10. That the finger-nail operation is the most thorough, as well as the most safe.

11. That the rhinopharynx must be examined after every operation.

12. That the finger-nail operation is less likely to be followed by recurrence than the more serious operations.

13. That constitutional treatment must be thoroughly instituted in all these cases in order to overcome the predisposing cause of the growth.

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DISCUSSION.

DR. W. C. HOLLOPETER, Philadelphia—I have always felt this was a subject which had been slighted by the pediatricist. The operation appears to be a cardinal necessity, especially when the sense of hearing is disturbed and the child sleeps with his mouth open, also when swallowing is followed by rapid and inefficient mastication. The author has covered the ground very admirably, and has simplified the surgical treatment. I think the majority of those following this special line of work are inclined to believe that the operation is more satisfactorily done without anesthesia and with the natural or artificial finger nail. The artificial finger nail exhibited by the author seems to me rather large; indeed, it is often rather difficult to introduce one's own finger. I should like to have an expression of opinion concerning the use of bromid of ethyl, as Dr. Bishop uses it, as an anesthetic in these cases.

DR. S. W. KELLEY, Cleveland—I have been pleased with the terse statements of this paper. What has been said by him about the number of instruments being indicative of an operation being either very easy or rather difficult applies also to the question of posture during operation and the use of anesthetics. In one case you may choose one posture for the patient; in another, another. But posture may vary according to the fancy or the habit of the operator, or be determined by the question of anesthetics. You may find it convenient to have the patient held in the lap of an assistant, while another holds the head and, perhaps, the gag. You may lay the patient down, with the head hanging over the end of the table. You may take his head under your left arm, or you may simply stand him up against the wall, and so on, according to the case you have to deal with. With some patients a local anesthetic can be used, and there is no trouble, while others can be operated on easily without any anesthetic. In some cases it seems to be impossible to do this operation without general anesthesia, because of the temperament or lack of training of the child. He may be too unruly, or he may be too timid. In some cases a general anesthetic would be contra-indicated. As a rule I do not like to use cocain in children. And, notwithstanding all that has been taught about the safety of chloroform in childhood, I have on four occasions met alarming symptoms from its use (not for this operation). So that I do not resort to chloroform unnecessarily. I prefer to do this operation when possible without an anesthetic.

The curette with a handle is a powerful instrument, and I believe a great deal of harm is occasionally done with it. Some operators proceed to use this powerful instrument as if they were about to remove plaster from a wall. Whenever possible I use my finger, and I find it a great deal better than the use of an instrument. Of course there are growths that will yield only to a sharp edge. It is just like the question of using the finger or the curette when it becomes necessary to remove the secundines in a case of miscarriage. I like the artificial finger nail exhibited, but I think the steel blade is too long and must interfere with the turning of the instrument. I prefer to use a narrow artificial finger nail, which slips under the natural finger nail and is guided by the palmar surface of the finger. Any of these instruments will occasionally pull off the finger; hence, I feel safer when a turn of bandage is taken through the last ring of the instrument and is then wrapped a few times around the finger or hand. This also has the advantage of preventing the child from biting the operator's finger.

DR. H. L. K. SHAW, Albany, N. Y.—I am in favor of general anesthesia for the adenoid operation, and I have witnessed the

bloody operations done in England and some other places, to which reference has been made. I also believe that one can do very much better with the curette than with the finger nail. I use ether as often as chloroform, and just as soon as the operation has been done the head of the patient is held downward to allow of the escape of blood.

DR. H. J. ROCK, Aberdeen, S. D.—Is it not a general principle that chloroform is the least objectionable anesthetic, particularly in the case of children? In a fairly extensive experience I have used chloroform, taking plenty of time to secure anesthesia by this means, and I have seen no harm from its use in this way. As soon as the operation is done the child is turned on the side, with the head low.

DR. J. F. KLINEDINST, York, Pa.—My work is limited to the treatment of eye, ear, nose and throat diseases, and, hence, I do many of these operations. When the child is so unruly that an anesthetic must be used, I prefer chloroform. My experience has been that of many others, i. e., that chloroform is more dangerous in this operation than in others, though we know, of course, that children stand chloroform well. I have not had any fatal cases, but in some the symptoms have been very alarming, so that I do not like to use it. I have used frequently a combination of cocain and adrenalin chlorid, and it seems to be a good one, because adrenalin is known to be a powerful heart stimulant and will counteract, to a great extent, the depressing action of the cocain. Moreover, the adrenalin, by its astringent hemostatic action, lessens the amount of hemorrhage. Why chloroform is dangerous I can not say, unless it may be that the chloroform is not given to the extent of abolishing all reflexes.

CYCLIC VOMITING IN CHILDREN,

WITH REPORT OF CASES.

THOMAS C. ELY, M.D.

PHILADELPHIA.

All neuroses necessitate an exclusion of organic disease, a most difficult task, and an appreciation of an unusual excitability of the nervous system. Of all the various gastric neuroses, secretory, sensory and motor, with their protean manifestations, none are subjects of greater interest than the motor and, though perhaps of less frequent occurrence, none of the motor of more interest than cyclic vomiting.

MECHANISM.

The mechanism of vomiting includes a vomiting center, situated in the medulla near the respiratory center, from which impulses are sent to the diaphragm by the phrenic nerves, to the stomach and esophagus by the pneumogastric and the abdominal muscles by the intercostal nerves. The complex act consists in an inspiration, the glottis closing, the diaphragm contracting the longitudinal fibers of the stomach opening its cardiac orifice, when contraction of the abdominal muscles completes the act, forcing out the stomach contents. The muscles of the diaphragm, of the abdominal walls of the stomach itself, require simultaneous contraction and must be co-ordinated by a relatively strong nerve center. The process is almost physiologic. Act of the will quite controls eructation, or belching of gas from the stomach and, in some instances, regurgitation or bringing up liquid or solid food from the stomach. Individuals have been able to vomit at will.¹

In the condition known as merycism or rumination swallowed food is returned and chewed over again. Poorly masticated food may be returned and even enjoyed at will, says one writer.²

With these strange exceptions, however, unlike a physiologic process, the nervous and vascular systems are always reduced in power, probably not only by the act, but by the morbid process which produces the condition

acting on other parts of the nervous system than the vomiting center.

CAUSES.

The differentiation of the causes of vomiting in children frequently presents difficulties. The causes are varied; children give little or no history and the practitioner must grope his way much as the veterinarian. Called for the first time, or in the first attack, to a child with excessive vomiting, with little or no history, we wish to call attention to a class of cases to which such vomiting may belong, and the differentiation of such cases from other attacks of vomiting in children.

The attacks which are herein described occur in gouty and neurotic children and are due to toxins from faulty metabolism and faulty kidney elimination. The attacks are distinct neuroses, being due to the action of a toxin on the vomiting center in a predisposed subject.

Such neuroses have been described at length in literature by Holt,³ Rotch,⁴ Pepper,⁵ Griffith,⁶ Gee⁷ and other writers. The distinctive features of this gastric neuroses (cyclic vomiting) is that it occurs in a certain type of children, gouty and neurotic.

SYMPTOMS.

Cyclic vomiting has been likened to migraine in its tendency to recurrence or periodicity. Prostration is extreme. Death has been reported in two instances.⁸ One other case of death unreported has been brought to my notice by Dr. C. Seltzer, where all known remedies were of no avail.

The vomiting is excessive, severe, protracted, and nothing can be retained by the stomach. Thirst is likewise excessive and distressing. There is no connection in an attack with diet or indigestion. There is generally a fever of indefinite type.

Abdominal symptoms are quite immaterial and varied. The abdomen is generally about normal in appearance. There may or may not be constipation. The urine seems the most distinctive feature, being loaded with amorphous urates and uric acid crystals entirely out of proportion to the fever and other phenomena. Closer study of the urine in all cases may reveal the true cause, possibly blood examinations assisting.

ILLUSTRATIVE CASES.

The following case histories illustrate the condition:

CASE 1.—Boy of 6, well nourished, whose father is subject to arteriosclerosis, and whose mother suffers with recurrent attacks of migraine. The patient had been subject to attacks generally of no longer intervals than eight months.

The prodromes of the attacks were generally malaise, headache, and disgust for food and soreness of the abdomen, with some rise of temperature. The attacks of vomiting were sudden, severe, occurring every half or 2 or 3 hours, and lasting for several days, till the child was completely exhausted. The fever continued throughout the attack. Convalescence was rapid. The urine was always loaded with excessive amorphous urates and uric acid crystals.

The treatment consisted of calomel 1/10 (plain, i. e., dry) on tongue, 1 every hour till ten doses; cocain ½ gr. in 24 hours, given in ¼-hour intervals. Later, phosphate soda. He was restored to health.

CASE 2.—Pale, round-shouldered and of sickly appearance. Both parents were near the age of fifty at her birth and both are of marked neuropathic type. Her diet is always carefully regulated. Cold has precipitated an attack.

There has never been a history of indigestion or constipation, no acid eructations, or foul breath, or coated tongue, or bad taste in the mouth preceding an attack. Skin, conjunctiva and stools are about normal, and there is generally no gaseous distension of the bowels. The prodromes were heavy eyes,

with dark rings beneath, no disposition to play, but rather to rest, lying down most of the day.

Vomiting began suddenly. The child insisted on the basin constantly at hand, saying every few minutes, "I am going to vomit," and retched violently. The blood was not examined. The urine was loaded with uric acid crystals and amorphous urates.

Cocain, at first in larger doses and gradually decreasing, controlled the attacks with calomel in tenths as before, dry on the tongue. This was followed by phosphate of soda, and later syr. hypo-phosp. comp. established convalescence.

CASE 3.—Girl, aged 9, of gouty family. Attack precipitated by grief over death of her mother. Mother's death caused by chronic interstitial nephritis, revealed at the autopsy, urinary findings being negative till fatal uremia. Child was of very affectionate temperament, pupils filling the eyes, a highly developed and easily irritated sympathetic nervous system.

Attacks began with nausea and slight vomiting for a time, and then attacks which were violent and persistent occurring almost every hour. Temperature ranged from 99 to 101. Vomited material consisted of frothy mucus and serum, very acid. The blood was not examined. The urine was loaded with excessive uric acid crystals and amorphous urates.

At the end of the third day the face was pinched, heavy black rings under the eyes, eyes half closed, body drained of fluids and condition one of prostration and collapse. The pulse was 160 and very weak, requiring digitalis and strychn. hypodermically. The tongue was singularly clear and red. The abdomen was neither distended nor flattened, but about normal, although auscultation revealed an absence of peristalsis. There was present distressing thirst and hurried and irregular respiration, though hurried respiration, particularly at the time of vomiting, should have little significance, owing to the proximity of the respiratory and the vomiting center.

The treatment consisted of high enemas of saline solution and a hypodermatic injection of morphin 1/18, and atropin 1/500. The duration of the acute attack was five days. The after-treatment was symptomatic, consisting of sedatives, eliminatives and tonics.

During convalescence itching skin and eczematous rash over the buttocks suggested a blood irritant of the uric acid series.

Thirteen weeks followed of irregular pulse and slightly elevated temperature—90 to 100—with no other explanation than a marked disturbance of metabolism.

This case seems to be properly classified as of the "cyclic vomiting" type, the causative factor in this instance being an emotion from an unusual cause.

DIFFERENTIATIONS FROM OTHER ATTACKS OF VOMITING.

A condition most likely to be confounded with these gastric neuroses is the more ordinary recurrent bilious vomiting.

The points of distinction are these:

IN BILIOUS VOMITING.	IN CYCLIC VOMITING.
1. History, improper feeding.	1. No such history; may occur with most careful diet, with no symptoms of indigestion.
2. Unloading the bowels relieves.	2. No such effect.
3. Tongue coated.	3. May be clean.
4. Breath heavy.	4. Breath late in attacks may have wine odor of acetone, but otherwise normal.
5. Abdomen bloated and distended.	5. Generally about normal.
6. Abdominal pain and colic.	6. As rule, none.
7. Abdominal peristalsis and with colic.	7. Auscultation of abdomen, especially later in the attack, reveals absence of peristalsis.
8. Stools often clayey.	8. Generally normal.

IN BILIOUS VOMITING.

9. Ordinary febrile urine.

In cyclic vomiting, in conclusion, the excessive thirst, cyclic character, severity and persistence of the vomiting are quite pathognomonic. A differentiation of other causes of vomiting requires an examination of all the organs.

1. Vomiting may be due to local disease, irritation of the walls of the stomach itself, as in cases of any irritation, as of medicine or of food in quantity or quality, overdistension with gas, congested mucous membrane, with irritating secretions, which cases reveal themselves by a study of the relation of vomiting to food and a study of the material vomited.

2. Vomiting may be due to intestinal causes of quite the same nature as above or to such other abdominal causes as obstruction, peritonitis, appendicitis, which soon present very distinct physical signs and symptoms of these conditions.

3. It may be, also, reflex from other disturbance, as of the cerebrospinal system or the special organs—from brain disease, from the pharynx, eye or ear, or almost any organ.

4. Vomiting may be central or toxic from an irritating state of the blood acting on the vomiting center, in the same manner as a hypodermatic of apomorphia.

This would include infectious diseases, which soon express themselves by well-known symptoms or rashes, and the vomiting is generally neither prolonged nor excessive, and very frequently consists of but one or two explosive effects.

Among other causes of central vomiting may be included the toxemia incident to kidney disease.

In the vomiting of children it is always wise to follow two rules—to examine carefully the throat, and not to be easily convinced that the cause is local—an irritated or diseased stomach. Very frequently it is not at all of gastric origin.

The stomach, organic brain disease and organic kidney disease may represent the most frequent causes.

G. R. Butler⁹ says: "Vomiting is sometimes seen as the only marked symptom of an apparently slight nephritis. In such cases its onset is abrupt, its course intense and its outcome not infrequently fatal."

5. Simple or tuberculous meningitis may present greater difficulties, especially when we consider that vomiting may be rarely the only symptom of such a meningitis till a fatal issue by convulsions. The condition of the pupils, the eye ground, irregular pulse and respiration assist the differentiation.

In the periodical vomiting which occurs in cases of tabes dorsalis in adults, a possible history of syphilis, the symptoms of station and patellar reflex and ocular symptoms are so characteristic that they can not be confounded and are mentioned only because articles on "periodical vomiting" refer to such neuroses, which are in no way related to cases of periodical vomiting now considered.

Other attacks of periodical vomiting, with abdominal pain, in adults, have been described in literature, but have none of the marked features of these attacks. Still other conditions described as periodical attacks of vomiting in children are very plainly recurrent bilious attacks, in children careless of diet and hygiene, which have been described.

IN CYCLIC VOMITING.

9. Urine scanty and loaded uric acid crystals and amorphous urates out of proportion to other symptoms.

That the phenomena of cyclic vomiting is due to some toxic blood state seems certain, the exact nature of the toxin remaining in obscurity. It may be allied to the unknown toxin of uremia. It is probably of the xanthin series, one of the uric acid group. The attacks resemble the so-called "uric acid storms" described so graphically by Haig, in that the extremities are cold, glandular secretions decreased and scanty urine and large excretion of substances regarded as uric acid.

The attacks differ in the fact that there is no headache or mental depression, and in the character of the pulse, which is not usually of high tension, but weak and irritable like the pulse of toxin poisoning. It is a pulse which can in no way be explained by the tension caused by impeded capillary circulation, which a colloid state of uric acid may occasion. The symptoms are not so much of uricacidemia and the clogging of capillaries as of some toxin possibly of the uric acid series acting directly on the vomiting center.

The impressibility of certain nerve centers, and the difference of susceptibility of particular nerve centers in particular individuals help to explain the phenomena. It is well known that toxins of the alloxuric group irritate particularly nerve centers, and that uric acid products are particularly injurious to nerve tissues, and we may be warranted in the assumption that some of these chief products of waste metabolism irritate the vomiting center in these gastric neuroses, though we do not know the steps of the biochemic process or the exact toxin. In all three cases there is a neurotic or gouty, or a neurotic and gouty family history.

In all three cases the presence of amorphous urates and uric acid crystals in excessive proportion to the febrile disturbance point to a toxin of the uric acid series. In each instance the alimentary tract and accessory glands seemed fairly normal and the autointoxication seems not of intestinal origin, but cellular, with perhaps faulty kidneys.

When we consider how little we know of the toxin of uremia—a condition more pronounced, more serious and more frequently at hand for study—we may be less chagrined at our lack of knowledge of the toxin in this gastric neurosis.

TREATMENT.

The treatment is sedative and eliminative. The indications are: First, to lessen the irritability of the vomiting center; and second, to eliminate. The first has been attempted by bromids and chloral by the bowel, which is not satisfactory. Nothing is so effective as hypodermatics of morphin and atropin in severe cases. In less severe cases cocain and Fowler's solution lessen irritability both of the vomiting center and the peripheral nerve endings in the stomach wall.

Elimination is best accomplished by calomel, dry on the tongue in small and frequent doses, in conjunction with high saline enemas.

Gavage has effected good results in young children. No other diet than some of the liquid peptonoids in form should be attempted for several days. In the interval there is indicated abundant fresh air and careful skin activity, exercise short of fatigue, an avoidance of nervous strain and child worry, with an antiuric-acid diet.

CONCLUSIONS.

In conclusion I wish to emphasize:

1. The importance of being watchful, on one's guard for the vomiting of this gastric neurosis, distinguishing it particularly from bilious vomiting and the vomiting of kidney disease and reflex vomiting, as of brain disease.

2. In children of gouty and neurotic history the three cases reported point to a toxin allied to the uric acid series as the possible blood irritant causing the vomiting.

3. The importance in severe cases of hypodermic injection of morphia and atropia in conjunction with elimination, by high saline enema; by gavage; and in extreme cases, hypodermoclysis and even intravenous injections of saline solutions.

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Special Article.

THE TYPHOID EPIDEMIC AT ITHACA.

(By Our Special Commissioner.)

II.

THE DIVISIONS OF ITHACA IN RELATION TO TYPHOID INCIDENCE.

Very early in the history of the outbreak it was suspected that the public water supply was in some way implicated. With respect to the sources of the water used for domestic purposes the town may be conveniently divided into five different districts: 1, Receiving water exclusively from Six Mile Creek;¹ 2, receiving a mixture of water from Six Mile Creek and Buttermilk Creek in the proportion of 1:1; 3, receiving mixed water from Six Mile and Buttermilk creeks with an excess of the former in the proportion of about 3:1 or 4:1; 4, receiving water from Fall Creek; 5, dependent on wells, springs or sources outside of the regularly pumped supply.

The distribution of the cases of typhoid fever in the town at once drew attention to the significant incidence of the infection. The main city water supply is derived in part from Six Mile Creek alone, and in part from mixture of this water with that of Buttermilk Creek. The water from these sources (Districts 1 to 3) is furnished by the Ithaca Water Company, a private corporation. The Fall Creek source, which is controlled and managed by the university authorities, supplies the university buildings, some fifty-two houses on or near the campus, including six fraternity houses and about seventeen houses at Cornell Heights to the west of Fall Creek. This section of the town has remained exempt from typhoid fever, except in the cases of a few individuals, who resided on the campus but boarded elsewhere, and one student in Sage College, who is known to have drunk water in other parts of the city. With the one exception noted, the women students of Sage College, numbering over 200, have not been affected. The same is true of the students in the several fraternity houses that are supplied with Fall Creek water. The larger part of

the town, however, especially that furnished with water directly from Six Mile Creek, has suffered severely.

It appears from the meager facts that could be learned concerning the distribution of cases within the infected area, that the district receiving exclusively Six Mile Creek water was much more severely affected than the rest of the town. This section, the East Hill district (1), which is thickly dotted with student boarding houses, has borne the brunt of the epidemic. In the district supplied with the mixed water from Six Mile and Buttermilk creeks, the proportion of cases appears to be smaller than on East Hill. In the outlying parts of the town, supplied with well water, the number of cases is said to be relatively small, although it is extraordinarily difficult to obtain precise information on this and all other points that require the consulting of accurate records. I have also found it impossible to obtain defi-

nite information concerning the distribution of population within the specified areas. The population supplied from Fall Creek numbers probably at least six hundred; and that supplied with mixed water from Buttermilk and Six Mile creeks is considerably larger than that supplied from Six Mile Creek alone; but beyond these facts there is little to assist the investigator in determining the proportion of cases to population. In view of the compact character of the town, and the opportunities for using infected water throughout most of its territory, it is certainly rather surprising that there have not been more cases of incidental infection among the population supplied by Fall Creek. If the disease had been distributed evenly over the city in proportion to the population this district should have had at least 30 indigenous cases, whereas it is not known to have had one. The fact that the section receiving Six Mile Creek water but no water from Buttermilk Creek (1) has been

1. First pumped to a small reservoir containing less than a day's supply.