

Digitalone that two of them had deteriorated and by the frog's heart method they were shown to be practically devoid of digitalis action. By some of the lethal dose methods they caused death when given in very large doses, but it was a question whether death resulted from the digitalis itself or from digitalis decomposition products. Specimen No. 2 when injected into the circulation of cats raised the blood pressure in two animals 55 per cent., which result the writers suggest may have been due to decomposition products of digitalis acting on the medulla, since the true cardiac action of the drug had been shown to be absent by tests on frogs. Specimen No. 1 when similarly injected showed an action on the blood pressure comparable to the nitrite series, for instead of raising the pressure it lowered it 23 per cent.

While showing the worthlessness of these preparations, the authors point out that although "Digitalone" is claimed to be an aseptic, non-alcoholic permanent solution of digitalis of the same strength as the U. S. P. tincture, it certainly is not permanent under all conditions. One preparation which evidently had not decomposed, at least completely, was about half the strength of a U. S. P. tincture, while the other preparations not only possessed no digitalis action, but were positively harmful.

## Correspondence

### Necrosis of the Liver After Chloroform Anesthesia

*To the Editor:*—May I be permitted to comment on the conclusions reached by Drs. John R. Williams and W. D. Becker in their report of a case of "Necrosis of the Liver After Chloroform Anesthesia," *THE JOURNAL* for May 8, 1909, page 1488? Under title, "Postoperative History," a typical picture of the second stage of acute yellow atrophy of the liver is drawn. These second stage symptoms became rapidly deepened on the third day after operation and chloroform anesthesia, ending in death forty hours after the first indication of any mental disturbance.

The history of the case points very clearly to a severe bacterial infection before the operation. We are shown a patient "subject to attacks of 'indigestion' from childhood." Turbid, dark-brown urine, of acid reaction, and showing albumin blood cells and hyalin casts found postmortem can be assumed to have been present four days before death at the time when the "slight yellow tinge to the sclera" was observed, together with the increasing jaundice "rather noticeable" at the time of death. The acidity of this postmortem urine certainly indicates acid intoxication, and it is a pity that no record of any examination of the urine before the operation appears in the report.

F. W. White designates as one of the special poisonous substances, damaging the function of the liver and thereby producing acute yellow atrophy, "certain products of decomposition in the bowel." Such products of decomposition are very likely to have been present in the case reported even before the attack on April 16 of vomiting and diarrhea, pain, tenderness and no elevation of temperature. Adding to this an expectant treatment of four days, evidences in the urine of acid intoxication and destructive protein metabolism not excluded; at the time of the operation the presence of a slight yellow tinge to the sclera; the finding of an abscess thoroughly walled off containing about eight ounces of foul-smelling pus, up to which event the formation of gastrointestinal toxins could go on undisturbed; the temporary general improvement following evacuation and drainage of the abscess, but the steady increase of jaundice; add finally the third stage symptoms of forty hours' duration, death and the postmortem findings, and we do not have to adduce the toxic action of chloroform used as an anesthetic "in the absence of other explanation" to account for the acute yellow atrophy and its typical pathology.

At the time of the operation there was a slight yellow tinge to the sclera, the patient died in less than four days from yellow atrophy of the liver. In a majority of cases death ensues before the fourteenth day. Almost one-half of the

cases terminate fatally in from the fifth to the tenth day, says A. O. J. Kelly in "Modern Medicine," vol. v. Did or did not chloroform used as an anesthetic cause the death of the patient in question? I think it did not.

I am not as yet prepared to advocate chloroform as a safe anesthetic in cases in which gastrointestinal decomposition products are to be suspected and where functional disorders of the liver is evidenced by even slight jaundice in the absence of gross gall duct obstruction.

In order to prove that chloroform in measured doses given to physiologic effect produces acute yellow atrophy of the liver it will be necessary to collect cases in which the dosage has been accurate and the exclusion of pre-existing atrophy has been positive. Postulates such as those of Drs. Williams and Becker from premises so contradictory are not satisfactory evidence of the danger of chloroform as an anesthetic and should be promptly denied.

CARL R. KRONE, M.D., Oakland, Calif.

Dr. Krone's letter was submitted to Drs. Williams and Becker for comment, and they replied as follows:

*To the Editor:*—Dr. Krone's criticism of our report is of interest because it suggests the widely different conclusions which careful students may arrive at from a given set of data. He states:

In order to prove that chloroform in measured doses given to physiologic effect produces acute yellow atrophy of the liver, it will be necessary to collect cases in which the dosage has been accurate and the exclusion of pre-existing atrophy has been positive.

It may be inferred from this that Dr. Krone believes it is not proven that chloroform has ever produced liver necrosis, but it seems to us that it has been too generally conceded and too well established to make this a point in a controversy. Moreover, the amount of chloroform administered apparently has little to do with the necrosis which may follow, for a study of the many cases reported in the literature supports this view. In this case, the chloroform was accurately measured, and as was indicated in the report, approximately 4 drams were used. Dr. Krone believes that the liver condition was due to a pre-existing bacterial intestinal intoxication rather than to the toxic effects of the chloroform, and supports his contention mainly on the rather slender evidence presented in the urine examination.

A summary of the facts is as follows: The patient had an old inflammatory condition of the appendix, evidenced both by the history and the anatomic findings. During the attack for which he was operated on he suffered from pain in the abdomen, vomiting and diarrhea. A very slight jaundice was present. The postoperative history was uneventful until the third day, when the patient became irrational and later maniacal. Then followed convulsions, coma, and death.

The history of this case until the third day after operation is clearly one of appendiceal disorder. There was absolutely nothing about it up to this time to suggest either liver disease or intestinal intoxication. The urine examinations made at the time of operation and immediately following it were practically normal. The urine examination referred to by Dr. Krone was made by Dr. Williams from the excretion taken from the bladder at the postmortem. It was entirely different from those previously made, indicating the development of another pathologic state. It is invading the realm of the speculative to conclude from this single examination that the patient was suffering from bacterial poisoning and it is not in accord either with the history of the case or with the material evidence of the postmortem. Histologic examination of the liver sections also pointed strongly toward chloroform necrosis rather than "idiopathic" acute yellow atrophy. It must be conceded that cases of this sort are not capable of demonstration as is a mathematical proposition, nevertheless, we believe the history and findings warrant the conclusion as to cause of death. Intestinal toxemia does not adequately explain it. Furthermore, we are persuaded that chloroform as an anesthetic is more dangerous than is generally appreciated, for since the study of this case two others of similar type and followed by death, have come to our notice in this community.

JOHN R. WILLIAMS.

W. D. BECKER.

Rochester, N. Y.