

HARVEIAN LECTURES

ON

THE MODE OF DEATH FROM ACUTE INTESTINAL STRANGULATION AND CHRONIC INTESTINAL OBSTRUCTION.

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LECTURE I.—THE MODE OF DEATH IN INTESTINAL STRANGULATION AND INTUSSUSCEPTION, WITH REFERENCE TO THEIR TREATMENT.

I PROPOSE, in the following lectures, to bring before you some points connected with abdominal surgery, and to consider, first, how death is occasioned in intestinal strangulation and intussusception; and, secondly, how life is destroyed by intestinal obstruction. The pathological inquiry will be illustrated by cases,¹ and followed by some practical conclusions.

Hitherto, it has been the custom to place cases of strangulation of the bowel amongst those of obstruction, indeed, to consider them as only one of its forms; but there is, I am convinced, in this arrangement a grievous error; since, in strangulation of the intestine, obstruction is only one of its symptoms, but not the cause of danger or of death; whereas, in cases of intestinal obstruction, the obstruction is the prominent and dangerous feature, and from it, or it chiefly, the consecutive changes are brought about.

From this proposed plan of procedure, you will see that the basis of the practical conclusions which I shall draw will be laid upon pathological knowledge, and that what is to be done to save or prolong life, will be deduced from what is known of the changes which tend towards its destruction. I do this, moreover, under the assured conviction that it is by this method alone that the scientific practice of surgical art is to be promoted.

And, first of all, with reference to what is commonly called "acute intestinal obstruction," but which should be designated "intestinal strangulation," is it true that patients die from the obstruction—that is, from the arrest of the passage of feces along the intestinal tube? or is it more true that the obstruction is merely a symptom of some condition which, if not relieved, must bring about a fatal result; fatal, however, not from obstruction to the passage of feces through the lumen of the bowel, but from changes in the bowel itself and the parts above?

I believe this latter observation to be correct, and would adduce as proof the case of acute strangulated hernia relieved by operation or taxis, as the case may be, and in which the symptoms, however severe before its reduction, at once cease on this result being effected; although, possibly, no action of the bowels may be obtained for two or three weeks subsequently, the want of action not giving rise to any special symptoms. In fact, in this instance, as, in all other cases of an acute or like nature, the symptoms are directly due to the arrest of the circulation of the blood through the strangulated bowel, and not to the obstruction to the passage of the intestinal contents. The action of the bowels may, as a clinical symptom, be one of value to prove the patency of the intestinal tract, and to suggest, consequently, the completed removal of the cause of the strangulation; but it is well to remember that the symptoms excited by a strangulation of the bowel are not due to obstruction alone.

It was from a want of appreciation of this fact that the older surgeons gave purgatives in cases of internal intestinal strangulation, as well as in cases of strangulated hernia after its reduction; and it is, I believe, from the want of a full appreciation of the bearing of the same fact that, in examples of intestinal strangulation not hernial, practitioners seem, even at the present day, to trust too much to physic, and various manipulative and other acts, when there is nothing less than the removal of the strangulating cause from which the slightest good is to be anticipated.

¹ All the cases quoted in these lectures, unless otherwise expressly mentioned, have been under my own care, or that of my medical and surgical colleagues at Guy's Hospital. The *post mortem* book has been resorted to for illustrative cases in preference to the clinical, since, from it, the most unquestionable data are obtained.

To impress this point, allow me to consider briefly the mechanism of what is called strangulation, and to illustrate it as best seen in an example of strangulated hernia—though, whether the case be one of external or internal hernia, of volvulus or twist, or of strangulation by a band, the mechanical results are identical. And here let me say, when interference with the circulation is mentioned, it is to the venous and not to the arterial circulation that reference is made; and that, by interference to the circulation, is meant obstruction to the passage of venous blood from the parts strangulated to those below, the obstruction varying from mere slowing of the venous blood-current to complete blood-stasis. In a case of hernia, when reducible, the circulation through the displaced knuckle of bowel may not be interfered with; and, under such circumstances, no other symptoms than those caused mechanically by the swelling are found. But if, from some cause or other, the hernia become obstructed, and the venous circulation be retarded by the mechanical pressure of the contents of the knuckle, or any external cause, local symptoms of fullness, or even of pain, and possibly of some swelling of the tumour, may be produced; and, with these local symptoms, there will possibly be the general one of nausea and dragging at the pit of the stomach, passing on, if not relieved, to vomiting and severe local pain. When the venous circulation is entirely arrested, the local and general symptoms of acute strangulation show themselves by vomiting, paroxysmal abdominal pain, and, perhaps, obstruction.

These symptoms, it must be remembered, are the same in all forms of acute intestinal strangulation. They are alike in every variety of external as of internal hernia. When we are, therefore, called to a case of external or internal strangulation, we should mentally see either the gradually increasing venous congestion of the strangulated part, or its rapid congestion; we should picture to our minds the venous blood-congestion passing on to a more or less rapid complete blood-stasis; and, when this stage is reached, we must not forget that the death of the strangulated bowel is not far off. Let us remember that slight interference with the circulation through the bowel gives rise to symptoms of incarceration; that greater interference excites those of obstruction, and that complete interference produces those of strangulation, as signified by vomiting. Should the process of increasing congestion be slow, inflammation may complicate the change, as demonstrated by effusion, or possibly ulceration; should the process be rapid, static gangrene, the direct result of the venous blood-stasis, is the pathological result. When the blood-stasis is great, as it is in the acute forms of strangulation of the intestine, hæmorrhage from the bowel, as a mechanical result of the congestion, is by no means an uncommon complication. I have seen it many times in the acute congenital form of strangulated inguinal hernia, both in the form of extravasated blood into the knuckle of strangulated bowel in the hernial sac, as well as of extravasated blood into the intestine above the seat of strangulation. In some cases, blood may even be vomited, and passed *per anum*, as reported in Case XI. Under both circumstances, the hæmorrhage is clearly due to the suddenness, as well as to the completeness, of the arrest of the venous circulation at the seat of strangulation, and the mechanical rupture of the turgid veins from their overdistension. Such a condition of intestine, when seen in a hernial sac, is serious, but not necessarily of fatal import; it means that the intestine thus engorged is in the condition that precedes static gangrene, though it has not reached that state; and it should lead the surgeon, where the subject of the hernia is otherwise favourable for repair, to hope for a good result, since such blood-stasis is, so long as the bowel is alive, capable of complete repair.

In cases in which the strangulation is subacute, and in which the bowel above the seat of obstruction is much distended and full of feces, ulceration is often met with, the ulcers being due to the mechanical pressure and irritation of the fecal contents upon the distended and, possibly, inflamed bowel. Such ulceration is seen in the chronic forms of obstruction, as in the more acute varieties; and, in both cases, it is due to the mechanical irritation of retained feces. In other cases, the bowel may even rupture.

In the following cases of obstruction of the small intestine, due to the presence of a band, possibly the result of an antecedent hernia, these points are well illustrated.

CASE I. *Small Intestine Obstructed by a Band associated with Hernia; Ulceration of the Bowel above the Obstruction.*—James C., aged 46, was admitted into Guy's Hospital, under the care of Mr. Cock, on January 25th, 1869, and died twelve days later, on February 6th. He had been ruptured on the right side for years. Two days before admission, when carrying a sack of flour, he had sudden pain in his abdomen, which was soon followed by vomiting; but the bowels acted twice. The vomiting continued, with abdominal

paroxysmal pain and obstruction. The hernia was explored without benefit, omentum alone being found, and the man died, unrelieved, on the fourteenth day after the commencement of the symptoms. At the *post mortem* (88) examination, made by Dr. Moxon, the omentum was found ligatured, in a hernial sac, on the right side of the scrotum. The thoracic viscera were healthy. The abdomen was distended, and, when opened, distended coils of the small intestine were visible. This distension suddenly ceased at the right sacro-iliac synchondrosis, where the bowel was obstructed as follows. The last two feet of the ileum, and the corresponding mesentery, were fastened down to the psoas muscle by a band of old inflammatory thickening, the bowel being flattened rather than constricted. At the proximal end of the obstructed bowel, the distended coil hung down into the pelvis; the mesentery was narrowed, probably congenitally. The intestine, above the seat of obstruction, was full of ulcers from distension.

CASE II.—A female child, aged 9, was admitted in 1876, with severe symptoms of intestinal obstruction of thirteen days' standing. She died, unrelieved, on the fourteenth day. After death, the lower half of the ileum was found bound down to the spine by old peritoneal adhesions, and the distended jejunum was ruptured.

In the first case, the man lived fourteen days after the first onset of the symptoms, which were typical of what has hitherto been described as sudden intestinal obstruction, but what I would wish to call internal strangulation. The band causing the obstruction was not rigid, but was enough to flatten the bowel and so obstruct it as to interfere with its venous circulation, and to bring about distension of the intestine above and collapse of it below. The small intestine above was, moreover, ulcerated from distension. Had the man lived longer, it is probable that he would have died from perforation of the intestine from ulceration. In the second case, the jejunum was directly ruptured from overdistension; and in the following case, ulceration took place in the cæcum from obstruction backwards, the cause of the obstruction being an omental adhesion to the ascending colon.

CASE III.—It occurred in the subject of Alfred R., aged 37, who was suddenly seized, on January 27th, 1877, with abdominal pain, vomiting, and intestinal obstruction. He was admitted on the 28th, the day following his attack, when the abdomen was greatly distended, and relief was afforded by paracentesis with a fine trocar and cannula. This benefit was, however, only temporary, and the man sank on the eleventh day. After death, the cæcum was found to be enormously distended, and situated in the centre of the abdomen. In it were circular ulcers exuding fæces, with recent peritonitis. The ascending colon was wonderfully twisted with an omental band; and to this the obstruction was due. The descending colon was contracted and empty. In this, as in the former cases, the ulceration was due to the pressure backwards of the intestinal contents. In it, the walls of the bowel were perforated, and general peritonitis was the result. In the first case, a like result would have ensued, had the patient lived longer. In all cases of subacute strangulation, the probability of this result occurring should be entertained.

What bearing, then, should these facts have upon surgical practice? Are they such as to lead the practitioner to depend upon a Surgery of Hope, based upon the administration of drugs which mask symptoms, but do nothing towards the relief of the mechanical conditions upon which the symptoms depend? Or should they lead him to look boldly at each case as it presents itself, and to act decidedly and with precision? In a case of strangulated hernia, the rule is now well recognised that, on the appearance of vomiting—from the first occurrence of which symptom the date of strangulation is calculated—no time should be lost in the reduction of the hernia, either by taxis or herniotomy; for surgeons and pathologists well know that nothing less than the mechanical relief of the mechanical condition which is called strangulation in a hernia can be of essential service; and that, until this end be secured, opium only masks symptoms and brings about a fool's paradise, where the Surgery of Hope may exercise itself at the expense of scientific knowledge and patients' lives.

In a case of internal hernia, or of internal strangulation, from whatever cause—conditions ushered in by the same series of symptoms as indicate an external hernia, though without an external swelling—surely the same sound principles of surgery are equally applicable; and it behoves the surgeon, in the one case as in the other, to relieve the mechanical condition which is called strangulation by the only means by which relief can be afforded, and that is by operation.

In cases of external, or of internal, strangulation, the same series of changes that I have sketched out take place. In the one instance, as in the other, the slight retardation of the venous blood-current, which may, at first, have existed, becomes aggravated; the blood-stasis, which was, at first, slight, rapidly becomes more nearly complete, passing on to static gangrene. Under such circumstances, unless relief be found,

nothing but a fatal result is to be expected. Whether the cause of the obstruction be an internal hernia, a volvulus, or band, the mechanical condition called strangulation exists, and, unless this can be relieved, the end by death cannot be averted. To make a more special diagnosis as to the form of strangulation is not required; to wait for it, is often to wait for a *post mortem* investigation. An exploratory abdominal operation is the only scientific surgical proceeding, and this should be undertaken as soon as a diagnosis of strangulation is made. In the case of a patient suffering with symptoms of strangulated bowel, and the subject of an old hernia, the rule of surgery is to explore the hernia, and, if nothing should be found in the hernial swelling to explain symptoms, to explore the neck of the hernial sac or abdominal cavity. In a case of a patient suffering with symptoms of strangulated bowel, but without an actual hernia, I trust a like rule of practice will soon be followed; and that a surgeon, in the future, will at once, on the diagnosis of strangulation being made, explore the abdomen, first to find out the true cause of the strangulation, and, secondly, to relieve it. In either case, failure will often follow the attempt; but success is likely to attend an early effort, when it will fail to follow a late one. And where success ensues, it means a life has been saved that, under other circumstances, would to a certainty have been lost.

I am well aware of the objections which may be raised against this advice; that it may be said that, since the diagnosis of any given case is uncertain, the treatment of it should not be heroic; and likewise that, since many cases, which appeared to be hopeless, have recovered without operation, the surgeon is not justified in submitting his patient to an operative ordeal. I can only answer to the first of these objections, that an operation is only suggested in cases in which symptoms of acute intestinal strangulation, similar to those of an acute external hernia, are present, and that, under such circumstances, an exploratory operation for investigation, as well as for relief, is not only justifiable, but absolutely demanded. In the one case, as in the other, the object of the operation is first to find, and then to remove, the cause of strangulation.

With respect to the second objection, I would say that it is well known that, in cases of strangulated hernia, recovery sometimes takes place without operation; but that no prudent surgeon, on that account, would use such cases as an argument against operative interference. An operation in a case of strangulated hernia may not be absolutely necessary; nevertheless it is the surgeon's duty to propose it. With a like object, I hold that, with symptoms of acute intestinal strangulation, though recovery may possibly take place by natural processes without operation, there is every probability against such a result being brought about. Under these circumstances, therefore, I hold that an exploratory operation is not only justifiable, but right. By the general adoption of this practice, I feel convinced that more lives would be saved than by the expectant principle which now too generally predominates.

The following brief notes (extracted from my note-book) of cases in which relief could have been afforded by operation support this view. They are taken at random, and are only a few out of many that I could adduce.

CASE IV.—James H., aged 46, who had been ruptured two years, was admitted in 1869, with symptoms of acute strangulation of two days' standing. The hernia was explored, but nothing was found, and the man died unrelieved on the thirteenth day. After death, a band was found fastening two feet of the ileum to the psoas muscle. This band could have been divided.

CASE V.—A man, John P., aged 46, was admitted, in 1870, with symptoms of intestinal strangulation of nine days' standing, and died unrelieved. After death, a loop of ileum was found strangulated by the arching of the appendix cæci from its origin to its termination, which was attached to the promontory of the sacrum. This could have been released.

CASE VI.—A boy, William B., aged 15, was admitted, in 1871, with intestinal strangulation of twelve days' standing, and died unrelieved. After death, two feet of ileum, of a purple colour, were found in the right iliac fossa, embraced by a band of lymph springing from a diverticulum, given off from the ileum twenty-four inches above the cæcum, and attached at its other end to the base of the diverticulum, thus forming a complete loop, which could have been divided.

CASE VII. *Intestinal Strangulation: Laparotomy: Double Band, one divided.*—Frances C., aged 41, was admitted, under the care of Mr. Bryant, on January 19th, 1873. Four days previously, when carrying a bundle of wood, she felt something inside snap and give away. She had sudden pain and vomiting, which persisted, and became fatal the day before admission. When admitted, she had a femoral hernia on the right side, with abdominal distension, nausea,

and vomiting. On the same day, the abdomen was opened, and an omental band divided, but without success, as the patient died in twelve hours. At the *post mortem* inspection (18), the edges of the incision and the omentum, with the parts beneath, were glued together by lymph. All the coils of intestine were likewise glued together. A coil of strangulated bowel, three inches from the cæcum, was found in the pelvis, pressed upon by a band other than the one divided at the operation, passing from the broad ligament to the mesentery on the right side of the pelvis. A firm adhesion between the ovary and the omentum had been divided in the operation. If this second band had not existed, a successful result might have been recorded.

CASE VIII.—A man, William M., aged 58, came into Guy's Hospital in 1873, with every symptom of acute intestinal strangulation, and a swelling in his right iliac fossa. On the seventeenth day, his abdomen was explored, a band found and divided. The intestine, however, had ruptured. After death, the cause of the obstruction was clearly traced to a mesenteric band, which had strangulated two feet of ileum. In this case, the verdict of "Too late" might have been recorded.

CASE IX.—*Internal Hernia from Strangulation of the Bowel passing through a Hole in the Omentum.*—James A., aged 61, was admitted on January 11th, 1871. Ten years previously, he had had nausea and vomiting, with swelling of the abdomen. This had disappeared after four or five months, and he had since had good health. On January 8th, three days before admission, at 11 A.M., he was suddenly seized with gripping pain in the abdomen. At 6 P.M., he vomited. During the night the pain increased, and the vomiting became persistent. He was admitted on the 11th, with stercoraceous vomiting and central umbilical pain and tenderness. There was more fulness on the right than the left side. The pulse was 120, thready. He was ordered one grain of opium every four hours, and temporary starvation. There was no vomiting afterwards, and he slept. He sank on the 14th, death being preceded by black vomiting. At the necropsy (15), the lungs were found engorged. On opening the abdomen, wide coils of small intestine were alone visible. The colon was shrunken; the omentum was strained down tightly towards the right border of the pelvis, and appeared braced down around the end of the ileum. The lower three feet of the ileum were black, and placed in the recto-vesical pouch. These had passed through a hole, one inch in diameter, in the lower edge of the omentum. The bowel could be withdrawn from this with the utmost ease (as Dr. Moxon, who made the examination, reported). Above the constriction, the bowel was upwards of five inches in circumference; below that point, it was very small. The liver was small, and weighed only 40 ounces. The kidneys were healthy. In this case, relief could certainly have been given by an operation.

CASE X.—A man, Robert W., aged 30, nine days before his admission in 1871, was seized with sudden abdominal pain and vomiting, associated with constipation, and followed by collapse. He died, and after death the duodenum was found to have been constricted by a band of lymph attached to the colon above the sigmoid flexure. This could have been divided.

CASE XI.—A man, John W., aged 34, was admitted in 1882, with an inguinal hernia of eight years' standing, and symptoms of acute intestinal strangulation. The hernial swelling was tense, and the man collapsed. The hernia was reduced, and the man next day vomited blood, and passed blood and faeces. He soon died. After death, a narrow cord, three inches long, was found extending to the cæcum, over which the last four feet of gangrenous ileum were suspended and strangulated. The cord apparently consisted of a couple of obliterated vessels. This cord could have been divided.

CASE XII.—Samuel B., aged 60, was admitted on October 8th, 1881. He had been quite well until October 3rd, when, in walking, he felt sudden pain across the abdomen. Vomiting followed, and increased. Five days later he was admitted into Guy's Hospital, with not much abdominal distension. Right colotomy was performed, and the bowel was found to be empty. After death from peritonitis, coils of intestine were found moderately distended, being from an inch and a half to two inches in diameter. A contracted coil existed in the right iliac region, constricted by a ring of omentum, which, on further examination, proved to be formed by a hole in it. Eight inches of bowel were incarcerated, two feet from the cæcum.

I have thus given you nine cases of internal strangulation of the bowel, all of which could have been relieved, and possibly cured, had the rule of practice I am now advocating been carried out. In several of the cases in which the operation was performed, failure followed, from the measure having been applied too late. May the future record be more satisfactory!

CASE XIII.—I must now, however, give you the brief records of a

successful example which I published in full, in 1867, in the *Transactions of the Royal Medical and Surgical Society*, vol. 1, p. 65. It occurred in the person of a gentleman aged 51, who had had a right inguinal hernia for twenty-five years, for which he had worn a truss. The hernia had only given him trouble once, six months previously. Three days before I saw him with Dr. Wilkinson of Sydenham, during some violent exertion, the hernia partially descended, but it was at once readily reduced. Vomiting soon followed its reduction, with pain on the right of his umbilicus; and both symptoms became worse. On the third day, the vomiting was fecal. No hernia could be felt; and there was no fulness at the internal ring, and not even tenderness on deep pressure. His abdomen was fuller than natural; and there was a fixed pain, increased in paroxysms, on the right side of the umbilicus. No other hernia existed. An exploratory operation was at once suggested, and performed at the site of the old hernia; and, when nothing was found at the part, the excision was extended upwards along the semilunar line for about two inches. A band was then felt with the finger within the abdomen, which was divided by means of a pair of scissors, and a rapid recovery took place. The patient is now alive.

I could add many cases of what is known as displaced hernia, to demonstrate the value of the practice I am encouraging; for such may rightly be called internal hernia. But surgeons are all agreed upon the necessity of an exploratory abdominal operation in these cases—first to discover, and secondly to relieve, the cause of strangulation.

I will now pass on to consider how it is that death results from what is known as intussusception, and by what means life may be saved or prolonged in that condition. I find that in the necropsies of twenty cases, of which I have notes, ten being males, and ten females, death usually occurred from either gangrene of the entering and returning layers, or perforation by ulceration of the receiving or external; gangrene of the intussuscepted portion, as has been already explained in the cases of internal strangulation, being brought about by the obstruction to its venous circulation. When the obstruction is sudden and complete, the symptoms will be acute, as in a case of strangulated hernia. When it is slow or incomplete, the symptoms, as well as the pathological changes, will be chronic; and, under the latter circumstances, inflammatory changes will have much to do with the pathology of the affection. Under all circumstances, whether in the acute or chronic form of intussusception, inflammatory changes take place in the outside or receiving layer, from which the pathological records of Guy's Hospital reveal the fact that perforation or ulceration of the bowel occurs.

In acute cases of intussusception, therefore, the pathological eye of the clinical physician should see more or less complete blood-stasis of the intussuscepted bowel, with inflammation and ulceration of the outside or receiving layer; and in the chronic cases the same pathological eye should see like changes, but of a more chronic form. In the one, as in the other, the changes are certain, though they may vary, somewhat, in the speed with which they are brought about; but to the surgeon they suggest decision, and not delay. The two following cases illustrate these points.

CASE XIV.—*Intussusception of Peræum; Sloughing; Acute Peritonitis.*—Mary K., aged 49, was admitted into the Hospital on December 31st, 1879, and died on January 9th, 1880. Three months previously she had begun to feel pain in the abdomen, which at the same time commenced to increase in size. Nothing had relieved her. When admitted, she had loss of appetite, but neither nausea nor vomiting. The abdomen was large, and flabby, but not distended. At times she felt great pain, when lumps were felt travelling about the abdomen; there was also a gurgling of fluid therein. The bowels were acting about five times a day. On January 7th the abdomen was larger, and the pain in it more constant. A streak of blood also appeared in one motion. On January 9th she died. Six hours before death the pain was intense. At the necropsy (17), acute peritonitis was found, with lymph all over the distended intestines. A foot above the ileo-cæcal valve, the distension suddenly ceased. The lower end of the ileum, the cæcum, and colon, were empty and healthy. At one spot the bowel seemed to be crossed by a band, and to be sloughing; but, on examination, it was seen that this apparent band was the collar of an intussusception, and that the receiving layer, at its upper part, was sloughing, and perforated by several holes. The intussuscepted mass was about four inches long; it was flaccid, free from swelling, but of dark colour, and probably sloughing.

CASE XV.—*Intussusception of Peræum into Cecum; Perforation of the Bowel by Ulceration at the Neck of the Entering Layer; Peritonitis.*—Catherine McL., aged 5 months, was admitted on May 11th, 1874, and died on the 19th, the twelfth day of her illness. She had been

well until four days before admission, when she was seized with pains and retching in paroxysms of fifteen minutes. She was quiet during the intervals. This condition of things lasted for five days, when the pain ceased for a few hours; but it returned next day. She passed blood *per anum* on the first day of her illness, and two days later, but not afterwards. The abdomen was hard on palpation, but resonant; no tumour was to be felt. The bowels were opened three times; the motions were of a natural colour. On May 19th, she was much worse, and sank, the abdomen being tense. At the necropsy (174), the abdomen was found to be distended; no lump was to be made out. The peritoneum was pink. Semifluid feces were spread over the intestines. The transverse and descending colon were distended with the intussuscepted caecum and ileum. The ileum was perforated; attempts to reduce the intussusception caused complete laceration of the bowel where perforated.

In some cases, as in three of the twenty now being noticed, the bowel below the seat of intussusception was ruptured from the inflation employed to assist the return of the invaginated bowel; whilst, in another case, the child collapsed rapidly after inflation. Under all circumstances, therefore, the treatment by inflation is hazardous and dangerous, although success in exceptional cases may be recorded. I have before me the notes of three cases in which this treatment seemed to be successful. In acute cases, it is hardly applicable, since the strangulation of the intussuscepted bowel seems to require as active treatment as an acute strangulated congenital hernia. In the more chronic cases, such as in severity seemed to be parallel with cases of obstructed or incarcerated hernia, running on to strangulation, inflation may be justifiable, and even successful; but then it must be employed in the early days of symptoms, that is, within the first three days; later on, changes in the bowel are almost certain to have taken place, which would render the treatment by inflation or injection fruitless, and probably dangerous.

Under such circumstances, the treatment of intussusception by laparotomy seems not only expedient, but right; but it should be undertaken early, that is, on the formation of the diagnosis in acute cases, and in the more chronic on the failure of inflation employed within the first three days. When delay has taken place, and the probabilities of success following the operation of laparotomy are small, Nélaton's operation of enterotomy seems to suggest itself, that is, the formation of an artificial anus above the seat of obstruction; since by this operation relief is afforded to immediate symptoms, and time given for the pathological changes that follow sloughing and ulceration of the intussuscepted bowel to complete themselves in a satisfactory way.

The treatment of an acute intussusception by opium alone is as delusive as is the treatment of an acutely strangulated hernia or intestine by the same means; while the treatment of an intussusception by inflation is, as already explained, dangerous, although sometimes successful. To support this view, the following cases may be recorded.

CASE XVI.—Harry M., a boy, seven months old, was admitted into Guy's Hospital on January 11th, 1880, with every symptom of intussusception, and the presence of a tumour in his left hypogastric region. The bowel was inflated, and it was thought the tumour had disappeared. The next day, however, the tumour was as large as ever, and an operation was entertained; it was not, however, carried out, as, after the administration of chloroform, no tumour could be felt. The child died on the fifth day; and after death three inches of the ileum, with the caecum, were found intussuscepted into the colon. The bowel between the intussuscepted portion and the sigmoid flexure, was partially ruptured in many places. The peritoneal covering was cracked and turned out, and in the sacculi the longitudinal muscular fibres were torn and the transverse separated. There was also general peritonitis.

CASE XVII.—*Ileo-caecal Intussusception; Inflation; Rupture of the Peritoneal Coat; Extravasation; Peritonitis.*—The next case was also in a male infant. Alfred A., aged six months, was admitted into Guy's Hospital on November 23rd, 1873. The patient had been suckled entirely up to November 22nd, when it was not so cheerful as usual. During that day he was sick, and was in pain during the night. On November 23rd blood was noticed on his napkin, but there was no straining at stool. The bowels had acted on the 22nd. On admission, the child looked very ill. A tumour could be felt in the abdomen, of the size of a pigeon's egg, just above and to the left of the navel. The napkin was blood-stained. At 4.30 p.m. oil was injected into the bowel, but was rejected at once by straining. Chloroform was then given, and inflation tried, without benefit. The tumour became larger. Vomiting continued. Oil was again injected, but again without benefit. Next day the tumour could still be felt. Inflation was repeated. Suddenly

the abdomen became generally distended; no air escaped *per rectum*. The child became almost pulseless. The abdomen was punctured, and air escaped. The child died. At the *post mortem* examination (383), the peritoneal cavity contained a pea-soupy kind of material, evidently from the intestines. The descending colon was dilated into a horse-shoe shaped coil which occupied the loin. The left half of the transverse colon and the splenic flexure were constricted and perforated. A second opening was found, lower down the bowel, in the horse-shoe dilatation of the sigmoid flexure. The right half of the transverse and the ascending colon were discoloured, of a purple tint, and within this portion of the bowel was the ileum with the caecum. This included part could not be drawn out wholly. The mother of this patient had lost another child, six months old, eighteen months previously, also from an intussusception.

CASE XVIII.—*Intussusception; Inflation and Injection; Ruptured Peritoneal Coat of Bowel.*—The following are the notes of a third case. Mary W., aged 7 months, was admitted on June 11th, 1871, and died six days afterwards. On the day of admission, when the girl was quite well, the bowels acted at 7 A.M., and soon afterwards blood passed, and she vomited. She was admitted at 5.15 P.M., with vomiting, tender abdomen, and paroxysms of pain, as indicated by sudden screams. A tumour, about two inches long, was then felt in the left hypogastric region. Blood passed with every motion, and there was much straining. Inflation was employed, and, it was thought, with benefit. On the 12th, injections were used, without benefit. On the 13th, the symptoms continued. An operation was proposed, but, on chloroform being given, the tumour could not be felt. On the 15th, the child was sinking. She died on the 16th. At the necropsy, suction-lines were present; an intussusception, three inches long, was found in the middle of the epigastric region. The caecum and ascending colon had disappeared into the transverse colon. This was partially burst in many places, its peritoneum cracked and folded back, the torn edges now being agglutinated. The cracks were in a series, thus, § § § § § §. There were no signs of peritonitis in consequence of the injury. The constricted, or rather invaginated, part was of a deep purplish colour, and marked off by healthy lines from the other. The interior was ulcerated, particularly at the line of constriction at the point of entrance. The viscera were healthy. An early operation should have been performed.

CASE XIX.—*Ileo-caecal Intussusception; Inflation of Bowel; Collapse of Patient; Peritonitis.*—W. F., aged 7 months, was admitted into Guy's Hospital on December 5th, 1878. He had had pain in his abdomen since his birth. On November 28th, after taking the breast, he seemed in great pain, and his mother gave him some linseed-tea. He had also difficult respiration. Some congealed blood was afterwards passed *per anum*. On the 30th, castor-oil was given. On December 1st, he still passed blood, and on December 2nd vomited. He was then brought to the hospital, when an abdominal tumour was felt, and his admission advised. This was not done, however, until the 5th, when the vomiting became fecal. The intussusception was felt *per anum*. The bowel was inflated, and the boy became collapsed, and convulsed, and died. At the necropsy (463), when the abdomen was opened, the injection-lines of peritonitis were visible. The small intestines were only moderately dilated. On removal of the small intestines, the caecal and right colic region was found empty, also the region of the transverse colon. The whole of those parts were found in the left colic region to the left of the spine. The mass was felt in the rectum, and the finger could be, from the anus, introduced into the ileo-caecal valve. Inflation, manipulation, and pressure, failed to reduce the intussusception. There was no adhesion between the peritoneal surfaces of the bowel, the mucous membrane of which was sloughing, particularly near the valve. Much blood was extravasated into the intestinal coats. The viscera were healthy.

Might I ask, could the operation of laparotomy have been more fatal in these cases than that of inflation proved? Might it not, with a great probability, if employed early, have been more successful?

As to the causes of an intussusception, there may be some difficulty in finding a satisfactory explanation. Some local irritation is the most probable, but, in exceptional cases, the presence of a polypus will suffice. The attempt of the bowel to expel the foreign body in this case being enough to induce an invagination of the bowel. I can quote a case illustrating this fact, and likewise a second, in which the affection was due to an intussusception of a diverticulum of the ileum.

CASE XX.—*Polypoid Tumour of the Ileum; Intussusception; Acute Peritonitis.*—H. K., aged 42, was admitted on February 3rd, 1879, into Guy's Hospital, under the care of Dr. Moxon, and died on March 7th. She had had pain in the right side of the abdomen six months previously, aggravated by respiration. She had lain up for three

months, and having convalesced, went about for three weeks, when pain appeared at the umbilicus, which was not increased after taking food. She kept about for three weeks, when she was compelled to take to her bed. She then had diarrhoea, without much pain or tenesmus, and for three weeks had vomiting, which, latterly, had been extreme. When admitted, she had an anxious face, and was very thin. There was pain at the umbilicus, and upwards along the sternum, and across the epigastrium. On February 5th, the bowels were opened, and the motion natural. She had no vomiting. On the 8th, she vomited after eating bread and butter. On the 11th, the pain was constant; the bowels were opened naturally; there was no mucus in the motion. On the 14th, the pain was constant, but aggravated in paroxysms, with vomiting. On the 18th, compound colocynth pill was given, which operated quickly, and diarrhoea set in, which lasted until the 22nd. On March 7th, at 8 A.M., sudden intense pain arose, followed in one hour by vomiting. Morphia-injections and poultices relieved the pain, but the patient was collapsed at 2, and died at 5 P.M. A *post mortem* examination was made (88). The peritoneum contained much thin, purulent fluid, and one coil of bowel looked of a yellow colour. Many coils were greatly distended. After removal, when laid open, they measured five inches and a half. Below the umbilicus, an intussusception was seen of the small intestine, two or three feet above the cæcum. On this being laid open, it was found that the lower end of the intussuscepted mass had a solid tumour hanging from it by a short thick pedicle. It was of the shape of a chesnut, of a dark purple colour. No adhesions had occurred between the entering and returning layers of the intussuscepted part, which were greatly congested for about two feet. The polypoid tumour was made up of fibrous tissue.

CASE XXI. *Intussusception of Diverticulum Ilei; Peritonitis; Laparotomy.*—James C., aged 22, was admitted on July 24th, 1874; laparotomy was performed on the 25th; he died on the 27th. He had been healthy until four days before admission, when, after eating fish, he had abdominal pain and vomiting, which became worse, and his bowels ceased to act. When admitted, he was vomiting a brown fluid, the abdomen was tender, but not tympanitic. The urine was scanty; temperature 99°; pulse 140. There was no tumour to be felt. On the 25th Mr. Davies-Colley opened the abdomen, under the carbolic spray; and, after twenty minutes' search, found an intussusception, which he drew out. A copious motion followed, but the patient sank. At the necropsy (273) the peritoneum was injected. The small intestines were distended. At the distance of 2½ feet from the cæcum was a diverticulum; the intestine at the part was flaccid and congested. The tip of the diverticulum was still invaginated; and there was no doubt that the invagination of the diverticulum had been the cause of the intussusception, by acting as a polypus.

CASE XXII.—A man, aged 44, came into Guy's Hospital in 1877, with symptoms of peritonitis following obstruction. He died, and at the *post mortem* examination, an intussusception of the rectum was found, due to the forcing down, by the bowel, of a mass of colloid cancer, attached to the end of the entering portion.

The process by which such intussusception is formed is the same as that which expels a rectal polypus through the anus, and likewise gives rise to prolapsus recti.

By way of conclusion, I would lay down the following as rules of practice.

1. Laparotomy should be undertaken as soon as the diagnosis of acute intestinal strangulation is made. There should be no delay allowed for the formation of a specific diagnosis of its cause. It should likewise be proposed in all cases of acute intussusception, and of chronic, which have failed within three, or, at the most, four days, to be relieved by other treatment.

2. In all operations of laparotomy, it is to the cæcum that the surgeon should first advance, since it is from it he will obtain his best guide. If this be distended, he will at once know that the cause of obstruction is below; if it be found collapsed, or not tense, the obstruction must be above. Adhesions or bands, are, moreover, more frequently near to, or associated with, the cæcum, than with any other part of the intestinal tract. It is also in the right iliac fossa that the collapsed small intestine, in cases of acute strangulation, is usually to be found; and, with this as a starting point, the surgeon will have less difficulty in tracing up the intestine to the seat of strangulation than if he begins at a distended coil, when it will be a matter of chance whether he travels away from or towards the special object of his search—the seat of obstruction.

3. In a laparotomy, when the strangulated coil of bowel is gangrenous, it should be brought out of the wound, and the gangrenous knuckle resected. The proximal and distal ends of the resected bowel should then be stitched to the edges of the wound, and an artificial anus established.

4. Nélaton's operation of enterotomy should be undertaken in all cases of intestinal strangulation, when laparotomy is rejected or seems inapplicable, as well as in cases of intussusception in which the invaginated bowel cannot readily be released. It should be performed in the right groin, or, rather, right iliac fossa.

5. If laparotomy succeed, the cause which called for it is removed, and the normal action of the bowel is restored. If resorted to early, and as a rule of practice, it is probable that it would be more successful than the treatment, by opium, inflation, or purgatives, which has hitherto been in vogue.

ON THE CONDUCTION OF PHYSICAL SIGNS IN DISEASES OF THE LUNGS.

Read before the Medical Society of London.

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IN the case of diseases of the heart, it is universally recognised that the physical signs by which certain morbid conditions are detected, are conveyed to varying distances from the site of their origin, and are transmitted by the different structures in the vicinity, and that the tissue of the lungs themselves takes its share as a conducting medium. Thus, it is well known that a cardiac murmur, if sufficiently marked, will be audible not only along the line of the heart and great vessels, but also over a certain region of lung, adjacent to the heart; and that, in the case of a very loud murmur, the sound may be heard over the whole of the pulmonary area. Hence it is a well-established clinical fact, that lung-tissue is a fairly good conductor of sounds developed by morbid conditions.

As far as my experience has gone, I have seen reason to believe that in the case of diseases of the lungs themselves, it is not so generally recognised that the physical signs which exist may be detected at a distance from the spot where they originate. It has repeatedly fallen to my lot to meet with instances where this fact has not been duly appreciated; and, I may observe, that it is not usually insisted upon in text-books. I have, therefore, ventured to bring before you, to-night, the subject of the conduction of physical signs in pulmonary disease, in the hope that it may be of some service to draw attention definitely to a point, the practical importance of which will be readily recognised.

I proceed, then, briefly to illustrate the following propositions.

1. Physical signs due to disease of a limited portion of lung may be conveyed by the surrounding tissue, so as to be recognised at a distance from the site of the lesion; as in front, where the disease is at back of the chest; in the lower part, where the disease is in the upper; or over the sound lung, where one lung only is affected.

2. It is, consequently, as important to trace to their origin the physical signs dependent upon lung-disease, as it is to follow out those of a cardiac lesion.

The first case in which my attention was definitely drawn to this subject was one which occurred at University College Hospital during my student-days. A patient, with the signs of left pneumothorax—tympanitic percussion-note and the usual auscultatory phenomena—presented the same signs over the upper part of the right side of the chest, and it was therefore supposed that there existed a limited pneumothorax on the right, as well as general pneumothorax on the left, side. After death, it was found that there was no air in the right pleura, but that the apex of the lung was consolidated, and had conveyed over to the right side signs derived from the left; just as a solid tumour in the thorax may transmit physical signs produced in the lung-tissue with which it lies in contact.

Since that time, I have frequently met with illustrations of the same fact. I will briefly give a few examples.

A patient was admitted into the Bristol General Hospital with acute lobar pneumonia of the left base—the usual signs being present. There was, in addition, tubular breathing over the right base, so marked as to have led to the diagnosis of consolidation of this base also. It was pointed out, however, that dulness and increase of vocal fremitus were absent on the right side, and that vesicular breathing existed, through which the tubular was heard. The patient died, and the *post mortem* examination proved that consolidation existed at the left base only.

A man was admitted into the hospital, with the right pleura almost full of fluid. Bronchial breathing existed near the spine on the affected side, and was conducted over to the sound side, as far as three inches