

vulsions. One frog was given 0.01 gm. pilocarpin and died after an hour; the other was alive and normal next day.

*Experiment 2.*—Two frogs of the same size, but larger than those in the previous experiment, received 0.03 mg. strychnin nitrate each. Forty minutes later neither had convulsions. One frog received 0.01 gm. pilocarpin. Five minutes later it had convulsions and was found dead next morning; the other had no convulsions and lived.

The foregoing experiments are sufficient to demonstrate the following two points: 1. Pilocarpin hydrochlorate does not act as an antidote to strychnin. 2. On the contrary, the addition of pilocarpin apparently supports the poisonous effect of strychnin, by its aid an ineffective subminimum dose may have a toxic or even fatal effect.

These are the conclusions we arrived at by our experimentation on two species of animals. What are we to think of the effect of injections of pilocarpin in strychnin poisoning in human beings? We are aware that conditions vary from species to species, and that what is harmful to rabbits and frogs might still be harmless or even useful to human beings. But until we have proofs of such deviations we have to be guided in our therapeutic efforts by the results we have obtained from animal experimentation. Surely we have to consider that as harmful to man which is found to be harmful to beasts until the contrary is proved. In other words, since the experiments on animals have demonstrated that pilocarpin increases the toxicity of strychnin, we are in duty bound to avoid the administration of pilocarpin in cases of strychnin poisoning in human beings, unless by many accidents a number of facts will be accumulated showing unmistakably that in this regard the human being behaves differently than the animals experimented on, i. e., that here the addition of pilocarpin does not increase but reduces the toxicity of strychnin.

Is the above quoted case such a fact, i. e., did the child really recover chiefly on account of the injection of pilocarpin which it received? We do not think so. We rather believe that the patient probably recovered not because it received pilocarpin but in spite of it. It was simply a case in which strychnin had a strong toxic but not a fatal effect. We do not know how much of the strychnin the child swallowed. Possibly it was altogether only a small dose; the immediate cleaning of the mouth by the mother and the washing of the stomach by the physician assisted in reducing the dose from a fatal to only a toxic one. It is possible that the profound narcosis produced by the liberal use of chloral contributed to the favorable outcome, not with the aid but in spite of the pilocarpin. In animals we have seen numerous cases of strychnin poisoning which without any treatment survived violent convulsions lasting many hours. The toxicologic literature contains reports of cases in which recovery took place after very large doses of strychnin—more than ten times the fatal dose. We have therefore no good reason to believe that the child recovered from the strychnin poisoning because it received pilocarpin. On the contrary, on the basis of our results, we have reason to say that it recovered in spite of the injections of pilocarpin.

Before we conclude, however, it seems to us to be a moral duty to call attention to one point. The recorder of that case says: "As a last resort I gave pilocarpin," etc. What authority did he have to consider pilocarpin a "last resort" in such a case? In looking over some toxicologic literature we failed to find it anywhere mentioned as a possible antidote for strychnin poisoning.

Pilocarpin is a poison and some authors state that in some cases it can even cause convulsions like brucin, nicotin, etc. If that child would have finally succumbed to the poisoning, in the face of our experimental results, we would have had no means to prove that the injection of pilocarpin did not have a share in the fatal outcome. Why do physicians forget the supreme law: first of all not to do harm? Physicians carry with them numerous alkaloids for use in cases of emergency. Their minds ought to be impressed by this obvious rule: On human beings each alkaloid should be employed only according to well established indications for its use and not according to theoretical notions. Well founded theoretical notions can and ought to be tested on animals.

## IDIOPATHIC GANGRENE IN THE YOUNG.

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The following case, I believe, is of sufficient interest to merit a place in the literature of gangrene:

*Patient.*—Elizabeth W., age 13, farmer's daughter; parents in good health. Personal history good. In appearance is tall but undeveloped.

*History.*—March 6, patient walked to my office, one and one-half miles, to consult me in regard to her left foot, which for two days had been painful and slightly swollen. A diagnosis of rheumatism was made. Three days later the soreness and swelling had extended above the ankle and she was unable to walk. There was some malaise. Pulse, 100; temperature, 99.5. Her condition grew worse from day to day, the soreness and slight swelling gradually extending up the leg, the soreness being more marked posteriorly along the course of the large blood vessels and the pain usually deep-seated and of a burning character. The foot was never found hot to the touch; on the contrary, it was always cooler than the rest of the body. Evidence of endarteritis and thrombosis of the nutrient arteries became more conclusive each day. The heart was normal.

March 17. Pain and soreness began in great toe of right foot and gradually extended as they had done in the left. The condition of the patient grew steadily worse as the disease continued to advance up both legs toward the body. Temperature at this time seldom exceeded 101. Pulse 110 to 120.

March 24. A small blue-black spot of moist gangrene appeared on the inner side of the great toe and another the size of a half-dollar on the inner side of the instep of the foot first affected. The urine was free from sugar. At this time the soreness had extended along the popliteal and femoral artery to the groin and the swelling above the knee on the left side. On the right the foot and leg were involved to the knee and the soreness extended along the course of the popliteal above. The gangrenous spots gradually extended by continuity and by the appearance of new spots higher, which later coalesced, the extension being most rapid posteriorly in the parts which received pressure from the bed.

April 1. The gangrenous process began in the right foot and extended in a similar way. Notwithstanding efforts to prevent it, decomposition of some of the dead tissue took place. Lines of demarcation were established in a few places, but spots of gangrene were always present above them. During this stage of the disease the temperature ran from 101 to 103. Muttering delirium was present, and death occurred April 14, on the forty-first day of disease. At this time the gangrenous process involved the entire left foot and about half of the leg below the knee, and the right foot and part of the ankle. No autopsy.

*Remarks.*—It is at once apparent that this case can not be classed among the more common forms of gangrene. The age of the patient and the absence of evidence of sclerosis of the vessels in the other parts of the body exclude it from the angiosclerotic cases. The trau-

matic, the spreading traumatic and hospital forms of the disease must be excluded because of the absence of traumatism affecting the blood supply or serving as an infection atrium.

To the symmetrical gangrene of Raynaud and to Morvan's disease it bears no close resemblance; nor was it the effect of any destructive agent which might act directly on the cells of the tissues, as chemicals, heat, cold, electricity, etc. There was no previous history nor present evidence of any of those diseases which predispose to gangrene, as diabetes mellitus.

The gangrenous process in this case was clearly the result of thrombosis of the arteries supplying the parts, apparently accompanied and probably preceded by an endarteritis. The specific first cause of the trouble is not known. A careful search of such literature as has been accessible to me brings to light nine cases which have been reported as idiopathic or spontaneous gangrene.

Of these, one<sup>1</sup> was in a diabetic. Recovery.

One<sup>2</sup> was in a patient 79 years of age. Autopsy showed atheromatous degeneration, vessels of leg and thigh plugged with coagula and a dissecting aneurism of the left iliac artery.

One<sup>3</sup> had agioneurotic symptoms (coldness and numbness of two fingers) for three years previous to the attack, and later paresthesia of the lower extremities, also previous to the attack. Amputation of part affected. Death. Pathology, thrombosis.

One<sup>4</sup> was preceded by paralysis in the upper extremities and the gangrene confined to a small area around the patella. Age of patient, 52. Pathology, not clear.

One<sup>5</sup> was in a patient 62 years of age. Death in eight days. Autopsy showed cardiac hypertrophy and an abscess of the heart opening in the left ventricle. To these five the name idiopathic gangrene can not be properly applied.

Of the remaining four cases, one<sup>6</sup> was in a patient 33 years of age and three<sup>7</sup> were in the insane. Of these last three, two were the result of thrombosis of the chief arteries and one the result of embolism.

In none of the cases herein cited did the disease occur in one so young as the patient whose case-history is herein contributed.

## THE RESISTANCE OF THE PERITONEUM.

### ILLUSTRATIVE CASE.

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A patient's liability to septic peritonitis following abdominal section or wounds involving the peritoneum depends manifestly on two factors: First, the virulence and number of the micro-organisms introduced, and, second, the vital resistance of the individual patient.

Concerning the first of these factors volumes have been written; as to the second, however, there is a singular paucity of references in the literature of surgery. To emphasize the rôle of the individual resistance of the patient in preventing or favoring peritonitis is the motive of this article. I consulted several systems of surgery

without finding any mention of the varying susceptibility of different patients to post-operative peritonitis. H. A. Kelly, however, gives recognition to the importance of the patient's condition in the following language:

"The more we learn of infectious processes the more we are convinced that the vital resistance of the patient plays an important, if not the greatest, part in the resistance to infection.

"If a patient is much depressed physically and is subjected to an abdominal operation in which there is extensive traumatism to the peritoneum attended by considerable oozing, the chances for a serious infection are much increased. To the individual factor of vital resistance are undoubtedly ascribable many of the discrepancies as to the apparently varying degrees of virulence of the same infection when under precisely the same conditions one patient will be infected and another escape. The gravity of the infectious process will, in a given instance, depend on the degree of absence of resistance to infection in the individual, the nature of the operation, the perfection of the technic employed, and the virulence of the entering micro-organism."

The following interesting case illustrates the remarkable resisting power of the peritoneum in certain healthy patients:

*Patient.*—J. D., a man aged 25, of fine physique and in rugged health, a professional burglar by occupation, was brought by the Chicago police to the Cook County Hospital with a bullet wound in his back.

*History.*—The following history was obtained from the police: About 6 p. m. on the preceding day, while burglarizing a house, the patient was shot from behind with a 38-caliber revolver. He made his escape, but was captured the following morning and brought to the hospital about seventeen hours after being shot.

*Examination.*—Examination showed the patient to be a strong, well-developed young man; he was pale, but otherwise showed no signs of severe shock. There was a bullet wound an inch above the crest of the right ileum and four inches from the spines of the lumbar vertebræ. Anteriorly the bullet could be felt in the abdominal wall of the epigastrium an inch to the left of the median line. The whole abdomen was tense and slightly tender to pressure.

*Operation.*—Immediate laparotomy was done by Dr. Owsley and myself; the peritoneal cavity was filled with intestinal and gastric contents and partially clotted blood. The bullet was found to have passed upward, forward and to the left, penetrating the small intestine twice, both walls of the stomach, and the margin of the left lobe of the liver. The small intestines were covered with flakes of fibrin. The intestinal and stomach perforations were all closed with Lembert sutures, and the peritoneal cavity irrigated with several gallons of warm salt solution. The incision was closed with figure-of-eight silkworm-gut sutures without drainage.

*Result.*—To our surprise the patient made an uneventful recovery—at any rate for the first nine days—his temperature never having gone above 100 degrees.

As the patient was a criminal with a police court record, an officer was detailed to sit on guard by his bedside day and night. On the night of the ninth day (the abdominal sutures were not yet removed), the patient, clad only in a short hospital shirt, jumped through the window, climbed the high fence and escaped, much to the chagrin of the policeman. Six weeks later I read in the *Chicago Tribune* that the fugitive had been recaptured, "still a little weakened from his operation."

This case is of unusual interest because laparotomy was not done till more than seventeen hours after the shooting and the gastrointestinal contents were spread diffusely through the abdomen. Yet the patient's extraordinary vitality enabled him to recover promptly

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