some of the patients. So-called clinics were established in about ten of the Coast cities. The money profits are stated to have approximated an annual sum of something like one million dollars!

A perusal of the newspaper items in the State Board column reveals the sordidness of the entire business. The jury's decision in the premises will be of interest. Present indications point to a long and bitter battle in the courts.*

Other State Association and Component County Society News.—Additional news concerning the activities and work of the California Medical Association and its component county medical societies is printed in this issue, commencing on page 430.

EDITORIAL COMMENT†

VENOUS PRESSURE

Determination of the venous blood pressure is at times of great value. In congestive failure, associated with failure of the right side of the heart, one of the first signs is increased pressure in the systemic or peripheral veins. Obstruction to a vein or venous channel will cause the pressure to increase distal to the site of the obstruction.

There are four fundamental factors affecting peripheral venous pressure, namely, (1) heart action, (2) intrathoracic pressure, (3) hydrostatic level, and (4) volume of blood in the vein.

Edema and the accumulation of serous fluid occasionally offer diagnostic problems. Determination of the venous pressure and estimation of the blood-plasma-proteins (indirect estimation of the approximate osmotic pressure of the blood) are usually of great help in the differential diagnosis between congestive heart failure, venous obstruction, and the edema of renal disease, depleted nutritional states, blood-loss and certain other metabolic disturbances.

There are two methods for determining venous blood pressure: (1) direct, and (2) indirect. The direct method is based upon a direct measurement of the pressure within a vein by means of a manometer connected with a needle or cannula introduced into the vessel. The indirect method depends upon the external pressure necessary to collapse a vein. The direct method should be chosen when reasonably accurate readings are required or when there is difficulty in obtaining a prominent pliable external vein. The vein chosen and zero level of the manometer tube should be horizontal to the mid-axillary line. This is approximately the level of the right auricle in the normal chest, with the patient in the recumbent position. This can be accomplished by using a long spirit level. The heart has been questioned as the point from which the hydrostatic factor in venous pressure is measured. However, for clinical purposes it is necessary to have a more or less fixed point or landmark to serve as, at least, a hypothetical zero level. The patient should rest in recumbency for at least fifteen minutes before the test. The manometer tube should have a bore not smaller than 4 millimeters. In the direct method a needle of 18 gauge is sufficient, and sterile aqueous solution of 2 per cent sodium citrate can be used to fill the small Kaufman-Luer syringe, rubber tubing and manometer to the level which is assumed to be the approximate pressure. All air should be excluded, and the plunger of the two-way syringe pushed in to the closed position. The needle is introduced well into the lumen of the vein. The plunger of the syringe is then withdrawn to the sidearm of the syringe, allowing the blood stream to be in direct contact with the manometer tube.

In patients suffering from congestive heart failure it is not uncommon to obtain readings of from 20 to 30 centimeters and occasionally even higher by the direct method described. Under normal conditions of tissue resistance, capillary permeability and osmotic pressure, the edema level of the venous pressure, as measured in one of the large superficial veins of the flexor surface of the elbow, is from 16 to 18 centimeters of the citrate solution. The normal pressure in this vein varies from 4 to 12 centimeters.

The pressure in the venule loop of capillaries is the most important factor in the production of edema of cardiac origin. This venule pressure is difficult to obtain, and at the present time it is not practical to obtain this reading for routine clinical use. The venule pressure is greater, but parallels the venous pressure in rise or fall.

Some clinicians obtain a rough estimation of the venous pressure by observing the level above the heart at which the superficial veins of the hand will collapse.

Serial determinations of the venous blood pressure are of great value in estimating the response of a patient suffering from congestive failure of the right side of the heart.

University of California Hospital.

DUDLEY W. BENNETT,
San Francisco.

DETERMINATION OF BLOOD VELOCITY BY THE SODIUM DEHYDROCHOLATE METHOD

There are available four principal methods for the estimation of the speed of blood-flow in humans. These are: (*a*) The radium method of Blumgart,[1] in which radium emanation is injected intravenously and its arrival in any given part of

* Editor's Note.—The trial came to a sudden end and the jury found eleven defendants guilty. A newspaper item on page 440 gives additional information concerning the penitentiary sentences imposed by the Court.

† This department of CALIFORNIA AND WESTERN MEDICINE presents editorial comment by contributing members on items of medical progress, science and practice, and on topics from recent medical books or journals. An invitation is extended to all members of the California Medical Association to submit brief editorial discussions suitable for publication in this department. No presentation should be over five hundred words in length.

1. Blumgart, H. L., Gargill, S. L., and Gilligan, D. R.: Studies on the Velocity of Blood Flow, J. Clin. Investigation, 9:69 (Aug.), 1930.
—The Velocity of Blood Flow in Health and Disease, Medicine, 10:1 (Feb.), 1931.

the circulation is recorded by a radium-sensitive instrument. This method has the particular value of providing means for estimating separately the speed of the flow of blood through the lungs and through the peripheral vascular area; (*b*) the cyanid method of Robb and Weiss,[2] in which sodium cyanid is injected intravenously and its arrival at the carotid sinus is marked by a sudden increase in rate and depth of respiration; (*c*) the dye (vital red) method of Hamilton,[3] in which arm-to-femoral circulation time is measured by injecting the dye in an arm vein and collecting samples of blood by puncture from the femoral artery; (*d*) the sodium dehydrocholate method of Winternitz,[4] which depends for its measurement of the blood flow on the time taken for the bitter-tasting bile salt to reach the tongue after injection into one of the antecubital veins.

The latter method is the simplest, safest and most readily available. It is highly accurate in comparison with more elaborate methods. In contrast with the above mentioned techniques, the sodium dehydrocholate method requires the coöperation of the patient in establishing the end-point.

Recent investigations[1, 5] have shown that the rate of blood flow is slowed in myxedema, polycythemia vera and in congestive cardiac failure, and is accelerated in anemia and in hyperthyroidism, but not when the metabolic rate is elevated with dinitrophenol[6]).

The blood velocity is determined by injecting 5 cubic centimeters of the 20 per cent solution of sodium dehydrocholate rapidly into one of the veins of the cubital fossa. The time between the beginning of the injection and the appearance of a bitter taste in the mouth is recorded with a stop-watch and gives one the arm-to-tongue circulatory time. Sixteen gauge needles are used and the determinations are always done in duplicate. Not more than one or two seconds should be taken in delivering the 5 cubic centimeters of testing fluid into the vein. The normal blood velocity, as measured by the above technique, is from 10 to 16 seconds, the average being 13. Duplicate determinations usually check to within one second. The test should be done with the patient in a basal condition, as for a determination of the basal metabolic rate.

450 Sutter Street.

HAROLD ROSENBLUM,
San Francisco.

2. Robb, G. P., and Weiss, S.: A Method for the Measurement of the Velocity of the Pulmonary and Peripheral Venous Blood Flow in Man, Am. Heart J., 8:650, 1933.

3. Moore, J. W., Hamilton, W. F., Kinsman, J. M., and Spurling, R. G.: Studies on the Circulation; description of the Injection Method of Studying the Circulation, with Some Clinical Applications, South. M. J., 23:1131, 1930.

4. Winternitz, M., Deutsch, J., and Brüll, Z.: Eine klinische brauchbare Bestimmungsmethode der Blutumlaufszeit mittels Dekolin-injektion, Med. Klin. 27:986 (July 3), 1931; 28:831 (June 10), 1932.

5. Tarr, L., Oppenheimer, B. S., and Sager, R. V.: The Circulation Time in Various Clinical Conditions Determined by the Use of Sodium Dehydrocholate, Am. Heart J., 8:766 (Aug.), 1933.
—Gargill, S. L.: The Use of Sodium Dehydrocholate as a Clinical Test of the Velocity of Blood Flow, New England J. Med., 209:1089 (Nov. 30), 1933.

6. Rosenblum, Harold: Rate of Blood Flow in Patients Receiving Dinitrophenol, J. A. M. A., 104:1592-1594 (May), 1935.

ORIGINAL ARTICLES

INJECTION TREATMENT OF HERNIA: ITS EXPERIMENTAL BASIS*†

By FRANKLIN I. HARRIS, M.D.
AND
ALFRED S. WHITE, M.D.
San Francisco

IN the past few years much interest has been aroused in the possibilities of treating hernia by a nonoperative method. Despite the fact that thousands of cases of hernia have been and are being treated by a method of injection, there has been very little scientifically conducted investigation to determine the value or dangers of such a method of treatment.

HISTORICAL BACKGROUND OF INJECTION TREATMENT

A study of the historical development of this subject and an analysis of the work which has been done by various investigators may explain the prejudice against this form of therapy. Since its first introduction by George Heaton in 1832, it has been alternately advocated and condemned. A study of the papers which have appeared on this subject reveals independent attempts by different investigators who have failed to base their work upon the experience of men who have preceded them. Perhaps it is this lack of correlation, this failure to build upon the experience of others, which has prevented the popularization of this treatment. Previous reports show an amazing lack of critical analysis, a failure to evaluate statistically the results of the treatment. The criticisms of the opponents of the method led not to a more careful evaluation of results, but rather to an exaggeration of claims which, in the first place perhaps, were extravagant.

HEATON'S CLAIMS

Following Heaton's claim of 100 per cent cures in his private practice, the American Medical Association sent a committee requesting information about his work; this he refused to give. This failure to reveal his exact technique to the medical profession brought him and the method much justifiable criticism. His results, which were finally published in 1843, reveal a complete lack of critical analysis and statistical interpretation. He states in his book that all of his patients were cured; but from comments and criticisms of contemporary men it seems apparent that he was successful in only about 75 per cent of his cases. Little additional work was done in this country in the succeeding few years, although Bigelow, in 1850, and Watson, in 1851, published single articles. Owing to the prejudice with which Heaton's work was received, he spent little time in introducing it in this country. On a European

* From the Department of Surgery and Pathology, Mount Zion Hospital, San Francisco. Services of Dr. Harold Brunn and Dr. G. Y. Rusk.

Read before the General Surgery Section of the California Medical Association at the sixty-fifth annual session, Coronado, May 25-28, 1936.

† Discussion of the three papers on the Injection Treatment of Hernia appears on page 395.