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SUBTOTAL COLECTOMY AND COLECTOMY IN ULCERATIVE COLITIS

BY

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The treatment of ulcerative colitis in this country has always been regarded as medical. Like most Australian surgeons, we have had little experience of the surgical treatment of this condition because patients suffering from ulcerative colitis are only referred for surgical treatment as a last resource. In three metropolitan hospitals over a ten-year period, the Royal Melbourne (in this hospital the ten-year period did not include the last two years), the Alfred, and St. Vincent's, 341 patients suffering from ulcerative colitis were admitted. Of these, 87 died and 23 were treated surgically (in one hospital 3 cases, in another 5, and in a third 15). There were 6 cases of appendicostomy, 6 of ileostomy, 5 of colostomy, 1 of ileosigmoidostomy, 1 of ileocolostomy, and 1 of colectomy. Of the 6 patients subjected to enterostomy 5 died.*

From these figures we may infer that in Victoria the incidence of ulcerative colitis is material; that its treatment has been mostly medical and has not been very successful; and that what little surgical treatment has been practised has not been of much value. This paper is founded on a relatively small series of cases, but they were desperate ones, and the later cases reflect team work by the authors—a necessary method of work in this critical surgery which demands painstaking and scientific preparation, often synchronous operating, small bedside operations, skilful post-operative methods, and constant surgical attention. Our interest in the radical surgical treatment of this condi-

tion was awakened by a particularly bad case which came under our notice (H.B.D.) in 1941.

Case 1.—A woman aged 34, who had been ill for six months with obscure abdominal symptoms, a progressive secondary anaemia, and some disturbance of her bowel function, became acutely ill with severe abdominal pain. She was operated on in the belief that she had an acute appendicitis; the appendix appeared acutely inflamed. About a week after the operation she began to have frequent and painful bowel actions and to pass large quantities of blood with some pus. It was apparent that she had a fulminating ulcerative colitis. Sigmoidoscopy confirmed this diagnosis and showed that the rectum was also badly affected. Notwithstanding many blood transfusions and every kind of treatment she steadily got worse until she was emaciated, cachectic, exhausted, and almost moribund.

FIG. 1.—A=divided ileum; B=divided sigmoid; C=some mobilization of rectum; D=some prolapse of peritoneum of anterior abdominal wall around the sigmoid remnant so that when the bowel-ends are being closed the size of the sigmoid remnant can be reduced by amputation.

Conservative surgical measures such as appendicostomy or enterostomy could offer little hope of cure and she was too weak to stand a colectomy. We decided therefore on a "piecemeal" surgical approach, each successive step in treatment being designed not only to bring about improvement but also to be a stage in the removal of the colon. (a) An enterostomy was so planned that it was a step in the formation of an ileorectostomy (Figs. 1 and 2).

FIG. 2.—A=distal end of the ileum; B=distal sigmoid; C and D show the ileosigmoid spur made up of proximal end of ileum and distal end of sigmoid; E=rectum.

(b) About five weeks later the ileum was connected to the rectum by the use of a special spur-clamp (Fig. 3) and the open ends of the bowel taking part in the anastomosis were closed under local anaesthesia (Figs. 4 and 5). (c) The colon, now isolated, with both ends open forming two mucous fistulae, was completely out of action and was treated by routine chemotherapy over a period of months

FIG. 3

*For this information we acknowledge our indebtedness to Dr. George Gunther, of the Royal Melbourne Hospital, Dr. Smibert, of the Alfred Hospital, and Dr. Carl DeGruchy, of St. Vincent's Hospital, who kindly collected it; and to the respective hospitals for their generous permission to publish the figures.

until the patient ceased to improve. Since she had no discharging enterostomy and was comparatively comfortable, the length of this period was immaterial and we could wait almost any time (in this case eight months) till we felt that she was thoroughly

fit for the last stage—namely, (d) a colectomy (or near-colectomy), which in this instance was done in one stage after a period of painstaking preparation.

Main Principles

Certain main principles should govern this surgical procedure. (1) A very careful preparation to correct hypoproteinaemia and anaemia. (2) A graduated method so that when the colon is removed there is no sudden dislocation of function. (3) No stage should be undertaken until the

FIG. 4.—A=clamp, made of hard aluminium alloy, in position to crush the spur; B=ileum; C=sigmoid; D=rectum.

FIG. 5.—A=openings of excluded bowel; B=ileum; C=closed ends of the ileum; D=lower segment of the sigmoid.

brittle tissue. The rectum is mobilized upwards and a small segment of the lowest part of the sigmoid is preserved so that this spur-clamp (Fig. 3) can be used.

In Case 1 when the resected colon was examined it was found to be 2 ft. 9 in. (84 cm.) long and uniformly affected with an advanced stage of acute ulcerative colitis. In the ileocaecal region there was a group of very large inflamed glands; nowhere else were the glands enlarged to any extent. The patient began to improve soon after the ileum was connected to the rectum. For eight months while her isolated colon was washed out with sulphonamide solutions her general condition improved steadily and she became much heavier and began to look well. There was, however, little improvement in the colon; an examination showed little or no improvement in the condition of the mucous membrane and pus poured from the mucous fistulae in large quantities. Then her general condition ceased to improve and this determined the time for her colectomy. This operation caused her little disturbance. The isolated colon was much retracted and much smaller than normal and was thus comparatively easy to remove. Four months after her colectomy she began to improve rapidly. The badly diseased rectum began gradually to clear up. A few tiny ulcers formed in the ileum, but these

soon disappeared. This patient is now, six years later, a red-faced, healthy-looking person; she is 4 stone (25.4 kg.) heavier and has no signs of active disease in her rectum. Her bowels open six to eight times a day and twice at night. (This is unusually frequent, as we shall see from later cases.) She has, however, a group of inflammatory glands which can be felt in the left iliac fossa and which on x-ray seem to be well away from the rectal anastomosis.

Case 2.—A man of 54 had suffered from a severe ulcerative colitis for three years. He had hourly motions, had lost a lot of weight, had become cachectic, was unable to work, and was very sick indeed. X-ray and sigmoidoscopic examination showed that extensive and irreparable structural changes had taken place in the bowel. A modified enterostomy as described in Case 1 (Fig. 1), the first stage of the subtotal colectomy, was done (H.B.D.). His general condition began to improve, but the repair of his abdominal wound was weak and a superficial mild but spreading ulceration formed around the enterostomy. Then about two months after his ileum had been connected to his rectum strangulation of a loop of bowel occurred under a band-like section of ileum which was attached to the anterior abdominal wall. He recovered from the operation, but died some months later from bronchopneumonia.

This case was a failure. He never derived much benefit from his enterostomy, never improved enough to enable us to proceed with the stages of his colectomy, and never had a healthy-looking abdominal wound. Deficient tissue vitality as shown by lack of repair in his enterostomy wound and by his terminal bronchopneumonia was probably the direct result of an intense toxæmia and of protein loss from the large ulcerating surface. Careful pre-operative measures to counteract his hypoproteinaemia had never been properly carried out.

Case 3.—This patient was in just as desperate a condition as Case 1. He had been sick for four years. He had ten or more motions a day and several at night, with copious blood and pus. He weighed 7 stone (44.5 kg.) and looked like a person in the last stages of tuberculosis.

This patient was operated on (H.B.D.) in much the same way as Case 1. When examined after removal the colon was over 3 ft. (91 cm.) long and showed a late stage of the disease involving the whole colon. After the colectomy there was a dramatic improvement and in 12 months the patient was able to do light work.

Two years after the colectomy he developed an acute intestinal obstruction. An operation (J.B.D.) relieved this. Now, three years after his operation, he appears to be quite well, has been back at full work for one year, and is 5 stone (31.8 kg.) heavier. The number of his motions has gradually diminished till now he has two in the day—one in the morning and one before going to bed. He says, "The motions are not formed, but they are not liquid; they are softish." The tip of a finger introduced into the rectum enters the ileum. Sigmoidoscopy shows that the disease in his rectum has completely cleared up.

Four More Cases

Case 4.—A woman of 43 was very wasted, acutely ill (pulse 130), and looked as if she would only live a month. For 18 months she had had all the symptoms and signs of a very severe ulcerative colitis in which the rectum was also involved. She had weeks of intensive preparation before any operation could be considered. With a great struggle she got through her first-stage operation carried out as in Case 1. She was so sick that the periods between the operative steps had to be long. Her tissues had very poor vitality; a slab of tissue, in the abdominal wall, lying over the anastomosis with the rectum, came away as a large slough. After each operation she improved, until finally we were able to remove her colon. The colon was white and opaque-looking, greatly thickened, oedematous, and uniformly involved. The appendix was in two parts, the division lying in the midst of evidences of a past abscess.

Two years later this patient was comparatively well. She had gained much weight and was doing her own housework.

The rectal condition was almost normal. She had six stools in 24 hours—four during the day, two during the night. A sinus still remained in the lower part of the abdominal scar where the slough had occurred.

Case 5.—A young man of 22 had had a very severe ulcerative colitis of two years' duration; he had spent six months in hospital. He received the usual careful pre-operative preparation with a view to correcting haemoglobin and protein deficiency. Immediately after the first stage of his surgical treatment—that is, after the modified enterostomy (H.B.D.)—he became painlessly distended, and notwithstanding Miller-Abbott therapy, jejunostomy, and every possible measure, including abdominal exploration (J.B.D.), he died of what we regarded as a paralytic ileus.

Case 6.—This patient reached a stage of almost complete cure and then died from an adventitious cause. He was 60 and had suffered from a bad ulcerative colitis for two years. The colon was removed in the way already described (H.B.D.). Following the operation his condition improved, and reports two years later indicated that he was comparatively well. About this time a report reached us that he had died suddenly up-country from an acute intestinal obstruction (no operation).

Case 7.—This woman of 37 had had an ulcerative colitis for 20 years and had been under my care (H.B.D.) for that time. In its early stages the colitis had been very severe for three years and she had been practically bedridden. In an effort to help her a valvular appendicostomy was made and into this we inserted an indwelling catheter (H.B.D.), which never leaked. Through this she gave herself a daily wash-out, and after a time she became well enough to earn her living.

Years later there was an exacerbation of the disease, and finally a stricture formed in the lower 3 in. (7.5 cm.) of her sigmoid.

FIG. 6

became so narrow that surgical treatment was imperative. Accordingly her colon was removed by the "sliding-scale" method already described (H.B.D. and J.B.D.). Since the stricture was in the lowest 3 in. of sigmoid it could be included in the spur. Thus, with the distal cut end of the sigmoid opening on to the abdominal wall, the stricture could be so dilated as to permit the introduction of the enterotome, so that when the spur was crushed it was divided (Fig. 6) and the stricture became part of the anastomosis.

Two and a half years after the operation this patient has greatly improved. Her colour has completely changed and she looks healthy; she has increased greatly in weight, is able to do full work and to defaecate comfortably. The number of her motions has become less and less until now they are four a day and none at night. Sigmoidoscopy shows that the disease in the rectum has almost cleared up; the signs of inflammation are gone and there is much scarring, but there still remains one small ulcer.

Possibilities of Surgery

The next case was a good example of what surgery can do for ulcerative colitis. It concerned a distressing and pitiable case of four years' duration in a 19-year-old girl. In the early stages of her illness a properly constructed

enterostomy had been done. For twelve months after this she continued to improve, but then began to relapse rather badly and soon became very ill indeed. Although her condition was desperate we felt justified in facing up to a colectomy because of her youth. The most favourable time for operation, when the patient had derived the greatest benefit from the enterostomy, had long passed. Her general condition was very bad. Her tissues had almost lost the power of repair; a small wound in the abdominal wall had not healed in nine months. There were fistulae from the rectum into the vagina, and there was a stricture in the rectosigmoid region. The disease in the rectum was so advanced that it was obvious that this organ was irrecoverable.

Case 8.—Special care was taken in her pre-operative preparation. Blood and serum to correct her anaemia and hypoproteinaemia were given well before the operation so as to get their full effect. At operation (H.B.D. and J.B.D.) it was seen that while the distal colon was severely affected the proximal colon showed no evidence of the disease. The disease was so advanced as to preclude the possibility of the colon ever functioning normally; there was a perforation in the sigmoid, and it was obvious that the rectum would eventually have to be removed.

In this case we thought it wise to take advantage of the absence of disease in the proximal colon to preserve the ascending colon, as it would provide a more controllable artificial anus than would the terminal ileum (the wisdom of this was subsequently proved). The colon was resected from the hepatic flexure to a point about 3 in. (7.5 cm.) above the recto-sigmoid junction. The cut end of the distal segment of the sigmoid was implanted in the lower end of the wound, the peritoneum of the anterior abdominal wall being stripped and well prolapsed into the abdominal cavity round the stump so as to leave as small a segment of sigmoid as possible. A small, carefully constructed artificial anus, which could be controlled, was made at the hepatic flexure. At a second operation the enterostomy was closed. The wound, however, showed little tendency to heal.

For about nine months her general health continued to improve, after which she was again so ill that it looked as if she would surely die. We were faced with a most adverse set of circumstances: a profound deterioration of general health and of all her bodily functions; wounds from the previous operation which had not yet completely healed; and spreading areas of cellulitis in various parts of her body. Nevertheless, because she was only 19, we decided to operate.

She was first given several blood transfusions. Later, under nitrous oxide anaesthesia (Dr. Travers), with two sets of instruments and two nursing teams—one for the abdominal surgeon (H.B.D.) and one for the perineal surgeon (J.B.D.)—the rectum was removed in just over the half-hour with astonishingly little disturbance to the patient. Penicillin was used as dressing in the large infected cavity left after the rectum was removed.

Her general condition began to improve very slowly, but for many months the rectal cavity showed no sign of healing. Finally a stage was reached when it began to heal very slowly; it was well over 12 months before it had closed.

Now, over three years later, she seems to have completely recovered. She looks perfectly healthy, has gained stones in weight, is able to ride and to drive a car, and carries out nursing duties for her father, who is a doctor. What is most gratifying is that, thanks perhaps to the fact that she has her ileocaecal valve, or that a small part of her colon was left to make the artificial anus, she has a practical control of her bowel. She gives herself a wash-out through the colostomy once a week, and until her next wash-out her abdominal wall is never soiled. This is unusual, but is cited to show the value of preserving the proximal part of the colon. That a patient as ill as this girl was could survive removal of most of her colon and the whole of her rectum, and could get so well that she could lead a normal life, has

made us revise our surgical philosophy in so far as it applies to the treatment of desperate cases of ulcerative colitis.

In this case we see some traits of the worst form of the disease: the intractable type of ulcerative colitis; the specific deficiency in tissue repair; the general dissemination of the infection as seen by the areas of cellulitis; and the greater incidence of the disease in the distal colon and particularly in the rectum. In it, too, we see the temporary value of enterostomy; the powers of recovery of youth in a desperate case of ulcerative colitis; the importance of taking advantage of an unaffected caecum and ascending colon; and the fact that in this case after all that was done to her she is able to live practically a normal life.

Partial Colectomy

Another case showed how a partial colectomy may help in some patients. A man of 57 had had an ulcerative colitis for 20 years. He was cachectic, emaciated, and dehydrated. He had been having motions, mostly of pus and blood, 12 or more times a day and three or four at night. About 18 months before coming into hospital he had begun to have attacks which were diagnosed as due to chronic intestinal obstruction. A 3-in. (7.5-cm.) stricture in the middle of the transverse colon and another but shorter one in the rectosigmoid region could be seen in a radiograph. A long, hard, nodular tumour, which was undoubtedly malignant, could be felt in the region of the transverse colon corresponding to the site of the stricture.

Case 9.—At operation (H.B.D.) a long sausage-shaped malignant growth was found occupying the greater part of the transverse colon. The walls of his chronically inflamed colon were about 1/4 in. (6 mm.) thick, rigid, and friable. To suture such a colon would be impossible. Here it was obvious that the only way to effect an anastomosis was to make a spur and use a bevelled-edged enterotome so as to crush by graduated pressure rather than cut through the rigid and friable tissue. The hepatic flexure and the adjoining part of the ascending colon, the transverse colon, the splenic flexure, the descending colon, and the upper half of the sigmoid were stripped from the posterior abdominal wall as one large segment. The limbs consisting of mobilized ascending colon and hepatic flexure and mobilized descending colon and sigmoid were sutured together to form a spur. The tumour-containing segment was then widely amputated. Later the spur was crushed by the gradual application of a bevelled-edged enterotome. The patient recovered and for three years enjoyed a comparatively comfortable life.

The lesson to be learnt from this case is that extensive partial colectomy—subtotal colectomy—has a value in the surgical treatment of ulcerative colitis. So much of his diseased colon was removed that the toxic effects of, and the miseries attendant on, the inflamed and ulcerated colon were greatly ameliorated. This patient died three years later following an attempt to remove the rectosigmoid stricture, which appeared also to have become malignant.

Low Stricture of the Rectum

The next case had a special interest in that it showed how a fairly low stricture of the rectum could be dealt with.

A girl aged 19 had had ulcerative colitis for six years. Sigmoidoscopy showed that the rectum and sigmoid were almost completely denuded of mucosa; there was a foul, frothy, semi-purulent discharge. A radiograph showed absence of haustration, rigidity of the bowel, and loss of the mucosal pattern as far as the splenic flexure. The remaining colon had a normal appearance. The patient looked very sick and had a haemoglobin of 65% on the 14-gramme standard.

Case 10.—As the disease was confined to the descending colon, sigmoid, and rectum, a transverse "defunctioning" colostomy was done in August, 1946 (J.B.D.), under gas and

ether anaesthesia. The idea was that as the patient was a young girl the question of resecting the distal part of the colon and making an anastomosis between a long proximal part of the transverse colon and the rectum should be considered if the "defunctioning" colostomy did not bring about healing of the disease. Following this operation, the patient improved and her weight increased by half a stone (3.2 kg.).

By March, 1947, she was again having almost continual rectal bleeding and her general health was no longer improving. She now had a stricture 2 in. (5 cm.) from the anus through which the tip of the examining finger could not be passed. At the Alfred Hospital under gas, oxygen, and ether anaesthesia a midline lower abdominal incision was made and the rectum was dissected free to within 1/2 in. (1.25 cm.) of the anus. The ileum was then transected and its acting loop brought down and sutured alongside the rectum as low in the pelvis and as near to the anus as possible. A spur was thus created with ileum going to below the stricture, and the end of the rectosigmoid stump was also implanted in the wound. At the same time the colon was removed from the rectosigmoid junction region as far as the transverse colostomy.

Six days after the operation a crushing clamp was applied as shown in Fig. 6, and the stricture was crushed into the ileum. Thus a free passage of ileal contents into the rectum was assured. At a later date, under thiopentone, the acting loop of the ileum and the rectosigmoid stump opening on to the abdominal wall were closed. The specimen removed was 3 1/2 ft. (105 cm.) long, and showed considerable fibrosis and much loss of mucosa. Following this operation the patient had put on weight and had become engaged to be married. She was having two bowel motions in the 24 hours.

Sigmoidoscopy before she left hospital revealed improvement of the disease in the rectal pouch, which had previously been markedly involved. There was a wide opening between the ileum and rectum. Three or four months later, by which time she was in every way a normal girl, sigmoidoscopy failed to reveal any disease in the rectum. It was now thought advisable to remove the isolated segment of ileum and caecum and ascending colon. This was done and she progressed favourably until the tenth day, when she developed a subphrenic abscess. The abscess was drained surgically below the twelfth rib. Drainage ceased in about a fortnight, and the next stage of her progress was uneventful except for the slow healing-over of a fistula from the ileo-rectal anastomosis which was inadvertently opened at the preceding operation.

Our last patient (Case 11), aged 55, was a woman who had suffered from diarrhoea, often having 15 motions in each 24 hours, and loss of weight. She had become very depressed and the disease had reached a late stage. The first stage of the operation (the junction of the ileum to the rectum and closing the ileo-rectal fistula) was carried out. The patient has been sent home where she can live comfortably, having only a slight mucous discharge from the two mucous fistulae. She can do her own work, so there is no hardship in her remaining any length of time, so long as she continues to improve, before the final stage, a colectomy, is carried out. This case is included to show the comfortable life that patients can lead while waiting for their colectomy, and also because we feel that it is in the first-stage operation that the danger lies.

Future Policy

Although our series is small it includes such bad cases and good results that we feel we are entitled to build from it a surgical philosophy for our future treatment of ulcerative colitis. We believe, first, that a case of established ulcerative colitis should come to a surgical consultation early in its course to consider the question of early operation from the following viewpoints:

(a) Can the surgeon help the physician? He may be able to do so by making a non-leaking valvular appendicostomy (in Case 7 such an appendicostomy functioned for about 18 years without leaking).

(b) There is some justification for the removal of the appendix, since it is not above suspicion as the point of entry of the infective element in the colitis.

(c) To find out early in the course of the disease whether the ascending colon is free from the disease, because in this case the prognosis is much brighter and early operation is justifiable.

(d) To ascertain the type and severity of the ulcerative colitis with a view to planning its treatment. Is it a case which medical treatment will not cure? I think this judgment can be made.

Secondly, we should advise in treatment more attention to tissue resistance and tissue repair. They probably play a larger part in this infective disease than does the virulence of the organism.

Thirdly, we should regard ulcerative colitis in much the same way as we do gastric ulcer; that is, when ulceration and loss of substance of the mucosa have taken place and the physician is making no headway with his treatment we should advise operation with a view to removing the colon, and advise operation early.

We believe that the reward of early colectomy or subtotal colectomy is a low immediate mortality and a very fair chance that the rectum will recover when the colon is removed. We feel it is not wise to wait on and on in the hope of medical cure.

Summary

Here were 11 advanced and desperate cases of ulcerative colitis for which a policy of careful radical surgery was planned. In general, it represents a rather timid and tedious method of operation, but both the immediate and remote results are more than satisfactory. We look forward to the application of the method to much earlier and less debilitated cases—to cases which from our experience we can say will not be cured by medical treatment.

Of the 11 patients two died. One died of an adynamic ileus immediately following the first-stage modified enterostomy, and one three months after the first stage from tissue deficiency and toxæmia. None of the patients died following colectomy or excision of the rectum. Thus, of 11 desperately sick patients, six survived subtotal or near-colectomy, one a near-colectomy combined with excision of the rectum, one a partial colectomy involving two-thirds of the colon, and one the first stage of colectomy.

Six patients seem to be cured—the worst case of all for six years. They have no bowel discomfort and live normal lives. One patient has only two motions a day and none at night. Most of the patients, however, have from four to five motions in 24 hours.

The Minister of Health recently held a valedictory reception for members of the Rushcliffe Nurses and Midwives Salaries Committees and members of the Advisory Council of the Civil Nursing Reserve, which were disbanded on July 5. The two Rushcliffe Committees worked almost continuously for nearly seven years and have reviewed the pay and conditions in every field of nursing. Their reports and recommendations have covered all grades of nurses, both men and women, in all branches of the hospital and public health field, as well as the midwifery service. In 1941, for example, a hospital staff nurse received £70-£80 a year; to-day as a result of the Rushcliffe recommendations she receives £140-£200 a year. With the coming into operation of the National Health Service there will be entirely new machinery for dealing with salaries and conditions of service. There is to be a series of Whitley Councils covering all those working in the Service, and one of these will be for nurses and midwives. The Minister of Health paid tribute to the great work of Lord Rushcliffe and the members of his Committees and of the C.N.R. Advisory Council. Lord Rushcliffe in reply said that during a long period in public life nothing had given him greater satisfaction than his association with the Nurses and Midwives Salaries Committees. Their recommendations had not been pigeon-holed but had shown prompt results.

DEATH FROM INHIBITION, AND ITS RELATION TO SHOCK

A CRITICAL SURVEY

BY

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Among medico-legal experts there is apparent a certain confusion in describing the nature of death from inhibition, and often also between the effects of shock and of inhibition. This is especially so when they are dealing with cases which might fall within either category, and regarding which they have to decide in one way or the other and to present a logical and scientific conclusion to the courts. The medico-legal expert cannot afford to use vague expressions and nomenclature. The pathologist, on the other hand, is not usually subjected to such difficulties and can afford to express opinions that are not necessarily binding; he is at liberty to advance hypotheses which are liable to modification or alteration but which can be so altered without serious consequences.

I propose to draw attention to the manner in which various writers on pathology and legal medicine deal with these matters and other related subjects of special medico-legal interest. We find, for example, in certain medico-legal textbooks special attention given to death due to inhibition with almost entire neglect of the subject of shock, while the exact opposite occurs in some of the books on pathology. Both sides may have their own reasons for this selective handling of their own subject. For instance, the medico-legal expert may contend that shock does not interest him greatly because usually it is possible to attribute the cause of death directly to the injuries so obviously and extensively present—severe trauma such as rupture of viscera, extensive burns, or severe haemorrhages. On the other hand the pathologist may contend that death due to inhibition has no material meaning to him so long as he cannot find microscopic or macroscopic evidence of direct pathological processes which he can hold responsible for the death. Thus both parties appear to be relatively satisfied with the present position in regard to both subjects.

Elsewhere in the literature of forensic medicine and trauma we find an obvious confusion between these two subjects, the terms "inhibition" and "shock" being used loosely and incorrectly as if they were interchangeable—a state of things that is perhaps attributable to recent activity in the study of shock and the frequency with which the subject is referred to in medical periodicals. The fact that shock has become extensively written about seems to have had as a consequence the effect of confusing the two syndromes.

Very few among the leading authorities in forensic medicine, pathology, or physiology deal with the difference between the two subjects with sufficient emphasis, and then only to put death due to inhibition under the title of primary shock while speaking of shock as "delayed shock"—an attitude which has served only to increase the confusion.

I shall endeavour to put forward the real facts concerning the nature and mechanism of both syndromes and of the other phenomena, related to quite different causes, which are ordinarily confused with death due to inhibition.