Gastro-Intestinal

Jetany

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During the past seven years I have been called upon to treat a number of Adults in whom the most striking symptom was that group of neuro-muscular phenomena recognised by the name of "Tetany". This fact has led me to a full consideration of the symptom, from the standpoint of its literature as well as from its etiological and clinical aspects. The causes of Tetany are many and various; but it is of one group of cases, namely those associated with gastric and intestinal symptoms, that I now intend to treat. Of late years Tetany in connection with affections of the alimentary canal has been attracting a large and increasing amount of attention from both Physicians and Surgeons, and the views held by leading authorities as to its etiology and prognosis are widely divergent. The great bulk of the published cases of this group has been observed by hospital Physicians in patients in whom the primary illness has existed for a prolonged period, and has led to marked exhaustion and general malnutrition, so that the secondary
Symptom, the Tetany, has assumed a gravity which is not inherent in itself. The large majority of the recorded cases has been fatal, and this fact, together with the severity of the symptom rather than its nature, has led to the publication of them. It has occurred to me that the subject viewed from the aspect of the General Practitioner might be of interest. He has the opportunity of seeing the milder cases that recover under appropriate treatment, as well as the earlier stages of the more severe types, and so is not inclined to give so grave a prognosis as the Consulting Physician who only too often sees cases when too far advanced for any but an almost hopeless opinion.

I have in all 22 in your undoubted cases of this condition and I now propose to give the history of them at some length, and afterwards to discuss, with reference to the literature, the frequency, prognosis, etiology and treatment of the symptoms.
Case I.

M. Male, 42 years of age. He was a coal hawker, selling coal by the sack from door to door; it was very hard work as each bag had to be carried by him. He worked six days a week and besides selling the coal had to look after his horse and cart. He has been unable to work for over two years.

His family history is not important.

In general appearance he is a small man about 5ft 3ins in height and poorly developed. His shows well marked signs of having had rickets. As a child and growing lad he did not get enough to eat.

The respiratory and circulatory systems are normal.

He first consulted me in 1900 for diarrhoea, which he had been subject to all his life; but latterly it had been much worse, he having as many as eleven motions a day. He was evidently suffering from colitis. At this time he was still working every day and all day. His appetite was
Enormous. He was often very flatulent. The tongue was clean. There was no enlarged or abnormality of either the liver or spleen. The stomach was not dilated. His urine on analysis was normal. Examination by the rectum was negative. The motions were of a dull yellow ochre colour and were pretty like brewer's yeast, and of much the same consistency. They were very offensive and copious. Various remedies were tried, intestinal antisepsics, purgatives, astringents and tonics (strychnine) with more or less success, he was sometimes better, sometimes worse. On a strict milk diet the diarrhoea improved considerably, but the patient would not continue it.

In the Spring of 1901 I took him to see Mr. Maye Robson, who examined him most carefully. Mr. Robson distended the stomach, there was no dilatation. The result of the whole examination was negative. At Mr. Robson's suggestion other drugs were tried. I also gave bromide. It was impossible to regulate the diet as the
Patient would not deny himself anything he fancied. He lost weight; but considering the copious diarrhoea his general condition remained wonderfully good.

In November 1901 Dr. Johnson Campbell kindly took him into the Bradford Infirmary. While he was there the diarrhoea improved and ultimately stopped under strict milk diet and rest in bed, to break out however, as badly as before, on his return home. His appetite was enormous, and is still very good if he has anything he likes. He is a man of low intelligence and it is impossible to get him to eat in moderation. His diarrhoea at one time was so bad that he became almost aphonic from weakness.

The diarrhoea usually comes on in the afternoon and lasts through the night. In the beginning of 1902 he came to my house complaining of cramps in the calves, forearms and hands, he was in an unmistakable attack of tetany, the hands being in the classical "accountant's hand" position. He could hardly walk. He complained of stiffness in the jaws and said he was...
partly "jammed". The diarrhoea had not been so bad for a day or two. Before the crisis he had "pins and needles" in extremities and a feeling of numbness and coldness. He was very flatulent. I sent him home and followed later. When I got to his house he was lying down on a sofa. His appearance was typical, the face was flushed and anxious looking, the forearms and legs, the wrists markedly so, and the hands, as before stated, in the accouchement position. The thighs were drawn up and the knees flexed; the feet were extruded. The affected muscles were very hard and painful. On taking off his boots his toes immediately flexed on the sole of the foot. I do not think I ever saw an abdomen more distended with flatus. I gave him one draught of Spirit of Assafetida by the mouth. In a short time he began to pass an inconsiderable amount of flatus by mouth and rectum and the spasm gradually subsided. He felt dizzy and faint the next day, but otherwise was not much the worse.
I examined a sample of the mixed urine of the twelve hours after the attack. Failed to find albumin.

On again examining his abdomen I found that the lower part was protuberant. The abdominal muscles were very tense. The stomach was not dilated, but the colon was easily made out to be enlarged, the dilatation has since increased considerably and now at times the outline of the colon can be seen. The sigmoid flexure seemed to be the most affected.

Up to this the patient had worked off and on, and I put down the dilatation of the colon to the fact that he had often to keep from defecating, when he should have done so, and so gradually stretched his colon.

I cannot now remember the length of the interval between the first and second attacks. However they became more and more frequent and worse in damp locations (the patient's house and surroundings are sunless and damp). The attacks are always preceded by and...
accompanied with flatulence, and are always worse when the diarrhœa is better.

Sometimes the hands and, to a minor degree, the forearms and calves would be cramped more or less for a week together, with very short intervals, and would remain cramped during sleep.

When the attacks are not bad the patient can force his fingers apart, by pressing those of one hand between those of the other. When in what, for a better term, may be called modified tetany, and his wrists are not flexed, although his fingers are affected, he lefts anything to his mouth between his two wrists in much the same manner as a man who has lost his hands uses his stumps.

Sometimes the hands are clasped like when in tetany, although the metacarpophalangeal joints are fully extended and the interphalangeal joint flexed, the distal ones marked by so. It is only when there is a bad attack of general tetany that the position of obstetricians hand
occurs, and not always there. The hands are always drawn to the ulna side. At times the muscles and nerves are very irritable. I have seen the patient put his elbows on the table to rest his arms, and in a very short time the pressure of the table against the elbows, or else the obstruction to the circulation caused by the acute flexing of the elbow joint, or perhaps a combination of both has brought on a tritonic spasm in the forearms and hands. I have seen this frequently.

The tongue has always been quite clean, and healthy looking and the appetite good and often ravenous. The attacks are always worse after a heavy meal.

(1) von Sorn's symptom (if during the intervals between the attacks the affected parts be compressed either in the direction of their principal nerve trunks, or over their blood vessels so as to impede their various or arterial circulation a paroxysm will be reproduced) a symptom according to some of almost pathognomonic value, was sometimes present sometimes absent; but more frequently present.

(2) The same applies to Chvostek's phenomenon.
(a tap over either the muscle or the nerve will produce a muscular contraction, usually the facial nerve is chosen)

Erb's Symptom (an increased irritability to the galvanic current, this usually is present, sometimes also there is increased irritability to the faradic current, but the latter is rare. The polar reactions are altered, a more ready response is obtained with the anode than with the cathode. The contraction is more prolonged than in health, and a feature peculiar to tetany is an aural opening tetanus) I was unable to test.

I did not observe as I did not at the time know of the Phrenic phenomenon described by Solovitch (this consists in a contraction of the diaphragm synchronous with the heart beat).

During this time I was trying crescents in capsules as an intestinal antiseptic, but without success. I also gave Chloral, Potassium Bromide and Opium, the latter appearing to give the best results. At one time I tried Petroleum Moll by the mouth for the colitis, as in the case of a Soldier invalided from South Africa with dysenteric colitis a cure resulted from its use after all other means
had failed; but in the case it did not appear free. I washed out the colon daily with a solution of chloroform. After a week of this treatment the patient was neither better nor worse and would not let me continue it. In November 1903 I took him to see Mr. Mackay to find out if there was any condition in the abdomen which had escaped me. Beyond the fact that the colon was very much dilated he could discover nothing; he examined the rectum with a negative result.

Sometimes after this I commenced giving the patient 3 habitol in five grain capsules twice in the day, still keeping on with the Opium, and he has continued taking both up to the present (April 6th 1904). He is certainly better, the diarrhoea and the flatulence being much less marked and the Istam not nearly so severe; indeed for some weeks he has not had an attack, whereas formerly not a single day passed without more or less severe spasms.

I will now give a description of an attack which he had on February 13th of this year. He had been in bed for three days, practically in modified Istam for the whole time. The
The bowels had not moved for twenty-four hours. At twelve o'clock he had eaten a very large meal of meat pie and the tertian got very much worse after it. I saw him about 4 p.m. His face was flushed, the mouth drawn up at both angles, but perhaps more so to the right. The eyes were screwed up, the palpebral tissues appearing very small. The pupils were contracted. He was very irritable and excited, and spoke as if he was not quite sober (he had not had any alcohol). I suppose this affection of the spire cle was due to his mouth being drawn up at the corners, as his tongue could not be moved in all directions. His head was drawn back. The jaws were very stiff. The right arm was flexed, the wrist very strongly so, the hand in the "accouchement" position and drawn to the elbow side. The left arm was in the same position as the right, the hand was drawn to the elbow side and closed, a neighbour had been rubbing it and had closed it (I had often noticed that if forcibly closed the first sudden attack was on, it would remain closed). The legs ached and were cold. The calf muscles were very hard, the thighs were not drawn up nor the knees forcibly flexed (he was sitting
on the edge of the bed). The feet were extended and the toes actively flexed, causing him a great deal of pain. In trying to overcome the flexion of the fingers, the resistance was like that of a strong inelastic rubber door spring, as soon as they were straightened they would bend back again, and it took considerable force to prevent them. It was the same with his toes, we had the greatest difficulty in getting his slippers on, on account of the accentuated flexion of his toes. He insisted on getting up as he said the attacks were always worse when he was lying down. At about 8 P.M. the diaphragm commenced and he also parted with a great deal of flatus. At 9 P.M. the attack was over.

This is a sample of many attacks.

I examined the urine on the morning of the 14th, there was no albumin. I could not produce either Troussseau's or Chvostek's phenomena (see anti, pages 9 and 10). Chronic spasms have been absent. The patient always complains of his legs and feet feeling very cold and heavy. At times the abdominal and intercostal muscles, share in the tetany, he then complains of great pain. Once or twice I have thought the diaphragm was partially affected. I have not found any alteration in the reflexes.
Case II.

A.E., male, 51 years of age in May next. By trade, he is a clogger, that is a maker of the wooden sole of boots and shoes worn in Lancashire and Yorkshire. This is very hard work at all times, and more particularly so when felling trees for the sole timber, as he then has much heavy lifting.

When cutting out the soles, which is his usual occupation, he stands with his legs apart and his body much flexed. He is 5' 8" in height, sparely built and very wiry, and a young looking man for his age. He has never been attended medically except for the following attacks. He has had several attacks, some slight, some very distressing.

The spasms occur usually at the end of winter, this being the time when the timber felling is done and he has much very heavy lifting. His hours of work are long, he has three miles to go to his work and is there by 6:30 AM, and often does not get home till 10 PM. On arriving home he has his supper, a good meal of meat, etc., with cocoa, and shortly after he goes to bed. He smokes very little and hardly takes any alcohol.
The first attack occurred in March 1896. He had had very hard work for some time and was always thoroughly tired out at night. On the morning of the day of the attack he received a blow on the abdomen from a tree which slipped off the wagon when the latter upset. This blow he says was not severe and only "winded" him for a few seconds.

He felt quite well on going to bed; but very tired. He went to sleep; but awoke at 2 a.m., his abdomen was distended and flustered, he was in great fear and felt as if he were going to die. He got up and went into another bed; but could not rest. He then went down stairs and tried to light the fire, but he was unable to do so as his hands were numb, prickly and drew up and then he pricked all over his body. He attempted to get up stairs, but fell when he got to the foot of them. He says he then lost his senses, but only for a very short time, thanks to the stimulate. He fell down, when he came to he crawled upstairs on his hands and knees, lay down on the bed and went into a kind of
doze, He got up at 8 am and tried to eat some breakfast, but the pricking started again so he went to bed and in an hour was very much surprised. He then felt a very severe pain in the region of the umbilicus, this lasted for about an hour. When the pain ceased he thought he was all right, but in a quarter of an hour after he had a sensation in both great toes which he says felt as if something was nibbling at them. At the same time his wife noticed a great change in his appearance, his face got very pale and pinched. The breathing was very fast and shallow. His wife thought he was about to die. My predecessor was sent for. The patient felt very cold. He was unable to speak as his tongue was curled up in his mouth and felt to him as if it were made of wood. He felt as if all the muscles in his body were contracted. The abdomen was much distended. His legs went up at right angles to the body, the arms did the same as the legs. The fingers were curved like claws. Neither the doctor nor the patient's friends could bring the limbs into proper position. This tonic spasm lasted for about
An hour and was followed by clonic spasms, which started he said with a feeling of something turning over in his abdomen about the region of the navel. He had great pain in the limbs. The spasms stopped gradually, and when the attack was over he vomited.

I soon to understand that no treatment beyond the giving of large doses of peppermint was adopted.

He felt quite well the next day, but suffered from insomnia for a time and had to take hypnotics.

I did not see him in this attack. After this he had some slight attacks and in the following Spring (1891) he had a severe one. I was called in, it was about 11.30 PM. He was propped up in bed by his wife and one daughter, and his two other daughters were rubbing his hands and forearms which were cramped. He felt very cold and had a look of fear and anxiety on his face. He was breathing very quickly, and was not able to articulate properly. The forearms were flexed, so were the wrists, but not to so great a degree. She
Fingers were clawlike. His legs were slightly crampf and flexed. The toes were adducted and the feet were in their natural position. The abdomen was much distended and the muscles very hard. The stomach was distended. He had violent pain in the abdomen and cramped limbs, and said he felt that he was about to die.

As he was so distressed and in general spasm I gave him a draught of mixture of Assafoetida by the mouth. Shortly after taking it he had the peculiar feeling of something turning over in his abdomen which is mentioned in the account of the first attacks, and which he says he always feels before he gets relief. This was followed by a free and continuous discharge of flatus per rectum. There was also a good deal of expectoration. The tonic spasm ceased and was followed by marked clonic spasms, which gradually got weaker and weaker until they stopped.

He says the attack was not so severe nor so prolonged as the first one. He was purged after it, but did not vomit. It was preceded by the "pins and needles", as all his attacks have
been. There was no albumen in the urine, but it was laden with urates. I was unable to find any dilatation of the stomach or intestines.

He has had other attacks since, but as soon as he felt them coming on he took a large dose of peppermint and ginger, put his hands and feet into very hot water, and rubbed his limbs about as much as possible, and in this way he thinks he lessened their severity.

At my advice he gave up doing the very heavy work. I called upon him on the 28th of February of this year, and he told me that since he had given up lifting heavy weights and had not worked so hard in general, and not got over tired he had been free from attacks.

**Case III.**

Mrs. H., 52 years of age. She is a big, well built woman, and has had eleven children. She suffers from mitral regurgitation and is sometimes dropical and has occasional albuminuria, but I have not found any casts. She has been a hard working woman and has
done a great deal of laundry work.

Her first attacks of tetany were mild and occurred during her last pregnancy seven years ago. She did not then live in this district. Her first bad attack, which I had the good fortune to see, was in the autumn of 1899. She had been working hard all day, bent over the washing tub, and as she was very tired went to bed early. She was very fatigued. The attack started suddenly about 9 PM. The first symptom she noticed was pain on both sides of her jaws, she was unable to open her mouth and thought she had 'lockjaw'. Her hands and feet began to prick. The hands became almost closed with the thumbs turned into the palms. The thighs and knees were flexed and she was unable to move them. She tried to get out of bed, but could not. She was unable to speak at first (she said afterwards that her tongue seemed fast). The tonic spasm subsided and was followed by clonic spasms, the pain left the jaws, the other cramp muscles had not caused pain. Then the tonic spasm came on again, and was again
followed by clonic spasms, this sequence occurred in all four times. I saw her about 11 PM and gave her assafetida by the mouth. Shortly after she passed a great deal of flatulence and the attack finally ceased about 2 AM.

Next morning her head felt rather heavy and her legs trembled; otherwise she was not much the worse.

She has had several attacks since, but not since, with the exception of one. I saw her in this and it was much the same as the first except that she was purged and vomited after the attack. There was nothing of note in the character of the stool. This attack occurred about eight months after the one described above, and as before that, she had had an extra hard day’s work at the wash tub. I had told her to keep assafetida by her and take a dose if she felt an attack coming on, and also to take carminatives whenever she was threatened with flatulence. As she was often constipated I told her to pay attention to the regular action of the bowels. She had lost nearly all her teeth, only a few stumps
being left, these however were not septic, the mucous membrane of the mouth and gums being healthy. I told her to get a complete set of false teeth, this she did.
She never has an attack unless she is badly flatusent and as soon as the flatusence is relieved the attack passes off.
There was no dilatation of the stomach or intestines.

I saw the patient on the 23rd of February 1904 and asked her if she had had any more attacks; she informed me that she had been free from it since nearly three years, that is since she got the false teeth. Since then she has had very good health.

Case IV
Mrs. F. Widow. Little woman. Aged 64. She has had a large family. She suffers from a large umbilical hernia and is somewhat constipated, but not markedly so. Her attacks are not pronounced. They always occur at night and when she is flatulent. She wakes up feeling quite powerless and with intense
pain in her thighs, which are drawn up. The calves are very painful and hard. She has a feeling of tingling down the left side. The right side does not tingle or prick. She has a feeling of impending death. She has had several attacks. The first attack I saw her in was in the middle of the night. She did not speak. Afterwards she told me she could not, her tongue refused to move. She was staring and very frightened looking. Her heart was acting normally, respirations normal. The legs were drawn up as I have described above. I gave her a carminative draught to be repeated every half hour till theFlatulence was relieved. As she parted with the flatus the cramps got better. She now always has a carminative by her bedside and as an anti-carminative she takes two drops of an oily Caju pepper sugar repeatedly as often as necessary. She is a very hearty eater. Sufferly the attacks have not been so frequent or so severe. Her spasms do not become Clonic. The service is very large and she would not
find out if the stomach was dilated.
She has no albuminuria.

Synopsis of the four Cases

In all four cases the attack has been preceded by extreme flatulence and hence distension of the abdominal hollow viscera. In two of them (II and III) the attacks came on after extra hard work. In three (I, II and III) the usual position when at work was to have the body much flexed. In all the flatulence had to be got rid of before the spasm ceased. In one (I) there was dilatation of the colon, and possibly dilatation of the stomach in another (IV). In the other two no dilatation whatsoever could be made out. In one (I) there was prophy diarrhea; but the attack was worse when the diarrhea was better. In two (II and III) there was sometimes vomiting and purging after the attack. None of the patients vomited before the spasm. In one (II) there was a loss of consciousness in the first attack, but this may have been caused by a fall.
This patient in his first attack did not feel his elbows or knees; these joints were extruded. In two of the cases (II and III) the clonic spasms were very marked. In the most there was a resembling clonic spasms was a twitching, while in the remaining case there was not. One (II) complained of a definite and localised pain in the abdomen in the region of the umbilicus, before the pain crossed he always had a feeling of something turning over in the above mentioned position, and until this happened he had no relief. This pain I take to be caused by a spasmodic contraction of the pylorus, as observed by Mayo Robson, and the feeling of turning over to its relaxation.

The attacks in three of the cases have always come on after returning to bed. In the other (I) the fit any would come on at anytime; but was always so as if he remained lying down. Two of the patients (II and III) had marked trismus. In I the face muscles have been affected. Frankl-Hochwart states that the spasm does not often affect the muscles of the larynx, face and jaw. Soltan Zawick looks upon trismus as a bad sign.
In two of the patients (II and III) the tongue musculature was affected and possibly also in another (IV) though I could not be certain whether the patient was speechless through fear or on account of the disease attacking the tongue.

Frankl-Hochwartz says the tongue is rarely affected; but I find in many of the reported cases that speech was interfered with.

None of my patients had any trouble in passing urine after the attacks. During the attacks they did not express any desire to micturate. In only one case (I) did I look for Troussseau's or Chvostek's Signs (pp. 99 and 100) they were sometimes present sometimes absent, but more frequently present. The former was very well demonstrated (as described in the history of the case) when the patient put his elbows on the table (p. 99).

In the three other cases the attacks appeared to have completely passed off on my second visit, and also for political reasons I did not care to run the risk of setting up even a partial spasm. I had not the means of testing Grt's Symptom (p. 10).

In three of the cases I failed to find albumin
in the urine at any time, in the other
the albuminuria was secondary to the heart
condition.

I think it a point of very great interest
that the patient whose case is described
third in the list has not had an attack
of Tetany since she has worn a set
of false teeth and so has been able to
masticate her food properly.

In all the Thyroid was normal in size and consisted

FREQUENCY AND PROGNOSIS.

I now intend to discuss the question of
the rarity or otherwise of Gastro-intestinal
Tetany, and also of its prognosis.

Of the four cases which I have described
the first is without doubt one of Gastro-intestinal
Tetany. The three others I consider to be
examples of Tetany of gastric origin, a
symptom of grave import when occurring
in a patient with a dilated stomach
of some standing and already enfeebled
by his primary illness.

In my opinion Gastro-intestinal Tetany is both
a more common and less dangerous
symptom than most observers would
have us believe. In reading some of


their papers one would almost think that death was the immediate and necessary sequel of an attack of tetany of postural origin. Also I hold that postural tetany can occur without dilatation of the stomach, as in two of my cases there was distension but not dilatation. Smijer takes the same view and says that tetany sometimes occurs in connection with atony of the stomach, and Freelyan reports a case in a girl in whose attacks of tetany occurred for some years, always after vomiting, in support of this. L. W. Strong also reports a case in which no dilatation was found.

It seems strange that Nodson in 1870 could not find the name 'tetany' amongst the six or hundred and odd diseases in the nomenclature of the Royal College of Physicians of London, although it had been described as early as 1831 in France by Adouze. I suppose then as now, cases of tetany were probably diagnosed as 'Hystoria.' Indeed as lately
As last December one observer, London, say he looks upon all tetany as an hysterical manifestation.

As I have said before most of the published cases of gastric tetany have had a fatal issue. Thus Collier reports two cases both fatal. The tetany having followed lavage in each case. He also reports three cases of hussmank's of which two died. Soltan-Frywick in 1895 reports two cases, one died in the seventh attack, the other got better under systematic lavage. He also states that up to the end of that year only twenty six cases had been published. Trivelliani reports two fatal cases and one which got better. Soutter Mcandrick reports one case with a fatal issue. Siwire had two fatal cases, both fatal within a few hours. Soltan-Frywick in 1903 reports another case, fatal in the first attack, and states that death in the first seizure is very rare. Carnegie Biscoon reports a case which at first improved greatly, but had to come back to hospital with a relapse.
was operated on and made a perfect recovery. Inzielich reports two cases, one of them fatal, and says that a fatal result during tetany must be of rare occurrence.

Of intestinal tetany two cases have been recorded in the British journals of medicine within the last few months. The first by H. T. Peircefield, in which there was tetany following on dilatation of the upper part of the jejunum, the patient died from the obstruction. The second by H. G. Thompson, in which tetany was associated with mucous membranous colitis in a patient suffering from phthisis, as the colitis improved the tetany subsided.

There have been several other fatal cases reported. The mortality has been placed as high as 41.4% by Lobb, 70% by Bouewhat and Browne. Flower says that in eight cases which came under his notice the death rate was 50%. These statistics, which are mostly the result of hospital experience, surely point to the fact that tetany has supervened on causes fatal in themselves, only as a rule the most
advanced cases of dilatation and those arising from malignant disease being admitted as in-patients.

As against the rarity and fatal nature of gastric titany we have the opinion of Majd Robson, who in a paper read before the Leeds and West-Riding Medico-Chirurgical Society, which I had the pleasure of hearing, states that severe muscular spasm of titanoïd character, possible, alluded to, if not really, an early stage of true gastric titany, are frequently associated with gastric dilatation. Ladyman in his discussion which followed said: "If the true gastric titany is allowed to include the milder as well as the severe cases, and there is no sufficient reason against the view, the disease may turn out to be more common than is usually supposed. The transition between gastric titany, strictly so called, titany with gastrointestinal symptoms and ordinary titany would seem to be a gradual one." With this fully agree, Lawrence, W. Strong in an exhaustive paper reports five cases.
of Intamy of Gastric origin, in all of which there was either cessation of the symptom or amelioration without surgical interference. Morphine admixture both the rarity and unnecessarily serious nature of Gastric intamy, and reports four cases in his first fifty operations of Gastro-intestinal stomy. He again alludes to the subject in another paper of later date and expresses the same views.

On looking up the earlier papers on Intamy in the British Journals of Medicine I find no mention made of a gastric cause for the symptom, patients being described as run down and wanting more. Still Intamy then as now must have been some times due to Gastro-intestinal causes, yet Lowens says almost all cases and in recovery and that when death occurs it is due to the cause of the Intamy.

An etiology.
The causation of Intamy in connection with Gastro-intestinal
Arrangements has given rise to much research and much controversy as to whether it is toxic or reflex in origin, but little light has really been thrown on the subject.

The general opinion is that it is toxic in origin, and that the toxine is produced in the dilated stomach, is absorbed into the blood, and acts on the nervous in the anterior horn of the spinal cord.

J. T. Cariquato, quoted by Adams, says:

*Ictany* as a general rule, follows upon such diseased conditions of the system as are observed to produce morbid discharges from mucous surfaces, whose absorption is known to cause symptoms in remote parts of the body, due to the circulation of septic poison. In all cases of recorded observations of morbid processes antecedent to *Ictany* a probable sepsis may be inferred, and no other cause common to them has so far been discovered. It is, therefore, logically necessary to assign the causation of the *Ictany* to this fundamental
peculiarity as the antecedent factor, and to consider tetany, not as an independent disease, but as a disorder consequent on some one of those diseases which generate septic poison. I have quoted them at length because it so well expresses the view held by the majority of authorities.

Mayo Robson says that there are two factors in true tetanus: (1) the absorption of some poison from the duodenal stomach, which increases the excitability of the nervous system, and (2) a reflex effect produced by the painful contractions of the pylorus. This combines both the toxic and reflex theories.

Sultain-Erwick says probably the poison which causes the nervous symptoms is frequently present in the stomachs of persons who have pyloric or duodenal obstruction; but its absorption is prevented by the integrity of the columnar epithelium, whereas when this is injured or partly removed by the use of tube or violent vomiting, the poison acts on the circulation and acts on the central nervous system. He thus arrives...
of the possibility of reflex spasm being set up by the passage of the tubule on the vomiting. While his explanation is ingenious it is not convincing.

Bouret and Barrie, who held the toxic theory of causation, strongly contended that the symptoms in all recorded cases have been those of dilatation, with hypersecretion of gastric juice. They say that the reason why in cases of lauter some observers have failed to find excess of acid is because the frequent vomiting which has preceded the attack has exhausted the secreting glands. They think that the toxic material is produced by the action of an excessive amount of acid on the retained peptones. This toxin, they say, is soluble in alcohol, and this accounts for several cases of lauter having followed drinking bouts.

Galliburton and McKendrick by elaborate processes extracted a substance from the gastric contents, a substance with markedly acid reaction, the injection of which into animals caused certain
direct or reflex excitation of the cardio-inhibitory centre. It is soluble in alcohol and normal saline solution.

They conclude that Gastric-titanye is an auto-intoxication, the exact nature of the toxins not being known.

Flower holds that there is no proof that it is an auto-intoxication. He points out that the substances isolated by Bouvarel and Brodie did not pre-exist in the stomach, and also that they did not come from patients who had Tittanye. (The objection that the substances experimented with did not pre-exist in the stomach also holds good in the experiments carried out by Halliburton and McEvedrick.)

Flower also objects to the reflex theory. He believes in the theory brought forward by Krusman (which the latter has since abandoned) namely that in Gastric-titanye the body is deprived of a great deal of water, owing to the dilatation and excessive vomiting, and that this dryness causes a state of irritability of the nervous and muscular systems.
...
generally, but rather makes it more difficult.

Tetany as we know it arises from several causes besides disorders of the alimentary canal tract, and if its cause is an auto-intoxication there must be several different toxins which irritate the same parts of the central nervous system in the same manner, and give rise to the same symptoms. This seems at least unlikely, and in all cases of Tetany, except those strange epidemics which have been described as occurring in Vienna and elsewhere on the Continent, and which usually attack shoemakers and tailors, (and in these cases I would like to draw attention to the position in which the men of the above trades work. The tailor sitting cross-legged with his body flexed and the shoemaker with the last pressed hard into the pit of his stomach or a little above it, I should like to know if these epidemics occur when wages are low, food bad, or work extra hard. Then has been either extra hard work, gastro-
intestinal disease, such as pregnancy or some illness which has for the time being or permanently increased the patient and so increased the irritability of the central nervous system.

I do not deny that in Gastric or other forms of Stenosis the absorption of septic products may not at times play a part, but I think they only act by generally lowering the stamina of the patient.

I consider that Stenosis from gastro-intestinal causes is not dependent on the absorption of a toxin, and can take place in cases where no toxin has been produced.

I think Stenosis to be the result of reflex action.

Up to the present Stenosis has not been produced in any of the lower animals by the injection into or giving by the mouth to them of the unattenuated stomach contents of patients suffering from Gas-streptos. Although several attempts have been made in this direction.

This points to the fact that the toxin,
if there is one, is not formed in the stomach. The experiments of Bonoveret and Drobic and Halliburton and McFendrick (p. 35) are fallacious, as by their elaborate methods they manufactured a substance which cannot be said to have pre-existed in the stomach contents. Up to the present written in France for other forms of tetany has any toxin been found.

The reflex theory has had many supporters, amongst them Bermain, 322. They consider that the contractions owe their origin to a reflex action, produced by the irritation of the sensory nerves of the stomach, especially of the Pylorus. Haller produced an attack in a patient of his by percussion on the stomach, and he holds that vomiting determines the onset of an attack.

Both of Collier's cases (p. 329) followed a lavage, many of the recorded cases followed vomiting or lavage. Mayo Robson (p. 34) allows the reflex factor as an element in the causation of tetany. Chedale considers that the tetany of
adults is the same as the tetany of children.
I cannot see how any distinction can be drawn between the tetany of childhood and that of adult life. The only difference, in my opinion, being the fact that in childhood it takes a much smaller cause to irritate the central nervous system than it does in later life.
In children the cause which gives rise to the tetany is likely if increased to set up convulsions. We know that in children any irritation of the intestinal canal such as may be set up by a piece of apple, curr or other undigested material is very likely to cause convulsions. Here we have no question of a toxin, simply reflex action and nothing else, as soon as the offending material has passed out of the body or has moved from the point of the intestinal canal where it was causing irritation the convulsions cease. Again tetany has been traced to the irritation set up by autozoa,
here (although it is said by some that intestinal worms sometimes give rise to a toxcid which is hardly likely they will produce a toxin like the potentialities of the supposed toxin said to be produced in the dilated stomach) we have continued irritation setting up reflex action.

When the nervous supply of the stomach and intestine deriving as it is from the vagi, sympathetic and special nerves, be considered it will be easily understood what an nervous nerve area is open to irritation by disease or distension of the alimentary canal. Surely a summation of stimuli in this area might readily set up reflex action in a body suffering from over fatigue or worn out by some wasting illness. Can the dilated stomach in some cases directly irritate the solar plexus by pressure?

In almost all the recorded cases of gastric tritymy if there has not been vomiting or the passage of stomach tube the dilated stomach has been worn-
ously distended before the attack of Tetany.
In three of my cases the stomach, although not dilated in the pathological sense, was always fully distended along with the intestines before an attack, and the spasm did not get better until the distension was relieved.
If these attacks were due to a toxin its elimination must have been very rapid indeed, and often by the kidneys alone, as generally there was neither vomiting nor purging; only free passage of flatus and so relief of the distension is not the removal of the flatus in these cases with the relief of the Tetany analogous to the removal of curd or other offending material from the bowel of a convulsed child with immediate good effect?
I think tetany supervening on vomiting or lavage can be best and most simply put down to reflex action rather than to the free distension of the intestines, as to what is and what is not a reflex action, and the reason suggested by Souttar Greenwick (p. 310) as to why an attack of Tetany sometimes follows
on vomiting or the passage of a stomach tube.

Now to return to my own cases. In the first one where we have a very much enlarged colon to deal with, the attacks are always preceded by flatulence and when the diarrhoea is worse the tetany is better. In other words, as long as his colon is not unduly distended the tetany remains in abeyance; but once let the diarrhoea get a better hold and the abdomen become tym-panitic (which it always did when the diarrhoea was not so profuse, prior to taking the B. Haltol) and tetany would come on. He also got attacks after eating too much.

I knew that a critic might say—
If in this case, there was no absorption of poison how do you account for the tetany being worse when there was a greater lodgement of this undisturbed fermenting force in the colon, that is, when the patient was not so violently purged? My answer is that the tetany is not due to the absorption of
Any product of the fermenting mass, but to the stretching of the colon, and secondarily of the rest of the intestine and stomach (and hence irritation of the intestinal nerves) due to the formation of gases by the decomposing contents.

Again it might be asked—How is it that the bacteria has produced fermentation? The answer would give us—Simply by prescinding the fermentable or so stopping the destruction of the colon by the resulting products.

It seems strange that if gastro-intestinal tachyary is due to a toxic the various parts of the alimentary canal with their different glands and different secretions, should be able to form what from its action seems to be the same substance.

I think that the upholders of the toxic theory have not allowed for the undue excitability of the nervous system in a patient worn out with overwork or still more so by disease.
The more one studies the question of tetany in general the harder it is to make a precise demonstration between the different varieties.

The treatment of an attack of tetany resolves itself into the removal of the causes and the alleviation of the cramps. Albee states that the tetany is due to the over-distension of the stomach by decomposing contents and says as soon as the stomach is washed out the attack ceases.

Bonvret and Ducroc say an alcohol should be given. Heiser says that during the attack nothing whatsoever should be given by the mouth.

In cases with dilated stomachs I think there is very little doubt but that it is best to perform lavage. After the lavage it might be well to give hydrobromate of thioscine hydrochloride. Hyser Thompson (p. 30) found this drug to control the spasms in the case reported by him.
In the milder cases where there is much flatulence I have found Bismuto Fritia to be very efficacious. Spirits of sulphuric ether in small doses often repeated is also useful. Any anti-spasmodic is useful, more particularly if it assists in the discharge of flatus. In my cases hot to the cramped limbs gave relief. Rubbing did not appear to do any good.

In the chronic case I found very little or no benefit from Chloral or Maceine Bromide. Opium however lessened the severity of the attacks. Antiseptics given internally were no good until I tried B. habitue which he had the best results.

In many cases a small purgative only in others an enema is followed by relief, as I said before the cause must be removed.

In cases of Tarry with marked distention of the stomach the patient should be operated on. It is in this class of cases, and in those of malignant disease of the stomach that Tarry is of such
Grave import.
The prevailing treatment is to cure any Gastritis or enteritis that may be present. Restore tone to the stomach and intestine. Regulate the bowels. So that the patient can masticate properly. Give a sparse and nutritious diet. Avoid over-fatigue. As soon as flatulence commences take some anti-fomentative, and the best of these in my opinion is Oil of Cajeput in 3 to 5 drop doses on a piece of sugar or bread and repeated as often as required.

Luessenau speaks highly of creeping the spine, this might be worth trying in a severe case.

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