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The use of a colon-streptococcus anti-serum as a pre-operation measure.

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The work here presented is a part of the elaborate research into the causation and treatment of the so-called functional psychoses, made at the State Hospital at Trenton, New Jersey, under the direction of Dr. Henry A. Cotton.

More than thirty years ago, while performing autopsies upon the bodies of patients dying in the hospital for the insane at Chicago, Dr. Albert J. Ochsner¹ noted that there was present in an unusually large number very marked pathological changes in the colon, and occasionally in the other viscera. He called the attention of the authorities to these findings but was told that even if present, these lesions had nothing whatever to do with the psychosis, which was a personality or psychic disorder, entirely separate and bearing no relation whatsoever to any physical defects which might be present. In spite of his protestations this opinion prevailed. Undoubtedly many other pathologists and surgeons, both here and abroad, have noted the striking frequency with which extensive pathological changes in the abdominal portion of the alimentary canal and elsewhere are to be noted among patients suffering with the so-called "functional" psychoses.

Impressed with the very definite clinical improvements which he had obtained by removing dental and tonsillar foci of infection among these patients, and believing that there must be additional sources for the very evident toxemia among those who made little or no improvement after the removal of these oral infections, Dr. Cotton invited me to conduct a surgical research which should furnish evidence as to the presence or absence of such abdominal infection. This work is now entering upon its fourth year. The pathology is present and the favorable clinical results following

¹ Ochsner, Albert J., personal communication.

its removal are already rather widely known. Suffice it here to say, that as a result of the application of the usual surgical principles of detoxication by elimination of all foci within reach, the hospital discharge rate has risen from thirty-five to seventy-six per cent.¹

Over ninety per cent. of all patients classified as "functional" psychotics have marked oral infection. Twenty per cent. present marked evidence of gastro-intestinal disease. Until some better form of therapeusis or early prevention can be found, there seems no better method at hand, as stated by Dr. James Ewing, than surgical removal. Continuing in a report of sixteen specimens of colon and ileum from this series, Dr. Ewing says:

"The most marked and constant lesion is pigmentation of the mucosa which has rendered the inner lining brownish or at times dark chocolate in color. This change is most marked in the cecum, diminishing toward sigmoid, but often present throughout the specimen. Sections show the pigment to be lodged in large polyhedral cells lying in the mucosa and at times in the epithelium. Pigmentation of the colon is fully recognized as a sign of chronic intestinal stasis and intoxication. It is sometimes associated with anemia and at times with severe and even fatal dystrophies of nervous and muscular systems."

"Pouching of the intestinal wall amounting almost to hernial protrusions was observed in most of the cases. These pouches were from one to two cm. in depth. The wall of the pouches was generally thinned, sometimes very much thinned, and the mucosa at the bottom was generally eroded, sometimes ulcerated. Through such erosions and ulcerations it is obvious that absorption of fluids and bacteria readily occurred."

"In general, the impression gained from the study of these specimens was that the clinicians were dealing with extensive and somewhat unusual grades of chronic intestinal stasis and catarrhal inflammation with its sequels."

In 1919, thirty-four partial resections of the colon were made with thirteen deaths or 40 per cent. mortality. In 1920, fifty-nine partial resections were done with eighteen deaths or 30 per cent. mortality. In 1921, forty-six partial and thirty-one total re-

¹ Cotton, H. A., "The Defective Delinquent and Insane," 1921.

sections were done with ten deaths or 12 per cent. mortality. It is a very simple matter to account for the lowering of the mortality rate from 40 to 30 per cent. It embraced the training of the staff and the development of an improved surgical technique. The fall from 30 per cent. to 12 per cent. followed immediately upon the introduction of the serum treatment, all other factors remaining as before. Coincident with the 30 per cent. mortality among the insane, the writer's mortality among private cases was 17.7 per cent., showing that psychotic patients are not good surgical risks. They are all physically sick. Their systolic blood pressure is abnormally low, and, as is well known, they often have an abnormally high small lymphocyte count coupled with a very small number of polymorphonuclear cells, the former sometimes exceeding the latter.

Aside from the extensive pathological lesions in the mucous membrane and the wall of the colon, which were found in the specimens removed at operation, it was noted that the mesenteric lymph nodes were very much enlarged. In the very beginning of the work these lymph nodes were cultured and various strains of streptococci and colon bacilli were isolated. This finding was of the utmost importance as it clearly indicated that these bacteria were passing through the wall of the intestine and were in all probability the cause of the lesion in the intestinal wall.

When these enlarged nodes were found in the mesentery of the colon alone, resection was clearly indicated. In many cases, however, it was found that the adenitis was not limited to the mesentery of the colon, but extended throughout the whole mesentery of the small intestine. In such cases it was evident that removal of the colon would not correct or eliminate the evident lesion throughout the whole of the small intestinal tract.

It was necessary, therefore, to devise some other method whereby these infections could be mitigated or eliminated. Autogenous vaccines made from the streptococci and colon bacilli isolated from the lymph nodes, were tried, but without success, probably because of the extent and severity of the infection existing in the intestinal wall, a condition analogous to that found in typhoid fever. As is well known, typhoid vaccine will immunize a patient against typhoid fever, but once the disease is established the

vaccines have no value in the treatment, because of the overwhelming number of typhoid bacilli in the intestinal tract.

When it was found that the autogenous vaccines were not effective another method had to be devised. As no colon serum had been previously made, Dr. Cotton consulted with Dr. John F. Anderson, who agreed to attempt to immunize a horse with strains isolated in the laboratory at the State Hospital at Trenton. It was found that the colon bacilli, even in small doses, were extremely toxic for the horse, but finally a serum was produced which was very potent.

As many of the patients were suffering from combined infection of the streptococci and colon bacilli, it was decided to combine these organisms in one serum, merely for the sake of convenience of administering the serum. As noted below, this serum has proved entirely satisfactory, not only in reducing the surgical mortality, but, combined with the surgical procedure of removing the infected colon, it has apparently hastened the disappearance of the mental symptoms immediately following the operation.

Hence, the colon-streptococcus anti-serum, prepared from strains furnished by Dr. Cotton, has been given as a pre-operative treatment, in a series of from eight to ten doses, extending over about a month. Without any other change being made in the surgical technique or post-operative care, the mortality dropped to 12 per cent. Autopsy notes show that this decrease was primarily due to a great reduction in the number of perforations which formerly had occurred in the operation area. It has been noted, clinically, that the character of the improvement is transient, probably due to reinfection.

This series of one hundred and seventy cases of colectomy is too small to permit of any definite deductions as to the value of this serum, and this report is merely a provisional one, the encouraging nature of which may not be supported by subsequent studies.