As you will have seen, we try to work on simple and economical lines. The apparatus is comparatively cheap, straightforward, does not require difficult measurements or repeated fittings, and lasts for a long time, as there are no fragile or complicated joints. The appliances enable the children to walk, and at the same time carry out the twin principles of posturization and avoidance of overstrain.

I feel that methods such as these go far towards realizing our dual aims of economy and efficacy, but doubtless there are many ways in which our methods could be improved, and I hope that the subject will be widely discussed, because I feel that its importance is great and that full knowledge of the most practical methods should be widely disseminated.

REFERENCE.

¹After-Care of Poliomyelitis in New York State. New York State Department of Health.

ACUTE INTESTINAL OBSTRUCTION.

BY

SIR JOHN O'CONOR, K.B.E., M.A., M.D.,

SENIOR MEDICAL OFFICER, BRITISH HOSPITAL, BUENOS AIRES.

THIS essay has been written with the intention of inviting surgeons to take stock of present methods of dealing with the most grave acute problem in general surgery, and if any of the suggestions herein contained should prove of value in helping to diminish the incidence of acute obstruction of the bowels or in enhancing the chances of surgical relief the time and thought devoted to its composition will be more than recompensed.

Adopting the motto, "Avoid the abstract and stick to the practical," I commence by putting the question: What is to be done in case of acute obstruction when a portion of the gut is found gangrenous? Before responding, one has to bear in mind that, from the moment the circulation of the bowel becomes impeded, splanchnic shock and systemic poisoning begin, and both intensify in compound ratio to the hours which pass until the obstruction is relieved. General symptoms often prove delusive guides as to the existence of this lethal combination, which seems temporarily to possess an insidious potentiality only requiring some slight surgical stimulation to unveil its effect with appalling rapidity. Whenever gangrene of intestine is met with, not only is it proof positive that the case has, for one cause or another, been sadly neglected, but there exist initial factors, poison and shock, which seriously handicap any attempt at human succour. While primary knowledge of these unpropitious facts may tend in a way to alleviate the sense of dire responsibility which everyone feels when he finds himself confronted with this tragic affection, yet it in no way defects from the duty to spurn finesse and, even at the risk of the "dead stymie," ileus complete, to give every patient not absolutely moribund a surgical chance. Conscientious work accomplished in the shortest time¹ is the one thing most likely to snatch a victory, the masterstroke being elimination of the morbid trio—eventration, undue manipulation, and prolonged anaesthesia.

With this preface I will endeavour to give a reply to the above question: Concentrate attention on the extent of the gangrene, carefully scrutinize the condition of the mesenteric zone, confine the attack to what is essential, and, as every moment counts, "force the game."

I do not hesitate to state that, next to having details of likely operations in clear mental perspective, there is nothing more conducive to operative celerity than, while the patient is being prepared (always including gastric lavage), personally to superintend the selection of instruments and drains, the threading of an adequate assortment of needles, the provision of an ample (counted) supply of sponges, towels, and some rubber tissue. A few sterilized kidney basins must not be omitted, and the apparatus must be ready for any washing or injection which may be required, the operating table warmed up, and last, and indeed not least, the help of two smart assistants must be secured.

There is also a contingency which may seriously interfere with expeditious surgery in acute intestinal obstruction. Assuming previous examination fails to give an indication, a very perplexing question arises at the start—where to make the incision so as to get directly at the seat of mischief. I cannot conceive anything more demoralizing to a surgeon than, when entering the abdomen on a forlorn mission, to

find his energy and time sapped, at the outset, in struggling to restrain inflated intestine from bursting out through the parietal wound. If the site of lesion is not evident—and, as frequently happens, the distension is so great and the serous coat of bowels so friable that it is impossible to pass the gut methodically through the fingers in search for the constriction without causing numerous peritoneal lacerations—his position is truly pathetic, between the Scylla of traumatism *plus* exposure and the Charybdis of retreating without having reached the objective.

These remarks are not penned on hearsay but on dire personal experience, which incited me to publish a note in the BRITISH MEDICAL JOURNAL, November 23rd, 1918 (p. 573), on the necessity of instituting careful inquiry in every case of intestinal obstruction as to a previous attack of appendicitis, or to an abdominal operation in which the appendix might have been removed for convenience; and I urged that regardless of the time which may have elapsed (detailed revision of the patient failing to point a path) a three-inch incision should be made in the right semilunar line low enough to expose the ileo-caecal region and right pelvis where the distal ileum will usually be found implicated in adhesions. While my experience may be exceptional, it suggests the personal conclusion that, excluding the era of iodine skin disinfection and those which can be located before operation, in the majority of cases the obstruction of the small intestine will be encountered adjacent to the right pelvic brim, and that the stereotyped central incision in such instances courts disaster, as in the search for the lesion the distended semi-paralysed intestines are subjected to needless exposure and manipulation.

It is not pertinent to the context to analyse the psychology which inspires postponement of operation² in acute appendicitis until what is academically styled "the cold stage" supervenes further than to interpolate that patients so treated who escape immediate translation to the glacial state remain endowed with a nest of adhesions³ which renders them likely candidates for premature mortification by the peristaltic contortions of their own small gut. And I must add that I am unable to comprehend the mentation which complacently admits of "We'll wait until to-morrow to decide" in a case of suspected acute intestinal obstruction.

Acute Obstruction of Small Intestine.

In a number of instances in which stoppage is suddenly caused by a band or kink only a narrow ring or small knuckle of bowel is found gangrenous, and in quite a proportion of these necrosis does not extend to the fixed portion of the gut, much less to the mesentery; the fact of the circulation in the heart of the intestine remaining intact induces a hope that there might be prompt restoration of peristalsis in the tube if inclusion or excision of the moribund area could be effected without entailing subsequent obstruction by diaphragm or angulation. Acting on this hypothesis, I venture to submit a classification from the operative angle, and I trust the suggestion will be viewed merely as a humble attempt to find some means of reducing the terrible mortality—40 per cent.—which attends surgical intervention as expressed in mediate or immediate enterectomy.

A.

In cases in which one finds that a complete circle of the bowel is beyond redemption I recommend that lateral anastomosis and excision of the gangrenous gut be carried out in the following order of detail:

1. The affected zone of intestine is drawn out through the external wound, extruding a sufficiency, above and below, so as to facilitate the performance of lateral anastomosis at a convenient distance from the lesion.

2. The protruded bowel is fixed *in situ* by sponges, which are meticulously packed into the wound so as to preclude any possible regurgitation into the peritoneal cavity during subsequent manoeuvres.

3. Coils of proximal and distal healthy bowel are approximated and held in apposition by an assistant while four Triollet catgut Lembert sutures, half an inch apart, baste the apposed loops together; each stay is tied when inserted and its free ends caught in a pressure forceps.

4. An opening, by sharp scalpel, two inches in length, is then made, close to and parallel with the line of stays, into the distal gut—as no clamps are employed a kidney basin is made to catch whatever escapes—and then a pressure forceps is applied about the centre of the free edge of the incision to act subsequently as a tractor. With a large kidney basin in position a corresponding incision is at once made into the proximal bowel, free vent is afforded for escape of contents (the more the better omen), and the centre of the free edge of this wound is similarly seized with a forceps.

5. Two assistants then make gentle opposing traction on adjoining stays, while a continuous through-and-through Triollet catgut suture (tautly secured to each stay in transit) seals the posterior segment; the ends of the "central" stays are then cut short. The forceps previously attached to the free edges of wounds are now grasped by an assistant so as to indicate a strategic site for the insertion of two anterior "central" stays; the continuous catgut through-and-through suture is then carried on (as it approaches each stay the latter is tied and continuous suture knotted to it) until closure of the anterior segment is completed; the ends of stays are then snipped away and the whole field is washed with warm peroxide lotion, dried with bibules, and the anastomosed part is enveloped in a dry towel.

6. The gangrenous portion is then taken in hand; a catgut ligature is applied at least two inches respectively above and below the proximal and distal suspect limits, the intervening necrosed intestine is excised, and any bleeding point in the mesentery is immediately dealt with. A purse-string catgut Lembert suture is next inserted around the base of each intestinal stump; with a few snips of a scissors each stump is then freed from its mesentery just enough to render it easy for an assistant to invert it, with a dissecting forceps, into its corresponding lumen as the purse-string is being tied.

7. A jug of warm peroxide lotion (1 in 35) is again requisitioned; a general wash and brush up follows; everything is thoroughly dried, and the bowel returned. Four or five through-and-through strong silk sutures close the parietal wound, leaving room at one angle for passage of two thick silkworm-gut wisps, which are so placed as not to adhere to any line of intestinal suture.

B.

In some cases an incomplete narrow ring of gangrene results from constriction by a band, which in width more or less corresponds to that of the band itself; if this does not exceed 1 cm. and the mesenteric zone is healthy, the affected coil is drawn out through the wound and secured in place as before mentioned. Four equidistant long catgut Lembert stay sutures are then passed—skipping over the dead zone—through living proximal and distal gut; these sutures are not for the moment tied—their ends are respectively caught in forceps, and the assistants with blunt hooks retract the loops of these stays well out of the way, while a kidney basin is placed in position and a transverse incision made through the whole extent of the gangrenous area (*N.B.*—This incision is only made in cases where, after removal of the "external" obstruction, there is no consequent visible inflation of the distal bowel); thus free escape for contents is provided. When the flow ceases the hooks are removed from loops, the forceps grasped, and upper and lower intestine approximated. The stays are then tied and a forceps applied to each pair of free ends with which the assistants make opposing traction, while a continuous catgut Lembert suture, braced to each stay as it passes, completes the matter; the ends of stays being clipped away, the toilet, etc., is effected as in A.

C.

The most difficult case for decision is the one in which a band, kink, or twist has caused more extensive necrosis, the fixed portion of gut remaining suspect, and the mesentery apparently uninvolved. The problem then arises, can infolding or excision of gangrenous section be accomplished without leaving an obstructive diaphragm or angulation? In order to clear the perspective I wish here to mention that I cannot as yet recommend the adoption of either if the belt of gangrene exceeds a width of one inch; anything above that commands the major procedure A, but within this limit the complications mentioned can be obviated.

Three long catgut Lembert stays are inserted, as above, into the proximal and distal bowel, one along the free border and one on each side midway between this anterior stay and the mesenteric attachment. Blunt hooks are then made to pick up the loops and retain them clear of the field while a free crucial incision is made through the moribund segment. When the intestinal discharge has ceased, the loops of stays being still held aside, the four gangrenous flaps (made by crucial incision) are liberally excised with scissors. The stays are then drawn taut so as to facilitate inspection of the amount of angulation produced by approximation of the proximal and distal gut. Two similar lateral stays are next inserted close to the mesenteric line, embracing as much or as little of the peritoneal coat, above and below, as may be judged necessary to correct any likely kinking by the anterior sutures. The five stays are then tied and a continuous catgut Lembert suture applied as in B.

The part stays take in the above procedures possibly warrants a little amplification. From beginning to end they make for rapidity and good workmanship, in that they point the line for the continuous suture, help to secure its tension, and in themselves form a strong second line of defence. They

are infinitely preferable to clamps, as they do not cause any devitalization of tissue, which, by the way, in acute intestinal obstruction is already sorely attenuated by distension and toxic infiltration. They possess a sound surgical attribute—namely, they admit of the operator seeing a bleeding vessel and tying it. They serve as excellent pliable tractors by which the operator can dominate at will the slippery-sloppy ground on which he has got to work, and consequently are the best insurance against an attack of "the tail wagging the dog" at a moment when one carries a heavy time handicap in a race for life in the most fatal of acute surgical affections.

Acute Colic Obstruction.

In this catastrophe, if the problem as to the seat of lesion is not solved before operation, it may be taken for granted that what was mentioned as a contingent complication in acute intestinal obstruction is a certain one in advanced colic obstruction, and, owing to the enormous distension associated with the latter, surgical intervention as often as not ends in a tragedy. After a certain amount of prolonged pressure and manipulation necessary to retain intestinal balloons inside the abdomen, a rather sudden and unexpected relaxation of tension occurs, which is apt to lure one on to proceed instead of beating a rapid retreat, but which in reality is the culminating exposition of intestinal paralysis induced by the superaddition of traumatic to pre-existing splanchnic shock. The curtain then drops as the anaesthetist whispers the epilogue—myocardial liquidation has begun.

Under such circumstances it is natural that one should seek for some mode of escape before the advent of the fatal loss of spring, and I cannot see anything promising on the horizon except, in all cases in which thorough examination and careful study of the history fail to give a clue to the whereabouts of the obstruction, to make a right semilunar incision, explore gently for a few minutes, and if there is no result proceed at once with the preliminary step of closing the wound by inserting four or five long through-and-through strong silk sutures, and without knotting catch the ends of each in a pressure forceps. Then coax the left hand, supinated and extended, between the parietal peritoneum and the bowels over to the right iliac fossa, where two fingers flexed forward point the site for an incision large enough to allow the external inferior sacculum of the caecum to be drawn outside and maintained there momentarily by forceps. The semilunar wound is then rapidly closed, and a dressing applied, covered by rubber tissue and a towel, and immobilized by fixation forceps.

Attention is then turned to suturing the exposed caecal sac to the margin of the iliac wound in such a manner as to preclude any subsequent backward percolation. The patient is then gently rolled over on his right side to the edge of the table, a basin is placed in position, and a stab made into the gut sufficiently large to give free vent to its contents. I have had gratifying results with this method, and whenever feasible I like to employ the external inferior sacculum for drainage; as its site is strategic, it seems anatomically adapted for the purpose, it occasionally closes spontaneously after the obstruction disappears, and it can be closed by operation without encroaching unduly on the lumen of the caecum.

The early insertion of the through-and-through silk closure sutures may require some explanation. These sutures, in place, help to prevent a rush from within, as the wound can be promptly occluded by traction on the forceps and thus diminish pernicious handling of bowels. They afford good support for any temporary packing, and their presence tends to obviate separation of layers of parietal wall during operation. Owing to internal pressure their introduction may be an arduous business, which, to save valuable time, had better be effected before the fatigue stage supervenes; and the fact of their being in affords a comfortable homeward-bound feeling, which on occasion is not to be despised. If long threads of silk are used the loops can be readily hooked away from the field so as not to cause any operative inconvenience.

It may have been observed that I advocate an incision in the right semilunar line for both acute colic and acute "intestinal" (unplaced) obstruction, the reason for doing so being that 70 per cent. of acute abdominal lesions are credited to appendicitis. If to this be added the incidence of pyloric, duodenal, and biliary affections, the ratio of involvement of the right as compared with the left abdomen must certainly stand not less than 6 to 1; and knowing that the most frequent cause of obstruction is the legacy peritoneal agglutination following infective processes and operations for their relief, the deduction is, to say the least, logical

that, given no direct guide, the chances are greatly in favour of finding the lesion in the right abdomen. And as to the systematic search for obstruction by passing the gut through one's fingers, my experience dictates that this can be (when serous coat permits) as effectively done through a right semilunar as through any other incision. As to making a separate suitable opening in the right iliac fossa for caecal drainage, I am all in favour of it, for it appreciably diminishes the risk of subsequent virulent infection and its consequences in the large primary wound.

Peritoneal Seclusion of Stumps.

In 1903 I received my first object-lesson as to the danger of leaving raw endothelial stumps in the peritoneal cavity, in the case of a young lady on whom I performed double oöphorectomy for cystic disease, and as the appendix was very much in evidence I thought it expedient to remove it. This was done by a method in vogue at that period—namely, ligation and touching the stump with a disinfectant. As there were no adhesions, the whole operation was simplicity itself. Ten days later she suddenly developed acute intestinal obstruction; the wound, under anaesthesia, was opened up, and to my intense disgust I found the stump of the appendix glued to that of the right ovary with a coil of congested ileum clutched in the adhesion. An uneventful convalescence ensued. Since then appendical stumps have, when possible, been buried in the caecal wall or covered with an omental plaster.

The most recent reminder occurred in a married lady on whom I performed right oöphorectomy in October, 1920. As customary, the appendix, for "insurance" reasons, was also removed, and the stump interred. On June 3rd, 1921, she was suddenly seized with violent abdominal pain and vomiting, which her doctor attributed to "acute gastritis"; various enemas and purgatives were ineffectually administered during the following four days. She was brought into hospital on the morning of the fifth day: the abdomen was distended and porraceous vomiting incessant. There were no general symptoms beyond a distressed facial expression. A test enema was at once given, but without result, and as soon as the stomach was delivered of a basinful of dark green foul liquid she was transferred to the operating table. As parietal vaginal and rectal examinations gave no indication, I made the usual right semilunar incision. Immediately some coils of distended congested ileum bobbed up in the wound, which were returned by bibule pressure; the left hand was then introduced into the right pelvis, where it found a loop of ileum bound down, after the manner of a Christmas cracker, by a tense band about 1 cm. in breadth and 10 cm. in length, passing from below the caecum to the base of the right broad ligament. The left index finger was gently insinuated beneath the band and the strictured gut, and the former elevated (without rupture) for inspection. Then we found the silk ligature, which had been placed nine months previously on the meso-appendix, snugly encircling the band about half an inch from its upper point of fixation, affording a direct and positive proof that the band had originated in and included the stump of the meso-appendix. A small caecal scar indicated the tomb of the appendix; the right ovarian stump was free and had contracted to the size of a pea. The band was excised and the gut drawn up into the wound; a belt of gangrene, corresponding to the width of the band, involved the greater part of the free zone of bowel. Stays were inserted, and as peristalsis had visibly resumed its function the necrotic segment was infolded (without incision) by stays and a continuous Lembert catgut suture. Prompt recovery followed.

Some months previous to this, while pondering over the matter of how to reduce contact to a minimum when dealing with the stump of an infected appendix, I stumbled into a very simple method of secluding the stump of the appendix and that of the meso-appendix by one ligature in one peritoneal pocket, and, in passing, I may add that my colleague (Dr. Felilly) and I have employed it in many cases and find it as useful as it is practicable.

1. The meso-appendix is ligated and the appendix isolated in the usual manner; the ends of the ligature are not cut away.

2. A curved intestinal needle is then attached to one end of this ligature and a three-insertion (two lateral and one anterior) purse-string suture is passed, at a distance of about one-third of an inch, around the base of the appendix; the anterior point of suture is purposely inserted beneath the anterior longitudinal band.

3. The needle is then removed and the ends as well as the loops of the purse-string suture are left loose and kept out of the way while the appendix is clamped at the level of the caecum, separately ligated, and cut away.

4. The ends of the "ligature suture" are then sought for, and as they are tied together (the assistant with a dissecting forceps

pushing the appendical stump backwards) both stumps instantly and definitely disappear from view; only two things touch the raw surface of the stump of appendix—the knife and the dissecting forceps.

The above is the first instance in which I found the stump of the meso-appendix *in flagrante delicto*, but I have often suspected its complicity in pelvic adhesion jungles; however, knowing the tendency that peritoneum has to adhere to any raw surface, I think I may safely advocate burial of this stump, particularly as both it and its mate (of the appendix) can be readily interred together with the same bit of string.

Peritonization of Stump after Salpingo-oöphorectomy.

After periodic attempts at rotating the ovarian or salpingo-ovarian stump downwards and suturing it face backwards on the anterior shelf of its broad ligament I have definitely abandoned the procedure, as I found it almost impossible to avoid, even with blunt instruments, the occasional formation of a troublesome intraligamentous haematoma; and, moreover, the manipulation necessary for such adjustment endangered the security of the pedicle ligature. Instead, I have adopted a much more simple and more readily applicable method, which can be always resorted to without "asking for trouble": a web about one or two inches square is excised from the omentum and plastered over the surface of the stump, and a piece of fine silk (or the ends of the ligature) is made to secure it, in bonnet fashion, around the neck of the same. In infected cases I always employ catgut instead of silk for ligation of the pedicle and for fixation of this omental "patch."

I beg leave to make a digression in stating that, irrespective of the result of any previous examination, and regardless of the "authority" who made it, whenever the abdomen of a female is opened for removal of the vermiform appendix, the opportunity should never be lost of making an internal digital examination of her uterus and ovaries, and I guarantee anyone who follows this advice that he will be astonished at the frequency with which he will strike a coincidental lesion in these organs. For this reason it is imperative to adopt a right vertical incision when performing appendicectomy in womankind.

In conclusion, I must crave indulgence for occupying so much space with practical details, yet, acting on "the faith that is in me," it is the close study of minutiae and their application in workmanlike order which makes for operative efficiency.⁵

REFERENCES.

¹ Operating to the Clock, BRITISH MEDICAL JOURNAL, January 31st, 1914. ² Appendicitis, *Lancet*, February 3rd, 1900. ³ Immediate Operation in Appendicitis, *Lancet*, September 5th, 1914. ⁴ Gastro-enterostomy, *Lancet*, October 26th, 1912. ⁵ Operating to the Clock, BRITISH MEDICAL JOURNAL, December 21st, 1918.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

CHOLECYSTOGASTROSTOMY.

On July 4th, 1922, I was asked by Dr. Dykes to see a lady, aged 60, who was suffering from deep jaundice and severe abdominal pain. In December, 1921, I had removed ninety-five stones from her gall bladder. She remained well until a month ago.

On opening her abdomen I found that her symptoms were due to stricture of the common bile duct; no stones were found. It has been my practice in these cases to make an anastomosis between the gall bladder and the duodenum, or, if more convenient, between the gall bladder and the transverse colon. In the present case there were so many adhesions that neither of these situations was favourable. Bearing in mind the recommendation brought forward by Mr. C. A. Moore in the BRITISH MEDICAL JOURNAL of November 19th, 1921 (p. 826), I made an anastomosis between the gall bladder and the stomach on its anterior wall about an inch inside the pylorus. The result has been entirely satisfactory. The jaundice has disappeared and the pain has not recurred.

I feel it is right to add my testimony to the value of this operation because there must be many cases which would be benefited by it.

J. LIONEL STRETTON,
Consulting Surgeon, Kidderminster Infirmary and
Children's Hospital.