THE EFFECT OF CEVITAMIC ACID INJECTIONS ON CAPILLARY RESISTANCE

GILBERT DALLDORF, M.D.
AND
HOLLIS RUSSELL, M.D.
VALHALLA, N. Y.

Relative fragility of skin capillaries is a common condition.[1] It may be found in individuals of all ages who are otherwise free of signs or symptoms of scurvy. Nevertheless, increase in the antiscorbutic value of the diet of such individuals increases their capillary resistance. This borderland nutritional disorder has been called subclinical scurvy, and a general experience with experimental nutritional diseases suggests that other slight deviations from health are probably present in such persons. The condition is therefore deserving of study. The influence of cevitamic acid on this condition forms the basis of the present report.

METHOD

The cevitamic acid used was Cebione, Merck & Co. The product was assayed against a standard iodine solution by Harris's method[2] and found to be pure within the limits of error of the method. The acid was

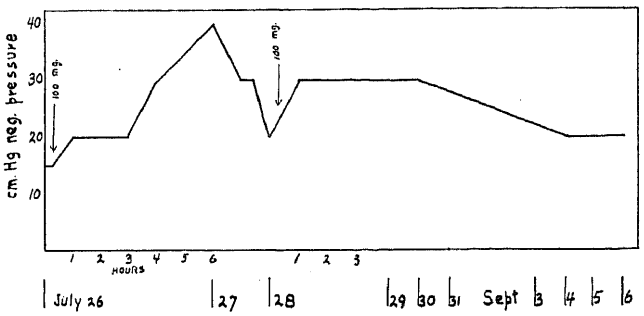

Chart 1.—Effect of two injections of cevitamic acid on the capillary resistance of a young woman during a period of twelve days.

administered intravenously, 100 mg. being dissolved in at least 10 cc. of distilled water and injected slowly. No reactions have occurred. Since the acid deteriorates rapidly once the ampule is opened, the injections were made as soon as the solution was prepared.

The capillary resistance was measured with our own resistometer. The instrument has recently been improved through an automatic valve and the use of a smaller pump. The cup size was identical with that previously used. The outer surface of the arm was tested, and the cup was applied for one minute. Capillary resistance is expressed as the least negative pressure required to produce macroscopic petechiae.

RESULTS

Fourteen residents of the local county home who were found to have reduced capillary resistance were first tested. In all but three cases, 100 mg. of cevitamic acid was injected. In the three exceptions, 50 mg. was used. These persons were all up and about, but many were old and feeble. All of them showed a marked and prompt response in capillary resistance, which persisted for at least twenty-four hours.

Of ten other county home residents, four were found to have fragile capillaries, and these likewise responded promptly to cevitamic acid. In this group the average capillary resistance before injection was 24 cm. of mercury negative pressure. After injection the average rose to 35 cm. The former value we have come to associate with groups on diets poor in fresh fruits and vegetables; the latter value is the normal for well fed groups.

REPORT OF CASES

In order to illustrate more clearly the influence of cevitamic acid on capillary resistance, the following cases are reported in greater detail:

G. T., a woman, aged 19, sent into the hospital from the hematologic clinic, had hypochromic anemia, and her history

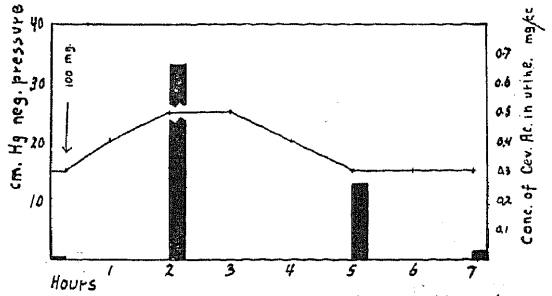

Chart 2.—Effect of a single injection of cevitamic acid on the capillary resistance of a boy during a period of seven hours. The concentration of cevitamic acid in the urine on four occasions also is shown.

showed that her diet had been limited in fruits and vegetables. Her capillary resistance was 15 cm. of mercury on each of several days. She was given 100 mg. of cevitamic acid intravenously. Forty-five minutes later the resistance was 20 cm. of mercury. Four hours after the injection it was 30 cm. of mercury. Chart 1 shows the effect of this and a subsequent injection of the acid over a period of eleven days.

Patients 2 and 3 were boys, aged 8 and 10 years, who were residents of the orthopedic pavilion. One was being treated for congenitally dislocated hips and the other for postpoliomyelitis paralyses. One had been in the hospital for two months and the other for four months. Their diets had contained ample amounts of antiscorbutic foods, since the average capillary resistance for the entire ward was nearly 35 cm. of mercury.

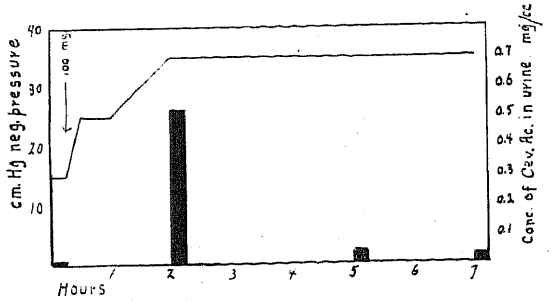

Chart 3.—Effect of a single injection of cevitamic acid on the capillary resistance of a boy during a period of seven hours. The concentration of cevitamic acid in the urine on four occassions also is shown.

Each had had 4 ounces (120 cc.) of fruit juices a day for the entire period of his stay in the hospital, in addition to the usual diet. Both had eaten well. Neither had any disorder other than the defects they were being treated for.

Both boys, nevertheless, showed many petechiae at 15 cm. of mercury partial vacuum. Each was given 100 mg. of the acid. Each responded promptly within an hour. The entire records are given in charts 2 and 3. The urine output of cevitamic acid is likewise shown. The total output of acid was 85 and 74 mg. respectively within seven hours. As the charts show, the increased output was the result of increased concentration of the acid. The urine volume was not conspicuously affected.

The boys were tested on two occasions. The cevitamic acid output during the second test was 58 and 39 mg. of cevitamic acid during a five hour period.

From the laboratories of Grasslands Hospital.

1. Dalldorf, Gilbert: A Sensitive Test for Subclinical Scurvy in Man, Am. J. Dis. Child. **46**: 794-802 (Oct.) 1933.
2. Birch, T. W.; Harris, L. J., and Ray, S. N.: A Microchemical Method for the Determination of Hexuronic Acid in Foodstuffs, Biochem. J. **27**: 590 (No. 2) 1933.

COMMENT

It is evident from these results that cevitamic acid promptly increases the resistance of the skin capillaries to rupture. The prolonged effect of the injections shows the action to be a specific one of the cevitamic acid and not an immediate reaction to acid as such.

The last two cases suggest that individual requirements of antiscorbutic foods vary or that absorption or utilization may be affected. Since the acid is readily oxidized, it may be that these two boys destroyed cevitamic acid in their stomachs before it was absorbed. This matter requires further examination.

The results we have secured are identical with those reported by one of us four years ago as occurring in scorbutic guinea-pigs following the injection of neutralized orange juice [3]; they are similar to but more rapid than the effect in both guinea-pigs and children of feeding large amounts of antiscorbutic foodstuffs.

The results further substantiate our observation that the common condition of capillary fragility represents a mild form of scurvy, a "subclinical scorbutus."

CONCLUSIONS

The parenteral injection of cevitamic acid has a prompt and prolonged effect on the capillary resistance of individuals whose capillaries are fragile owing to dietary inadequacy or faulty absorption of cevitamic acid.

Clinical Notes, Suggestions and New Instruments

A SPLINTER OF WOOD LODGED IN THE URINARY BLADDER

JAY J. CRANE, M.D., AND E. E. MOODY, M.D., LOS ANGELES

R. B., a boy, aged 7½ years, while playing, July 1, 1934, fell from a garage roof, lighting astride a picket fence. Examination revealed a laceration 1 cm. long on the inner aspect of

Fig. 1.—The point at which the splinter of wood pierced the inner aspect of the thigh.

the upper third of the left thigh, through which a probe was passed, but no foreign body was found. During the first four days the only symptom complained of was a dull ache over the bladder area, which gradually disappeared. A few red blood cells were found in the urine immediately after the accident and continued to be present during this period. By the end of the second week pus was found in the urine, accompanied by a tickling sensation in the urethra during the act of micturition. The laceration now was entirely healed, and it was thought safe to allow the patient to go to a boys' camp, where he could be under observation. Here he engaged in the usual camp activities. Frequent urinalyses during a period of four weeks showed pus cells and an occasional red blood cell to be constantly present but unaccompanied by subjective symptoms.

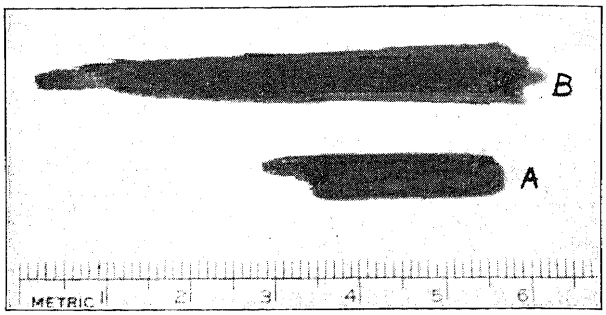

Fig. 2.—Splinters of wood after removal from bladder. *A*, the smaller piece passed spontaneously through the urethra to the external meatus, where it was extracted. *B*, the larger piece was removed from the bladder through a cystoscope.

July 30 he was returned from the boys' camp because of difficulty and pain on urinating, in conjunction with a swelling of the penis, which appeared very suddenly the same morning.

Examination on the latter date revealed the penis to be swollen and discolored as the result of the evident local disturbance of blood supply caused by the swelling. The picture as a whole was not unlike a periurethral abscess. Urine was voided with difficulty but there was little discomfort except on voiding. Because the patient would not permit us to palpate the penis, a general anesthetic was given, at which time a piece of wood 3.5 cm. by 0.5 cm. was readily palpated, lodged in the pendulous urethra. By manipulation the splinter was removed, followed by the ability to urinate freely. Roentgenograms revealed a second and larger piece of wood 6 cm. by 0.5 cm. to be resting crosswise in the pelvis. Several smaller splinters were visualized in the soft tissues in the leg. The fragments of wood cast only the faintest shadow in the roentgenogram. Since the patient was symptom free, six days was allowed to elapse before a cystoscopic examination was made, at which time the larger fragment was visualized lying free in the bladder (one end was pointed and the other end blunt). A reddened area on the left lateral wall of the bladder indicated the point of entrance of the wood. Through an 18 French panendoscopic sheath, which passed readily, the sharp point was grasped with a pair of foreign body extractors and pulled into the sheath. By retaining a firm grasp on the splinter the sheath was removed, followed by the splinter. Recovery was uneventful.

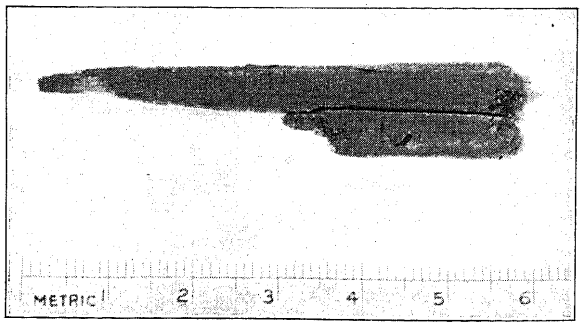

Fig. 3.—Reconstructed pieces of wood showing their relationship as they passed into the bladder.

3. Dalldorf, Gilbert: A Criterion of Hemorrhagic Diathesis in Experimental Scurvy, J. Exper. Med. **53**: 289-297 (Feb.) 1931.