Address.

SURGICAL PAIN.¹

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"Every pain has its distinct and pregnant significance, if we will carefully search for it."—HILTON.

IN acknowledging the honor of this hour, the reader is reminded that we are living in the closing days of a glorious century, a hundred years that will forever be remembered by medical men as the period of their greatest conceptions, their finest discoveries and their most precious boon to humanity. The temptation in this valedictorian time to flush your cheeks with the pride that justly emanates from an enumeration of this century's achievements in medicine is indeed strong, and might, if indulged in, lead to an hour's agreeable entertainment; but the reader asks your indulgence in listening to a more painful subject, a subject which will for eons of time elicit, at least, the sorrowful attention of its victims, unless, forsooth, Christian Science finds some shorter cut than it now possesses to that Utopian state of curing "while you wait."

The child of the twentieth century will awaken at night, and toss in agony, thinking himself a living refutation of his father's fairy story about the nineteenth century being the one hundred years in which the bitterness of the primal curse was abolished and the horror of pain mitigated.

Pain will always exist. I invite you, then, today, to consider it as our ally, the one prominent symptom of all acutely dangerous processes within the abdominal cavity, rather than an enemy we would single out for destruction. To learn its import, to comprehend its value in the early discernment of disease, is our task and duty. The present drift of surgical thought since the triumph, during the last decade, over the terrors of appendicitis and pelvic disease is to apply the same reasoning and treatment to other similar, yet more dreaded, pathologies of the abdominal cavity.

And what is pain? Cicero believed it was a disagreeable movement in the body independent of the senses. Savage calls it one thing, Erb another. Whatever the neurologists may say, you and I believe the word to be sufficiently descriptive in itself.

Every increase of ordinary sensory stimuli above the physiological limit produces pain; excessive stimulation is the only prerequisite in its development. Beyond this the reader finds nothing clear and proven. There is no department in neurology which affords so unique a symptom in diagnosis, the relief of which requires discernment and ingenuity of so high an order. Very powerful nerve irritation, such as is produced by extreme shock, is painless, the higher degree of irritation destroying function.

The reader trusts he may not be thought to assume a too dogmatic tone in the presence of those whose experience overshadows his if in the following pages statements are made which challenge discussion.

We would not imply that pain *per se* is of sufficient importance to call it pathognomonic, except in certain few instances, but we would advance the suggestion that a more minute study of the subject may be the means of making an earlier diagnosis, and the saving of much time and life.

Gesture of pain.—In appreciating the value of pain

as a diagnostic symptom, which, we claim, is the most important and instructive of all subjective signs, we are thrown upon the sincerity and intelligence of the patient to accurately and truthfully depict his suffering. Any outward manifestation displayed by him in the description of his pain oftentimes affords the strongest clue to its seat, its nature and its character.

An investigation of a case characterized by pain should first elicit from the patient where the pain first began, where it is at present and what kind of a pain it is. Verbal descriptions of pain are often so indefinite in the ignorant, or so verbose, exaggerated or inconsistent in the hysterical and neurotic, that their gestures are more valuable as testimony than their word pictures. When a pain is due to inflammation of an external part, the patient will be observed to approach it in a very respectful way, if he does not actually avoid touching it, so that in a peritonitis his hand hovers over the part without touching it.

In mucous membrane inflammation like intestinal functional disturbances, the whole hand is laid upon the abdomen and passes over and across it to denote the diffuse general soreness. The localized pain of an appendicitis is indicated by the open hand, shielding it as it were from the observer's touch. There is an absence of gesture in meningitis, because such movement causes pain while in myelitis both hands pass from the spine to the umbilicus, indicating the sensation of pain or constriction.

In the gestures indicative of pain elicited only on pressure no such timidity of touch is noted as in inflammatory pain. Tumor, aneurism or abscess pains are indicated by pressure over the painful area. An extended thumb pressing into the back, indicating the area of a fixed pain, is said to be suggestive of aneurism. In the contractile muscular pains of a hollow tube, like the hepatic ducts, ureter or bowel, as in hepatic, renal or lead colic, the sufferer grasps or presses the part in contrast to his attitude in the inflammatory pains of pyelitis or cholecystitis.

Your attention is called to three great characteristics of inflammatory pain, with which this paper has largely to deal. The first is that pain is elicited or provoked by pressure and is greatest, as a rule, at the seat of the inflammation. This fact is of special interest in interpreting the diagnostic value of pain. You may move at will a limb the seat of pain without causing an objection on the patient's part, but pressure excited over the course of a nerve the subject of neuritis will provoke a distinctly painful sensation.

The second characteristic of inflammatory pain is that movement of the part even in the maintenance of its own function causes pain. Thus it is that an inflamed appendix is kept quiet by the contraction and rigidity of the overlying muscles, which act somewhat as a splint. If in the case of epigastric pain there be present no rigidity, one may exclude a gastritis or a localized peritonitis. Probably the best type of inflammatory pain which nature seeks to quiet, because thereby it keeps the part at rest, is the pain of vertebral disease. The child no longer bends his spine, but seeks to keep the spinal muscles at rest by bending the knees should occasion call for any stooping.

The third characteristic of inflammatory pain is that it is accompanied by a disturbance of the normal function of the part, as seen in the case of meningeal headaches, with the intolerance to light, delirium, etc

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Such is not the picture of a neuralgic headache. But inflammatory pain, besides these characteristics, differs somewhat according to the part involved. Mucous membrane pain is rather a soreness, and when severe, it is styled burning; when gripping, colicky pains ensue, it is because the inflammation is no longer confined to the mucosa, but has involved the muscular structures of the viscus. Serous membrane inflammation is more apt to be acute and stabbing. Fibrous tissue inflammation, if moderate, is of a dull, aching character, but violent and throbbing with each heart systole if the tissue is much inflamed.

Referred pains.—Inflammatory pain is either local or radiated along the course of nerves in direct communication with the seat of the inflammation, and this statement brings us to a consideration of referred pains, to whose study no better contribution has been made than the now aged but scientific and classical monograph of Hilton. A characteristic of these referred pains is the fact that movement and pressure do not elicit any objection on the part of the sufferer, or increase the pain, and so they can be proven not to belong to that part. You may press the sixth and seventh dorsal vertebrae without increase of pain, when, as it often happens, such pain is referred to that region from an ulcerative gastritis, the association having been maintained through the terminal ends of the sixth and seventh dorsal nerves. Likewise you may press, without increasing the pain, at the pit of the stomach, when such pain has been conducted there by these same nerves from a diseased vertebra.

Hepatic inflammation of the convex surface of the liver may send a nervous message along the right phrenic on the under side of the diaphragm, and then to the top of the right shoulder or the interscapular space, but pressure and movement do not affect the intensity of such pain. This brings us to an explanation of many of the pains situated between the scapula dependent on visceral lesions. The fourth, fifth and sixth dorsal nerves are distributed over the inferior angles of the scapulae and the interscapular space, and are the particular nerves in question involved. If you will follow these sensitive peripheral filaments of the skin to their connection with the great splanchnic nerve, you will remember that the latter, passing down through the thorax, then enters the solar plexus, and that its abdominal ends are distributed to the liver, pancreas, duodenum and stomach, and hence supply us with a positive route for the transmission of inflammatory pain from these viscera to the scapular region of the back; such at least is one such nerve channel.

To the mid-dorsum may be referred pains of the kidneys, abdominal aneurism and the small intestines. In the lower back, likewise, we frequently find pains referable to the pelvis and lower abdomen. Referred pains from the pelvis come by way of the hypogastric plexus, travelling along the pelvic splanchnic, and enter the cord with the second and third sacral nerves.

Abdominal brain.—No definite or satisfactory comprehension of referred pains can be obtained without reference to that marvellous mechanism of the abdomen which presides over organic life, the abdominal brain. Although it was discovered by Galen, who was born 130 A. D., you could not spend a more delightful evening than by reading the recent works of Fox and Robinson.

The two great functions of the visceral mind are nutrition and rhythm. Here nutrition and secretion are controlled. Here visceral function and rhythm are begotten and sustained or prohibited. It receives sensation and transmits motion; it controls circulation and gland secretion; it presides over the organs of generation and has a master hand over the peripheral automatic ganglia of the viscera.

The abdominal brain is situated at the base of the celiac axis and the renal and superior mesenteric arteries. It lies, therefore, along the aorta, just behind the stomach, and consists of a meshwork of ganglia, comprising the splanchnics, the pneumogastric and phrenics. The abdominal brain, therefore, has brain centres, conducting cords, and a peripheral nerve apparatus, just as the brain proper has these parts. The abdominal brain can live without the cranial brain, but the cranial cannot live without the abdominal. This great visceral centre is connected with and is a part of the lateral chains of the sympathetic system, which range along the sides of the vertebrae, from skull to coccyx, and so gets its direct connection with the spinal and cranial nerves.

There are two interesting and practical features of this system instrumental in the production of the pain we are considering. Between the longitudinal and circular layers of muscle in the viscera lies a system of nervous ganglia known as Auerbach's plexus. This is the peripheral apparatus which induces intestinal peristalsis or vermicular motion. Overstimulation of this plexus causes colic, while insufficient stimulation is productive of constipation and paresis. Just under the mucous membrane there lies a still more delicate system of ganglionic brains, called Meisner's plexus, whose office is to preside over the secretions of its viscus; they induce a secretion of the digestive fluids and preserve a nice balance between over and under secretion.

The automatic menstrual ganglia of Robinson are situated along the ovaries and Fallopian tubes, and so preside over monthly rhythm. The uterine set of ganglia affect the muscle of the fundus only, the neck being supplied with spinal nerves, which inhibit rhythm, hence the powerful preservative action of the uterine neck against any undue stimulation tending to cause miscarriage.

Auerbach's and Meisner's plexus of the stomach, being the nearest and largest of the peripheral visceral apparatus, are generally the ones most readily responsive in all abdominal lesions, and hence we meet with nausea and vomiting so constantly as early accompaniments of abdominal pain, or of fermentation and indigestion in less acute abdominal disorders. When the peripheral apparatus of the small intestine becomes involved, constipation or diarrhea and tympanites result. If these little bodies are excessively stimulated, as in appendicitis, strangulation, etc., we get the colicky periodic pains characteristic of all abdominal tubular organs.

Pelvic stimulation is transmitted by way of the ovarian or hypogastric plexus, which latter, situated in the post-peritoneal membrane, is clinically the more sensitive and important as explanatory of the severe pain of tubal perforation.

Classification of pain.—Before proceeding to a consideration of visceral lesions themselves, the reader would refer you to a classification of pain by Lomer, of Hamburg, whose monograph on gynecological pain

appeared about a year ago, and which adds another most charming treatise on pain at a most opportune time, when pelvic surgery has become a question less of surgical technique than of sound surgical diagnosis. He divides pain into (1) traumatic; (2) contractile; (3) inflammatory; (4) neuralgic; (5) hysterical. This classification applies very well for practical purposes to all visceral lesions.

Simple uninfected *trauma* of the viscera is causative of comparatively little pain. It is recognizable as wound pain and soon subsides. Visceral nerves in the absence of inflammatory states are so little sensitive that pure and simple trauma of the peritoneum in these post-Listerian days is causative of little pain, as the reader has had occasion to notice in several cases when completing a section, with the patient in full consciousness. The tying of a pedicle, comprising the ovarian plexus, causes momentarily severe pain, and even under ether, you all have noticed the altered respiratory rhythm of the bowel reflex.

Contractile pain, of which examples are afforded by any abdominal viscus, as the hepatic and renal ducts, the intestine, appendix, Fallopian tubes, stomach, uterus and bladder, is typical in its recurrence, and is rhythmical in character, due to contraction and dilatation of the organ, and dependent on the peculiar peripheral nerve apparatus of Auerbach. At times it is the most intense in character, is paroxysmal and colicky, and ceases only when the obstruction which clogs the lumen is removed, or the muscles become overstretched, ruptured and worn out. An aborted ovum, a tubal pregnancy, an enterolith in the appendix, a stone in the renal and hepatic ducts, an intussusception, or an offending fecal mass causing obstruction, are all common illustrations in the causation of colicky pains. It is, therefore, the implication in diseases of orifices having contractile cavities behind them which is most calculated to make pain a prominent symptom in clinical histories.

Inflammatory pain is caused, we are taught, by the swelling of the tissues and the consequent pressure on nerve ends, but since the birth of bacteriology we know full well that the chemical action on the tissues of the toxins is by far the greater cause both of inflammation and its pain, and the reader believes it fair and essentially accurate to say that the colon communis and streptococcus cause more pain than most other germs, unless the nervous system is so steeped in poison as to be utterly demoralized.

Neuralgic pain is due to a neurosis of the sympathetic system, is paroxysmal with distinct intermissions, and, like the same pain elsewhere, is often accompanied by trophic disturbances, and lightning-like, lancinating pains. Enteralgia, as such exists, is a distinct lesion, but more often is an expression of some nerve reflecting a pain from a spine of ataxia, an inflamed ovary or an enteritis.

The most perplexing, annoying and interesting pain of the abdomen is the *hysterical*. Its seat and course are independent of any nerve zone or division of nerves, its course frequently forming geometrical figures. It depends on psychological changes, and is not influenced by rest or inflammation. It is subject to suggestion and referable to some central lesion. "It is generally a burning pain, and may occupy any part of the abdomen and its contents," says Charcot. Pains of the lumbar and sacral back, or of the abdominal wall, intensified by the slightest touch, are gen-

erally hysterical. As these pains have been the cause of much blundering in diagnosis, and the reason given for opening the abdominal cavity without finding a sufficient causative lesion, and, therefore, bringing calamity on the head of the operator, the reader would remind his hearers that Charcot's so-called stigmata are the essential means of differentiating them from genuine pains. In such hyperesthesia there is always present some other manifestation of altered nerve force, like the anesthesia of the conjunctival bulb, or the soft palate, or some anesthetic zone in the face, leg or back. Pinching the muscle and so locating the pain in the abdominal wall is a simple yet efficient method of discrimination. Thus the terrible pain of an hysterical, supposed to be suffering from gastric ulcer, perityphilitis, ovaritis, enteralgia, or gall stone, is soon converted into a skin hyperesthesia, whether due to a rheumatic myositis or a central hysterical lesion, and is amenable to other measures than the scalpel.

Clinical significance of acute abdominal pain.—

He who starts out to elucidate the clinical significance of abdominal symptoms of an acute character, in which pain is the prominent one, meets at once on the threshold of his investigation the confession that the abdominal cavity is a veritable grab box, in which anything may be found from a simple innocuous cyst to a rare yet verified teratoma; while the number of mechanical instruments, wearing apparel, vegetable and chemical sundries that have been removed from the human intestines would suggest the propensities and capacity of a Harlem goat.

We acknowledge the impossibility of correctly diagnosing, before the abdominal incision is made, many even of the common forms of disease. Only the minute study of the early individual symptoms seems, at present, to promise much assistance in reaching a prompt diagnosis in that great class of diseases which suddenly threaten life from mischief brewing within the peritoneal sac. In the symptom complex—pain, vomiting, rigidity of abdominal wall, meteorism, collapse, etc.—called peritonism or peritonismus, pain is the one constant and foremost symptom.

Location of pain.—The more common localities of visceral pain are, first, the umbilical region, to which are referred all the early transmitted pains of the various types of obstruction, appendicitis, acute miliary tuberculosis, lead colic, twisting of tumor pedicle and thrombosis of the mesenteric vessels; the superior mesenteric plexus being the nearest box from which an alarm of intestinal fire is rung in to the central station, or abdominal brain. The second common locality of abdominal pain is the appendicular, in which region are found the secondary pains of appendicitis, obstruction, inflammation and right-sided pelvic disease, neuralgia of superficial branches of lumbar plexus and myalgia. The third locality is the hepatic and renal area, generally the localized seat of renal and hepatic colic, acute hepatitis, cholecystitis, aneurism of the mesenteric artery, aortic disease and subphrenic abscess. The fourth area is the pelvic, the peculiar seat of tubal pain; and finally the epigastric area, in which latter region are located the pains of gastric, duodenal and pancreatic ulcer with perforation, acute pancreatitis, malignant growth, diabetes, locomotor ataxia and reflex pelvic pain.

To further localize pain is impracticable without the

aid of pressure. Pressing the abdominal walls elicits frequently a localized pain, an expression of a localized inflammation, and is of the utmost importance.

Rigidity of muscle wall is the next important aid we possess in suggesting a localized pathology, it being the result of reflex irritation from involved viscera to the spinal cord, reflected back through the lower intercostals, governing the muscles, and hence frequently distinguishes purely abdominal from purely pelvic trouble, since the latter, for reasons before mentioned, has no such reflex before the peritoneum becomes involved.

Obstructions.—The great class of obstruction emergencies, which include bands, hernia, volvulus, intussusception, foreign bodies, stricture, tumor, fecal accumulation and perforation, are all characterized by sudden onset without apparently exciting cause, by severe abdominal pain, generally localized about the umbilicus, with at first little or no tenderness, but careful and attentive pressure by the first physician summoned very frequently evokes a localized tenderness of inestimable value to the surgeon who comes later.

The pain is colicky and constant, due to the disordered rhythm, provoking violent peristalsis, then comes vomiting with stomacheic, later bilious and finally brown, offensive products. It is copious, persistent and gives no relief; constipation is absolute from the first, with the single exception of intussusception; tongue furred, thirst intense, temperature subnormal, urine diminished; then appears collapse, weakness, pallor, sunken eyes, feeble and rapid pulse, cold sweat and sighing respiration. As the case persists unrelieved, the dry tongue becomes brown, the face has the aspect of horrible anxiety and the patient dies within three days from the start of these symptoms of septic peritonitis, which even modern surgery has failed to control. Vomiting is the more persistent, pain the more pronounced symptom, until exuded serum and lymph or pus bathe the roughened peritoneum.

The pain of intestinal obstruction depends on the futile, wild and irregular peristalsis and is measured in severity by the suddenness of the strangulation, the amount of bowel involved, the seat of the obstruction and the age of the person. The small bowel, when the seat of the lesion, causes greater pain and collapse than the colon, and naturally being severer as the jejunum is approached. The sigmoid flexure possessing a very susceptible and responsive nerve apparatus as compared with the rest of the colon, and being generally involved in its entirety when the seat of volvulus, causes great pain and collapse. The young adult, full of life and vigor, is the subject of more pain and collapse than the aged.

The periodic peristaltic waves may frequently be seen in a thin person hurling themselves against the seat of obstruction, like gallant Englishmen against Spion Kop, and with usually a like result. Tympanites arises in exact proportion to the peristalsis above the obstruction. The patient experiences a sense of fulness and of dragging at the bowels, and frequently says that he feels the movement in his abdomen arrested at the same spot.

In these cases of obstruction there is a feature of the pain which demands especial attention, namely, that when obstruction is complete the pain is constant though liable to exacerbations; while in partial ob-

struction the pain is distinctly intermittent, and the sufferer enjoys intervals between the attacks. If, for instance, an obstruction due to stricture becomes suddenly complete, the pain will as suddenly change and become continuous where before it was intermittent. Pressure frequently relieves the pain of obstruction at first, stopping the nervous telegram, but later aggravates it, a trustworthy sign of beginning peritonitis, or at least a peritoneal hyperemia. A diminution of pain toward the end of a fatal case is due to collapse, a sensorium steeped in the lethal septicemia, or upon extensive paralysis of the intestine, while its cessation is synchronous with perforation.

It is impossible to localize obstruction in the small intestine from pain alone, as the coils are continuously changing their position, but pressure aids materially. The stomach and colon being more fixed, it is quite possible to localize the painful lesion in them. The frequent site of abdominal pain in sigmoid obstruction is a point a little to the left of the umbilicus, the site of the inferior mesenteric plexus. In those rare cases of appendicitis and obstruction where pain is referred to the corresponding area of the left side, pressure over the right hypochondrium increases the referred pain of the left side. Indiciumuria, as an accompanying symptom of pain, is of some considerable value in localizing obstruction to the small bowel, and is a pronounced symptom; when the small intestine is involved in obstruction cases the pain is more severe, begins earlier and is more persistent.

Strangulation by bands and apertures.—Strangulation by bands and apertures, one of the most difficult matters to diagnose as well as the most painful, constitutes about one-third of all intestinal obstruction. A history of previous peritonitis affords a strong presumptive proof of this variety. The subnormal temperature and weak, rapid pulse are not significant; the pain, agonizing at first, becomes more diffuse and continuous. There is no tumor. Pressure relieves. It may be said of such a status that a patient between twenty and forty years (the subject of previous peritonitis) presenting no evidence of stone, no gas per rectum, no tumor or hernial swelling, but a sudden, severe, colicky, abdominal pain with marked constipation and tympanites, with vomiting which does not relieve, demands surgical attention, for, with all these conditions, many feet of small intestine may exist as red as an autumnal sunset; and the reader ventures here a surgical axiom, that whenever a patient is suffering from any grave abdominal disease characterized by these symptoms, *without* a previous peritonitis, which cannot be accurately interpreted, an early exploratory incision is demanded, for in just these cases before pressure necrosis and peritonitis have set in surgery is the most successful.

Intussusception constitutes, also, about one-third of all intestinal obstruction. Here age is the primal consideration, for nearly one-third of this class occurs before the completion of the first year, and the majority of these, again, occur under six months. In 80% blood or bloody mucus occurs; vomiting is never severe at first, nor does it occur so early as in other obstruction, because the bowel is not completely blocked. Seventy per cent. of these obstructions are ileocecal. The sausage-shaped tumor is felt in only about one-half of the cases. Tympanites not reliable. Pressure at first relieves, afterward aggravates, the pain. (The invagination may be present at the anus.)

"After a few hours in a child, or a longer period in the adult, pain ceases as suddenly as it commenced, and there is an interval little suggestive of the continuance of the pathological condition." The pain returns with renewed energy and at shorter intervals.

Given a child under one year, especially a boy, suddenly seized with acute periodic pain, passing little else but bloody mucus, the subject of tenesmus, suffering from shock, and an incision to the right of the right rectus muscle would not be bad surgery, for, while undoubtedly many cases of invagination occur in infancy which nature herself relieves, and include many of the more persistent forms of belly colic, yet less harm is done by interference than by delay. A noteworthy feature of this pain is that while the invagination is increasing the pain is acute, but when adhesive inflammation sets in and fixes the part, or gangrene occurs, the pain subsides or is absent. The ileocolic variety is the most painful. The amount of intestinal contents has nothing to do with the amount of pain. As the invagination advances, and especially as a definite tumor appears, the pain becomes more localized, generally in the ileocecal region, and is increased by pressure. Vomiting is a less conspicuous ally of pain than in other forms of obstruction, and generally gives relief, contrary to the fact in complete obstruction.

Volvulus constitutes only about one-fortieth of all obstructive cases, and is generally located at the sigmoid flexure, occurring more frequently in the male between forty and sixty years. Its onset is sudden, pain referred to the umbilicus not increased by pressure, but there is no form of obstruction in which pain on pressure is elicited so early. It soon locates itself. The abdomen is early and frightfully enlarged, mostly from dilatation of the sigmoid itself, which facts, occurring in a case of marked chronic constipation, are so prominent in contradistinction to obstruction due to bands and invagination as to make a suspicion of volvulus quite probable. Hemorrhagic infarction may give rise to these symptoms.

In abdominal pain produced by the very infrequent obstructions of gall stones, salol enteroliths and other foreign material, it may be said that the seat of the obstruction is either in the duodenum, jejunum, or more usually in the lower ileum, with a previous history of hepatic colic, or the swallowing of foreign bodies, as in the insane. Their presence and location is usually detected by the Röntgen rays.

Stricture obstruction pain differs from these preceding dolores in that it is extended over a long course of time, and becomes progressively worse, until the complete occlusion of the bowel causes the typical symptoms of peritonismus characteristic of all obstruction cases. The pain becoming colicky announces the beginning of the last chapter of the patient's life unless surgically treated. Non-cancerous stricture occurs about middle life, cancerous beyond. The clinical fact of note in reference to the pain is that it comes on regularly some three or four hours after food, in paroxysms which occur at intervals, and is the constant feature of the disease. These attacks appear monthly, later weekly, daily, and finally the pain becomes continuous.

Fecal accumulation may cause obstruction and sudden acute abdominal pain, referable to the umbilicus, with absolute constipation. Tympanites and tenesmus suggest a volvulus, but the presence of a rounded fecal

tumor, the history of the prolonged constipation, and the aggravation of symptoms by the taking of food, the capability of the mass to be changed and flattened by pressure and the occurrence of these phenomena in the female neurotic present a much less obscure lesion than in other obstruction cases.

Twisting abdominal tumors, a not very uncommon form of intestinal obstruction, can usually be correctly diagnosed by the history and ether examination, and do not differ in their symptomatology from that of other sudden obstructions.

Peritonitis. — Abdominal emergencies characterized by inflammation have all one common and timely feature, that pain is increased by pressure. Just at this point in the case history, if not before, a final decision must be made for or against interference, for to ignore it is to court disaster, to heed it may result in the saving of another life. The pain is localized at first, but soon becomes diffused and constant; nothing else simulates it but the pain of an acute enteritis. At this stage all the classical symptoms are present, and intervention is generally too late; even at this point, however, with an abatement of symptoms and an arrest of the inflammatory extension, a successful laparotomy is frequently possible. Pain ceases in the final stage of poison intoxication, and all success is hopeless.

Let us simplify the manifold causes of peritonitis, and say they are due to extravasations of some visceral contents and abscesses or the escape of germ life. Of these, appendicitis, salpingitis, cholecystitis, gastritis and intestinal ulcers are the more common lesions in the order named, while traumatic, pancreatic, renal, tumor and fat necrosis inflammation are the less frequent.

Appendicitis. — Although much good ink and the futile display of functioning gray cells have been wasted in voluminous writings on this little part of our anatomy, yet as it is a type of inflammation yielding to improvement in recent surgical treatment, the reader ventures a few suggestions and the repetition of some established facts. Because at times this inflammation has been mistaken for every other possible lesion in the abdomen, and even for pneumonia, it does not detract from the importance of its initial symptoms. The initial pain, rarely elsewhere than over the solar plexus, is sudden, colicky and severe, and simulates at this stage renal and hepatic colic, acute pancreatitis, perforations of the digestive tract, functional colic, the crises of locomotor ataxia, embolism of deep, mesenteric artery and acute obstructions. This pain, the most important of the cardinal symptoms, settles into the right iliac fossa within thirty-six hours, generally much sooner. It is due, in the first instance, to overstimulation of Auerbach's plexus, by retained mucus, an enterolith, or by the swelling and pressure of the inner tube by interstitial serum, causing appendicular peristalsis, and is reflected to the superior mesenteric plexus, thence to the abdominal brain, causing umbilical pain and nausea. A few hours later, by an increasing stimulus, vomiting ensues, and a transmission of nerve irritation to the spine reflects back the muscular message of the external oblique through the intercostals, and so rigidity of the abdominal wall becomes the second most trustworthy symptom of this disease.

If it be remembered that beside the smallness of Gerlach's valve, the male appendix lies more closely

in contact with the psoas muscles, while in the female it is more dependent, one finds an easily understood explanation why the traumatism in a young male of the psoas muscles is more frequently provocative of trouble than in the female, and why an appendix is so frequently found agglutinated to a tubo-ovarian exudate.

Pressure in the neighborhood of McBurney's point elicits pain rather early and is caused by the ensuing movement of inflamed peritoneal surfaces. In only about one-fifth of his cases does the reader find the initial pain of appendicitis so referred to the seat of the trouble. Some writers lay considerable stress on the location of pain under the sternum, as significant of cecum inflammation or so called catarrhal appendicitis, rather than an appendicitis proper, and hence regard it as a favorable omen. The pain reaches its intensity in from twelve to twenty-four hours, while the appendix is trying to extrude its contents. It soon becomes more general over the right abdomen, which is hard and tense. Constipation is hard to overcome, except by salines, and combined with vomiting is apt in the first hours to suggest obstruction. Germ life and blood count aid much in the interpretation of appendicitis pain and its progress. In general it may be said that the streptococcus causes greater release of animal force in the form of heat, while the colon bacillus tends to depress the temperature even to normal, but they overstimulate the sympathetic nerves until the heart cannot well relax before each contraction, and thus we get, instead of an increase of temperature, a small, rapid, feeble pulse. The streptococcus and the mixed infections cause more temperature; the colon bacillus, a smaller pulse and greater pain owing to its more destructive nature.

The spasm of the external oblique muscles, near their costal attachments, when the region of the appendix is tapped in the early hours of trouble, is an accompaniment of pain that is very valuable in the diagnosis of appendicitis, and the progress of the case. The tonic spasm of these muscles, while continuing to guard the contents within, soon becomes tired and exhausted, and their relaxation before the normal decline of the disease, while other symptoms are increasing, is a bad omen for the patient's strength. Pain is continuous throughout the disease, colicky and spasmodic at first, but localized afterward, until the general diffuse pain of a peritonitis ensues. So long as nature can keep the Cronje of the abdomen within its surrounding defences, the ileocecal region becomes a veritable river of Paardeberg, where final surrender and starvation are sure, and the pain of the bombardment remains localized; let the enemy escape through the lines, and the surrounding country becomes the seat of a destructive conflagration, in which friend and foe are exterminated. The pain is everywhere; destruction general.

The pain frequently radiates to the testes and bladder, and indicates an entanglement of the hypogastric plexus, exciting bladder symptoms, or radiates down the leg and back, denoting an appendix posteriorly and deeply seated and difficult of enucleation. The persistent pains after the convalescence from an appendicitis are due, according to Morris, to nerve filaments being caught into the scar tissue, undergoing chronic sclerosis, following a neuritis, and therefore inhibiting the peristaltic movements of the

colon, and predisposing to constipation, intestinal fermentation and dyspepsia.

The secondary pain of appendicitis is to be differentiated chiefly from acute obstructions, floating kidney, renal and hepatic colic, the pains of pelvic disease with shock, and from cholecystitis, where the gall bladder is extended low down, an ether examination being frequently demanded in the latter case. When hepatic colic is epigastric in location, it frequently radiates to the midscapular region or the shoulder. It is not generally so violent or sudden, but is aching and tearing; when the calculus has entered the duct, it is tearing and cutting; is seated in the hepatic area.

The entrance into the duct of an hepatic stone starts a rhythmical or periodic pain, which begins slowly but rises to a maximum. When appendicitis pain becomes secondary, and thereby in close relation to the hepatic area, it generally becomes constant. Before the duct or bladder has perforated, patients are better able to locate a gall-stone pain than most other acute abdominal pains. Jaundice when present is decisive.

The referred pains of a renal stone, the course of the pain along the ureters and the tenderness on deep pressure in the kidney region are usually quite sufficient for a diagnosis of renal trouble. The pain of appendicitis increases progressively; nephritic colic, coming on suddenly, very rapidly attains its height. Appendicular pain ceases gradually; nephritic, suddenly. Suppressed or bloody urine decides a doubtful case. Ralph says that "aneurism of the aorta or mesenteric artery causes pain similar in amount and location to renal pain."

Pelvic pain.—Most pelvic pains, being more definitely located and more amenable to examination, are of less interest to us at the present time than the foregoing. The sudden, acute abdominal pain, however, of a woman of child-bearing age, referable to the pelvis, means usually a ruptured tube filled with pus or an ectopic pregnancy, is of extreme importance and is the one lesion of the pelvis most apropos to our subject. The sudden, severe colicky pain in a woman of this age, suddenly ceasing, followed by shock, rapid pulse, low temperature, usually means hemorrhage or pus escaping into the abdominal cavity and demands immediate relief, with a few exceptions where shock is extreme, in which case, after the filling of the vessels with normal salt solution, a rise of temperature and a falling pulse indicate the propriety of interference.

The question of interference in all abdominal hemorrhages, whether pelvic, post-operative, traumatic, cystic, gastric or intestinal, depends upon the early recognition of such a catastrophe and the state of pulse and temperature, the pulse being the better guide. "The combination," says Richardson, "of a temperature that does not respond to stimulants and artificial heat, with a pulse that still rises, calls for intervention in strongest terms, for it means the patient is bleeding to death." Sudden pelvic pain, at any age, accompanied by grave general symptoms of pyrexia and septicemia and followed by a rather abrupt cessation of the pain, points to purulent peritonitis.

Perforative peritonitis with sepsis occurs so suddenly, is so rapidly fatal, barring the few cases where Nature has been successful in her walling-off process, that the attendant has little time to lose. The pain is severe and constant, no longer colicky, followed by

symptoms of severe shock, local pressure, tenderness and rigidity. When extravasation and hemorrhage occur, the pulse begins to rise and we have then imperative indications for interference; a few hours' delay tips the scales unfavorably.

The call for surgical consultation is imperative in all cases of gastric perforation, for operations to be successful must, according to Lund, be performed within twelve hours of the accident, 79% recovering of these early operative cases.

The general conditions, according to Warren, under which surgery may become necessary in gastric and duodenal ulcers are perforative hemorrhage, persistent spasm of the pylorus with pain and dilatation, and, finally, perigastritis with the formation of adhesions and abscesses, the cause of death in these cases being septic peritonitis, retrogastric and subphrenic abscess.

In all perforative cases where pain is continuous, or when it revives after a period of freedom from it, the call for aid must be heeded immediately, Nature showing that she cannot resist the invasion.

General abdominal distention and immobility are the two other most important allied signs calling for outside aid. If the general distention does not pass away after the use of rectal tube, turpentine enema, etc., by the second day, it indicates a progressive case and a surgical one. In perforative appendicitis general distention with pain and pressure tenderness, but without localized tumor, is a grave condition; if in such a case the temperature constantly rises, the prognosis becomes worse and death is imminent within four days, unless surgically treated. Leucocytosis, as you know, increases and is marked before the perforation of an appendix or ulcer, but afterward suddenly drops, and when general peritonitis supervenes, it may disappear entirely. Its presence serves to differentiate appendicitis from typhoid, aneurism, simple obstruction, floating kidney, uncomplicated renal or hepatic colic, functional colic, fecal accumulation and ataxia. A steadily increasing leucocytosis in appendicitis is always a bad sign though other signs improve.

Typhoid perforations. — As from 10% to 20% of typhoid fatalities are caused by perforation, the majority of them occurring in the region of the cecum, a recent list of 103 operative cases, including Dr. Keen's, is of some interest, showing that 21 were saved when done within twenty-four hours. Senn writes, relative to his experiences in the Santiago campaign, that a bullet may penetrate the abdominal cavity at or above the umbilicus without causing lesions which demand surgical attention, but that if it penetrates below the navel, one to fourteen perforations will occur. Did time allow it would be profitable to discuss Professor Manley's aphorism: "When in doubt don't operate." We would rather say, first consult, then if in doubt, the patient being in fairly good condition but with symptoms growing progressively worse, give him the benefit of the only plausible course and operate. Of these cases of perforation it may justly be stated that the experience of Professor Senn at Santiago, and of Sir Wm. MacCormac in South Africa, points to the advisability of non-interference in visceral wounds below the umbilicus made by the modern bullet, while in civic life the traumatic cases of abdominal blows and crushes offer a much less successful surgical field than the purely pathologic.

When the term peritonitis can be relegated to the same oblivion as has the term bedridden in connection with pelvic disease, then will the physicians of the twentieth century have as much cause for just pride as we of today in the triumphs of Lister, Tait and others, but as the decreasing mortality of operative cases progresses, with the intelligence and promptness of the family physician, it behooves us to abolish the fictitious line between medicine and surgery, and learn whatever we can of the early signs of abdominal disease. The bulk of all successful practice depends upon an early and accurate diagnosis.

From what has been said, one general conclusion may be drawn, best stated in the language of Dr. Richardson: "Is it not a duty, therefore, for those of us who see many of these cases to demonstrate again and again, as far as human error and frailties will permit us, those signs by which possible impending disaster may be recognized, to emphasize on every occasion the one great cause of disaster in these formidable lesions — the unnecessary loss of time; and to shorten, as much as possible, the interval which must elapse between Nature's first call for help and the surgeon's response?"

Finally, it may be said that while many a life can be spared by timely care and the knowledge of the just value of painful symptoms, we must confess to the large mortality of all acute, painful abdominal diseases. Those of you who will this summer visit that historic old pile, Westminster Abbey, will be reminded of the very common fate of this class of cases by reading the epitaph, in the Poets' Corner, of William Shakespeare:

"The cloud-capped towers, the gorgeous palaces, the solemn temples, the great globe itself, yea, all which it inherits shall dissolve, and like the baseless fabric of a vision leave not a wreck behind."

Original Article.

THE PSYCHIC FACTOR IN DISEASE.¹

BY ROBERT W. GREENLEAF, M.D., BOSTON.

A STUDY of the cases occurring in one's private practice leads to the conclusion that many of them present aspects of a mentoneural relation worthy of consideration. This relation, for want of a better term, we may call the *psychic*. The term is somewhat objectionable because it is burdened with diverse popular meanings. I use it simply in a plain medical, and in no sense a mystical, meaning.

We probably all remember the stories our teachers of physiology told us of the pranks the nervous system plays; of how a wise man on being asked to tell which of a set of servants was guilty of theft arranged them in a row, placed some rice in the mouth of each and then on calling for the rice found that one returned it dry. This one, perturbed by his consciousness of guilt, had failed to secrete saliva. It would be well if we paid more heed to such teachings of physiology, but in the interest attaching to pathology and to our diagnoses with instruments of precision, these less conspicuous factors easily escape our attention. What I have to say may seem commonplace

¹ Read before the Clinical Section of the Suffolk District Medical Society, February 21, 1900.