Uterus, Ovaries, and Fallopian Tubes.

Affections of the female reproductive organs afford some very interesting examples of reflex pain, and possibly exhibit a wider distribution of such pains than any other abdominal viscera. This arises from the fact that the sympathetic plexuses—the ovarian, pelvic, and hypogastric—are connected with the eleventh and twelfth dorsal, the lumbar and sacral (particularly the third and fourth) spinal nerves. We therefore get pain referred to the lower part of the hypogastrium, the lumbar and sacral regions behind, and the iliac regions in front, with occasionally extensions down the legs. Now, of all situations for the most frequent exhibition of pain in affections of these organs, the left iliac region is the commonest, and in this region we may indicate as the *lieu d'élection* a point about 2 in. to the inner side of the superior iliac spine. Here pressure at once evokes pain, and both skin and muscle may be found hyperalgesic. It may be asked, Why should the left side be more frequently the seat of pain than the right in uterine disease and in affections, it may be, of the right ovary? We must assume, as was done in the case of the kidney, that the cells on one side of the cord are more susceptible to stimuli than those on the other; but that hardly gets over the difficulty of explaining the constancy of the pain on the left side unless we accept the assumption promulgated by Herman that the lesser strength of the left side of the body renders it capable of offering less resistance to sensory stimuli. In regard to the frequency with which female patients who suffer from affections of the reproductive organs have widely diffused referred pains, one must remember that these patients are often anaemic, neurasthenic, and generally wanting in body tone. As indicated in my introductory remarks, the sensitiveness of the receptive centres is greatly augmented by certain conditions of the blood, so that a stimulus arriving at one group of cells may readily extend to other groups, and so greatly widen the area over which reflex pains will be felt.

Acute Abdominal Crises.

Let me now refer to that most interesting exhibition of reflex pain which is manifested in almost all acute abdominal crises. I allude to the sudden, agonizing, and prostrating pain felt in the mid-line of the body as the result of a gross lesion associated with one or other of the abdominal viscera. It matters not where the viscus is situated within the abdomen nor where the lesion is located in the viscus, the initial acute seizure is most frequently felt in the mid-line, although variations will exist regarding the particular spot in this line. I have said enough not to need repetition of the nerve connexions between the various viscera and the spinal nerves. You will remember that in nearly every instance the pain was referred to the middle line, and that this was explained on the basis that the cells in the cord which received the afferent fibres of the sensory nerves contained in the lower six intercostals were abnormally irritated. The question, then, is really one of degree. These same cells receive a sudden and violent stimulus from an equally sudden and virulent lesion, and the clinical result is an unusually severe attack of pain proceeding as if from the terminals of the sensory nerves implicated. I believe that the acuteness of the initial seizure is largely affected by the relation of the lesion to the parietal peritoneum. This structure, as you know, is supplied by sensory fibres from the spinal nerves, and has within it many sensory nerve endings. Hence, when from the rupture of a viscus irritating material comes in contact with it, a very acute stimulating influence suddenly acts upon these sensory nerve endings; and, if it be not in itself a direct source of pain, one can well understand how it can indirectly augment the reflex symptoms evoked by the lesion in the way already explained. Without attempting to differentiate clinically between lesions causing pain in the same spot, I may give a sort of classified list of the diseases which may be expected to cause reflex pain in certain definite areas. Thus, (1) perforation of a gastric or duodenal ulcer, rupture of gall bladder, acute haemorrhagic pancreatitis, cause acute pain to be felt in the epigastrium; (2) perforation of the appendix vermiformis or of the small intestine, ruptures, strangulations and obstruction from various causes, embolism or thrombus of the mesenteric vessels, etc., cause acute pain to be felt

in the region of the umbilicus; and (3) rupture in tubal affections, including extrauterine pregnancy, causes acute pain to be felt in the hypogastrium.

In these few remarks, gentlemen, I can claim to have given you no more than a very cursory review of the subject of reflex pain as exhibited in certain affections of some of the abdominal viscera. I would like to interpose here and emphasize the fact, for the sake of making the drift of my remarks and conclusions quite clear, that while diseases of the abdominal viscera may give rise to reflex pain located in one or other of the anatomical regions into which the abdomen is artificially divided, all reflex pains experienced in these particular regions do not necessarily signify diseases of the abdominal viscera. Without bearing in mind this very important clinical fact, we may be led occasionally into committing egregious blunders both in the matter of diagnosis and, what will be still worse, in treatment.

The subject of reflex pain is one which is, as you will have already gathered from what I have said, fraught with innumerable difficulties—difficulties that involve intricate questions of anatomy, physiology, and pathology; and for want of exact answers to these questions it has often been necessary to base reasons on theories. If, however, even on the somewhat insecure basis of hypothesis, it is possible to formulate a few practical guides and derive some clinical assistance, we may legitimately feel that the ends are not altogether unjustified by the means; and that, until light shine out of darkness, our benighted path must be illumined by such artificial means as will best enable us to encounter and overcome, though it be ever so imperfectly, the many obstacles that at present beset our progress.

A Clinical Lecture

ON

HOW TO OPERATE FOR APPENDICITIS.*

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In a previous lecture¹ I gave my views about the choice of time for operation. I then submitted that:

1. It is wise to remove the appendix in the quiescent period after one definite attack of appendicitis.
2. The best treatment of acute appendicitis is an operation at the earliest possible moment.

In this lecture I propose to deal with some of the important points in the technique of the operation and after-treatment.

THE INCISION.

The same incision is not suitable for all cases. This could hardly be expected considering the varying conditions under which the operation has to be performed, and the varying position and abdominal relations of the appendix and caecum.

(a) *The Valvular or Gridiron Incision of McBurney.*

This incision has the advantages that hernia is very unlikely to follow it even when an abscess has to be drained, and none of the nerves or muscles of the abdominal wall need be divided, so that the abdominal wall is not weakened. It is particularly suitable for those interval cases in which the diagnosis is certain. It is also suitable for acute appendicitis in which an operation is performed before there is any suspicion of spreading peritonitis.

It is, I think, the best incision for appendicular abscess in the iliac fossa, but it is not a good one for pelvic abscess, on account of the difficulty of draining. When the position of the appendix is fairly well known, either by the presence of swelling or rigidity, or from the history of localizing signs in previous attacks, the gridiron incision can be made at the most suitable point. When the appendix is retrocaecal the incision is made unusually high up and far back, and when it is in the pelvis the opening is made low down and far in.

* Delivered at Guy's Hospital.

When the McBurney incision is placed in the usual position, a little above and internal to the right anterior superior spine, it has the serious disadvantage of giving too little room if the appendix be adherent and low in the pelvis, or unusually high and fixed behind the caecum or to the liver. It also hampers the surgeon when he wishes to explore the whole of the abdomen thoroughly, or when he, having made a mistake in diagnosis, has to deal with a perforating gastric ulcer, suppurating gall-bladder, or tubal disease. A good deal more room can be obtained by slitting the anterior wall of the rectus sheath upwards or downwards, and by displacing the rectus muscle inward. It is unsuitable for cases in which there is a suspicion of spreading peritonitis of uncertain origin. A very small incision is sometimes made for the removal of the appendix, but this is inadvisable, however much it may be appreciated by the patient. Some patients seem to judge the surgeon's skill by the shortness of the scar, but these stab incisions do not allow the proper exploration of the abdomen. Moreover, it is not easy to close the deeper layers of the abdominal wall properly in a small incision. A passion for these small incisions has frequently led to the overlooking of a serious condition that could have been found and remedied if a proper incision had been made. For instance, a piece of gangrenous bowel and even a large foreign body in the pelvis have been overlooked with disastrous results.

The transverse incision of Davis is very much the same as the usual gridiron incision, except that the fibres of the external oblique are cut across. This does not materially weaken the abdominal wall, and it allows drainage at the extreme outer end of the wound, where a hernia is very unlikely to develop. It is therefore particularly suitable for the treatment of the common abscess localized in the iliac fossa.

(b) *The Incision through the Rectus Sheath.*

Of the various vertical incisions, one near the middle line is not very suitable, because of the great difficulty of getting to the appendix and removing it, especially when it is retrocaecal and high up. It is much better to make the wound over the outer third of the rectus muscle, and then to displace the latter inward or to separate its fibres. In either case the deep layer of the rectus sheath and the peritoneum are incised in a transverse direction, so that none of the nerves need be divided, unless it becomes necessary to enlarge the wound to an unusual extent on account of a wrong diagnosis. I adopt this incision for all cases demanding a thorough exploration of the abdomen, and whenever spreading peritonitis is suspected. It is the best incision for pelvic abscess. The risk of hernia after it is small, even when temporary drainage has to be adopted. It is an advantage to make the opening fairly small at first for exploratory purposes. It can be freely enlarged as may be required, upwards or downwards.

PROTECTION OF THE ABDOMINAL WALL.

In infective cases it is particularly important to prevent infection of the abdominal wall during and after operation. The sides of the wound can be protected by gauze pads and sterilized waterproof material accurately fixed to the parietal peritoneum. These are not removed until all the infective material has been dealt with. When drainage has to be adopted, infiltration of pus amongst the layers of the abdominal wall can be prevented by accurately suturing the layers together around the drainage tube, thus obliterating all spaces between the muscles.

PROTECTION OF THE GENERAL PERITONEAL CAVITY.

It is wise to protect the healthy part of the peritoneal cavity by careful packing, so that if during the separation of the appendix from dense adhesions a small abscess be opened, the risk of contamination of the peritoneum is reduced to a minimum. In dealing with an abscess in the iliac fossa it is important to pass gauze packs upwards towards the right loin and inwards towards the left loin, and downwards and inwards towards the pelvis, before attempting to deal with the abscess. When the abscess is adherent to the abdominal wall it can be incised without opening the general peritoneal cavity. Then it is not necessary to pack unless the surgeon is going to remove the appendix. In cases of spreading peritonitis due to appendicitis, it is important to remember that the upper

part of the abdomen, especially about the diaphragm and spleen, are generally healthy at the time of the operation. It is therefore important to protect these regions immediately the abdomen is opened. This is done by passing a roll of gauze into each loin. This serves to absorb any fluid that may pass upwards during the manipulations in the lower part of the abdomen. Another gauze roll is then passed into the pelvis and is left there to soak up the fluid while the appendix is being sought and removed. This saves time. One end of each gauze roll is secured to the towels by forceps so that none may be lost. Irrigation of the peritoneal cavity is not so satisfactory as mopping for peritonitis of appendicular origin.

THE REMOVAL OF THE APPENDIX.

Is it Wise to Remove it in all Cases?

Most surgeons are agreed that it is wise to remove the appendix when it is the cause of spreading peritonitis, and, as a rule, it is an easy matter to do this. There is little or no difficulty in finding it, and the adhesions, if any, are soft. There is more uncertainty about the wisdom of removing the appendix in cases of localized abscess. To save life it is often enough to drain the abscess without removing the appendix. The incision can be so placed in some cases that the general peritoneum need not be opened. It must be remembered, however, that when the abscess is merely opened and drained recurrence of symptoms occurs in about 15 per cent. of the cases, and that the subsequent attacks may be either grave or slight. In some cases a sinus never heals, and in others an induration persists in the iliac fossa. In some there is pain localized in that neighbourhood. It may be either due to persisting disease of the appendix, or to intestinal adhesions or bands interfering with the functions of the lower part of the ileum or caecum. In addition to this it may be urged that a diseased appendix left in the abdomen is a danger to life, for infection is more likely to spread along its veins, giving rise to portal pyaemia, septicaemia, or pulmonary complications. Intestinal obstruction is also more common when the appendix is not removed. Moreover, drainage has to be adopted, and has to be continued for a longer time, and therefore hernia is more likely to develop. When recurrence of symptoms follows and the appendix has to be removed, the operation is usually difficult on account of the extensive and dense adhesions.

During the last six months I have had to operate on four patients for intestinal obstruction secondary to appendicitis. In two the symptoms did not arise for several years; in the third the operation became necessary within three months of the onset of the appendicitis, and in the fourth within three weeks. In two other patients I have had to operate for recurrence of appendicitis long after simple drainage, and in each of these a small abscess was found at the second operation, which was a very difficult one. In another patient, in which a faecal fistula had existed for nine months after simple drainage of an abscess by another surgeon, I operated with a view of closing the fistula, and found the whole of the appendix to be lying free in the general peritoneal cavity, except at its base, which was constricted and formed part of the wall of the sinus. The distended appendix might have burst at any moment, and would probably have given rise to general suppurative peritonitis. In several other patients on whom I have operated for ventral hernia following simple drainage I have found the appendix in a similar state. Some surgeons never remove the appendix except when they find it hanging loose in the cavity of the abscess. This is a rare event. Others maintain that if a calculus is to be found in the abscess it is not necessary to seek the appendix. This is a false doctrine, because a calculus may be discharged into an abscess round the root of the appendix, which in healing becomes more contracted than ever, and the obstruction is a potent cause of future attacks of appendicitis.

Some make it a rule to remove the appendix only when the abscess is quite small, believing that it is more likely to be destroyed when the abscess is large, and that the risk of removing it varies with the size of the abscess. I do not believe that there is sufficient ground for this belief. There is no doubt that patients are occasionally seen with such large abscesses, and so very ill, that simple drainage is the only justifiable treatment, but these cases should become less and less common. For over a year

I have not left the appendix in any of my cases, and this practice has lowered the mortality.

In removing the appendix in these cases it is of vital importance to prevent infection of the general peritoneal cavity. The chief danger lies in spilling pus or infective material into the abdomen without knowing it, and this is particularly liable to happen when the appendix is sought through a small wound made directly into the abscess. Some part of the surface of the appendix is nearly always free in the peritoneal cavity, and its careless removal under these circumstances is apt to be followed by unsuspected leakage downwards and inwards towards the pelvis and general peritoneal cavity with disastrous results. The opening of the peritoneal cavity in these cases does not seem to matter if proper precautions be taken to prevent soiling. The risk of setting up spreading peritonitis can be prevented in one or two ways:

1. By deliberately opening the general peritoneal cavity first, and making a large enough incision to enable the surgeon to pack around the abscess in all directions, thus fully protecting the general cavity before opening the abscess. All the pus is soaked up, and the abscess cavity is cleaned before the appendix is sought.

2. By very carefully mopping away all pus and infective material from an abscess cavity opened extraperitoneally before attempting to remove the appendix.

The first is the better method, although it may seem at first sight to be more risky. The second method is particularly suitable for all large abscesses which have become adherent to the abdominal wall. When the packing and mopping are well done, the appendix can be safely removed, and all adhesions can be broken down, thus lessening the risk of intestinal obstruction and other complications already mentioned. Before removing the protective packs the region of the abscess is thoroughly cleaned by means of moist gauze, and then dried with sterilized gauze.

HOW TO REMOVE THE APPENDIX.

All the elaborate and fanciful methods of dealing with the appendix deserve to die, for all that is necessary is to clamp the base of the appendix with a pair of strong Spencer Wells forceps, which crush and break the muscular and mucous coats (after Doyen's method). The crushed part is then divided without fear of any leakage, for the cut ends are sealed by the crushing. It is not necessary to tie the stump, nor is it wise, for the ligature is a source of danger, and prevents proper inversion of the stump. The inversion is done by means of a simple sero-muscular purse-string suture of catgut. This is placed in the wall of the caecum a quarter of an inch away from the base of the appendix. The meso-appendix is firmly tied and divided before the appendix is removed. This simple method is suitable for all cases of appendicitis except those in which the caecum is so stiff and friable that inversion is not practicable. Then it is enough, when the patient is very ill, to ligature the appendix close to its base, and to remove it and all the mucous membrane on the distal side of the catgut ligature.

DRAINAGE.

There is a good deal of doubt as to when it is necessary to drain the abdomen in these cases. Appendicitis and its complications are so variable that it is almost impossible for any one to tell another what to do under all circumstances. In the quiescent cases with no pus there is, of course, no need for drainage. When a small abscess is discovered in a subacute case, it is a little difficult to decide whether to drain or not. If care be taken to remove all the pus, there is no need to drain the peritoneal cavity, but a wisp of gauze can be placed in the abdominal wound as a precaution against suppuration in the parietes. This can be removed at the end of thirty-six hours.

When an operation is performed during an attack, the question of drainage has to be decided upon the local and general condition. When the operation is done within twenty-four hours of the onset of the attack, it is an exceedingly rare thing for drainage to be necessary if care be taken to get the peritoneum clean and dry. When the infection has not spread beyond the appendix, it is not necessary to drain the peritoneal cavity, and this is true also of those cases in which there is localized plastic peritonitis only about the region of the appendix.

When there is a large abscess, I always leave a drain in the abdomen for at least forty-eight hours, and the same is true of all late cases of spreading peritonitis. In the early cases, where there is only a serous or slightly turbid fluid in the abdominal cavity, it is not necessary to drain; but when the effusion is sero-purulent or sanious, or the infection is virulent, as shown by the absence of lymph and the presence of severe collapse, it is safer to do so. In those suppurative cases in which the abdominal cavity is not drained, suppuration is apt to develop in the abdominal wall unless the latter be temporarily drained. This can be done by passing a small drainage tube or a wisp of gauze to the deep surface of the external oblique or the rectus sheath. If this simple method be adopted, the peritoneum can be safely closed in a great many more cases than we used to consider to be safe even a year or two ago.

But it is a mistake to go to the absurd extreme of closing the abdomen accurately in all acute cases, for unless the resistive power is good, the peritonitis may go on spreading, or cellulitis of the abdominal wall may develop and end fatally. Some say that it is impossible to drain the peritoneal cavity, but this is absurd, seeing the amount of fluid that escapes in these cases of suppurative peritonitis, especially when they are treated by the continuous infusion method. Some surgeons still use Keith's glass tubes, passing them into the pelvis, but I have recently heard of a case in which a part of the wall of the bowel was strangulated in one of the holes of a Keith's tube. I never use a rigid drainage tube, believing it to be a potent cause of faecal fistula and ulceration. Moreover, I think that there is no advantage to be gained by passing any tube into the pelvis or far among the intestines. The practice is fraught with danger of intestinal obstruction from contracting adhesions. All that is necessary is to pass a tube of very wide calibre right through the abdominal wall, its point only projecting about 1 in. into the abdominal cavity. A wick of gauze is passed through it and carried a little deeper than the tube, sometimes to the outer side of the caecum.

A retrocaecal abscess is best drained into the loin. The wound in the anterior abdominal wall can then be completely closed and a hernia avoided. When the disease extends into the pelvis it is much better to drain through the upper end of the vagina, because the abdomen can be completely closed and a hernia avoided. Moreover, the drainage is far more efficient and the patient gets well in a shorter time, often leaving the hospital at the end of three instead of six weeks, as happens when the pelvic abscess is drained above the pubis. When it is necessary to drain through the abdominal incision, I close the greater part of the peritoneal wound by means of a catgut suture, unless there is a grave reason for hurry. Stout salmon-gut sutures are passed through all the other layers and tied, except two or three placed where the tube is inserted. In most cases these are tied after thirty-six hours and a hernia is thus avoided. This plan is safer and simpler than giving a second anaesthetic for closing the wound a few days after the primary operation.

AFTER-TREATMENT.

Nothing need be said here about the after-treatment of the patients in whom no peritonitis exists at the time of the operation; but when either localized or spreading peritonitis has developed a great deal depends upon the after-treatment. In such cases it is necessary to do all that is possible to keep the intestines at rest, to deal with collapse, and to procure sleep. With these objects in view an injection of morphine and atropine is given before the patient recovers from the anaesthetic. This prevents the pain and restlessness which come on in bad cases as the patient regains consciousness. Only water is given by the mouth for at least twelve hours. A pint of saline is run slowly into the rectum directly the patient is returned to bed. This is more likely to be retained if morphine has been injected. If the patient is very collapsed at the time of the operation 1 pint of normal saline solution is injected into each axilla by means of the Lane apparatus, all of which can be sterilized; this is by far the quickest and simplest way of introducing the fluid. To prevent infection the skin must be thoroughly cleaned, and to avoid haemorrhage the needle should be passed right through the pectoralis major into the middle of the axilla. If the

rubber bag is suspended at a good height the infusion can be completed within ten minutes. The fluid is absorbed very rapidly, so that it is unnecessary to use such an elaborate and comparatively dangerous method as intravenous infusion, still used by those who do not know or who do not appreciate the advantages of the simpler method. In bad cases the initial axillary injection is followed by the continuous rectal saline infusion during the first twenty-four hours. In milder cases I prefer to have a saline enema given regularly every three hours. If carefully given it is generally retained.

To procure sleep the first night after the operation a dose of morphine may be injected subcutaneously, or 30 grains of aspirin may be added to a saline enema.

In the treatment of the shock strychnine is avoided, because clinical experience confirms the statement of Crile that strychnine is the surest method of producing shock. Alcohol is not much better. The effect of adrenalin is very transient, and the same is true to a lesser degree of the various preparations of ergot. Lately I have used subcutaneous injections of pituitary extract, which raises the blood pressure for several hours. Shock is rarely severe when the operation is completed, as it should be, within twenty or thirty minutes. The collapse, which is due to deficiency of fluid, is best treated by giving plenty of water by the mouth, by the rectum, or subcutaneously. It is particularly important not to give any purgative during the first two days after the operation; there is nothing more harmful. There is no need to get the bowels open for the first day or two, because they are generally fairly empty as a result of the vomiting and enforced starvation which usually precede the operation. Moreover, it is of vital importance that the small intestine should be kept at rest, for intestinal movements tend to disseminate the peritonitis. The purgative often fails to act, especially in the worst cases. Under these circumstances the drug is an irritant poison, and generally induces vomiting. The bowels generally act naturally on the third or fourth day, and often there is diarrhoea about this time. An enema given after the third day does no harm, and is useful to empty the lower bowel. If flatulence be troublesome, minim doses of oil of peppermint may be given by the mouth or a rubber tube with several perforations may be passed into the rectum and left *in situ* for an hour or more at a time. It is unfortunate that many people still believe that it is necessary to purge these patients. Some have an idea that if the bowels are not opened soon the patient will die. Others think that an action of the bowel is necessary for the excretion of toxins. There is no foundation for either belief. It is true enough that the bowels are paralysed in the worst cases in which the operation has been too long delayed, but no purgative will make the paralysed bowel act. My experience is that it increases the distension, probably by forcing the contents of the upper and comparatively healthy part of the intestine into the ileum, which is more or less paralysed.

The treatment of paralytic distension of the intestine is a difficult subject. Pituitary extract may be found useful, as suggested by Blair Bell, but in bad cases temporary enterostomy is the only thing likely to succeed. In several cases treated in this way I have been able, three or four days later, to close the fistula under a local anaesthetic. Three or four days after the operation laxatives and purgatives are not so dangerous, and it is often good to give small doses of nux vomica and belladonna, with the idea of keeping the intestines active at this stage to prevent them getting too adherent. The half-sitting position is very valuable to ease the breathing and to lessen the risks of subdiaphragmatic and pulmonary complications.

In the after-treatment of the wound, when drainage has to be adopted, the drainage tube is generally removed about the third day, and is replaced by a smaller one or by a wisp of gauze. In many cases when there is only a little discharge the stitches previously inserted are tied, almost completely closing the wound. When there is much discharge, drainage has to be continued for a longer time. When the discharge has the offensive smell characteristic of the *Bacillus coli*, the wound may be bathed and the dressing soaked with a weak solution of sodium hypochlorite or hydrogen peroxide. Healing is sometimes hastened by the use of *Bacillus coli communis* vaccine.

When drainage at the vagina has been adopted the tube is removed on the third day. If the temperature goes up again, the wound at the posterior fornix can be easily dilated with the finger to let out any collection of pus. A vaginal douche is used in these cases.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, January 29th, 1910, p. 245.

THE EFFECT OF ABDOMINAL COMPRESSION IN A CASE OF VERY RAPID HEART,

WITH INSPIRATORY OBLITERATION OF THE
RADIAL PULSE, FOLLOWING INJURY:
RECOVERY.

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WE know so little of the causes of the conditions at present described together under the common name of "paroxysmal tachycardia" that I may be excused for giving a fairly full description of the following case. Some additional interest attaches to it because, in its course, an inspiratory obliteration of the radial pulse (the so-called "pulsus paradoxus") was observed. I do not think that this inspiratory obliteration has been previously recorded in association with cases of this sort. Abdominal compression is a recognized method of treatment in "paroxysmal tachycardia," and in this instance it appeared to have been the chief means of saving life.

A gentleman aged 68, well built and healthy, was on April 3rd, 1909, thrown down by a large motor car which backed on to him. No bones were broken (as an x-ray examination proved), nor was there any cerebral concussion, but his right hip and thigh were bruised, as well as the left side of his face, and probably a certain amount of general shock was sustained. He was attended by Mr. Russell Coombe, removed to Miss Johnstone's Home Hospital, and placed under the best possible conditions. It is not unimportant to state that he seemed in no sense neurotic, being, in fact, very courageous, and, under the circumstances, most philosophic.

His pulse on the day of the accident was counted at 100, and between April 3rd and 10th it varied between 100 and 80. The accompanying chart shows this as well as the subsequent changes in the pulse until after his last attack of tachycardia. The pain in the bruised parts gradually subsided, but on April 5th, two days after the accident, he complained of severe abdominal pain and was sick three times; he had also hiccough and a great deal of flatulence. On April 7th and 8th he was more comfortable, but on April 9th he began to complain of an aching pain over the heart, with a good deal of flatulence and abdominal distension, and his pulse became rather weak, intermittent and irregular. On April 10th, just a week from his accident, Mr. Coombe and I saw him together. We found him in the condition described, with considerable gastric and intestinal distension. The heart was apparently of normal size, free from murmur, but with rather feeble sounds. There was slight pulmonary emphysema but no other lung trouble. The urine was normal. A mixture containing bismuth, soda, carboic acid, and nux vomica was ordered and a simple aperient.

During the day (April 10th) the pulse became very unsatisfactory, and Mr. Coombe asked me to see him again in the afternoon. The pulse was then very small, irregular, and intermittent, running about 100, and the patient was pale and perspiring. There was no dyspnoea, no distension of the veins in the neck, no sign of cardiac dilatation. There was no murmur or friction to be heard, only rather feeble sounds. He still complained of aching over the heart. He was ordered $\frac{1}{4}$ gr. of strychnine hypodermically every four hours with this four-hourly mixture: R Spt. aetheris nitrosi, spt. am. aromat., tinct. lavand. co., $\bar{a}\bar{a}$ m xv, aquam ad $\bar{z}$; also a tablespoonful of whisky every six hours. Under this treatment the pulse improved somewhat, remaining, however, very intermittent. Next day (April 11th) it rose further in frequency, and at 2 p.m. was running at 144. Small doses of digitalis were now given, and these reduced the rate as counted at the wrist. But this apparent reduction was only due to the digitalis increasing the number of beats which did not reach the radial artery, so on April 13th strophanthus was substituted, with small doses of ammonium bromide.

On the evening of April 13th the right saphenous vein became thrombosed. The pulse was then counted at 180. Next morning it was counted at 74. Cheyne-Stokes breathing was very marked on April 14th, and occurred occasionally for several days.

From this time until April 21st a very serious condition was maintained, the rate of the pulse varying greatly from time to time, as the chart shows, but being usually excessive, and often very rapid. At no time was there dyspnoea, cardiac dilatation,