worker as George Draper, in which this branch of medicine is rapidly gaining the recognition it deserves. Much has been accomplished, much more still remains, not only in more clearly determining the significance of these constitutional inadequacies but also in establishing more normal relations. The task is fraught with great difficulties, but in the words of Draper, "it is a fascinating and profitable one and to it should be brought the best thought, which many minds must provide."

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**INFLUENCE OF EMOTIONAL SHOCK ON THE GASTRO-INTESTINAL TRACT IN THE PSYCHONEUROSES**

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The course of human endeavor, or life, as one of the most important elements in the evolution of the species, is marked by psychologic changes which are often more obvious than the physical. Whether these have become more frequent or whether attention has been more closely focused on them is not so important as the fact that modern research is becoming more concerned with their influences. The rapidly varying activities of modern life from business and social points of view have modified environmental states in their spiritual, social, economic and domestic, as well as sensual, aspects. Mental reactions have multiplied, fixations and habit patterns have been altered, and complex, repressions and other psychopathic effects correspondingly developed or elaborated. These are sometimes so marked and severe as to occasion a response which is comparable to shock or trauma from other causes.

The influence of fright as well as anxiety, fatigue, anger, pain or unusual excitement on the digestive tract and its associated systems is not new but its importance has not been given the attention it merits, especially from the neuropsychic point of view.

Long before the influence of psychic stimuli on the secretions as well as the motility of the gastro-intestinal tract, the salivary activity through the sight or smell of food has been recognized. That the activity was not entirely the result of hunger and conditioned on the stimulating influence of food is evidenced by the amusing incident of the little boy who stopped the Marine Band during a concert in Washington by the sucking of a lemon as he passed by.

Some time ago Dobree* stated that:

Daily observation teaches us that every profound sensation, especially the emotions, gives rise to distinct alterations in our arterial life—changes in the pulse and respiratory rate as well as that of blood pressure as generally within the domain of the vasomotor reflex. In the same category belongs the influence of emotion upon the glandular system. A light or copious flow of tears, subject to individual variations, as a result of pain or grief. Occasionally in frank anxiety states involuntary urination occurs.

In 1852, Bidder and Schmidt demonstrated the influence of craving food, withheld in hungry individuals, as sufficient to release gastric secretion; this was later confirmed by Richert in 1878.

The depressive effects of strong emotional stimuli on the gastric secretion was first accurately studied by Bickel.2 He was able to observe in gastric fistulas in dogs a profound inhibitory effect on the secretory function of the gastric mucous membrane through anger experiments in animals selected because of their excitability. Controls were carefully carried out on esophagotomized dogs and observations made by means of a gastric fistula. Not only the quantity but the quality of the secretion was influenced.

Later, by investigations of Pewsnr, the influence of psychic stimuli on the external secretion of the pancreas was shown. Oechsler* confirmed these observations and was the first to demonstrate the reaction of the emotions on the flow of bile as well as the inhibitory influence on the digestive glands. It was conclusively shown that this influence was on glandular activity and not merely inhibited outflow, since with the removal of the inhibitory effect no increase in secretory flow took place.

The suppression of urine under high emotional states, followed by a large output of urine of low specific gravity, is a common observation.

Motor effects have been observed, such as spastic constrictions of involuntary muscles, especially made evident through gastro-intestinal radiography through the intermediation of insoluble opaque precipitates. Contraction of the circular muscle of the stomach thus may cause the well known "hour glass" deformity to be portrayed, without revealing organic constriction when explored by operation.

The comment of Alvarez* is interesting in view of the apparent conflict in effects:

At first thought one would expect an increase in the irritability of the digestive tract to result in diarrhea, whereas actually constipation is the rule. A possible explanation is that the sphincters at the two ends of the stomach and of the colon, which I have reason to believe are normally more sensitive than the rest of the tract, become so irritative and tonic that they cramp down and interfere with the progress of food and its residues. This explanation is supported by the fact that there are a number of nervous, unduly irritable women who suffer from spasm of every sphincter in the body. They have perhaps pharyngospasm with globus; slight spasm at the cardia; spasm at the pylorus, causing delay in the emptying of the stomach; spasm at the ileocecal sphincter causing delay in the emptying of the ileum and sometimes a sort of hunger pain; spasm of the anal sphincters causing constipation, and spasm of the muscles about the vulva causing dyspareunia and irritability of the bladder. Constipation is commonly of nervous origin; it is often associated with an extreme tonicity of the anal sphincters, and this I believe is part of the general tenseness of the muscles which is seen in nervous, hypersensitive persons.

One may therefore summarize the influences of emotional stimuli as operative through the inhibition of secretory activity of the glands of the stomach, duodenum, pancreas and liver; the motor activity as affecting the conformation and relationship of the viscera, as revealed by roentgenographic study; and secondarily, or consequently, modifying the chyme, biliary and pancreatic outflow.

Most experiments in man were carried on through condition reflexes associated with the sight, smell or taste of food. That other stimuli, however, may oper-

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1. Read before the Section on Nervous and Mental Diseases at the Eighty-First Annual Session of the American Medical Association, Detroit, June 25, 1930.
2. Dobree: Experimenteller Beitrag über den Einfluss von Affekten in Muskelarbeit auf die Urausscheibung.
ate effectively is evident from the observation of Sine
nikoff, who has described an interesting case of a
woman in whom an artificial esophagus was made from
a loop of small bowel transplanted under the skin of the
chest. When activity was quite apparent in the loop,
harsh words immediately stopped the movements for
several minutes.

Alvarez cites an instance of a young man who had
been much disturbed over a political row in his lodge
and when submitted to fluoroscopic examination it was
found that every bit of barium meal eaten six hours
later was still remained in the stomach. With the restora-
tion of calm and the settling of the difficulties, the
stomach emptied promptly.

Cannon described a woman who, at the first exami-
nation, appeared to have no gastric juices but who on
subsequent tests was found to have plenty. It was
then learned that on the night preceding the making of
the first analysis she had been kept awake and badly
upset by the conduct of her husband, who had chosen
the occasion to get uproariously drunk.

It seems unnecessary to elaborate further on the
influence of emotion on the motor phenomena of the
gastro-intestinal tract at this time in view of the numer-
ous experiments in man and animals by such observers
as Cannon, Brillat, Savarin, Haudde, Stiegler, Sailer,
Gilmer, Biernaski, Bickel, Ivy, Cohnheim and Dryfus.

The influence on the secretory structures varies in
different individuals, at times being more manifest in
the salivary or gastric secretions than in the pancreatic
or intestinal, and vice versa. It is probable that in the
majority of susceptible psychoneurotic subjects the
alteration in the chyme as well as that of the pancreatic
juice is chiefly responsible for the flatulence and gase-
ous distention which is so frequently a cause for com-
plaint in these patients. Not only is the secretion of the
pancreas inhibited and the volume consequently dimin-
ished, but its enzymatic content is also diminished or
altered. That the flow of bile through the common
bile duct exerts an exciting influence on the outlet of
the duct of Wirsung with a stimulating effect on the
flow of pancreatic juice is generally conceded; indeed,
with all the factors that may influence the pancreatic
secretion in amount and constituents growing out of the
effect of the emotions it would indeed be surprising if
complaints from the gastro-intestinal tract were not
forthcoming.

The normal metabolism of fats is most interesting,
but the alteration of this process as a result of inhibited
secretory activity—especially of the pancreatic juice and
the bile—becomes particularly so, and probably is the
most important factor in the development of the dis-
tressing intestinal disturbances so frequently accom-
panying functional nervous states.

It is not opportune, within the allotted limits, to do
more than to indicate some of the changes from one
point of view.

It is a well known physiologic fact that both the
pancreatic juice and the bile are necessary for the inte-
stinal digestion of fat. It has been determined that, in
the absence of the pancreatic juice alone, the diminu-
tion in the absorption of fat is 50 to 60 per cent. If bile is
also absent, the diminution reaches from 80 to 90 per cent.

The faulty metabolism of fats often results in the
overproduction of fatty acids—possibly in part due to
limited saponification as well as to lipase deficiency; this
is responsible for the intestinal irritative reaction as a
result of the change from the normal alkalinity, as well
as the familiar manifestations of acidosis frequently
encountered. The chief offenders in the fatty acid

It is quite probable that such disturbance plays an
important part in the development of ulcer, especially
if the way has been prepared by an alteration of the
chyme because of the gastric glandular inhibition or
suppression proceeding from the same general influence.

Similar distressing symptoms may be attributed to the
lessened amylolytic and proteolytic enzyme content of
the pancreatic fluid.

It would seem desirable that more attention be given
to functional alterations which have been provoked in
psychoneurotic individuals through emotional sus-
ceptibility to shock or psychic trauma in evaluating the
cause of the consequent subjective complaints. It
should be especially emphasized that such susceptible
individuals should be submitted to careful observation
from the psychologic as well as from physical aspects
and that therapeutic measures both psychologic and
medicinal, directed toward their correction, should take
precedence over operative procedures. There is good
reason to suspect that many patients with anxiety neu-
rosis with depressed or maladjusted emotional conflicts
have been deprived of appendixes and gall bladders
without pathologic changes, or submitted to gastro-
enterostomy and other plastic operations when the real
issue was not with an organic disease, and the sub-
jective complaints for which they were undertaken still
obtain. The treatment, in general, indicated in cases
in which psychic, traumatic or emotional cause can with
fair reason be suspected if not definitely determined
may be approached from two angles. One is distinctly
psychologic, having as its purpose the effecting of a
readjustment, especially with reference to conflicts
interfering with the libido in its broadest sense, on the
eliminating of repressed complexes which are incom-
pletely obliterated. The latter may often, but not nece-
sarily, pertain to the sexual in either its broad or its
narrow aspects. The other aspect of the treatment is
through sedative medication without, however, clouding
the consciousness; and the corrective administration of
the deficient enzymes. The question of the effective-
ness of enzymatic ferment when introduced into the
intestinal tract, the physiologic effect of ox bile or other
contributory influences should not concern one nearly
so much as the fact that they do afford relief from the
most obtrusive complaint, and in doing so they have the
distinct advantage over surgical procedures in that
if they fail in their purpose they may be discontinued
and the organs have in no way suffered from their
having been used.

Indeed, the foregoing may be regarded as a plea for
the more careful study of gastro-intestinal disturbances
as occurring in the highly neurotic and, especially,
anxiety neurotic patients; and to avoid for them what
appears to be all too frequent and ineffectual surgical
attempt at relief. The large percentage of so-called
neurotic or psychoneurotic patients who have been
deprived of their appendixes and gall bladders without
experiencing the relief contemplated is quite familiar
to most neurologic clinicians.

The following two cases present the general clinical
picture: one submitted to operation without relief; the

5. Sine
nikoff, E. J.: Ueber Hungerbewegungen eines Döderleh
6. Cannon, W. B.: Body Changes in Pain, Hunger, Fear and Rage,
second almost entirely relieved by antispasmodic and intestinal medication:

Case 1.—Mrs. L. M. V., a well-developed Southern woman of 38, had an irrelevant antecedent and family history; the former included typhoid at 15, several attacks of malaria, and influenzal pneumonia in 1918. Menstruation was established at 11; there was no difficulty. The patient was married at 15. She had one normal birth. She was widowed for twelve years and remarried. There was no difficulty in both marriages. Many repressed emotional complexes were admitted by her.

She consulted a physician because of stomach (?) trouble of fifteen or twenty years' standing. Her chief complaints were pain and distress about an hour after eating. There was some tense pulling in the occiput and the neck. Her appetite was good but was limited because of fear. There was gaseous distention and constipation.

The patient submitted to operation with the diagnosis of gallbladder and appendicular disease. The operation revealed a normal stomach, gallbladder and a long narrow appendix, free from evidence of disease, some plastic veil-like adhesions, and a rather large but patent pylorus. The left ovary was removed because of old pathologic changes and adhesions.

Recovery from the operation was prompt and with the establishment of convalescence a recurrence of symptoms appeared. The worry, repressed complexes and defense reactions were quite evident.

Much relief was afforded by the administration of strontium bromide before meals and the use of ox gall, pancreatin and heavy magnesium oxide an hour after meals.

A later diagnosis of duodenal ulcer was based on roentgenograms and persistence of symptoms. Rest and a dietary plan afforded some relief. The marked improvement at the present time was antedated by domestic adjustments leading to the abolition of disturbing anxieties. This readjustment in domestic life has now resulted in complete recovery, which has continued without recurrence for about two years.

Case 2.—A woman, aged 40, well nourished, was observed in 1928 because of pain and abdominal distress, with flatulence. Her ears were filled with aural discharges of the exanthemata 23, and influenza in 1918 which was quite severe. She had had an appendectomy with an abscessed ovary at operation and a tonsillectomy nine years before. The menstrual history was negative except that there had been no catamenia since the operation.

During the following operation. Considerable worry during this period culminated in a shock, the result of a fatal accident to a son. Marked depression with tenseness and anxiety persisted. Her appetite failed; distress increased with the abdominal distention. The bowels were constipated. Her sleep was much disturbed.

Physical examination did not reveal any organic evidence. There were no definite points of pain; there was considerable flatulence. The blood pressure was 120 systolic and 80 diastolic; hemoglobin was 80 per cent. There was moderate acidosis.

Relief was prompt under salure aperient and antispasmodic medication combined with the pancreatic enzymes.

**CONCLUSION**

It is earnestly hoped that this discussion of the subject may not be viewed as an attempt to depreciate the judgment on which surgical pathologic cases definitely rest, but rather to emphasize the fact that many psycho-neurotic disturbances of the glandular structures associated with the visceral organs in question as to justify more careful study from the psychoneurotic aspect.

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**ABSTRACT OF DISCUSSION**

Dr. W. H. Riley, Battle Creek, Mich.: When a patient comes to a physician complaining of pain or distress or disorder of any organ or group of organs, the physician has immediately presented to him a problem to determine whether the cause of the trouble is in the organ itself or in one of the controls of the organ or in both. This is an important point for the physician to decide but unfortunately one that he does not always consider.

There are at least three great controls of the function of the body: first, the psychic including the emotional part of the mind; second, sensoriomotor or reflexes; third, the internal secretions. The function of any organ or any group of organs may be disturbed or changed by insufficient or imperfect action of one or more of these controls. In emotional shock one of these controls is disturbed. The work of Pavlov, Cannon, Boldreyff and others has shown that the emotional influence has a wonderful influence in changing the function of the digestive system. Pleasant and agreeable emotional states favor the function of digestion and absorption, while unpleasant emotional states disturb the digestion. The emotional shock or strain to which the patient has been subjected is quite often readily discoverable. In other cases it is more difficult to discover and the physician must quiz the patient quite at length and at different times before the emotional strain or shock which may be responsible for his present ailment can be discovered. The patient often does not make any connection between the trouble from which he is suffering and the emotional strain or shock which may be the cause of it. As a result of these emotional or psychic shocks, the most important symptoms that the patient presents in the digestive system, according to my own experience, are anorexia, nausea, vomiting, distress in the stomach and abdomen which usually occurs soon after eating; gaseous distention; hyperacidity of the stomach; heartburn; constipation; diarrhea, and attacks of mucous colitis. While the emotional strain or shock may be the primary cause of these symptoms, it is well for us to keep in mind that as the result of this emotional shock the nervous system has become sensitized and the nervous reactions, the results of taking food or digesting food, may be excessive, the result of a hypersensitive condition on the part of the nervous system, and not always a mental reaction on the part of the patient. In a study of these cases it is important that the physician approach his problem unbiased and with a broad view of the problem.

Dr. Meyer Solomon, Chicago: What applies to the gastrointestinal tract applies to all the other tracts and therefore it brings up the general question of psychogenic influences on the bodily organs. I believe that the various physical complaints are dependent approximately on the following factors: The first group comprises hypochondriac ideas, practically delusional in character, which, as the result of these emotional or psychic shocks, the patient feels nothing unusual but is complaining. Second are attention sensations. All have heard about so-called attention pains, which may be disputed; but there are attention sensations, in other words, the complaint of feeling various sensations in different parts of the body, though physiologically normal, which the individual would not feel or complain of if happy. The third group includes bodily manifestations due to autosuggestive activity on the part of the patient. These are really self-produced symptoms of an ideational nature, and the specific state is so-called hysteria, which has well been called autosuggestive neurime¬sis, production of symptoms simulating organic neural lesions but of an autosuggestive nature. This affects particularly the voluntary system. The fourth group, which is really specifically the problem discussed in this paper, is the effect of emotions on bodily functions in which there may be an upheaval in any part of the gastro-intestinal tract or any other tract or system, voluntary or involuntary, due to some emotional shock that often neurologists make an error in failing to differentiate the first three groups from the fourth group. This brings up, then, the fact that gastro-intestinal disturbances of an emotional nature are one part of the picture of psychogenic influences on the gastro-intestinal tract and that one has to consider the role of condition reflexes, the constitutional physiologic make-up of the particular person, and the particular weak links in the physiologic chain of each particular patient.

Dr. A. B. Olsen, Battle Creek, Mich.: I would like to emphasize the necessity of a most thorough physical examination in all these cases. A woman, aged 22, presented the typical subjective symptoms of an acute appendicitis with exquisite tenderness in the region of McBurney's point. But she had had both cholecystectomy and appendectomy several years previously, and one or two other operations. Careful tests and study
revealed a case of major hysteria, from which she made a good recovery.

Dr. A. B. Yudelson, Chicago: The importance of differential diagnosis between actual psychosis or psychic states and organic disease must be stressed. A careful study should determine whether the patient is of a type of mentality that is apt to misinterpret peripheral irritation in such a way as to simulate organic disease. As a general proposition, when the patient’s complaints are symptomatic of angina pectoris, gastric disturbances or visceral upsets, if the patient is not frankly psychotic but is able to concentrate on the focal conditions, that patient is going to give an accurate description of angina pectoris and will stick to that description. Similarly, if the patient is suffering from emotional and concentric on the gastric conditions which Dr. Solomon called “hypochondriacal states,” the symptoms will simulate gastric ulcer and typical gastric phenomena. It is precisely the same in visceral disturbances. All are familiar with the visceral type of migraine. The patients have periodic visceral pains which simulate gallbladder pain, accompanied by diarrhea, constipation or variable intestinal disturbances. These patients are not necessarily psychotic. On the other hand, if an obvious psychosis is discernible, it is necessary to study the psychic state and the syndromes suggestive of organic disease; for patients who are frankly psychotic are not systematic nor methodical in their description of their organic symptoms. But it should not be forgotten that the group of these symptoms in either emotional anxiety or mildly psychic states are focalized on the so-called vegetative nervous system. With the distribution of the vagi from the epiglottis down to the rectal mucosa, in the event of vasomotor sympathetic upsets, everything is possible in the way of symptoms: tachycardia, which simulates thyroidism; gastric irriations, angina pectoris, or visceral states. The important point is to study not only the emotional instability but especially the vasomotor sympathetic conditions, because it is on the distribution of the autonomic nervous system that the string of symptoms is strung along. The symptomatology may be focalized on the gullet, the heart, the stomach, the lungs and the abdominal viscera.

Dr. Irving J. Sands, Brooklyn: It is a matter of common observation that psychic influences have a tremendous effect on the body and bodily functions, particularly on the gastrointestinal tract; they are expressed anatomically along the vegetative nervous system either through stimulation or depression of the parasympathetic nervous system and occasionally of the sympathetic nervous system. Most of the signs and symptoms expressed by the patient and found on examination may be under one or the other heading. They are due to a vegetative imbalance in the greatest majority of instances. Furthermore, the action of the endocrines, particularly the thyroid and the suprarenals, has a tremendous influence in this particular state. All are familiar with the work of Ziegler and Levine (Am. J. Med. Sc. 169:68 [Jan.] 1925), who found basal metabolic increase in most of the psychoneurotics patients at a time when their conflict was touched on. Henry (J. Nerv. & Ment. Dis. 70:598 [Dec.] 1929) at Bloomingdale only recently reported a series of cases showing the tremendous effect of emotions in psychic patients. In cases of manic-depressive insanity, the manic phase, he found an increase in metabolic rate. In those psychotic reactions associated with depressions he found a diminution in the basal metabolic rate. In these cases, of course, the action at first is reversible. Remove the psychic trauma, and the physiologic expression will return to normal. However, a certain stage is reached where there is definite structural change which is liable to occur. There is no doubt that a continuous pounding of the vagus, say, will cause definite anatomic changes in the stomach and duodenum. And although I cannot and most textbooks and mention this, these emotions have a tremendous influence in the causation of duodenal ulcers or hyperthyroidism, as the result of the influence of emotion on the endocrines and the vegetative nervous system. There is no doubt that the profession at large is now beginning to realize the influence of the interaction of emotions and physical factors to a greater degree. Really, there is a different phase in each of these states. There is no such thing as psychic and physical factors. They are parts of the same thing. Every act of the body is associated with some emotional reaction. Every emotion must express itself anatomically along some nervous pattern, particularly along the vegetative nervous system.

Dr. G. A. Mollen, Denver: This subject is so large that I tried to focus on just the one phase—the altered secretion which resulted in an altered chemistry of the gastro-intestinal tract, and that this could and does account for a great majority of the disturbances which one finds in psychoneurotic individuals; and also to lament on the frequency with which operations are undertaken for relief of this apparent glandular disturbance or the functional disturbance in the gastro-intestinal tract, without success. I think the incidence of this is apparent. And in most communities one recognizes that the orthodox Jew is probably the most frequent neurotic patient in the clinic. At least, that has been my experience. It is a sad commentary that one finds upward of 90 per cent of the neurotic Jewish patrons without appendices, their gallbladders threatened, and the symptoms still persisting. The real trouble seems to be a result of emotional shock with abnormal changes in the digestive function, and the production of fatty acids. These, as long ago as 1902, von Noorden pointed out as the most disturbing elements in the acid intoxications. I refer to the isomers of butyric acid. This leads to many possibilities. It is not concerned so much with the thyroid or the suprarenal disturbances as the shock itself might at first lead one to think. Although the shock is probably inhibitory through the vegetative system, the thyroid itself possibly does not play so much a part as the suprarenal, and the two not a great deal so far as the glandular activity is concerned. It is mainly the influence of the glandular activity and the secondary effects leading to the ill in the gastro-intestinal tract to which I intended to direct attention, and it was also with the idea that one might correct or relieve this deficiency, brought about by emotional shock, by supplying the enzymatic deficiencies in the digestive fluids as well as to correct the psychic traumas by the removal of the effects of maladjustment.

OCULAR NEUROSES

AN IMPORTANT CAUSE OF SO-CALLED EYESTRAIN

GEORGE S. DERBY, M.D.

BOSTON

J. W. L., a teacher working for his Ph.D. degree, who consulted me last December, said that eight years previously he had strained his eyes while reading a difficult text and had not been able to use them for some time. At various periods since then the same thing had happened. The present trouble began in March, 1928, when he strained his eyes again. Since then he had not been able to use them much; print blurred, and he had had constant headache for which he took acetylsalicylic acid. He was able to keep on with his teaching, but he did a minimal amount of work with his eyes and became much depressed. For three months during the past summer he had practically not used his eyes at all. The thesis for his degree was almost finished but had been laid aside for the past year. He was much depressed at times and suffered a good deal. He had seen a large number of ophthalmologists, had had many prescriptions for glasses, and was no better.

Examination showed a moderate amount of mixed astigmatism in each eye for which the patient was wearing the correct glasses. He had no muscular anomaly and the examination showed no ocular abnormality. He had had extensive and thorough physical examinations, including a lumbar puncture; his tonsils had been taken out and his sinuses drained, all to no