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ORIGINAL ARTICLES.

AUTO-INTOXICATION IN ITS RELATIONS TO THE DISEASES OF THE NERVOUS SYSTEM.

Read before the Illinois State Medical Society.

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We are at the beginning of a new era in the pathogenesis and treatment of the neural diseases. The discovery of the neuron has resulted in making clear some of the dark passages in physiology and pathogenesis, and the dynamic changes produced in these neurons by alcohol and other extrinsic poisons, that have been so marvelously demonstrated by Andriezen, Van Gieson and others, and the reasonable inference that intrinsic poisons are equally powerful in establishing pathologic conditions, open up a new line of important therapeutic investigation.

The primary form of the psychoses from the beginning has been called melancholia, "black bile," because of the relation ever recognized between mental depression and perverted action of the great viscus of the abdominal cavity, and in more modern times quaint old Abernethy emphasized the same etiologic thought when he gave utterance to the aphorism that the best medicine for the "blues" is the blue pill. That various nervous diseases are produced by alcohol, lead and other extrinsic poisons, and by the toxins of various infectious diseases, by uremia, by sunstroke and by experimental thyropravia is universally accepted, and moreover, the neuro-cellular lesions that are produced by some of these poisons have been demonstrated. Auto-intoxication includes the results of toxins that are produced within the body by normal and abnormal chemic activity, and those that follow from the suppression or disturbance in the functions of such organs as the thyroid and other glands that produce constituents necessary to healthy nutrition, and those toxins that are produced by germs in the gastro-intestinal tract and elsewhere about the body.

Albu suggests the following general classification of auto-intoxication:

1. Auto-intoxications from the suppression or disturbance of the functions of an organ, *i.e.*, auto-intoxication of thyroid gland, pancreas, liver, supra-renal capsules, producing myxedema, diabetes, acute yellow atrophy and Addison's disease, respectively.

2. Auto-intoxications which occur from anomalies in general metabolism without definite localization, such as rheumatism, gout and oxaluria.

3. Auto-intoxications which are caused by the retention of the physiologic products of metabolism in different organs, such as poisoning due to extensive

destruction of the skin by burning, carbonic acid poisoning, uremia and eclampsia.

4. Auto-intoxications due to the over-production of physiologic and pathologic products of the organism, such as ammonemia, acetonuria, diaceturia, diabetic coma, Basedow's disease, etc. The most frequent source of this intoxication is the gastro-intestinal tract.

In normal digestion we have ultimately elaborated absorbable products, soluble albuminoids, emulsified fat, glucose and maltose. In indigestion we have numerous aromatic, nitrogenous and acid compounds produced that are poisonous. In the stomach the absence or diminution of free hydrochloric acid results in putrefaction, and in this viscus and in the intestines the presence of micro-organisms result in decomposition, and among the resultant toxic products thus produced we have lactic, acetic, succinic, carbonic, the aromatic and the volatile fatty acids, indol, skatol, phenol, peptinatotoxin, ammonia, methane, sulphuretted hydrogen, methyl, mercaptan, etc.

The liver acts as a barrier to guard the organism against the invasion of these various poisons and may transform them into innocuous substances or eliminate them by the bile as non-absorbable chemic combinations. The skin, kidneys, bowels and lungs assist the liver in eliminating these products.

Bouchard¹ has demonstrated that the normal man manufactures enough of these several poisons each day to destroy the body if retained within it; he has separated from the urine of such a man, seven toxic substances, two of which will produce convulsions, one myosis, while one is antipyretic, one is narcotic, one is diuretic, and one is a sialagogue. The toxicity of the urine in the healthy man varies according to numerous circumstances, such as cerebral and muscular activity, sleep, diet, etc. The urines of sleep are usually less toxic than those of the waking state. The urotoxic co-efficient varies with disease; the urine of a uremic patient is not toxic, because the poisons which should be eliminated are retained. The urine in mania is less toxic and in melancholia more toxic than normal. The urine from a maniacal patient when injected into an animal will give rise to excitement and convulsions; that from a melancholic to depression, restlessness and stupor.

Morgan² found abnormalities in the urine in 70.6 per cent. of the cases of insanity; such a high specific gravity, albumin, excess of phosphates, urates, uric acid and oxalates.

Agrotini³ noticed the gastric disturbances, the hyperchloridity and the urinary toxicity with the epileptic attacks, and very wisely concludes that auto-intoxication from altered tissue change and digestive disorder has an important part in the mechanism of the attack.

Somers⁴ concludes that in all cases of insanity there is a deterioration of the blood, showing a diminution

of red corpuscles, an increase in white corpuscles, and a low percentage of hemoglobin; that cases of melancholia show the lowest amount of hemoglobin; the eosinophilic cells are absent in the majority of the cases, and that poikilocytosis is characteristic of this disease. That the eosinophilic cells are increased in mania, and that there is an intimate relation between an hypertrophied heart, sclerosed arteries, lowered blood nutrition and the course of mental diseases, and asks this important question, "Is it possible by the use of some drug where you increase metabolism to also increase the number of eosinophilic cells and thus free the system of the toxic influences which are supposed to be the cause of melancholia?"

Contributing to this toxemia of the brain is doubtless the peculiar arrangement of lymph channels around the blood vessels; the blocking of these channels, a pathologic condition not unreasonable, would result in auto-intoxication of this organ. The psychoses that are probably of auto-toxic origin are the manias, primary melancholias, whether acute, sub-acute, or chronic. The nervous diseases that have probably the same origin are neurasthenia, epilepsy, tetany, chorea, exophthalmic goiter, disorders growing out of rheumatism and gout, and probably many others.

Van Gieson⁵ has demonstrated, in these toxemias, an acute parenchymatous degeneration of the neuron from which recovery, both of structure and function, may take place, provided the poison acts only for a brief period, but if the action continues, the degenerative changes eventuate in the irreparable destruction of the cell.

The gastro-intestinal tract is the theater of the most important of the operations of auto-intoxications, and the first important factor is dilatation of the stomach. Bouchard⁶ has most graphically described the consequences of this pathologic condition, and it is unfortunate that our means of diagnosis in these cases are so meager. The second important factor is intestinal indigestion, and the third is coprostasis. The urine will often give important aid to diagnosis, and it should be tested for indican and the total sulphates, and will show increased ratio of the former and diminished ratio of the latter, although ethereal sulphates will be increased in auto-intoxication.

The treatment of these cases must consist in the treatment of the pathologic condition associated with it. First to be considered is the treatment of gastrectasis, and, in this, diet is of the first importance. The food must be very digestible, concentrated, so as to give least taxation to the motility of the stomach. The meals should be taken three times a day with the longest possible interval. It is necessary to avoid, as much as possible, everything that can have a tendency to undergo fermentation. Alcohol, which furnishes acetic acid, especially red wines, beers, tea, coffee, carbohydrates and fat are objectionable. The best diet would be a predigested one, peptonized milk, malted milk, somatose, especially the combinations of malted milk and somatose. The best dietary is an animal one, tender beef, mutton, fowl free from fat, eggs, fish, the smallest possible allowance of bread, peas, asparagus, tomatoes, peaches, grapes, apples and but very little water, and this should be taken hot before meals. If hydrochloric acid is deficient in the stomach contents, as it usually is, then hydrochloric acid may be administered after eating. It is without doubt the best of the stomach antiseptics; with this

may be administered the simple bitters. Strychnia is also a drug of great value, because of its power to restore tone to the debilitated muscular fiber. The intragastric application of faradism, the cutaneous use of faradism and of static electricity, all alike stimulate peristalsis and promote the nutrition of the muscular coats of the stomach. Abdominal massage is also of service. Lavage is necessary in all of these cases, and it should be used daily; it can best be performed a half hour before breakfast, or dinner. The red-gum soft-rubber tube, with funnel attached, is the simplest and best apparatus; the patient can soon be taught to use it himself. The water should be warm, and with some mild antiseptic, such as sodium borate, sodium salicylate, or such as may be preferred. About a pint should be introduced at a time, and then this should be siphoned out and followed by another and another until it returns clear. It may be necessary to change the climate; a high altitude for some, a sea level for others, with freedom from care, distraction by travel, or some pleasurable occupation.

The treatment of intestinal dyspepsia calls first for purgatives, and the salines meet the indications best. The combination of sodium sulphate with sodium phosphate, four parts of the first to one part of the second, is an admirable one. The best intestinal antiseptics are beta-naphthol, benzo-naphthol, bismuth salicylate and guaiacol carbonate. Of this valuable series benzo-naphthol is probably the best, because it is but little toxic and does not irritate the kidneys. It should be administered in $\frac{1}{2}$ gram doses, four times a day.

Colonic impaction is a very frequent condition in chronic invalids and is very frequently overlooked. For its relief cathartics are not sufficient. Colonic flushing, in the knee-breast position, with normal saline solution at body temperature, with abdominal massage, must be used. The flushing will frequently have to be repeated several times before the accumulations are removed. It should be followed with aloetic laxatives and intestinal antiseptics. As a rule, all of these cases of auto-intoxication will require hematinics, Bland's mass, freshly prepared, combined with extract nux vomica and arsenic, have given me the best results.

The treatment of Albu's first class of auto-intoxications, of those due to the suppression or diminution of the secretions of some gland, suggests the question of organo-therapy, and I think we may say that the great expectations of this new therapy have not been realized. Spermin, cerebrin, medullain, cardain and all such have failed to produce the results promised; but thyroid, bone marrow and nuclein have in some cases given results that are surprising. No one can dispute the value of thyroid extracts in myxedema, cretinism, acromegaly, obesity, tetany, rosacea, ichthyosis, scleroderma, some forms of syphilis and some forms of insanity, especially the adolescent, climacteric and puerperal cases. The value of red bone marrow in certain cases of anemia seems well established, and the nucleins seem to have the power of increasing the bactericidal capacity of the blood and in anemia following infectious diseases; in gonorrhea and in tuberculosis, benefit has sometimes been obtained.

CONCLUSIONS.

1. Some of the nervous diseases are the product of auto-intoxication.
2. This autotoxis produces a parenchymatous

degeneration of the nervous system, acute or chronic, that may result in the destruction of the structure and function of the nerve cells. (Van Gieson and Andriezen.)

3. The peculiar arrangement of the lymph channels in the nervous system makes auto-intoxication of the brain possible by the blocking of these channels.

4. The principal factor in this autotoxis is a disordered gastro-intestinal tract.

5. Gastrectasis, intestinal dyspepsia and coprostasis are ordinary conditions producing gastro-intestinal intoxication.

6. The diagnosis is to be made; *a*, by a regional examination; *b*, by examination of the gastric contents, and *c*, by examination of the urine.

7. The urines will show increased amounts of indican, diminished total sulphates, and an increase in the amount of ethereal or conjugate sulphates.

8. There will also be found, usually in consequence of this autotoxis, a diminished hemoglobin record and a diminished number of red blood corpuscles.

9. The treatment should consist of lavage, enterocolysis, gastric and intestinal antiseptics, laxatives and hematinics.

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- ³ Rev. Spermatal, xxii, 1896.
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- ⁵ State Hospital Bulletin, Vol. 1, No. 4.
- ⁶ Auto-intoxications, Lectures on, p. 150 at seq.

SURGICAL TREATMENT OF GASTRIC ULCER.

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Surgical interference for the relief of the ulcer of the stomach and its complications, although of comparatively recent date, has by the brilliancy of its results become a well established procedure and promises much for the future. In considering its applicability I shall be as brief as possible, dwelling only on those conditions in which it has been proven of unquestionable value. Although the radical cure of gastric ulcer has been advocated, and attempted by excision of the ulcer itself, the results have not as yet justified the adoption of this measure as the routine treatment for this condition, nor is it warranted by statistics, as according to Welch about 85 per cent. of all cases of ulcer of the stomach heal spontaneously.

Therefore, I shall in this paper consider the value of surgical interference in those cases of gastric ulcer complicated by one or more of the following conditions: Perforation, hemorrhage, cicatricial contraction and adhesions to neighboring viscera or the abdominal wall.

Perforation of a gastric ulcer is always a very serious accident and in the majority of cases the only hope for the recovery of the patient is offered by surgery. If the perforation occurs rapidly and into the general peritoneal cavity, no time having been afforded for the formation of limiting adhesions, the patient unless relieved by surgical intervention rapidly succumbs to acute septic peritonitis.

In these cases the surgeon should never hesitate, as experience has demonstrated that the successful cases are those in which the operation was performed within a few hours following perforation. Delay can mean nothing but a rapidly fatal infection.

An incision should be made in the median line between the umbilicus and the sternum, and if the stomach is not then readily accessible another incision at right angles to the first will render it so. First, locate the position of the perforation and effect its closure before attempting to remove the extravasated gastric contents.

In by far the greater number of cases closure may be best effected by turning in the peritoneal edges and retaining them in position with Lembert sutures. In some cases, owing to the diseased condition of the stomach wall, a large portion of it may require inversion. Again, a portion may be resected and the opening closed. It is extremely fortunate that perforation of ulcers of the anterior wall of the stomach is much more common than of those situated on the posterior, as in the latter case the perforation is accessible only with the greatest difficulty, if at all.

As soon as the perforation has been closed, the peritoneal cavity must be carefully cleansed of all extravasated matter, first, by dry gauze sponging and then by irrigation with large quantities of normal saline solution. Irrigation, as frequently practiced, employing three or four quarts of fluid, is worse than useless, as with such a small quantity the extravasated particles are only disseminated throughout the peritoneal cavity and not washed out. In all cases, gallons of hot normal salt solution should be used.

Following the irrigation, the peritoneal cavity should again be sponged dry and ample gauze drainage provided. If evidences of general peritonitis are already present it is well to supplement the ordinary drainage with gauze wicks placed at the most dependent portions of the cavity and carried out through incisions in the loin.

M. H. Richardson¹ has collected forty-four cases of operation for this condition, with ten recoveries. When we consider that all these would have died without operation, these results are gratifying. The same observer also states that the percentage of recoveries during the last two years was much larger than in those cases operated on before that time, indicating that the results are improving with experience.

Sometimes perforation of a gastric ulcer occurs so slowly that time is allowed for the formation of limiting adhesions and we have a localized abscess resulting. This abscess may be superficial deep or sub-diaphragmatic. Weir² urges that left-sided pyoneumothorax with a previous history of gastric symptoms should be suspected as due to a perforated ulcer of the stomach. These abscesses should be freely opened and drained, following the technique employed in pelvic or abdominal abscesses due to other causes, and the perforation closed in the usual manner. Cases have been reported in which perforation was followed by neither general peritonitis nor localized abscess, and a complete spontaneous recovery was made, but such a fortunate termination is extremely rare.

Again, adhesion has occurred between the stomach wall and a neighboring viscus or the abdominal wall before perforation has occurred, the ulcer being thus provided with a new floor and infection prevented. The resulting adhesion, however, may occasion so much functional disturbance and pain as to necessitate an operation for its relief.

The abdomen should be opened, the adhesion found and separated and the opening into the stomach closed

¹ Dennis' System of Surgery, Vol. iv.

² Annals of Univ. Med. Science, 1893.