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1. Intussusception.
2. Volvulus of Sigmoid
3. Strangulation by Meckel's Diverticulum.

Read before the Section of Surgery and Anatomy at the Forty-fourth Annual Meeting of the American Medical Association.

BY
A. J. OCHSNER, B. S., F. R. M. S.
CHICAGO, ILL.
Surgeon in Chief of the Augustana Hospital, Consulting Surgeon of the Hospital for Women and Children.

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1. Intussusception—2. Volvulus of Sigmoid—3. Strangulation by Meckel's Diverticulum.

In reporting these cases of acute intestinal obstruction, due to mechanical causes, I am aware that so small a number of cases cannot have any definite influence upon the plans of treatment which have been discussed with so much vigor in the medical societies in all parts of the world, especially since the general introduction of antiseptic surgery has made surgical treatment, theoretically at least, very attractive.

The fact that individualization is of especial importance in cases of intestinal obstruction makes each additional observation of some value.

I need not detain you by discussing the general subject of intestinal obstruction. This has been done so thoroughly by men of great experience in almost every civilized country, and especially well by our own Professor Senn, that I can certainly not improve upon it. I will consequently at once proceed to consider the cases which I have treated:

Case 1.—December 15, 1892, I was called to see Edwin N., a bright, healthy child, 3 years of age, at 741 N. Clark St. His physician, Dr. O. N. Huff, gave me the following history: A week ago the child fell a distance of a foot or two, and

complained of a little pain in the region of the cæcum for a few moments, but almost immediately resumed his play. From that time he repeatedly had small twinges of pain in the same region but not severe enough to cause any anxiety on the part of his parents. Within the last six hours he began to suffer severely from pains in the abdomen and to complain of nausea.

The pain was very severe and spasmodic, and during the attacks the abdominal walls were tense and a hard sausage-like mass could be felt and seen to the right of and a little below the umbilicus. A rectal examination gave a negative result. The child had a constant inclination to evacuate the bowels, but the attempts remained fruitless, exeept there was a small amount of mucus passed once or twice.

Dr. Huff and Dr. R. G. Bogue, who had already examined the case, made the diagnosis of intussusseption, which I readily confirmed. I immediately proceeded to perform an abdominal section. After the patient was anæsthetized, the abdomen was washed and shaved, then washed again with soap and water and with strong alcohol. An incision four inches long was made in the median line below the umbilicus. The transverse colon was brought out of the wound and was found to contain an invagination of six to eight inches each of the ascending colon and the ileum. There were no adhesions and the serous surfaces were not inflamed; nevertheless it required a considerable amount of force applied alternately by pressure from below and by traction from above to reduce the intussusseption. The vermiform appendix, which was five inches in length and almost without any mesentery, had formed a loop around the ileum at its point of entrance into the cæcum. I ligated the appendix at its origin, disinfected the stump with strong carbolic acid, inverted it into the lumen of the cæcum and covered it with a fold of the peritoneum from either side, by means of a few fine silk stitches threaded in ordinary cambric needles. The peritoneal cavity was then closed with silk stitches grasping all the layers of tissue of the abdominal wall.

A sufficient amount of morphia was administered during

the first four days to control pain and to lessen peristalsis; on the fifth day a small glycerin and warm water enema was given which effected a slight evacuation of the bowels. A daily evacuation was obtained in the same manner after this for the first two weeks. The stitches were removed on the ninth day. The wound healed primarily throughout. Rubber adhesive straps were used to support the abdominal scar for six weeks after the operation.

There was scarcely any deviation from normal in pulse and temperature after the operation, and the child showed almost no shock. He was permitted to sit up three weeks after the operation and to walk about a week later. His diet consisted of milk and broth for four weeks, and of very simple and easily digested food for two months more.

The child is in perfect health at the present time, six months after the operation.

In this case it is probable that at the time of the original fall the vermiform appendix was thrown around the ileum, causing a slight constriction, and that this in turn gave rise to the intussusception; consequently the removal of the appendix would be likely to prevent a recurrence. This peculiarity in this case seems to me to be of especial interest.

It was deemed wiser not to attempt to reduce the intussusception by means of large enemata, because we could not be certain as to the condition of the intestine nor the anatomical cause, which evidently must have been connected with the fall. Moreover, the intestine has been ruptured upon applying as low as five feet of hydrostatic pressure[1] and it seemed apparent to all who examined the case that it would require much more force to reduce the intussusception with the conditions present; for the same reason insufflation with air was omitted. The conditions we found upon opening the abdomen fully confirmed our previous conclusions.

Case 2.—Isaac Libin, a German laborer 32 years of age, who had formerly always enjoyed good health, came under my care January 29, 1893, giving the following history: Five days before, while walking in the dark, he stumbled

and fell into a ditch two or three feet deep. He experienced a slight amount of pain in the left inguinal region but paid no attention to it. Two days later he began to suffer throughout the abdomen, the pain becoming very severe about twelve hours before I saw him. The patient's abdomen had become tympanitic and he had suffered from nausea. There had been no evacuation of the bowels for five days and no passage of gas. The patient had the appearance of a strong healthy man suffering from a very severe acute disease, giving him an anxious look.

There was a globular enlargement in the lower part of the abdomen, a little to the left of the median line. The patient suffered severe colicky pains and requested that something be done at once. Cathartics and enemata had been administered for two days with great persistence but without effect.

My diagnosis in this case was volvulus, probably of the sigmoid. Two hours, and one hour, previous to my seeing the patient, my assistant had given him hypodermic injections of morphia, one-fourth of a grain each time to control the pain.

The skin covering the abdomen was at once cleansed, disinfected and shaved.

An incision was made in the median line, at first three inches long and enlarged to twelve inches after the preliminary examination. A volvulus of the sigmoid flexure was easily discovered. The intestines above this volvulus, both large and small, were considerably distended, but the portion of the colon composing the volvulus which was apparently two feet in length, was enormously distended having the appearance of an inflated stomach, its diameter being nearly twelve inches. It was impossible to reduce this volvulus within the abdominal cavity; it was therefore permitted to protrude through the incision, when it was reduced by making a half turn. It was again impossible to return the largely dilated intestine into the abdominal cavity; consequently an assistant carefully dilated the sphincter-ani muscles and introduced a large soft rubber tube, similar to a stomach tube, into the rectum and up into the dilated colon. This permitted the gas to escape, which at once

reduced the size of the intestine sufficiently to allow its replacement in the abdominal cavity. The intestines had in the meantime been protected by the use of towels wrung out of warm sterilized water.

The abdominal wound was closed with silk sutures grasping all the layers of tissue of the abdominal walls. The rubber tube was left in place in order to secure the continued escape of gas. The operation was completed in fifty minutes.

No food was administered for forty-eight hours; at the end of this time the patient was given small quantities of milk and lime water every two hours. The temperature rose to 101.4 F. during the first twenty-four hours after the operation. The pulse never exceeded 116 beats per minute. After the second day the temperature remained normal, and the pulse varied from sixty to ninety beats per minute. After the fifth day the bowels moved daily under the use of enemata. The patient was limited to liquid diet and was advised to be careful about his food for several months after leaving the hospital. The wound healed primarily and the patient was discharged from the hospital in an excellent condition March 1, 1893, just thirty days after the operation.

This case illustrates the principle laid down several years ago [2] by von Wahl, and explained experimentally by his assistant,[3] that the presence of an abdominal dilatation and fixation, of an intestine, perceptible by inspection or palpation, indicates the presence of strangulation. It is plain that relief can be obtained only by means of an operation in patients suffering from a strangulated intestine. It is claimed that in very rare cases the patient has been relieved by the formation of adhesions followed by ulceration, causing an anastomosis; but this seems so unlikely to occur that the surgeon can not hope for such an issue in any given case. In this case peritonitis had not occurred from the introduction of microörganisms [4] into the peritoneal cavity through the walls of the intestine; a serious condition which

would undoubtedly have followed had the operation been postponed for several hours.

The advantage derived from stretching the sphincter-ani muscle and the introduction of the rubber tube into the enormously distended colon in this case should not be under-estimated. It not only enabled me to replace the intestine with greater ease and less strain upon the patient, but it prevented the further accumulation of gas in the colon after the operation.

The contractile power of the circular muscles of the colon had been much lessened by the over distention; notwithstanding this, gas passed freely through and along the sides of the rubber tube which was left in place for four days, being moved slightly several times a day to prevent harm from pressure.

When emptied of gas and replaced, it did not seem necessary to fix the sigmoid to prevent a recurrence, because the intestine maintained its position without any support. In this case this could not have been improved by forming folds of meso-colon parallel with the gut[5] as this would have caused a bunch-like arrangement which in turn might have interfered with the fecal circulation. Suturing the meso-colon to the parietal peritoneum[6] or stitching the colon itself in the same way with a few sutures[7] was contra indicated by the condition of the intestine resulting from the enormous dilatation. It seemed to me that the least possible amount of disturbance of the intestine or its mesentery would be of especial importance in preserving the organ.

No further attempts at irrigation or insufflation were made before proceeding to operate, because this method appears to be of very doubtful value, except very early in the treatment of volvulus, for the reason that one cannot determine the power of resistance of the diseased intestinal wall.[8]

Notwithstanding the fact that it has been demonstrated upon the cadaver long ago[9] that volvulus can be reduced by insufflation of air, the conditions are

so different that experiments on the cadaver are of very little value.

The use of massage [10] seems too dangerous and too little promising to be considered under the condition in which I found the patient. Moreover, large enemata had been employed patiently and persistently before the patient came under my care.

Case 3.—In the night of Febuary 27th, 1893, a neighboring physician requested me to see Mr. Daniel B. of 326 Mohawk St., in consultation with him. The patient was 81 years old; had always been well and was at the time in fair general condition, with the exception of showing symptoms of acute shock.

Four days previously he had suddenly experienced a severe abdominal pain at a point a little above and to the right of the umbilicus. The severity and the location of the pain suggested biliary colic to the attending physician. An anodyne was prescribed and the pain disappeared. The patient remained quiet and suffered but slightly during the following two days, but on the next day the pain became more severe, and during the day of my visit had increased in violence notwithstanding the use of morphia. The patient had been nauseated all day, and had vomited repeatedly for six hours. During the past two hours he had vomited sturceraceous matter.

I found the abdomen distended uniformly, and there was no point of dullness upon percussion. The patient was perfectly rational; his temperature was 99° F.. his pulse, 120 beats a minute.

The diagnosis of intestinal obstruction in the region of the small intestine was made, but there was nothing in the history or the conditions present to suggest an anatomical diagnosis.

Preparation for laparotomy were made at once because the shock had increased very markedly during the last two hours. The patient did not take ether or chloroform kindly; his pulse increased and his breathing was very irregular; the abdominal muscles did not relax at any time during the operation. An incision six inches in length was made

in the median line, extending downwards from a little above the umbilicus. A reddish fluid similar to that contained in a hernial sac of an old strangulation, escaped upon opening the peritoneal cavity. The intestines were severely distended, and several loops showed marked congestion and roughness of the peritoneal covering.

Introducing the hand into the peritoneal cavity I at once found a hard mass in the left iliac region. Opening the wound over this point by means of blunt retractors, I found a loop of small intestine about one foot in length, which had slipped through beneath a Meckel's diverticulum, originating from a fold of the ileum, and being attached by its apex composed of a fibrous band, to the mesentery. The adhesions were very firm, and had evidently existed for years. It was impossible to reduce the intestine which had become strangulated, consequently I ligated the adhesions double with strong fine silk, and cut between the two ligatures.

On account of the patient's age and his depressed condition I did not deem it wise to prolong the operation by removing the diverticulum. The loop of intestine did not appear sufficiently injured to demand a resection; I therefore completed the operation by sponging out the abdominal cavity and closing it in the usual way.

The operation was completed at one o'clock in the morning, having occupied forty minutes. The patient died thirteen hours after the operation without recovering from the shock, although he was rational to the end. He had several evacuations of the bowels through the day, but the vomiting continued. This might possibly have been avoided, had the patient's stomach been emptied and irrigated through a stomach tube previous to the operation. This should never be neglected if the patient has vomited freely; and particularly if there has been vomiting of sturceraceous matter.

It is likely that the loop of intestine slipped through the opening on the first day, but that it did not become strangulated until about twenty-four hours before the operation, the cause being an in-

crease in the œdema of the band and the intestine. In a younger patient the prognosis would have been very much better.

It is questionable whether an earlier diagnosis might not have been possible. It was, of course, obstructed by the fact that the pain was referred to the region of the gall bladder at first, and the cessation of pain after the use of morphia. The absolute obstruction to the passage of feces and of gas might have sufficed in completing the diagnosis. It is possible that careful auscultation[11] might have determined the seat of obstruction.

There was no congenital deformity[12] in any other part of the patient's body, which occasionally makes it possible to form a probable diagnosis of obstruction due to a Meckel's diverticulum. Besides the classical signs and symptoms of acute intestinal obstruction viz: (complete constipation; vomiting, first the contents of the stomach, then bile, then intestinal contents; if the obstruction was high, or if peritonitis had occurred; periodical pains; localized tympanitis early, general tympanitis later; violent peristalsis above the seat of obstruction); I noticed in each of these cases an absolute abhorrence of any form of food, and a constant desire for water.

The important points regarding this subject, seem to lie in securing as accurate a history as possible regarding previous sickness and especially previous attacks of a similar character; also the habitual condition of the patient's bowels. The history of an injury or of an over exertion is important. The apertures at which herniæ occur should be carefully examined and also a rectal examination should be made. The abdomen must be inspected for the recognition of violent peristalsis, which may determine the point of obstruction because peristalsis is entirely above that point. Irregularities in contour should be observed. The abdomen should be palpated in order to determine the presence of any point of resistance. Auscultation should be practiced pa-

tiently because there is no peristaltic murmur at the point of obstruction.

The abdomen should be percussed because a metallic sound can sometimes be elicited from a point above the obstruction, and a tympanitic sound over the strangulated intestine.

If a loop of intestine is strangulated, the patient has the general appearance so familiar to us in strangulated hernia. If the abdominal walls are tense, infection of the peritoneum has already occurred.

As soon as the diagnosis has been made these patients should be operated upon, first having tried carefully the use of injections, insufflation and massage to a safe extent, and that only at an early stage of the disease. Strangulation is sure to follow, which will permit the transmission of microörganisms into the peritoneal cavity. The intestine will become paralyzed by over distention and some portions may become gangrenous.

It is well to operate during the first twenty-four hours [13] after the occurrence of an acute intestinal obstruction.

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[1] Dr. J. D. Mortimer, Lancet, May 23, 1891.
[2] v. Wahl, Centralblatt fur Chirurgie 1889, No. 9. v. wahl, Langenbeck's Archiv. fur Klinische Chirurgie, Vol. 38.
[3] B. Kader, Langenbeck's Archiv. fur Klinische Chirurgie, Vol. 42.
[4] Paul Reichel, Deutsche Zeitschrift fur Chirurgie, Vol. 35.
[5] Senn, Medical News, 1889, and Intestinal Surgery, p. 104.
[6] Roser, Centralblatt fur Chirurgie 1883, No. 43. Nussbaum, Deutsche Chirurgie, 1880.
[7] Braun, Archiv. fur Klinische Chirurgie, Vol. 43.
[8] Frederick Treves, British Medical Journal, Aug. 29, 1885.
[9] J. Heiberg, Virchow's Archiv. fur Pathol. Anat. Vol. 54, 1872.
[10] Johnathan Hutchinson, Archives of Surgery, London, Vol. 1, 1889.
[11] L. Rehn. Langenbeck's Archiv. fur Klinische Chirurgie, Vol. 43.
[12] Oderfeld, Lancet, Jan. 30, 1892.
[13] Obalinski, Archiv. fur Klinische Chirurgie, Vol. 38.

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