms close enough to permit one to reject positively the strong doubts expressed by Davaine of such cases.

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* A species of vermicular motion sensible to touch.

Max Braun,[7] in 1906, in his introductory remarks to his book on the animal parasites of man, a treatise descriptive of the distribution, life history and anatomy of these parasites, does not discuss nor refer to this possibility. His remarks are, however, necessarily short.

Reed,[8] in 1905, believes that round worms killed by a vermifuge may produce serious obstruction, and especially, as suggested by Leichtenstern, when there has been a previous gut stricture.

Boas,[1] at the same date, seems to hesitate to accept the observations of Mosler, Peiper and Huber, this latter reporting thirteen cases of the condition. Heidenrich and Simon have operated for the obstruction, but Boas says that very few of the observations heretofore made will stand critical examination; that it is impossible to describe the characteristic symptoms, and that the diagnosis is only possible through the accidental evacuation of ascarides.

Manson[9] and Ritchie[10] admit that the ascaris lumbricoides can pierce the intestinal wall and set up peritonitis and abscess formation. Manson also, who has evidently examined Davaine, asserts that it is possible for worms to pass through the intestines, post mortem; also that they can enter the urinary passages during life.

Heller[12] negatives the possibility of a verminous obstruction, but says that masses of dead worms mixed with the other contents of the intestine can very readily form an obstruction to any other body moving through the intestine.

To sum up, there is a large amount of negative assertions and in a few cases a kind of " didymus " position.

Previous negative evidence has, however, depended almost entirely upon literature only. It has, as far as I can ascertain, seen no case in which a bolus of worms was associated with obstruction, with or without an accompanying stricture of the gut. It (the negative evidence) has stringently raised its denial to cases reported by observers who have seen *in toto* about thirteen cases of the condition.*

*See Boas' reference to Huber.

Moreover, either by direct reference or by inference, we see Davaine's ideas supported upon all sides, and it is for this reason I now enter upon some of the results of a study of Davaine's "Traité des Entozoaires et des Maladies Vermineuses."

Levin[11] found that at Spitzbergen, in most instances, white bears, seals, reindeer, eider ducks and penguins had entirely sterile intestinal contents.

Manson[9] found, that, with regard to the ascarides, they are much more common in the tropics than in cooler latitudes, and that a great deal depends upon local conditions, particularly upon the faecal contamination in the water or vegetable supply. To this I can bear testimony, and such contamination is achieved with greater facility in semi or uncivilized regions. In temperate climes, says Manson[9], one, two, or even ten lumbricoid worms at a time may be found within the bowel, but in the tropics twenty or thirty were not uncommon, and that instances of hundreds being found in an individual are far from rare.

Heller[12], of Kiel, says that entangled masses of worms are rarely met with in life, while Max Braun[7] supports the observation of the greater frequency of the nematodes, indeed of all parasites, in warmer climates. The moral of all this, is, that the negative evidence against worms causing an obstruction is collected by observers residing in the "cooler latitudes" of Manson. Of this Davaine is fully aware when he remarks "Le nombre des ascarides existant dans l'intestin est très variable, on n'en rencontre souvent qu'un ou deux jusqu' à six ou huit, quelquefois ils sont assez nombreux pour remplir et distendre l'intestin . . ."[5] Later he says "Les auteurs qui ont écrit sur les maladies des colonies sont unanamies sur la fréquence et la gravité des accidents determinés par les vers, et en particulier par l'ascaride lombricoïde."[*5]

Or again "Let us at the same time remark that the rarity of worms at Paris gives us scepticism regarding the accidents which worms may occasion, and that enlightened physicians had in

* "The number of ascarides in the intestine is very variable, often one sees only one or two up to six or eight, sometimes they are so numerous as to fill and distend the intestine . . ." "Authors who have written on Colonial diseases are unanimous on the frequence and gravity of accidents produced by worms, and in particular by the ascaris lumbricoides."

affected districts in our day, the rarest accidents attributed to worms and cured by a vermifuge."[5]

Here then is the mind of Davaine. He recognises that his own field of observations is limited, and, as I hope presently to shew, this affected his writings, and though he endeavours to preclude preconceived ideas, these latter have control of his findings. He accepts as proved many cases of mania, hysteria, epilepsy, with other nervous conditions, as being due to the presence of intestinal parasites[5]; but as for the fever "vermineuse," he adds, that these are "sans doute" without any relation to the worms.[5] In passing I may mention that I have had in our hospital at Jerusalem, a number of cases whose varying or continuous temperature, proving negative to malaria or typhoid infection in their blood or sera examinations, led to a diagnosis of worm habitation, the use of santonin with compound liquorice powder, the expulsion of round worms, and the immediate relief of my patient. I have also seen a case of peritonitis with a serous agglutination of many coils of intestine (at the operation no pus could be discovered, and the patient was collapsing so that the abdomen was closed before a diagnosis of the cause could be arrived at). This patient had had an associated septic temperature for some weeks, together with the frequent evacuation of numerous worms; she had refused an early operation and returned when too late; but the surgeon in charge and myself, who was called to see the patient, regarded the peritonitis as having its origin in the numerous parasites. This latter case is by the way, and perhaps not absolutely conclusive in itself.

We will now proceed to the examination of certain instances quoted by Davaine.[5]

A boy had passed many worms, at one time he had expelled thirty. Four days later the patient was seized with abdominal pain and vomiting. Davaine, on examining, found signs of peritonitis, and the boy succumbed in twenty-four hours.[5]

At the autopsy, among intestinal fluid in the peritoneal cavity, a dead ascaris lumbricoides was found as well as a general peritonitis. There was a small round hole in the ileum, as though produced by

a pointed instrument, and having no signs of inflammation around. Within the ileum were several other ascarides; the mucous membrane was healthy. From this case, in which there was no sign of a previously ulcerated intestine, we may deduce, that the parasite *may* have been the cause of the perforation, failing another explanation, and that the worm, having been robbed of its nutrition, died within the peritoneal cavity. It is interesting to observe that, though Davaine denies the possibility of the worm piercing the intestinal wall prior to the patient's death, he makes no suggestion as to etiology of the case.

The next example[5] to be quoted is one which Davaine regards as that of typhoid perforation, though there was no trace of any disease of the intestinal mucosa, though the history is against this diagnosis, and though the perforation was in the upper part of the jejeunum.

The child, aged 15, on the 7th January, 1856, complained of headache, abdominal pain, lack of appetite, and of thirst; the slight fever the patient had taken rose a little towards evening, and *the stools were retarded.* Two days later the symptoms which had been thought to be of a continuous fever still persisted, but on the night of the 12th to the 13th, that is, the sixth day after admission, the patient had violent abdominal pain, green vomit and intense fever, . . . the abdomen was ballooned and painful on pressure, particularly in the hypogastrium. On the 15th the pain had much diminished and the vomiting had ceased. On the 17th all went well but the following day the young girl died almost suddenly, with, although she seemed "en pleine convalescence," fresh violent pain and a great increase in respiration.

At the autopsy there were marked signs of peritonitis,—a lumbricoid was found lodged in a small hole made into a fold of the gastro-colic omentum. The round hole in the upper and anterior portion of the jejeunum shewed no sign of ulceration, and there was no trace of any other abnormality in the intestinal canal. According to Davaine this was an instance of a worm coming out post mortem. I quote such cases to shew that his conclusions are, in all probability, biassed and incorrect. The course of the above illness may have been the following: the ascaris lumbricoides fastened on to the mucous membrane of

the jejunum. This would cause a marked spasm of the bowel wall and some slight denuding of the inner lining of the gut. There would be a condition of "retardation of the stools." The glands in the neighbourhood would become inflamed, and the gut, softened by the surrounding hyperaemia, would tend to be more and more eroded at the point of parasitic attachment. Later on acute peritonitis would occur, either prior to the perforation, when the weakened wall may have given way from the subsequent vomiting; or the wall may have been actually pierced by the worm, the occurrence of which Manson[9] and Ritchie[10] recognise, leading to the peritonitis, the later stage of which would be quiescence of the vomiting and pain. The worm then bored the small hole in the gastro-colic omentum, and the patient died from the violent abdominal shock resulting from the wriggling nematode.

In support of this possibility, I will here describe a case of subacute obstruction, which had a stage very similar to the initial one of the above. A patient came to the English Hospital, Jerusalem, complaining of marked left hypogastric pain with tenderness and slight fever—he had no vomiting. On examination and observation in hospital, the man was found to have a very resistant left rectus for 4½ inches below the costal margin. He was exceedingly constipated, and while the facies was somewhat anxious, the patient's condition was not one which gave rise to alarm—his temperature was almost negligible, remaining at about 99° F. A week after the onset of his symptoms the temperature commenced to rise, a small hard tumour-like formation was increasing under the upper part of the left rectus, and below this there was the persistent resistance of the muscle.

A laparatomy was performed for a local peritonitis caused possibly by a perforated gastric ulcer (?). The tumour-like condition was an enlarged and very congested spleen—there was no sign of an abscess of this organ. The stomach was thoroughly examined for a local peritonitis—there was none. Lifting up this organ, the transverse colon and great omentum, to view the posterior aspect of the stomach, one found a section of the mesentery, corresponding to a few inches of the jejunum, with markedly dilated arterioles and venules, while over this part of the peritoneum lymph had been poured out. Several glands of the mesentery were

acutely inflamed. The corresponding gut contained two lumbricoid worms, and the intestinal wall, tightly gripping the foreign bodies in a spasm, was inflamed. *Above this, the bowel was distended with fluid contents, while the segment below the spasm was empty, flat and cyanosed.*

Here then was an enterospasm causing a sub-acute obstruction and accompanied with a commencing peritonitis and lymphadenitis of the mesenteric glands. The spleen was congested from the portal system which drained the part. The patient, with the aid of santonin, made an uninterrupted recovery.

It is essential on account of the almost general acceptance* of Davaine's doubts on the subject, to examine also his statements regarding the formation of masses or balls of worms in the intestine. He says, in a note,[5] that balls of worms will only be found after the latter have entered the large intestine, or after death, and suggests that drugs may produce the agglomeration. To support this,[5] he reports a case of Campenon's, who found, post-mortem, in the case of a man who succumbed after violent colic, the cæcum and part of the colon filled and distended with a mass of worms.

At the same time he refuses the evidence of Pouppé Desportes,[5] who thought the blood of negroes to be of a particular quality suitable for the production of worms, as he had made post-mortem examinations upon this class and found the stomach and intestines containing packets of entangled worms. Neither does Davaine seem to accept the following as proving the possibility of balls of worms forming within the small intestine during life.[5] A case was reported in 1843 which had died from repeated vomiting and cerebral symptoms, in which duodenum, jejeunum, ileum and caecum were full and distended by worms; or again, an eight year old child died almost suddenly with vomiting and convulsive movements. At the autopsy *two masses of worms distended the small intestine.* One which exceeded the size of the patient's fist was caught in the duodenum, it consisted of twenty interlaced worms, which had injured and destroyed the coats of the intestine so severely, that a great part of the circumference of the mucous membrane was destroyed. Bloody mucus

*e.g. Heller says "Large entangled masses of worms are met with very rarely, and that only after death."

p. 734 Intestinal Parasites, Vol. vii, Ziemssen's Cyclopedia of Medicines.

was mixed around the worms, attesting that the interlacing occurred before death; the coats of the intestine shewed no "véritable inflammation."[5]

This case, Davaine says, was one in which the agglomeration must have been post mortem, or else, he says, and this is his great reason for his conclusion, why do we have cases in which hundreds of worms are found in the small intestine, without agglomerations, He also deducts the impossibility of massing of worms because in dogs no such accumulation is to be found.

A man aged fifty died after several days of vomiting of a stercoral nature and an abundant diarrhoea. To explain this "imperfect ileus" were found packets of lumbricoids, one in the middle of the small intestine and the other in the middle of the transverse colon. There was found also considerable shrinking or shortening of the whole length of the intestine. Davaine says this massing of the worms *may* have occurred during the last few days of life, but failing to appreciate fully this possibility, he adds, that this massing may have been produced by the shrinking of the intestines.[5]

Such then is Davaine's evidence; it lacks freedom from bias and would not convince an open minded critic as to the impossibility or even the improbability of a bolus of worms being formed during life within the small intestine.

I have collected from Gaza, Damascus, Tiberias and Es-Salt, towns of Syria, evidence of the bolus of worms producing obstruction. To a surgeon at Beyrout who had not long been in the country and who was living in a city where there are more accompaniments of civilisation than in the other cities of Turkey, no such condition had been seen.

Dr. Stirling, of Gaza, reports a case of acute obstruction due to a massing of worms; the condition must have been recognised on palpation as suggested by M. Martignon.[2] The mass, says Stirling, formed "a large lump in the intestine which I kneaded under chloroform, gave a purge, and the young boy passed an enormous number of worms."

Though one cannot dogmatise on the condition, the probability is that the obstruction was sub-acute rather than acute, as the

surgeon could knead the tumour so freely and certainly from without the abdomen. In any case this particular instance rids us entirely of Treves' words—"I can find no trustworthy illustration of this somewhat improbable form of obstruction;"[2] or those of Leichtenstern,[3] "From the time when Gordon in the 14th century presented volvulus verminosus, based upon the vomiting of an ascaris during an attack of ileus, until the present century, this classification (by parasites) was held in undiminished respect, even by the best authorities;" or of Barnard,[1] "It is very doubtful if they (balls of ascaris lumbricoides) ever occlude the intestine."

Dr. Mackinnon, of Damascus, a surgeon of considerable experience, once operated on a case suffering from, as he describes it to me, "a sub-acute attack of intestinal obstruction," and finding the cause to be a bolus of ascarides, he closed the abdomen, and when the incision had healed, santonin and a dose of castor oil removed the cause.

From Tiberias, a place where tropical heat occurs, Dr. Torrance reports three cases, for one of which he performed a laparotomy, the case being acute; for the two others he employed medicinal remedies successfully—these were not so acute.

Finally at Es-Salt, on the East of Jordan, an Arab suffering from obstruction was ultimately cured of his condition by a very large dose of castor oil given by his relatives, thus expelling a bolus of material which the natives described to Dr. Brigstocke of Es-Salt, the latter concluding the foreign body to be a conglommerate mass of worms.

We have thus thoroughly substantiated the two methods of obstruction caused by the ascaris lumbricoides and mentioned by Wedekind.[5]

i. By spasm of the intestinal wall.

ii. By actual obstruction to the lumen.

Such observations were made by Wedekind in relation to these parasites in herniæ. There is, however, a third factor to be added—

iii. Invagination of the wall of the intestine.

Of this factor we must be aware that the opinions of Davaine, Leichtenstern and later schools have denied the possible existence.

Morgagni,[5] concluded that lumbricoids can cause an invagination of the gut -- this, says Davaine, is a pure hypothesis suggested by Morgagni, because, in certain cases of intussusception, he found at the same time lumbricoid habitation.

Leichtenstern follows in almost similar words:[3] "Worms were held responsible for invagination of the intestine. *There is no support for such an opinion.* Sometimes the ascarides, as Ruysch described and de Haën pictured it, wind themselves about the intussusceptum, an entirely unimportant incident which can have no connection with the etiology, for the reason that an intussusception must be present before the ascarides can wind themselves upon it." Leichtenstern seems to forget that, if the worm forms the intussusception his criticism is worthless, save that it proves his acceptation of an association of worms and invagination.

Mummery[11] has concluded from experimental evidence, in which he endeavoured repeatedly to produce an artificial intussusception, that this *pathological condition must be produced by a foreign body or by abnormal intestinal contents.*

As conclusive evidence on this point Dr. Ussher, of Van, in Asia Minor, was once operating for an abdominal condition—I believe the case was a posterior gastro-enterostomy; while operating he was astounded to observe a round worm produce an intussusception; he is of opinion that the cases of intussusception in his district are due to these parasites.

One of my own interesting cases was that of a chronic intussusception formed by an ascaris lumbricoides curled in the ileum. I will in another connection report this instance in full detail.

Thus we have evidence of, not only a "verminous" obstruction of sub-acute and acute nature produced by spasm or actual obturation of the gut, but also, that this species of obstruction may take the form of an intussusception.

III. The need of the inclusion of sub-acute obstruction in our modern classification.

a Because the number of such cases may be estimated at 20 per cent. of all cases of obstruction--including 34 per cent. of all intussusceptions[2] and 50 per cent. of all obstructions due to bands.

b On account of the great variety of obstructions revealing sub-acute types. In intussusceptions, kinks, matting of intestines, paralysis of the intestine (reflex or direct), enterospasms. In strangulation by bands, slits in the mesentery, volvulus and internal herniæ. In obstruction by foreign bodies, compression from without, and finally, during the course of chronic obstructions.

c Because of the difficulty of the early diagnosis of a sub-acute obstruction and the danger of delay, *e.g.*, when a sub-acute may become acute, "when the transition (in cases due to bands) is often coincident with the administration of aperients."[2]

d Because the prognosis of the case is worse in this variety in certain types of obstruction, *e.g.*, in all obstructions due to bands there is a mortality of 53·7 per cent. of which a large proportion is due to the sub-acute class. The very mildness of the attack leading as Barnard says, "to procrastination from day to day . . before surgical aid is invoked."[1]

Most of the cases of sub-acute intussusceptions on the other hand recover.[2]

The lack of early distressing signs and symptoms; or the colicky pains, the accompanying constipation, the difficulty of the passage of flatus; possibly the usual occasional vomiting, the continued tenderness, should suggest the possibility of a sub-acute obstruction of which the prompt recognition would lead to a decreased mortality percentage in cases now classed as acute or chronic.

B.—The need of enlarging the Modern Classification of Chronic Obstruction.

The general classification by nearly all authorities of the chronic variety, includes, on the one hand, those which become acute, and on the other hand, those which lead to exhaustion and auto-intoxication or to an accident such as peritonitis and ultimately to death. It is indeed almost time that both these divisions were discarded, and included under the heading, "Those cases of chronic obstruction which lead to operation and recovery." In the existence of human infallibility, however, we retain the former grouping, but class them under Section I. of the following classification:

CHRONIC OBSTRUCTION.

CLASS I.—Tending to fatality.

a Terminating in complete occlusion.

b Termination in cachexia and exhaustion, peritonitis, etc.

c Those with an existing occlusion.

CLASS II.—With no tendency to a fatality.

In CLASS I, the existing sub-divisions of chronic obstruction are included; in the sub-division "a," however, we include those cases of chronic obstruction which may become sub-acute or acute, and the class of case with it's cause in the rectum or anus in which, though complete obstruction occurs, the symptoms are neither acute nor sub-acute. For example, a severe prolapsus recti in an old debilitated patient caused a *complete* occlusion incapable of relief; distension and exhaustion resulted in cardiac oppression and death. Or again, in chronic accumulation in the rectum the symp-

toms are often not of a sub-acute or acute character. In Gaza, Palestine, Dr. Stirling informs me that he has had many prickly pear stones' accumulations leading to complete obstruction in the rectum and marked abdominal distension, the patient is relieved under chloroform by means of irrigation and a spoon. The same surgeon reports a case of prolapsus ani in a boy. His friends burned the protruding mass, treatment which cured the condition but lead to a cicatrisation which caused absolute occlusion. On examination, the child was suffering from marked distension and absolute constipation, the rectum only admitted the tip of a probe.

In sub-division "c" one is reminded of congenital sub-divisions such as an imperforate anus or a congenital volvulus of the sigmoid.

CLASS II.—*Cases with no tendency to a fatal termination.*

This class, though largely recognised under various headings, has not been distinguished by inclusion amongst the divisions of obstruction.

Barnard's definition of obstruction says that "Intestinal obstruction is a condition in which the intestinal contents are *more or less* hindered in their passage along the bowel."[1] The class which we have at present under consideration is one in which the intestinal contents are "*less* hindered along the bowel."

The clinical evidences may be

1. Those of simple chronic constipation.
2. Those of mucous or membranous colitis.
3. Those of an alternating diarrhoea and constipation.

There may be in addition accompanying colic and flatulence, with or without dyspepsia, occasional vomiting and toxaemia, depending upon the site and degree of the lesion, In some cases no constipation may exist, for example when there is a stricture high up in the duodenum, the obstruction may then only be evidenced by acute, sometimes excruciating, pain shortly after food.

The causes of the condition are

1. Those which produce the other forms of obstruction only in a minor degree.

2. Certain secretive, absorptive, muscular, nervous, constitutional, dietary and other defects which in their essence create an obstruction to the normal flow of faeces. The discussion of this division alone would need a volume; and though they belong to the causes of this form of obstruction one can but mention their existence. Constipation is only a symptom, and to clear the mind of laity and our profession alike it would be wise to regard it as such.

The former group, which constitutes the coarser obstructive causes, we must treat, though briefly, yet so sufficiently as to establish their position and ensure their respect.

These coarser causes may be sub-divided.

1. Those which narrow the lumen.
2. Those which are due to a foreign body in the lumen.

1. *Those causes which narrow the lumen.*

A. Pressure from without.
B. Kinking.
C. Stricture.
D. An intussusception.
E. An irritated nervous system.

A.—PRESSURE FROM WITHOUT.

A prominent example of this is that of a lady whose chief symptoms were digestive associated with abdominal discomfort and constipation. She had suffered from the condition for some years, and on examining the abdomen a large cystic tumour was found. This, at the operation, was found to be in the mesentery of the jejeunum, and the comparatively slight symptoms of obstruction were due to an eminently important pathological condition.

Speaking generally, the coprostasis or obstruction of this nature is usually of secondary importance to etiological factor. Such is the case with pelvic abscesses, uterine fibroids, left broad ligament cysts, a retroverted uterus (particularly a gravid one), or an enlarged prostate. These causes, be it noted, are pelvic.

If Palestine I have observed, however, the part played by enlarged malarial (?) spleens and it is of great interest.

An enlarged spleen may occupy the epigastric region as well as the left hypochondrium. It may fill the whole of the umbilical area and left flank; it may be so large as to reach the right vertical line, but there is never any evidence of coprostasis, in spite of the anemia, until vertically, the level of the inter-tubercular plane is reached by the organ, and thereby pressure is brought to bear on the colon and the left iliac bone. I have collected some twenty of such cases.*

B.—KINKING OF THE INTESTINES.

Prior to entering upon this subject it would be well to state that the intestinal stasis due to adhesions, as described by Lane,[13] is a doubtful question. The adhesions, the author describes, as tying down the caecum, appendix and hepatic flexure; he observes that there is an hypertrophy and contraction of the pleuro-colic fold, and that other peritoneal bands may be present. It is highly to be questioned if such affect the normal flow of faecal matter; X-ray photography, post mortem and operative examinations do not support his conclusions.[14]

Kinking of the intestine however, is a very prominent factor in the form of obstruction we are considering,—bands passing over the intestine Lauder Brunton,[15] attributes as a cause,—and other writers have had experience of this condition. Moreover we meet a congenital variety due to an abnormally long pelvic colon creating a constipation which is recovered from at the fifth to the seventh years of life.[14]

Earlier observers have noted the fact that mucous or membranous colitis was associated with constipation, and much discussion has been held on the etiological factors of this disease. As a matter of fact the condition arises from some pathological state of the intestine, and in his able dissertation and investigation of the

* The war unfortunately deprived me of my notes on the number of cases, I believe it was twenty, in any case it was a sufficient quantity of examples to establish the conclusions I have above written.

subject, Mummery found, of eighty cases, thirty-four had an associated intestinal obstruction, and of these at least fourteen were due to kinking of the gut.*

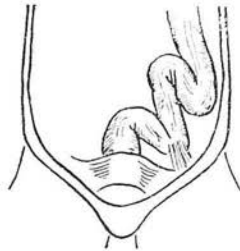
Adhesion and pericolitis, causing more or less kinking and obstruction	14
Enteroptosis of the colon	5
*Chronic appendix trouble	5
Previous operations involving the colon ...	2
Cancer	7
Fibrous stricture of the sigmoid	1

There were also two cases with an associated inflammation or displacement of the uterine appendages.[11]

We do not suggest that all such cases would not tend to a fatal issue, but a proportionate number would not.

Apart from conditions of mucous colitis, the same author was able to collect twenty-four cases of angulation or kinking of the colon, causing severe chronic constipation or complete obstruction, in which the condition was verified post mortem or at an operation. I enclose a diagram copied from his book of kinking and angulation of the pelvic colon. In two out of three of such cases the symptoms were those of severe pain and an intractable constipation.[11]

Diagram I.
Copied by kind permission from Mr. T. P. Lockhart Mummery's Book, "Diseases of the Colon," &c.



* The chronic appendix cases may not have been obstructive in nature.

A frequent etiological factor is the extensive adhesions from pelvic peritonitis, of which the following is an example :—

A Jewish woman, aged thirty-two, and hailing from the Caucasus, was sterile. Fearing divorce, on account of non-productiveness, she had submitted herself to vaginal examinations by various Eastern midwives. The ultimate result accruing, was, a chronic perimetritis and pelvic peritonitis, which, failing any history being given, was diagnosed as a pelvic tumour. On performing a laparotomy, a dense mass of intestines was found filling the whole pelvic cavity and incapable of any separation. The chief symptoms of the patient had been a dull ache in the pelvis and back, with occasional exacerbations and marked constipation and anæmia. Three years later, when about thirty-eight years of age, the same condition prevailed, and we re-admitted her with a view to further operative procedure. Unfortunately the outbreak of war caused a cessation of our work, and the patient was dismissed "in statu quo."

A striking case of a congenital angulation at the splenic flexure is contributed by Maylard.[16] A woman was brought to him ; she had suffered from a life-long constipation and had had at no time any marked "obstructive" symptoms. At the operation the great omentum was found adherent for four inches along the descending colon—thus the Transverse and Descending colon appeared to be bound together by a broad ligament causing the angulation mentioned. The band was divided and the patient made an uninterrupted recovery.

The question of angulation and kinking producing in enteroptosis, and its association with, the obstructive symptoms so frequently present, is still to many a moot and debatable point.

On the one side we get supporters of the proposition that this stasis is due to muscular atony, defective expulsive power, and to the venous stasis existing. Doubtless, these are important factors in the etiology of the constipation with or without the intestinal catarrh. Hertz's[11] objections to the obstructive element are not conclusive, and his specific evidence seems to rest largely on a case of gastroptosis and ptosis of the small intestines[11]—an entirely different matter to a general enteroptosis. Keith, on the other hand, has seen evidence of obstruction, at

post-mortem examinations, from kinking at the pyloroduodenal splenic and hepatic flexures. He also reports that in all cases of ptosis of the small intestine the duodenum is dilated and hypertrophied, owing to an obstruction of the third part of this section of intestine caused by the strain thrown upon the superior mesenteric artery.[17]

Maylard[16] establishes the fact that "sagging" of the colon *alone* is quite capable of creating a marked obstruction of the nature with which we are dealing. The case was that of a chronic constipation in a woman who had, at times, severe pains, especially localised to the right iliac fossa. Increasing difficulty of defaecation with the aid of aperients was being experienced, till ten months after the onset of the disease, she came into hospital for relief of the condition. On examination the cæcum was found distended, and at the operation the omentum and transverse colon were found in the pelvic cavity. The meso colon was therefore stitched, close to its attachment to the bowel, to the abdominal parietes one and a half inches above the umbilicus. Three months after this the patient was greatly improved constitutionally, and the old iliac pain due to the distended cæcum had ceased to trouble her.

We may here note that Mummery's investigation shows that five cases of mucous colitis had an associated enteroptosis.

In Palestine we have a large number of these general enteroptoses occurring in Jewish women between forty-five and seventy years of age. They are, in all cases, due to repeated labours, lack of post-partem rest, and the disregard of all abdominal support. These factors and the accompanying sedentary existence attribute to the cause.

Finally, in connection with the pelvic colon and rectum we would remark on two conditions, the one of chronic volvulus of the sigmoid, the other of the kinking produced by the habit of neglect of attention to regular defaecation, in which the pelvic colon becomes loaded with faeces which lose much of their moisture, increase in weight, produce some sagging of the colon and some thickening and adhesions of its walls, leading to adhesion with the rectum, and thus forming such an acute and immobile angle with

the latter that a permanent constipation inevitably results.[14] The former condition, that of chronic volvulus, is dwelt upon by Mummery, who reports a patient who was only able to relieve his bowels by large enemata.[11] A meso-pexy bracing upon the elongated mesentery cured the condition.

C.—STRICTURE OF THE INTESTINES.

With regard to the cases of chronic obstruction due to an organic stricture, generally, we may say, these are due to causes which have a tendency to a fatal issue. Had, however, the present class of case we are dealing with been more generally recognised, there would have been an earlier diagnosis of carcinomatous and allied conditions. Mummery[11] has suggested this by his findings in cases of mucous colitis which were in seven cases due to carcinoma, once to a fibrous stricture of the sigmoid, and were twice associated with previous operations on the colon.

Perret* reported fifty-eight cases of rectal stricture of which thirty-two were three inches from the anal orifice.

Examples of dysentric stricture are exceedingly rare, even in a manifestly dysenteric region such as Palestine. I have seen several hundreds of cases of dysentery, but in only two examples have I met with a resulting obstruction. The one was of the milder type we are at present discussing, and was associated with flatulence, the other developed a sub-acute obstruction, and, in large measure owing to procrastination, surgical interference was invoked too late for recovery.

As an example of an organic stricture with no tendency to a fatal issue and due to adhesions I would quote the following:—
A man of sixty-two summers came to the English Mission Hospital, Jerusalem, complaining of flatulence and constipation of two years' standing. On examining the abdomen an intra-peritoneal, small, irregular mass was found lying midway between McBurney's point and the right inferior anterior iliac spine. At the subsequent operation the condition proved to be a large thickened appendix coiling firmly around the outer and anterior surfaces of the lower part of the cæcum, and was fixed to

* Quoted by Edwards. Diseases of Rectum and Anus, 1908.

this latter by firm adhesions. The patient's symptoms disappeared with removal of the offending member and the adhesions. Constipation and flatulence were, however, again returning when I saw the patient during the summer of 1914, one year after the operation. In all probability fresh adhesions are reforming and again retarding the flow of fæcal matter—lateral anastomosis would doubtless give permanent satisfaction.

Multiple adenomata are frequently due to some irritating agent in the intestine, such as ascaris lumbricoides, bilharzia hæmatobium, old stricture and hyperplastic tuberculosis of the intestine. Whether primary or secondary, due to encroachment upon the bowel lumen, obstructive constipation occurs sooner or later. In bilharzia hæmatobium habitation, of which we have itinerant cases (from Egypt, Arabia, &c.), I have never found this adenomatous condition by rectal examination, and the only case in which abundant multiple adenomata were present high up in the rectum and associated with constipation, the patient did not report himself again for observation. An important reason for their diagnosis is the great tendency to malignancy.

The early symptoms of hyperplastic tuberculosis of the colon are those of this mild obstruction with an accompanying tumour frequently difficult to diagnose without microscopic examination.

D.—CHRONIC INTUSSUSCEPTION.

The existence of a chronic intussusception without a tendency to a complete occlusion is supported by Barnard,[1] Reed,[8] Cripps*, Hertz[11] and others. Gant † has performed sigmoidopexies in no less than fifty cases with a satisfactory relief, in fifteen of them, of the obstructive symptoms of constipation, sometimes associated with diarrhœa.

A rectocele is also a form of chronic intussusception which may result in obstructive constipation.

The following is a rare example of the type we are considering :

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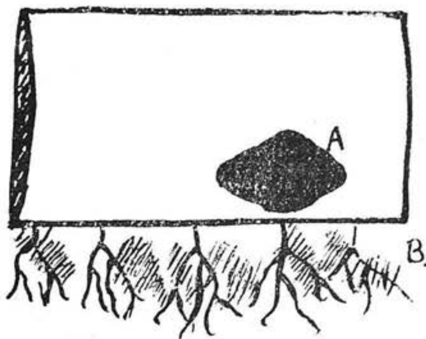
* Quoted by Hertz to consider the condition as a prolapse of the mucous membrane of the rectum.

† Quoted by same author—constipation with intussusception of all coats of the rectum not uncommon.

A young man entering my consulting room had the history of chronic periodic right iliac pain, together with constipation and and tenesmus. On abdominal examination a small irregular tumour was located in the right iliac fossa and the temporary diagnosis was that of chronic appendicular tumour. The patient was advised to be under observation and to consider the possibility of a future operation. He, with the customary Jewish temperament, shunned active surgical intervention, and delayed his second visit three months, when he returned limping for advice and with the same history. His trunk was flexed and turned towards his right side as he walked. Once again the tumour was noted of the same size, lying one inch below and external to McBurney's point. At an examination twelve hours later, the tumour had shifted its position to one inch to the right of the umbilicus.

The following day an incision was made, but the tumour, which had been the size of a very small apple, had disappeared, and in its place lay a stretch of many inches of cyanosed gut, within the lumen of which *a round worm was curled in two coils and lying in the long axis of the ileum.*

Nor was this all, for near the mesenteric margin on one side was found an irregular whitish yellow fibrous patch (see Diagram II.), which was about one inch in length and three-quarters of an Inch in breadth.



A. Fibrous Patch.
B. Mesentery.

In my opinion this patch had been the apex of a chronic lateral intussusception formed through the coiled-up ring of the parasite.

It would be interesting to know how far the mild dysenteries, occurring in certain cases of nematode habitation and cured by

their expulsion, may or may not be due, originally, to slight intussusceptions.

E.—CASES DUE TO AN IRRITATED NERVOUS SYSTEM.

These may be due to a general or local derangement : shock may cause marked inhibition of normal peristalsis ; rough handling of the intestines during operations, painful ovaries, hard fæces, painful piles, and anal fissures are all types producing reflex paresis or spasm.

Enterospasm is probably always due to some irritation of the mucous membrane ; it causes a spastic periodic constipation,[11] relieved temporarily by anti-spasmodics, and in some cases cured by the exhibition of these drugs. Occasionally a laparotomy is performed[11] only to find that the disappearing tumour was due to an enterospasm.

II. Those cases of this mild obstruction due to a foreign body in the lumen of the gut.

It is well known that faecal concretion can establish this condition, but I am particularly desirous of mentioning certain observations upon intestinal parasites and especially the nematodes with which we have so largely dealt in this thesis.

All writers are agreed as to the constipation and occasionally diarrhœa associated with infection by these parasites, the present writer had a chronic diarrhœa during three months of a summer, the cause of which was later discovered to be a taenia saginata. In Moslem and Jewish patients we never meet with the taenia solium, and the wilderness of Judaea is free from fish, thus the bothricephalus latus is unheard of. Unfortunately the war prevented me continuing a systematic investigation of fæces which I had commenced with a view to ascertaining the association of worms and abdominal conditions.

There are, however, a number of cases, suffering from chronic constipation and various nervous phenomena, which are cured by a vermifuge. Whether the mild obstruction and the colic is due to a slight intussusception it is impossible at present to say, though in certain cases tenesmus and the passage of blood and mucus exist. In the case of the tapeworm the condition is probably an obturation.

In one particular instance a girl of twelve had to be admitted into hospital on account of a severe persisting constipation. No possible cause could be discovered till the expulsion of a tænia mediocanellata cured her.

Another case of obstruction produced by round worms was that of a woman aged about thirty. She had had violent pain in the appendicular region; in her agony the patient threw herself upon the ground as though suffering from right ureteral colic. She suffered from constipation and tenderness in the right iliac fossa and lower right umbilical area. The patient was admitted under the care of Dr. F. W. Milne. The following day she developed a leucorrhoeal discharge, and the second day an hæmorrhagic one The surgeon found no explanation of the abdominal pain, which, with the constipation, continued. A week after the onset of the symptoms, which had somewhat abated, I assisted the operator at a probable amputation of the appendix; he removed a broad ligament hæmatocele of the left side, and the cause of the supposed "chronic appendix" trouble was found in two lumbricoids occupying the ileum and producing a violent spasm of the muscular layers of intestine which gripped the foreign bodies tightly—in fact an enterospasm existed.

Thus we have followed the history of the classification of intestinal obstruction; we have brought a mass of evidence that its present classification is inexact, misleading, and incomplete; we have further proved, without any possibility of question, that the attack on worms as a possible factor in the etiology of intestinal obstruction has been exaggerated and is erroneous.

We append our full classification of intestinal obstruction, within the which we can anticipate the inclusion of every form of obstruction, without the attainment of which ideal any classification is false and incomplete.

The Classification of Intestinal Obstruction.

A—Acute.

B—Sub-acute.

C—Chronic.

1. Tending to a fatal issue:—
   - (*a*) Those leading to complete occlusion.
   - (*b*) Those leading to exhaustion and cachexia or to an accident such as a perforation.
   - (*c*) Those with an existing occlusion.
2. Not tending to a fatal issue.

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