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Resection and Circular Enterorrhaphy by Maunsell's Method, Followed by Complete Recovery; with Remarks on Multiple Intestinal Strictures.

BY

RUDOLPH MATAS, M.D.,

OF NEW ORLEANS, LA.

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MULTIPLE (TRIPLE) STRICTURE OF PROBABLE TUBERCULAR ORIGIN WITHIN THIRTEEN INCHES (33 CM.) OF THE JEJUNUM.

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WHILE the comparatively recent contributions of Bouilly, Schier, Billroth, Durante, Czerny, Koenig, Salzer, Hofmeister, and others have fully established the importance of the tubercular process as a frequent and most important cause of stricture in the ileocecal region, the occurrence of multiple stricture of the small intestine attributed to this cause is not so generally recognized, and I trust that reference to this subject, and the presentation of an illustrative case, will not be considered superfluous. I have been prompted to present this observation not only because I believe that the subject itself is worthy of agitation, but also because the type of the strictures observed and the multiple character of lesions in the jejunum, so far away from the favorite seat of tubercular infection, viz., the ileum and the ileocecal region, justify its present record as a rare occurrence. Furthermore, as an illustration of the value of enterectomy and the method adopted in performing it (Maunsell's method), I believe it also presents technical features which may have some bearings on the history of the operative treatment of this condition, which is still in process of evolution.

In the latter part of April, 1896, I was consulted by Mr. W. H., of Texas, a civil engineer, for the relief of an obscure

complaint which had very gradually but progressively undermined his health during the last 20 years. He is a tall man, over 6 feet in height, and 46 years of age. When the patient was referred to me through the kindness of my colleague, Professor Elliott, he presented an exceedingly thin, weak, and gaunt-looking appearance. In addition to his profound emaciation, his face indicated long and continuous suffering. He at once referred all his troubles to his abdomen, which had been the seat of paroxysmal attacks of pain, of variable intensity, since 1869, and which, in view of their repeated occurrence, foreshadowed the more serious complaint that now existed.* His troubles had not become distinctly localized until about 2 months ago, when he felt a slight but distinct tumefaction in the left umbilical and lumbar regions. The appearance of this swelling coincided with a most violent paroxysm of pain, vomiting, fever, and constipation, which threatened his life for several days, when the acute symptoms gradually subsided, leaving a large, tender mass, which is at present distinctly recognized on abdominal palpation.

Upon examination I found the abdomen exceedingly thin and retracted. By palpation and inspection a distinct tumor could be recognized in the lower part of the left half of the abdomen. The center of the swelling occupied a spot which was crossed by a line drawn from the umbilicus to the left anterior superior iliac spine. In size, contour, and mobility the tumor suggested a large movable left kidney. The mass could be moved up and down from the costal arch to the iliac crest; laterally from the umbilicus to the lumbar region. The mass spontaneously shifted its position, and was larger at times than at others. An experienced physician, who had seen him at his home, believed that this was a floating kidney, which caused crises of abdominal pain from torsion of the pedicle. He had consulted numerous physicians during the many years that he had suffered with his complaint. In the beginning of his complaint he was treated for gastralgia, then for intestinal indigestion, gall-stones, renal colic, etc., but nothing gave him any permanent relief. His description of his symptoms was, nevertheless, very striking and suggestive.

When he came to me he could eat anything, as far as simple admission of food into the stomach was concerned. His stomach accepted all food without rejecting it, but about two hours after ingesting his meals he would begin to suffer most intolerable and agonizing pain in the left hypochondriac and umbilical regions, which was accompanied by persistent nausea and vomiting. This condition of intolerable suffering would culminate in such unbearable and agon-

* From 1871 to 1877, while at school, he was almost entirely free from pain. In 1879 he had a spell of vomiting and purging, with intense abdominal pain, which confined him to his bed eight weeks.

izing pain that only large doses of morphin (one and two grains), administered hypodermically by his wife, would suffice to quiet him. At times, when he committed any indiscretion in his diet the pains were so violent that even morphin failed to relieve him, and chloroform by inhalation had to be appealed to to allay his sufferings. Coarse food, fruit, and vegetables were always certain to provoke these attacks. When he limited his nourishment to milk and soups he suffered less pain. After years of experimentation with various articles of diet, he finally gave up everything but milk and beef-tea. Lately even milk would disagree with him, and following the advice of his physicians he had been compelled to resort to nutrient enemas to assist his nutrition. His condition became very much worse after the appearance of the abdominal tumor. After the lump had formed he soon realized that any indulgence in solid food might cost him his life, so that when I saw him he lived on an exclusively fluid diet. In the vomiting that followed the ingestion of even soft, semi-fluids (eggs, oatmeal, corn-meal) he noticed that frequently no relief would come to him until he had expelled every particle of the food taken.

He described his abdominal pains as "colics," which began intermittingly, but rapidly became continuous and agonizing. Before the acme of the paroxysms was reached he felt his bowels contracting and twisting in an indescribable manner, but these movements were soon lost to the touch, owing to the extreme rigidity of the abdominal muscles, which became spasmodically contracted and hard as a "wooden board." His bowels were usually constipated, a condition which he attributed to the frequent use of morphin, and he was often compelled to resort to purgatives, salines, Seidlitz powders, and castor-oil to relax them. At times a diarrhea would set in without any assignable cause.

In view of the progressive aggravation of his condition, he finally decided to have a radical operation performed that would release him, no matter at what risk, from his present "martyrdom."

In questioning him as to his family-history, I learned that he was the descendant of very healthy and long-lived parents, except a grandfather on the paternal side, who had succumbed to some pulmonary trouble. His contemporary relatives had not suffered from known pulmonary or cancerous lesions; he had no children. As far as his personal history was concerned, he said that up to the age of twenty he had enjoyed exceptionally good health. He had never had any suspicion of venereal disease; he never indulged in alcoholics. He remembered, however, that in his childhood he had a protracted and rebellious diarrhea, from which he had apparently fully recovered when the first signs of his present illness (occasional colics) led him to remember his early bowel-ailment, though he failed to associate this with

his present condition. He had had malarial intermittent fever in his childhood and pneumonia in 1872. A careful general examination failed to reveal any sign of disease in any part of the body but the abdomen.

In my mind, the history given by the patient clearly indicated an obstructive intestinal lesion, but what was the nature of the obstruction, what the character of the tumor that was now so clearly discernible in the abdomen —was not so plainly defined. The long period of time that had elapsed since the beginning was not compatible with the primary existence of a malignant neoplasm—the tumor in the abdomen having developed suddenly and only in the previous two months.

A secondary carcinoma of the intestine engrafted upon an old intestinal lesion was possible, however. A displaced kidney following the relaxation of the peritoneum, consequent upon a progressive emaciation and fat-absorption (nephroptosis), suggested itself as another possible diagnosis. But the right kidney was not displaced, and there was no evidence of the relaxation and displacement of the colon or other viscera which Glenard and others have so clearly described as "enteroptosis" and "splanchnoptosis," and which is so likely to be associated with fat-absorption and peritoneal relaxation.

Then there were no reflex renal symptoms; no abdominal sensations referable to the bladder or urinary apparatus, which are likely to exist in such cases. In addition, the urine was perfectly normal, though scant and of high specific gravity. The possibility of simple stricture from previous ulceration did not suggest itself, as the patient's history of previous diarrhea in early childhood was not remembered until subsequent events and cross-questionings on my part served to revive the recollection of an early bowel-complaint.

Other possible conditions, of course, suggested themselves to account for the tumor, but none appeared sat-

isfactory or conclusive. I, therefore, could not arrive at any complete diagnosis, except that there was some form of obstruction of the bowels associated with the development of an abdominal tumor of unknown nature and origin, but probably connected with the small intestine. I, therefore, agreed with the patient that the best course to pursue would be to perform an exploratory celiotomy—a conclusion which he hailed with great satisfaction.

The man was admitted to the New Orleans Sanitarium, and after a few days of careful preparation, during which he was given gentle laxatives and strengthened with hypodermics of strychnin and digitalin, and by enemas of peptonized foods, he was operated on on April 24, 1896. Under ether a median incision was made between the umbilicus and pubis large enough to allow the hand to palpate the mass. No clear idea could be obtained of the nature of the tumor until it was brought to the surface, where it was recognized as a loop of small intestine, which was twisted upon itself very much like an elongated (Ω) omega. It was largely covered by the omentum, which was firmly adherent in many places. In addition to this it was plastered and held in its peculiar shape by bands of old peritoneal exudates and pseudo-membranous formations. After enlarging the abdominal incision a little further, the entire loop of bowel with its mesentery was completely extruded from the abdominal incision, and a search was made for further abnormalities in the remainder of the intestine, but none was discovered. The bowel was traced upward toward the stomach, and at a distance of about 3 feet from the tumor the terminus of the duodenum was recognized at the crossing of the superior mesenteric artery. Further exploration of the small intestine downward from the tumor, toward the cecum, revealed a perfectly normal condition.

A further examination of the diseased loop showed that it was evidently a portion of the jejunum. The valvulæ conniventes were in some places remarkably thick and large, and could be distinctly felt through the bowel-walls, which were abnormally dilated above the loop. It was difficult to determine that the abnormal bowel was strictured at all until several bands of adhesions and masses of adherent omentum which covered it had been removed. It was then easily perceived that the bowel was contracted and very thick in several places. The coats of the bowel in the loop were thickened throughout. In some places where the omentum was adherent there were areas of marked injection of the serosa, and fresh flakes showing recent patches of localized peri-

tonitis. The mesentery connected with this loop was unusually thick, injected and edematous, thus contrasting markedly with the other portions of the mesentery, which was very thin and almost translucent. The thickening of the mesentery appeared to be due to chronic infiltration, with inflammatory edema and exudates. The mesenteric glands corresponding to this area were also distinctly enlarged and hard.

As the patient had withstood the exploration without any evidences of serious shock, I decided to excise the entire loop with its corresponding mesentery and to perform a circular enterorrhaphy. The intestine was completely empty of all contents, and in a very favorable condition for extirpation. After thoroughly protecting the peritoneal cavity with towels, so that the operation would be performed outside of the abdomen, the loop that was to be excised was completely excluded by clamping it with long, thin-bladed forceps. The healthy bowel beyond this point was compressed by two long intestinal clamps applied over thin sponges and aided by the fingers of an assistant. The intervening healthy portion of the bowel was then divided with scissors and with it a wedge-shaped section of the mesentery was removed. The bleeding from the mesentery was provisionally controlled by forcipressure as the vessels were divided and permanently controlled by suturing the cut edges together with continued fine silk sutures. By this means the entire thickened and abnormal mesentery was removed. The Maunsell procedure for circular enterorrhaphy was then adopted, and in less than twenty minutes a very satisfactory joint was secured. A few extra sutures, made with fine silk, aided in giving greater security to the joint, and, by burying the through-and-through sutures of the Maunsell procedure, effectually diminished the risk of sepsis.

After completing the enterorrhaphy and thoroughly washing the united surfaces with normal salt-solution, the joint was dropped into the peritoneal cavity, two long but narrow iodoform-gauze drains were placed on each side of the united bowel so as to surround the line of suture completely. The thin edge of the abdominal wound was now closed completely with silkworm and catgut sutures, except at the center, which was allowed to remain open to give exit to the gauze strips. The operation consumed one hour, but the patient suffered very little from shock, though he was frequently nauseated and attempted to vomit. He recovered rapidly, though he suffered from nausea and vomiting until the third day, when, after the administration of one ounce of Epsom salt by enema, he had a free watery evacuation of the bowel, and was greatly relieved in every way.

The gauze packs were removed on the third day. Their removal was followed shortly afterward by the escape of

some flatus *per anum*, and the patient was much relieved of pain caused by the active peristalsis and gurgling of the bowels. Nothing was given by the mouth except a few spoonfuls of very hot water and broken ice until the fourth day. The patient was stimulated regularly by the hypodermic injection of $\frac{1}{10}$ gr. of strychnin every 6 hours. Water and food were furnished by rectal enemata administered systematically every 5 hours. These enemas consisted of 1 teaspoonful of beef-juice, 1 tablespoonful of whisky, 5–10 minims of digitalis, and 6 to 8 ounces of water.

After the operation the specimen was examined and found to represent 13 inches of very much altered jejunum. It presented three exceedingly narrow constrictions, the largest of which barely allowed a No. 5 E. catheter to pass through it. They were situated as follows: The first and second strictures were separated by an interval of nearly 5 inches; the second and third by an interval of 2 inches. The strictures were caused by very thick circular rings of hypertrophied cicatricial tissue. At the point of constriction the mucous membrane was smooth, pale, and apparently divested of all epithelial covering. A dense ring of cicatricial tissue occupied the submucous tissues and indicated that the original ulceration, which had undoubtedly existed at some time past, but was now entirely healed, had begun in the sub-epithelial strata and penetrated the submucous layers. At several points the excessive outpour of exudates and agglutination of the omentum to the serosa showed that the ulceration had threatened to perforate the bowel completely. The bowel was distinctly sacculated in the spaces between the strictures. In the vicinity of the strictures the muscular and submucous coats were remarkably hypertrophied. The mesenteric glands had undergone a sclerogenic process, and, though larger than usual, were firm and hard, except in the center, which showed some *foci of caseation* undergoing calcification and other conservative involution-changes. It was evident that the original infection that had irritated them had been almost completely eliminated.

The excised bowel contained a little fluid, but no hard particles of food. The high situation of the strictures, about three feet from the terminus of the duodenum, or four feet from the pylorus, partially accounted for the remarkable escape of the patient for so many years from the dangers of total obstruction; the liquid character of the intestinal contents at this point preventing a total fecal obstruction, which would have been more likely to occur in lower portions of the intestine. The frequent and desperate attacks of colic, with vomiting, prove, however, that at times even very soft and easily digested foods would reach the strictures without sufficient maceration and succeeded in temporarily blocking up the opening of at least one of the strictures.

It should be stated that the existence of *multiple* strictures

was not recognized until after the operation, when the excised piece of gut was opened, and it was found to be distinctly strictured at the points referred to.

In these places the strictures were formed by thick, concentrically hypertrophied rings of cicatricial tissue.

The patient began to eat soft-boiled eggs and milk on the fourth day after the operation. After this, more food of a semi-solid consistence was given with a great deal of water, until the end of the twelfth day, when some chicken-tea and more solid food were added. When he left the Sanitarium (May 27), 34 days after the operation, he could eat three full meals a day without experiencing the least distress or inconvenience. It is now (March 27, 1898) one year and eleven months since the operation was performed, and the patient has steadily gained in weight and strength. From less than 100 pounds, which he weighed when he came to see me, he now weighs nearly 180 pounds. He pursues his vocation without interruption. The only event that marred his recovery for a short time was the formation of a small abscess in the center of the scar of the abdominal incision. This abscess opened spontaneously about three months after his return home. He came back to me in considerable alarm, but I was soon able to relieve his mind by extracting six knots of ligatures which, I presume, had been detached from the mesentery. After the removal of these knots of silk threads, the sinus healed rapidly, and the patient has never been annoyed since. He now eats of everything, enjoys his food, and never complains of his bowels.

The points of interest presented by this case are : 1. The difficulties, almost insurmountable, in making a satisfactory diagnosis of the true condition before operation. 2. The difficulty and practical impossibility of determining the true nature of the obstructive lesion until after the removal of the diseased bowel, which was opened and found to present three distinct strictures. 3. The unusually high position of the lesions in the jejunum. 4. The unusually long and slow evolution of the stenotic process (over 20 years). 5. The apparently complete disappearance or cure of the primary ulcerative cause—tuberculosis. 6. The repeated recovery of the patient from numerous attacks of acute obstruction brought about by the plugging of the narrow orifices of the strictures by food-masses or other accidental causes. 7. The existence of a tumor simu-

lating a displaced organ or neoplasm, a condition which evidently resulted from repeated attacks of localized peritonitis, which caused adhesion of the intestinal coils and omentum and the outpour of a mass of plastic

Specimen of jejunum resected from multiple tubercular strictures.

exudate, evidently intended by nature as a conservative process to protect the bowel from rupture during the attacks of acute obstruction caused by the plugging of

the strictures. 8. The marked hypertrophy of the muscularis of the intestine, especially on the proximal (gastric) side of the strictures—a compensatory process to aid the bowel in propelling the intestinal contents through the narrow constrictions. 9. The survival of the patient under these dangerous conditions without fatal permanent obstruction, owing in a great measure to the liquid character of the contents of the intestine in the constricted portion. 10. The limitation of the ulcerative process that led to the stenosis to a restricted portion of the bowel, as ascertained by a careful examination of the entire bowel-tract during the operation. 11. The apparently complete and permanent cure obtained by the operative procedure adopted, viz., enterectomy. 12. The simplicity and security of Maunsell's method of circular enterorrhaphy as applied in this case.

Apart from the features of individual interest presented by this case, there are a few general but all-important questions that it suggests which it will be well to consider. Among these the problems that relate to diagnosis are most prominent. How is the diagnosis of multiple stricture of the small intestine to be made *intra vitam* apart from operation? If there are obstructive symptoms, and the history of the case suggests, as in this instance, the classical signs of progressive stenosis of the bowel, we, of course, endeavor to know what is the nature of the strictures—*i. e.*, are they of tubercular, syphilitic, digestive, so-called catarrhal, peptic—or are they neoplastic, and especially cancerous? Then, are the strictures single or multiple? What is the amount of bowel involved? If the strictures are multiple, it is especially desirable to know in what part of the intestinal tract they are situated, and what is *the distance* that separates the obstructed portions. Again, if strictures exist, are they causing the obstructive

symptoms in virtue solely of pure cicatricial contraction of the lumen, or are they due to simple accidental plugging, or to secondary inflammatory processes, etc.?

The importance of these questions is self-evident to the operator or practitioner who is confronted with such problems. A careful analysis of the patient's history and clinical phenomena will greatly elucidate the case and aid in approximating the diagnosis. But a complete and satisfactory diagnosis is impossible in unfortunately too many, if not the majority, of cases. Next to determining the true nature of the obstruction and its location, the question that interests the operator most directly is that which refers to the *number* of the strictures and their situation when these are multiple. But here, again, unfortunately, these questions must remain unanswered until an exploratory celiotomy reveals the actual state of affairs. For this reason we see that there are few cases recorded in which the diagnosis has been accurately made before actual exploration. It may be also truly said that there are few abdominal conditions which justify more often an exploratory celiotomy, and which, after this has been undertaken, more thoroughly tax the resources and judgment of the operator. For this reason it is plain, also, that the surgery of intestinal stricture is of comparatively recent origin, and in fact owes its birth to the conditions which have made surgical intervention in the peritoneum successful, viz., the aseptic practice and perfected technic of the last two decades.

As the *multiple* strictures of the small intestine are those which offer the greatest complexity, it will not be amiss to inquire into the relative frequency of this class of obstructions. In his classical monograph on intestinal obstruction (American edition, 1884), Treves presents us with a synopsis of 78 cases of stricture that he was able to gather in the literature of the subject up

to 1884. Of these, 26 were cases of stricture of the small intestine, 8 cases of stricture at the ileocecal valve, and 44 of stenosis of the colon. Of the 26 cases of stricture of the small intestine, 10 were due to cicatrix after ulcer; 2 to cicatrix after injury; 4 following after strangulated hernia, and 10 after cancer. Of the cicatricial strictures of the small bowel, the most frequent in spite of their actual variety are, no doubt, those due to primary or secondary tubercular infection. It is now recognized that, notwithstanding the frequency of tuberculosis of the bowel, this condition is rarely followed by complete *cicatricial* stenosis. Yet it is undeniable, in the light of recent experience, that tubercular ulceration in the bowel is capable of producing obstructive conditions; not so much because of cicatricial retraction, but, as Koenig, Czerny and Hofmeister have demonstrated, from the fact that deep-seated tubercular ulcer will give rise to so much secondary inflammatory thickening, edema, and plastic exudation, that the lumen of the bowel will be narrowed and obstructed. In other words, a distinction must be made between the hypertrophic inflammatory type of tubercular stricture, which is relatively common, and the circular or cicatricial form, which is very rare, and is a sequel of cicatrizing surface-infection. In confirmation of this statement we find that "Eisenhardt, of Munich, as a result of 1000 post-mortem examinations made upon tubercular subjects, found evidences of tuberculosis in the bowel-tract in 566 cases, and yet in only 9 was the bowel strictured from this cause." On the other hand, Hofmeister,[1] from whom I have borrowed this statement, has been able to collect 83 reported cases in which operative intervention was practised for stenotic lesions caused by tuberculosis. In 13 of the cases collected by Hofmeister the operations were performed for *multiple* tubercular strictures; in 60 cases for *single* strictures. In

8 cases multiple strictures existed, but these were only recognized at the post-mortem, as no operation was performed.

All of these cases (91) were reported in the period beginning with 1880—*i. e.*, within the last 17 years. Again, if we were to examine the older literature of the subject—*i. e.*, that which preceded the present operative period, we would find in the anatomical descriptions given by the careful observers of the last century, and of the first half of the present, that a great many cases of single and multiple strictures of the small intestine were reported, which would strongly suggest a greater importance of the tubercular process in the causation of intestinal stricture than is usually accorded to it. In this connection the observations of Lalouette (1776), Billot (1809), Combe, C. (1813), Thillaye (1813), Bailey (1816), Heyne (1826), Goodrich (1829), Darrach (1829), Greenhow (1821), Roepke (1834), Roberts (1832), Rokitanski (1839), Ossipowski (1840), Hickley (1841), Consbruch (1842), Landgraff (1843), Oppolzer (1841), Perrin (1852), Millard (1859), Lancereau (1859), Peter (1862), Dumontpallier (1863), etc., would be especially instructive to the student of the subject, not only from a pathogenetic point of view but as a clinical study of multiple stricture-formation in the bowel as well.[2]

But as it is not my intention to discuss the pathology and clincal history of cicatricial stricture of the bowel except in so far as to call attention to its growing importance in the practice of abdominal surgery, I shall simply limit my remarks to intestinal strictures of tubercular origin, as these have a direct bearing upon the case reported in this paper. In reviewing some of the phases of this subject, I shall draw largely from the recent and valuable contribution by Fr. Hofmeister, of Tübingen, previously quoted, to which I now freely acknowledge my indebtedness.

To begin, it is interesting to know the number of strictures that may be found in one individual case. On this point we find that in 20 recorded cases of multiple strictures collected by Hofmeister, there were 5 cases (Koenig, Voltz, Esmarch, Meyer, Eisenhardt) in which there were *two* strictures in each individual; *three*, *four*, and *five* strictures were found in cases reported by Frank, Koeberle, Trendelenburg, respectively; *six* strictures existed in each one of the patients reported by Litten and Homén; *seven* strictures in Rotter's case; *eight* in Fränkel's, and finally, *twelve*, the greatest number thus far recorded in the same subject, in the cases reported by Fränkel (second case), Koenig, and Hofmeister respectively. In 6 cases the number of strictures is not accurately stated, and only vague designations are used, as "numerous constrictions," etc.

The vast majority of these (tubercular strictures) are found in the ileum.

Only in one case were the only existing strictures discovered in the colon (Eisenhardt, postmortem examination). Sometimes one or more strictures coexist with typical tubercular tumors of the ileocecal region, the ileal strictures being situated at a greater or less distance from the valve (Billroth, Koenig, Frank, Esmarch). But precisely in those cases which are distinguished by the greatest number of contractions (from 4 upward), the ileum is exclusively the seat of these constrictions. Furthermore, it is a notable fact that it is precisely when the strictures are multiple and are situated in the small intestine that we are likely to notice the most perfect type of cicatricial constriction—*i. e.*, the involution or healed form of intestinal tuberculosis. These peculiarities are typically illustrated by my case, in which almost all vestige of the original infection was lost in the cicatrizing process. In this case, probably the highest (nearest to the pylorus)

multiple tubercular stricture thus far recorded, the tubercular process exhibited a remarkably slow and benign evolution. This fact is in accordance with the suggestion of Hofmeister, that in the small intestine tubercular ulcer exhibits a greater tendency to cicatrize and develop circular or annular constriction, because the infection is primarily more superficial (surface-infection), while in the lower bowel, where single strictures occur most often, the tubercular infiltrations are deeper and more extensive, and the thick, wide, hypertrophic type of intestinal tuberculosis, as described by Koenig, is the rule.

The *distance* of the single strictures from one to another varies most widely (from a few centimeters to a half meter). In a case reported by Trendelenburg five strictures were distributed over a distance of 42 cm. (about 16¾ in.) In Koeberle's celebrated case there were four strictures in over 205 cm. (over 83 in.) of excised intestine. Boiffin even speaks of multiple strictures over the *whole* small intestine.

As to the *length* of the individual strictures, it is notable that in the course of multiple constriction in the small intestine the tendency of the stricture is to form narrow rings. In others they form elongated tubular contractions (8 cm., Meyer, Eisenhardt). Sometimes in strictures which are closely approximated, as in my case, the local conditions distinctly simulate the hypertrophic tumor-like forms of tuberculosis that are more clearly identified with the ileocecal region.

As to the *caliber* of the strictures, they vary extremely, rarely, if ever, constituting an absolute atresia, but often closing so much as to barely admit a small No. 4 catheter, or even a fine probe.

Great interest attaches to the anatomical changes that are observed in the affected bowel above the stricture (afferent portion), and in the intestinal wall of the

strictured portion. The relationship of acute obstruction by fecal and food-masses to stricture, without actual atresia, and the sudden relief of some of these patients, even when on the verge of dissolution, should be remembered; but these considerations must be passed by with a mere reference in order to reach the most important phase of the subject, viz., the management and mode of intervention which is indicated in strictures, and in multiple strictures especially.

On this point the status of surgical evidence is furnished very thoroughly by Hofmeister, and I can do no better than to quote his summary: "In 83 collected cases of intestinal strictures of all kinds in which surgical interference was resorted to, including in this 6 exploratory celiotomies, 52 patients recovered (62.65%), and of the 26 fatal cases (31.33%), in only 16 (19.3%) death was more or less directly attributable to the operation. Of course, the value of these statistical conclusions is exceedingly debatable, for it is probable that many fatal cases are not reported, and the use of the word 'cure' is also very elastic, and, to say the least, uncertain, especially when unaccompanied by detailed explanations. But the individual reports of some surgeons who have recorded their uninterrupted cases in series are more instructive, as, for example, Czerny's experience, which embraces the reports of 11 cases of intestinal tuberculosis, with 3 deaths (2 of which were attributed to the operation), and 6 cures, which after one to three years were still under observation and doing well, and two other cases that had proved to be incurable, and were presumably only temporarily relieved.

"If we restrict our study to *multiple strictures* we find 13 cases which were operated upon (including 3 exploratory celiotomies) with 8 recoveries (61.54%), and 5 deaths (38.46%), of which 3 (23.1%) are attribu-

table to the operation. If we were permitted to conclude from this statistical evidence alone, it would appear that the risks of operation in the *multiple* variety are about the same as in the *single* cases, but this conclusion is of no value, practically, since the operator who undertakes an exploration for stricture of the bowel never knows whether he will find a single or a multiple stenotic condition. In other words, when he undertakes an operation of this character he must always bear in mind the possibility of multiple strictures. He must give due consideration to this possible contingency, and must be prepared to act accordingly.

"While it may appear theoretically much more simple to deal radically with single than with multiple strictures, there are single strictures which may offer insurmountable difficulties in the way of complete removal. Under all circumstances, the condition of the patient at the time of operation is the dominant consideration. How much traumatism can he stand? How long can he be kept under the anesthetic? are questions that must be answered before final action is taken. Of course, the ideal of surgical treatment in dealing with strictures of the bowel would be *enterectomy* or resection of the diseased and strictured sections.

"The fact that in 50 complete resections for tubercular strictures, including cases in which an artificial anus was left after the excision, resulting in 34 cures (68%) and 15 deaths (30%), of which 12 (24%) are ascribable to the impracticability of resection, does not condemn the surgeon to inactivity. On the contrary, almost as good results may be obtained by entero-anastomosis (5 cases with 5 cures) which will permit the re-establishment of the fecal circulation with a minimum of danger and often with prospect of radical cure. Another procedure which we owe to the Billroth school, and which bids fair to supplant enterostomy in certain

cases, though still a procedure that is in an evolutionary stage, is *partial exclusion of the obstructed and diseased portion of the bowel.* While *total* exclusion of the bowel is to be condemned, *partial* exclusion, as practised by Salzer, Bardenheuer, Hochenegg, Frank, Körte, and Eiselsberg, Obalinski, and Kammerer in this country, is at least worthy of trial in certain cases. It consists in the absolute isolation of the strictured portion of bowel, with anastomosis or enterorrhaphy of the proximal and distal ends on each side of the excluded portion. The excluded portion is partially sutured to the abdominal incision, and an opening (enterostomy) is made to permit drainage of the isolated part. The advantages that may be claimed for this procedure over simple entero-anastomosis are, that while partial exclusion permits a re-establishment of the fecal circulation, the diseased bowel is entirely excluded from the contaminating contact of the feces, and that by this means the bowel is given absolute physiological rest. By this means involution and atrophy of the diseased area are favored, and a permanent cure may be obtained. It has the advantage over total resection that it obviates shock, hemorrhage, and other complications that might result from an attempt at excision of a diseased area."

Two other modes of relief are now left for consideration, and these are *enterostomy* or the formation of an artificial anus on the Nélaton plan, and enteroplasty on the plan of the Heinecke-Mikulicz pyloroplasty—by which the stricture is enlarged by the *modus operandi* of this well-known procedure.

In cases of multiple stricture the surgical conditions are altered extraordinarily according to the *number* and the *situation* of the individual strictures. The more favorable cases are those in which the constrictions are closely distributed over relatively short sections of the intestine. In these cases, as illustrated by the writer's

report, the strictures must be treated collectively, as if there were only one long stricture, and resection (enterectomy) should be the operation of election (*vide* cases reported by Koenig, Trendelenburg, Frank, and the author). On the other hand, when only a few (two) strictures exist, but these are separated by a long distance of sound intestine, the best course to follow is to attack the individual stenosis separately, and to resect, if possible, each single one in turn (Voltz, Esmarch), To this ideal treatment, which removes the diseased part without sacrificing more intestine than that which is absolutely necessary, there are very narrow limitations. It stands to reason that we cannot ask too much of the usually ill-nourished patient, whose powers of resistance have been reduced to a minimum by the condition which calls for the operation. It is in these extreme conditions, and when confronted by a great number of widely distributed strictures that the judgment of the operator is more severely taxed. The questions then resolve themselves into: Shall we resect the entire strictured area? Shall we exclude it? or perform anastomosis? or enterectomy? or can *any* operation be performed that will yield even a palliative result?

Cases of this complex type, in which many strictures of narrow caliber were distributed over the greater portion of the small intestine, are recorded by Boiffin, Fränkel, Rotter, Koenig, and Hofmeister.

It is very plain that when a very large portion of the bowel is involved total resection of the affected bowel is out of the question; Koeberle, it is true, succeeded in successfully removing 205 cm. of the ileum, and though he has had a few imitators, it is very doubtful that the sacrifice of so much bowel is physiologically safe or compatible with sound surgery. At any rate, success in such wholesale sacrifice of the

bowel must follow as a very rare and exceptional event. To dream of relief by resection would be preposterous in those cases in which the whole intestine is marked by cicatricial rings at variable and irregular intervals. In such extreme cases, which are, fortunately, clinical curiosities, there is nothing to be done but to close the abdomen and simply let the patient await the end. In cases of lesser severity a wise compromise may be made between individual resections of the stricture, entero-anastomosis and exclusion. As to enterostomy, on the Nélaton plan, it should always be kept in view only as an emergency operation when dealing with strictures or obstructions that are situated in the colon or low down in the ileum. If applied too high in the intestine the physiological exclusion of the remainder will result fatally in a few days, as the progressive emaciation and malnutrition will so diminish the patient's powers of resistance as to unfit him for further intervention. Finally, I shall close by adding two important recommendations made by Hofmeister: 1. In cases which present a history of gradual obstruction of the lower bowel the surgeon should be prepared to find multiple strictures, and in all such cases the exploration will not be complete until the entire bowel-tract has passed under the eye and finger of the operator. 2. If called upon to operate for an acute obstruction (ileus) in a case of chronic obstipation, and there is much distention with gas, it is best to make a free abdominal incision at once, as Kussmaul suggests, by which the entire bowel-mass can be rapidly examined and the seat of the obstruction promptly determined. It is only by this procedure that a proper diagnosis can be made and a proper decision quickly arrived at. Again,[8] one of the prime requisites to success in the operative treatment of stricture of the bowel is not to wait too long after the onset of the symptoms which

indicate chronic obstruction (repeated but intermittent paroxysms of abdominal pain with vomiting, obstipation, etc.), before proceeding to exploratory celiotomy. It is evident that when a stricture becomes markedly narrowed its lumen is liable to sudden obstruction by accidental fecal plugging. Under these circumstances all the phenomena of acute ileus are liable to present themselves rapidly, and the tympanites which complicates this condition will be added to the original difficulties of the case. Remembering that the chances of perfecting the intestinal technic are infinitely greater when the intestinal tract is empty, we should advise early exploration in a calm period whenever a careful and long-observed history strongly suggested the possibility of chronic obstruction from the causes herein referred to.

Finally, a last word in reference to the special method of performing enterectomy in this case—Maunsell's method. I have had occasion to apply Maunsell's principle of invagination and intramucous suture through a fenestrum, in 6 cases of enterorrhaphy, including three gastro-enterostomies. In every instance but one I have found the joint reliable and safe, and the method itself very practical and of easy application. But Maunsell's method is not applicable to all cases. The chief technical contraindication for its performance is a very thick fat or inflamed mesentery, as this decidedly interferes with the amount of invagination required for a good suture. In such cases, Czerny-Lembert or other simple suture-methods are preferable. A thick mesentery is also in the way of the proper application of the Murphy button, which in my experience is less safe, but a little more rapid, than the Maunsell method. In cases of multiple strictures at long distances, which would justify repeated resections at the same sitting, it is probable that a judicious combination of methods, viz., the button for the distal

stricture, with Maunsell's suture-method for the highest, or even the button alone, would expedite the termination of the operation and yield the most satisfactory results.

REFERENCES.

[1] Hofmeister: *Beiträge zur klin. Chirurg.*, 3. Heft, Jan., 1897.

[2] Full references to contributions by authors quoted in this paragraph will be found on p. 65, "Intestines (stricture of)," Index-Catalog, Surgeon-General's Library, Washington, vii, 1886.

[3] A valuable report of a case of multiple tubercular strictures of the small intestine has been contributed recently to the *Norsk Mag. Lægevidensk.*, Jan., 1898, an abstract of which has appeared in *Semaine Médicale*, p. 88, No. 11, Feb. 26, 1898, and in the very interesting and valuable experimental and clinical paper on "Intestinal Tuberculosis and its Surgical Treatment," by Dr. Oreste Margarucci (*Il Policlinico*, Rome, Anno v., No. 4, Feb. 15, 1898), which I regret has reached me too late to be utilized in the preparation of this paper. An exhaustive paper on "Intestinal Tuberculosis in its Surgical Aspect" is also being prepared by my distinguished friend, Prof. Senn, which I know will prove to be one of the most instructive contributions that has appeared in this country on this important subject.