

which we have sometimes agrophobia, the fear of space, seemed to go hand in hand in improving, with the improvement in these symptoms.

It is a great addition to our knowledge that these symptoms are the result of toxins due to the developing and growing microorganisms on the wall of the gastro-intestinal tract, and that the nucleins have an antitoxic effect.

CALOMEL.

A STUDY OF ITS PHYSIOLOGIC ACTION AND THERAPY IN GASTRO-INTESTINAL DISORDERS IN ONE HUNDRED AND FORTY-FOUR CASES—IS IT A DIURETIC PER SE?

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The physical properties of calomel are so well known to the profession that they need little consideration here. One point presents itself at this time and that is, Do you examine into the purity and quality of the calomel you use, or do you accept it as perfectly pure? Have you ever stopped to ask yourself the question why your large doses of calomel always caused griping and pain in the majority of cases?

Calomel is subject to adulteration; to improper purification in manufacture; and to chemic changes both atmospheric and in chemic mixtures. Bichlorid of mercury is the most common impurity found in it, and this varies from the smallest trace to comparatively large amounts. Many instances are on record where the usual large doses of calomel have produced violent griping, cramps and gastro-intestinal catarrh which were undoubtedly caused by the presence of bichlorid of mercury rather than "a special idiosyncrasy." In fact, instances of fatality are reported from the administration of large doses of calomel contaminated with this poison.¹

On the other hand, calomel may contain such large amounts of barium, calcium, lead and other impurities that its action is greatly lessened and rendered almost inert. With these thoughts before us, and a thorough knowledge of making appropriate chemic tests for their confirmation, we can often explain many untoward actions which might otherwise be attributed to a pure preparation.

The methods of administering calomel have undergone a great change during the past ten years, and its general and special applications have been carefully studied and extended. It is an axiomatic fact that calomel should never be administered with acids or chlorids, and not at a time when the stomach is performing its digestive functions, owing to the danger of chemic change from the mild chlorid into the bichlorid, thus giving the effects of the latter drug. Until recent years, calomel has been administered in its purity, or in combination with other drugs, in doses varying from one to forty grains and in many cases the patient was an innocent victim to an overdose. To-day, calomel should be thoroughly triturated with sugar of milk and administered in doses of one-half to five grains. Why this change?

Calomel plain is a heavy drug; is very slowly assimilated and absorbed, owing to its extreme insolubility and the size of its isolated crystals. In this form it is not in its finest state of subdivision, and

is confined to a smaller area of distribution over the tissues of the alimentary tract. Calomel, when thoroughly triturated with sugar of milk, is brought into its finest state of subdivision and its presence can be readily demonstrated with the ammonia test in a trituration of 1 part in 1000, thus demonstrating the possibility of administering it in such small doses if desired. One grain of triturated calomel is capable of distribution over a wider area than the pure drug alone; is in a finer state of subdivision; is much more readily brought into a condition for absorption.

With a view of demonstrating the value of the pure drug and its trituration, I selected a number of cases in which both preparations were used at different times in the same subject, and under circumstances as nearly similar as possible. The dose selected was one grain of the pure drug and a one grain trituration with sugar of milk. The dose was administered at bedtime. In the majority of the cases where the pure calomel was given there was no evidence of a bilious stool until the next evening, and in many of them there was no apparent action at all. These same individuals some days or weeks later responded so violently to a one grain trituration that next morning one to five bilious stools resulted; and in one, who had not responded readily to the one grain pure, there was such a large number of evacuations produced that measures had to be used to check the bowels. This may be considered a mere matter of coincidence, but my clinical experience teaches me that one grain of thoroughly triturated calomel is worth an equivalent of five to ten grains of the untrituated drug. A simple mixture of calomel and sugar of milk will not produce any better results than the pure drug alone.

When given for its purgative effect, or for its action upon the liver, it is my custom to administer a one-tenth grain trituration every hour or half hour until free evacuation occurs or until one grain is taken; when, if necessary, liquor magnesii citratis is given in one ounce doses until free action is obtained. During the last four years of practice I have not found occasion to use more than one grain of the drug in the same individual for this purpose. A one-tenth grain trituration at bedtime will produce excellent results in small children, except in those who are habitually constipated, when the former method must be used. There is a certain amount of propriety in administering calomel with bicarbonate of soda, as it will prevent the formation of bichlorid and, as calomel is most readily absorbed in an alkaline medium it is synergic.

After administering calomel in a large number of cases and carefully noting the results upon the various organs, I have failed to appreciate the so-called diuretic effects of the drug *per se*. It undoubtedly acts *indirectly* to a slight extent, simply by its general stimulating action upon the emunctories of the entire body thus favoring secretion, excretion, and the elimination of intestinal ptomaines and systemic poisons, all of which act unfavorably upon the secretory and excretory organs when present. In a case of scarlatinal nephritis in a little girl of six years, with decreased amount of urine, calomel in both large and small doses produced no appreciable diuretic effects while the ordinary diuretics acted nicely. A man of sixty-five, showing mitral disease, chronic Bright's disease and edema of the lower extremities would not manifest diuretic effects from large doses of

¹ U. S. Dispensatory, 17 Editt., pp. 695.

calomel frequently repeated, but responded to alkalin diuretics readily. In giving the drug to over one hundred children, in varied doses, I have never noted diuretic effects which could be ascribed to it alone.

Dr. Wm. Pepper has recently reported² a case of Bright's, complicating aortic disease, where large doses of calomel were followed by diuretic effects, and where there were manifested no toxic symptoms from its prolonged use in doses of ten grains daily. His experience does not seem to point to its general diuretic action except in large doses, and then it is often uncertain in its effects. While I am still closely observing results in its use, yet I am not convinced that any diuretic action other than a very indirect one is produced by calomel. Typical biliary stools have almost invariably followed the use of the triturated preparation in doses exceeding one-quarter to one-half grain. In some cases there was a regurgitation of bile from the duodenum into the stomach, producing obstinate vomiting. Calomel undoubtedly increases the secretion and excretion of bile by its direct stimulating action upon the cells of the liver. To this cholagogue action is partially if not wholly due its beneficial results in treating diarrheas.

How does calomel act in diarrheas? When taken into the stomach in large doses it is slightly irritating; part of it is absorbed and the remainder enters the intestines where it is further absorbed and possibly may have a slight local antiseptic action. Systematically it acts upon the liver producing increased flow of bile, which enters the duodenum. Bile is nature's antiseptic and acts in neutralizing ptomaines, preventing germ growth, sometimes destroying germs themselves and aiding digestion. It increases peristaltic action and intestinal secretions and thus assists nature in cleansing the bowels by production of free biliary stools. The cause once removed, the cure is apparent. Small doses of calomel act more by a direct cellular impression, by which the cells of the stomach and bowels are stimulated to renewed physiologic activity. The action upon the liver is the same as in large doses, being proportioned to the size of the dose.

I desire briefly to report the results of treatment in one hundred and forty-four cases of all forms of diarrheas which I have noted in my work, all of which terminated successfully under the action of calomel alone and in combination. Seventeen cases in adults, all of which were due to the ingestion of improper food. Diarrhea varied from a mild to a very profuse type. Twelve powders were made from one grain of triturated calomel and one-half grain of podophyllin and one powder given every two hours until free bilious stools were produced. From two to six powders usually gave a curative result—dietetic measures being observed, as in all the cases here reported. No astringents or other medication was necessary.

Nine cases of the so-called bilious diarrhoea in adults responded rapidly to one-quarter grain trituration of calomel every four hours for two to four doses. Only one of these cases proved obstinate and it rapidly reacted to one grain doses of sulpho-carbolate of zinc every hour for six doses.

Sixty-eight cases in children from two months to ten years all received a saline cathartic of liquor magnesii citratis as preliminary treatment. This was followed by a trituration containing one one-hundredth of a

grain each of calomel and powdered ipecacuanha every one to four hours. The action of this combination in controlling the nausea and diarrhoea in these cases was marvelous. The saline was often sufficient in other cases, but in those where it was not, the small doses of calomel and ipecac worked excellently. I have seen some cases so obstinate that all other forms of treatment failed, but the institution of this method, combined with strict dietetic and hygienic measures, brought about cures. It also gives me best results in treating adults suffering with diarrhoea, nausea, vomiting, cholera morbus, dysentery, and the diarrhoea of typhoid fever. One case of slight but obstinate dysentery in an old man of seventy-five years failed to respond to ordinary methods, but quickly subsided under this small dose of calomel and ipecac every two hours.

Twenty-five cases of obstinate diarrhoea which had been running some days before consultation, all responded rapidly to a combination containing one-tenth grain of calomel and one grain each of lactopeptin and sulpho-carbolate of zinc given every two to four hours. Four cases of the diarrhoea of typhoid fever responded rapidly to this same combination given every four hours.

I have met with twenty cases of diarrhoea following excessive use of alcoholic liquors, and in every case have succeeded in getting absolute results in one to three days by administering a combination of one-fiftieth of a grain of calomel and one-hundredth of a grain of podophyllin every three or four hours as required. Two to four doses answered in several, while others proved rather obstinate but responded in the end.

In summarizing the results in these one hundred and forty-four cases, I am not presenting entirely new facts to you, but merely adding clinical testimony to the true efficiency of calomel and its eliminative power as contrasted with the evil routine methods of astringency and opium in treating diarrheas. These cases are not selective, but followed each other in succession. It is my general experience that diarrheas will respond more rapidly to doses varying from one-tenth to one-hundredth of a grain of calomel, thoroughly triturated, than to larger amounts. While these small doses may seem homeopathic to many they are not presented as such, but are given with a full knowledge that they will give certain clinical results which can not be obtained from larger amounts.

DISCUSSION.

DR. CHAPMAN, of Louisville, Ky.—I would like to ask Dr. Stewart if I understood him correctly; that is, if he considers calomel, in these small doses, one-tenth of a grain to one-fifth of a grain, as a germicide.

DR. STEWART—For the information of the ASSOCIATION I would be glad to answer it. I do not consider that calomel in this amount will act directly as a germicide, being entirely too small in amount. I am a believer, as I stated in the paper, that the small doses act more by a direct stimulating action upon the cells of the gastro-intestinal tract.

DR. DIDAMA, of Syracuse, N. Y.—May I also ask a question? Is it not possible, also that these doses are converted into bichlorid? Many of us have been treating these things with small doses of bichlorid every two or three hours with wonderful effects, such as the Doctor had with one-tenth grain of calomel. The large doses of calomel we would expect to have more effect than small doses.

DR. HARE, of Philadelphia—There are one or two points in the Doctor's paper which interested me. I think that the clinical results which the Doctor has had in the administration of calomel are just such results as we have all had. His paper is simply an interesting contribution confirming the experience of other physicians, summing up their experi-

² The Medical News, Dec. 15, 1894, pp. 647.

ence. There are one or two statements which he made in the beginning of his paper which interested me, and I ask the following questions, not with the idea of criticising, but of being instructed. He stated that there was a possibility of a certain amount of the mercury being converted into the bichlorid of mercury. The results of my studies upon this question I have given in the columns of the *Therapeutic Gazette*. The laboratory investigations which I have made have established beyond peradventure that calomel is not converted into bichlorid of mercury. There is only twentieths of 1 per cent. of hydrochloric acid in calomel, and it has been proved beyond all cavil that the amount which is changed into bichlorid is infinitesimal. On the other hand, clinical evidence would seem to prove that it is converted into bichlorid, because every investigation of very much note that has been made has proved, at least in the lower animals, that calomel is absolutely without effect in producing a flow of bile, but hydrochloric acid does produce a flow of bile. The question as to how calomel does act, whether it is changed by the alkaline juice of the intestine, or whether it acts as calomel or as mercury is unsettled.

The statement I am interested in is the statement of the Doctor that calomel is "adulterated" by bichlorid. I do not suppose he meant that bichlorid was employed as an adulterant. A very able chemist of Philadelphia, in the last few months, has carried out for me a series of studies in this matter. In no instance was he able to find that there was any contamination owing to the presence of bichlorid of mercury. We might have some oxid of calomel, but there was no single instance in which bichlorid of mercury was found, and I was particularly on the heels of bichlorid of mercury, because I wanted to find out whether it was the bichlorid of mercury which contaminated the mercury, or whether it was the calomel which produced the bilious stools in administering the drug.

DR. STEWART.—In answer to the first question that was asked, Is it not possible that the bichlorid was the drug which produced the results and not the calomel, I think in my paper I stated clearly that all that was theoretical. Together might be grouped the question, both of the gentleman who preceded Dr. Hare and that of Dr. Hare himself. My own belief is just as Dr. Hare has said, that there is very little of the calomel itself converted into the bichlorid in the stomach. That is all theoretical. Now comes up a question. Is there a difference between a chemic reaction conducted in the laboratory and that conducted in the stomach itself without outside interference? That is, is not a strict chemic reaction in all probability slightly different from that which is produced by what might be termed a chemic-physiologic action in the stomach? It is well known that if we interfere with the nervous supplies of any part we will have one of two results, namely, over-activity of that part or decreased activity of that part, and it is my own belief that in interfering with the stomach by operations, we interfere more or less with the active secretion of the stomach. Clinically, when I give calomel to my patients in one-tenth of a grain I do get the bilious stools. I can not say that the action comes from the calomel or the bichlorid; it may be one, it may be both, it may be either. In regard to Dr. Hare's other point, namely, in regard to the possibility of contamination of these different products by the bichlorid; my experience in the examination of these preparations has been different from those of the gentleman whom Dr. Hare quoted. I have found bichlorid present in calomel, due either to the improper drug being used or insufficient care being taken in manufacture, or else due to chemic change occurring afterward. I am not quite certain as to the authority quoted in a late number of the United States Dispensatory, in which facts are given which show us that calomel is subject to the presence of large quantities of bichlorid of mercury, and where one case is reported and the authority given for it where poisonous effects were presumed to occur from the use of calomel. This whole matter of the action of calomel in the gastrointestinal canal is theoretical.

SOME POINTS IN THE ETIOLOGY OF PULMONARY TUBERCULOSIS.

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In considering the subject of pulmonary tuberculosis, and in endeavoring to support a theory deduced

from etiologic facts, which tends to show that the almost universally accepted germ cause of this disease is quite secondary in its influence, it must be admitted that, while it is evident to my mind the ground taken is not irrelevant, much opposition is to be expected.

Most physicians recognize, in certain individuals a pre-tubercular condition; meaning by this term that in such persons who subsequently develop tuberculosis an abnormal condition exists, which, while symptomatic or suggestive of consumption, does not give that evidence of the disease which renders the diagnosis absolute; *i. e.*, the demonstration of tubercle bacilli.

It can not be denied that the tubercle bacillus plays an important part in the phenomenal expression, if not in the etiology of tuberculosis, but facts are daily being brought to light which tend to prove that the bacillus alone is as inefficient as a grain of wheat is ungerminative without sunlight, air and moisture.

When one considers the impunity with which colonies of tubercle bacilli are probably taken into the system of the majority of persons, we must fall back on the certainty of a preëxisting condition, which, when present, offers favorable influence for the development of the bacilli, on which the latter depend for support, and without which the germ is rendered inert, even though it may exist in the blood.

Hardly an autopsy is made wherein it is not seen that some time during the life of the subject, tubercles had been present in the lung, or in other tissues of the body, which tubercles had resolved or had been discharged as evidenced by cicatricial repair. We know to obtain cicatricial repair of lung tissue a suppurative process must have coexisted, and that suppuration never takes place where there is not interference with, or stasis of the circulation of a part involved. In other words, there is a loss of normal correlation between the supply of arterial blood, carrying oxygen and nutrition to the part, and the venous blood, bearing away the carbonic acid gas and waste tissue elements.

Essentially, then, perfect tissue repair is one with perfect circulation, and conversely, any stasis in the circulation prevents perfect repair. Any suppurative action must have origin in an obstruction to circulation in the part affected, and resolution, occurring during any stage, depends on the reëstablishing of normal correlation in the entire circulation of such diseased tissue. Abscess formation is nature's way of ridding tissues of abnormal waste when the circulation is impeded.

Circulation in the animal system is a complex phenomenon, physiologically of two kinds: afferent and efferent; anatomically of three kinds: arterial, which is superabundantly generous for nutrition; venous, which is inadequate for the removal of all the excess; lymphatic, which supplements the office of the veins in removing waste. A vigorously active lymphatic system precludes danger from tissue stasis in rapidly wasting parts, while inactivity of the system implies obstruction.

We may logically distinguish the lacteals and lymphatics as belonging to different systems. It is true that both character of vessels hold pabulum, a fact which does not argue against the lymphatic as being a system, the office of which is purely emunctory; for the pabulum found in these vessels, that is