characters is the best example of this. Of all the forms of acute intestinal obstruction acute intussusception affords the most striking instance of the influence of early operation in diminishing the mortality. The history, the symptoms and signs, and the presence of a tumour which can almost always be found if it be sought for under an anaesthetic, form a very definite clinical picture. Sir William Taylor of Dublin, and Sir Charles Clubbe of Sydney, have long preached the gospel of early operation in acute intussusception, and their pleadings have brought their reward. In one series of a hundred cases operated on by Sir Charles Clubbe the mortality was 3.5 per cent., and in a series of Sir William Taylor's the death rate was less than 4 per cent.

OBSTRUCTION BY GALL-STONES

In rare instances a gall-stone in the small intestine has been felt, but so rarely that help in this respect cannot be looked for. Most assistance is derived from a history of symptoms pointing to disease of the gall-bladder. Consideration of these, and of the clinical features of the case, have enabled me in the last thirteen years to diagnose, with rare good fortune, gall-stone obstruction in three cases of acute stoppage of the bowels. The stones were removed successfully in each case through a muscle-splitting incision in the right iliac region. In a fourth case, seen in consultation, I was able to make a correct diagnosis, and the stone was successfully removed by another surgeon. The operation in one of my cases was performed on the fifth day. I am able to show you the stone I removed. The patient was fortunate to survive, as the records show that when operation is postponed beyond the fourth day the patient almost invariably dies. So far as I can recall I have never been asked to see a case of gall-stone obstruction before the third day. It should be possible to make a correct diagnosis on the second day. A carefully taken history should direct attention to the gall-bladder as the possible origin of the trouble. Indeed, in most of these cases the first diagnosis has been one of gall-stone colic, and morphine has been given. This, however, only gives temporary relief. The acute pain, the frequent and copious vomiting of dark material, and complete or almost complete constipation persist. The acuteness of these symptoms, associated with a relatively mild degree of tenderness and rigidity in the right upper quadrant of the abdomen, and the absence of the referred pain and cutaneous hyperaesthesia associated with gall-stones, should afford grounds for a presumptive diagnosis of gall-stone obstruction. It is possible that the large size of the stone may enable it to be detected by radiography. I am not aware that a diagnosis has been successfully made in this way. The slides before you have been made from radiographs of large gall-stones placed on the anterior abdominal wall of obese women. It may interest you to know that shortly before I left Australia a colleague of mine on the staff of the Adelaide Hospital successfully removed a large gall-stone which was obstructing the intestine of a full-blooded male Australian native.

SURGICAL RELIEF OF INTESTINAL PARALYSIS

With regard to late cases of intestinal obstruction in which the mechanical obstacle has been dealt with, the important question arises whether the intestinal paralysis and toxæmia should be relieved by a high enterostomy or by a lateral anastomosis. A high enterostomy (jejunostomy), the rubber tube being brought through the omentum, appears to me to achieve all that is necessary with the least possible strain on the patient, and to permit of the restoration of the intestine later on to its *status quo ante*.

ACUTE INTESTINAL OBSTRUCTION *

BY

SIR W. I. DE COURCY WHEELER

DUBLIN

I will confine my remarks to early post-operative obstruction of the small intestine and to acute obstruction of the large bowel, the result of new growth. The early recognition of post-operative obstruction arising after an interval of weeks or months is helped by the history. If the patient is within reach of a surgical centre, operation is seldom unduly delayed. Obstruction arising a few days following a simple abdominal operation is another matter. In this case we must consider whether the symptoms are due to so-called ileus or to filmy adhesions between loops of small intestine. Both conditions are often found.

The trouble commences to manifest itself after the first aperient; in a few hours the patient becomes restless and uncomfortable, and may vomit. An enema is given, and is reinforced by an injection of pituitary extract, with no result. The failure of response to aperients and enemata aggravates vomiting and increases abdominal distension and general distress. A second enema is given, but there is no peristaltic response.

Few will recommend reopening the abdomen within the first twelve hours unless the condition at the time of the recent operation was such as to suggest the likelihood of mechanical post-operative obstruction. The next twelve hours is marked by therapeutic inactivity. Vomiting prevents the patient taking anything by the mouth, and previous stimulating enemata have made the rectum intolerant. The patient should be given rest. Beneficent quietude is promoted by aspiration of the stomach through a Jutte tube, which may be left *in situ*; no liquid paraffin or other aperient should be introduced. If the pulse rate has not gone up, and if the tongue remains moist and the material aspirated from the stomach is still bile and mucus, there is a likelihood that an enema at the end of twenty-four hours will be followed by the passage of flatus and intestinal contents. It is taken for granted that during the period of anxiety—that is, from the time of the failure of the first aperient and enemata—fluids are generously administered. Normal saline is introduced by the drip method into one axilla from a flask above the head of the bed. It is absorbed as rapidly as it is introduced. Intravenous injections of 10 per cent. glucose solutions are given slowly every four hours. When the introduction of the needle is found difficult owing to badly defined veins, it is better to introduce a cannula and allow the solution to drip by the continuous method into the selected vein. Continuous intravenous medication is an immense advantage in selected cases.

But if, after the second twelve hours, an enema of turpentine, ammonia, or ox bile is ineffectual, immediate operation must be considered. While preparations are being made one or more intravenous injections of hypertonic salt solution are given slowly; 500 c.cm. of a 6 per cent. solution is an average quantity and strength, although the strength may be increased to 20 per cent. The replacement of the depleted chlorides in the blood sometimes has a dramatic effect in producing intestinal peristalsis and in combating the toxæmia associated with alkalosis. A copious bowel action may take place during the injection when there is no insuperable barrier to the intestinal onflow.

* Contribution to a discussion in the Section of Surgery at the Centenary Meeting of the British Medical Association, London, 1932.

In a case reported by Gosset, an infant of 4 months was operated upon for acute intussusception, and life was saved by the post-operative administration on two or three occasions of 50 c.cm. of a 20 per cent. salt solution given by the rectum. Gosset mentions two series of cases of acute intestinal obstruction. In the first the mortality was 50 per cent., but in the second it was only 11.1 per cent. The striking improvement in the second series is attributed by Gosset to the intravenous injection of hypertonic salt solution. If the slow injection of hypertonic salt solution produces colicky pains without bowel action a definite obstruction may be anticipated. While obstruction remains, the more fluids introduced the more active will the stomach become as an excretory organ. This is one of the minor disadvantages of the administration of copious amounts of glucose and other solutions. It necessitates more frequent aspirations through the Jutte tube. The other drawback is the frequent occurrence of rigors however carefully and slowly the solutions are given at intervals by the intravenous route. When introduced through a cannula by the drip method, however, these reactions do not occur. Anti-gas-gangrene serum is often given in these cases, but I have not seen any very convincing results.

The *Bacillus welchii* is a normal inhabitant of the intestinal tract. The bacteriological report of an appendix recently removed (during the course of a gall-bladder operation) states that the appendix appeared normal to the naked eye, and on microscopical examination showed an unusual excess of anaerobic flora. There were no signs of inflammation, no streptococci, and no trace of non-lactose-fermenting bacilli. Experimentally, the gas gangrene bacillus has been found in the normal jejunum in 17 per cent. of the animals investigated, but when obstruction exists the bacilli are found in great profusion—94 per cent. The organism apparently multiplies rapidly in the presence of obstruction, but there is no proof that the *Bacillus welchii* toxin is the lethal agent in intestinal obstruction.

When aperients and enemata, followed by rest and intravenous injections of hypertonic salt, all fail to produce the desired result, a spinal anaesthetic is given on the operating table. Spinal anaesthesia gives rise to considerable and almost immediate increase of intestinal peristalsis, even when the peritoneum is intensely inflamed. This procedure may occasionally be followed by an evacuation of the bowels on the table. If there is no action, the abdomen is opened with the certainty that definite obstruction will be found. Any operative procedure can be carried out with complete relaxation of the abdominal wall and no danger of aspiration pneumonia. Whether search for the site of the obstruction is to be made, or whether a blind high or low enterostomy is to be performed, depends upon the circumstances in each individual case. The Jutte tube acts in much the same way as a high jejunostomy. The tube for intestinal drainage may therefore with advantage be placed in a distended loop of intestine through an incision low down on the left-hand side of the abdomen.

Post-operative obstruction can be anticipated and prevented to some extent by gentle manipulation and well-planned operations. I think the elimination of the danger of post-operative obstruction is the most weighty argument in favour of the Ochsner-Sherren treatment of cases of acute appendicitis seen on the third day. Simple drainage of a well-walled-off appendix abscess is seldom followed by obstruction, and there is little or no risk of this complication following the removal of the appendix two months later. On the other hand, the majority of cases of post-operative obstruction follow early but delayed operations for the removal of an infected appendix.

Rough handling of the small intestine in attempts to reach a quiescent appendix through a high abdominal incision for gastro-enterostomy or cholecystectomy may lead to post-operative obstruction. For this and other reasons I have been converted to the Kocher plan of approach in operations on the gall-bladder and bile ducts. The appendix is removed through a second small far-out vertical incision planned as far as possible to lie directly over the caecum; the coils of small intestine are neither handled nor seen. Transverse incisions for gastric work have a similar advantage.

C. H. Mayo states that the stomach tube is the most valuable test we have for the purpose of determining the condition of the stomach and the nature of the gastric contents; it must be used repeatedly to prevent dilatation. He would prefer to see a stomach tube rather than a stethoscope hanging round the neck of his surgical intern. In a paper written ten years ago he preached the now well-known fact that if the abdomen is opened within twenty-four to thirty-six hours after the symptoms begin the filmy adhesions causing kinks and twists can be separated with little difficulty and with immediate benefit. Hypertonic chlorides and spinal anaesthesia may do likewise in these early cases of post-operative obstruction.

I recently had a case of high obstruction with tetany. It is necessary in such cases either to drain the duodenum by a tube passed through the pylorus or to perform a duodeno-jejunostomy.

Acute intestinal obstruction from colonic cancer is common. Prevention lies in early diagnosis, but the question of early diagnosis is outside the scope of this discussion. I should, however, like to emphasize that late diagnosis may be attributed *inter alia* to the fact that early symptoms often point to an upper and not a lower abdominal lesion. W. J. Mayo says that man has little consciousness of what is going on in the small intestine and right half of the colon, whereas he is more or less conscious of the action of the sigmoid.

Peristalsis is induced normally in the colon by certain foods and other factors—for example, the colon is coaxed to empty itself after breakfast by marmalade and a cigarette. Such stimuli in the presence of an early growth of the colon produce reflex spasm of the pylorus and a colonic peristalsis which is uncomfortable or painful and may lead to vomiting. The patient feels the distress above the umbilicus, and attributes it to the food he has just ingested. I have two cases in Mercer's Hospital at present illustrating these points. The one underwent a thorough clinical and x-ray investigation in another hospital for gastric symptoms. No lesion was found. He was admitted three months later to Mercer's with acute intestinal obstruction from carcinoma of the pelvic colon. The colon was resected after preliminary caecostomy by a modified Mikulicz operation two and a half years ago. He was readmitted last month for ventral hernia. But for some adhesions to the abdominal wall the site of resection could not be located—it was as if an end-to-end junction had been made. In the second case I explored the upper abdomen for persistent symptoms suggestive of duodenal ulcer; the x-ray evidence and other examinations were inconclusive. At the operation nothing was found. A few months later the patient was readmitted for acute intestinal obstruction from a growth of the pelvic colon; it was fixed and inoperable. In considering the treatment of such cases, it should be borne in mind that acute intestinal obstruction from colonic cancer does not necessarily indicate an extension of the cancer beyond the reach of radical operation. In many cases the growth is still local and the ultimate prognosis after a two- or three-stage operation is on the whole good.