Lumleian Lectures

ON

SOME FORMS OF VOMITING IN
INFANCY.DELIVERED BEFORE THE ROYAL COLLEGE OF PHYSICIANS
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BY

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GUY'S HOSPITAL.LECTURE III.—SOME FORMS OF "HABITUAL
VOMITING" IN INFANCY.

IN my first lecture I dealt with vomiting due to high obstruction from developmental defect; in my second with vomiting due to the imperfect working of the sphincters of the stomach and intestines. There remain a number of other conditions, marked by persistent and severe vomiting of more obscure etiology, but more frequent occurrence, which are best grouped together under the name "habitual vomiting of infancy."

VOMITING AND AEROPHAGY.

In the first place it will be well to consider the part played by aerophagy in the causation of habitual vomiting in early infancy. Every infant normally swallows considerable quantities of air mixed with the milk. Upon the breast this admixture is generally greater than when the infant is carefully fed from the bottle. The difficulties of breast-feeding are seldom due, as they commonly are in the unnatural feeding with artificial substitutes, to abnormalities in the chemical reactions within the stomach. The infant is the suction apparatus, upon the efficiency of which both the quantity and quality of the milk in great measure depends, and the difficulties of successful breast-feeding are largely concerned with the problem of securing effective adaptation of the suction apparatus to the nipple. With the bottle, on the other hand, the flow of milk is so easy that it calls for comparatively little effort on the part of the child. If a young infant is taken from the breast and given a bottle instead, it is a common experience to find that excessive aerophagy is at once diminished, together with its attendant troubles of pain, hunger, restlessness, and vomiting. A mother who has had this experience is likely to conclude that the quality of her milk had been at fault and to confuse what resulted from a want of adroitness in the infant's suction with a true dyspepsia. Her mistake will be tragical if, as often happens, a true fermentative dyspepsia is established by the unnatural diet and the infant exchanges for its former discomfort a dangerous and perhaps even fatal disorder.

Examination by means of the x rays of infants after breast-feeding shows clearly the extent of the normal aerophagy. At this early age in order to study the distension of the stomach with gas an opaque meal is unnecessary. While the meal is being taken the stomach of the nursing allows itself to be passively distended with the swallowed milk and with the swallowed air. By the end of the meal it is usual to find that the intake of air within the stomach has reached very considerable dimensions. For some time after the ingestion of the milk there may be no movement on the part of the stomach to contract down upon its contents—that is to say, the so-called peristaltic function of the stomach is delayed. At length, after an interval—it may be perhaps after five or ten minutes—it is usual to note a somewhat brisk contraction of the stomach which expels a considerable part of the swallowed air with an eructation which is clearly audible. The practice common among nurses of holding the infant upright to assist in the expulsion of the wind is justified by what is apparent under the x rays. In that position the air ball lies most directly under the oesophageal opening, so that eructation without escape of fluid or with only a minimal escape of fluid is facilitated. If, on the other hand, the child is laid down upon its back the air ball may be prevented

from escape by the intervention of fluid. Eructation then requires a very violent contraction of the stomach, and is apt to be accompanied by regurgitation of much of the stomach contents.

Aerophagy, a normal process and one which is always found in some degree to accompany the swallowing of milk, may be so excessive as to become pathological. Thus severe nasal obstruction, as might be expected, in a young infant interferes greatly with effective suction. The hold upon the nipple must be constantly broken, in order that a hurried breath may be caught. A nasal catarrh in a young infant is a serious misfortune, not only because it involves a considerable risk of direct extension to the bronchial tubes and to the middle ear, not only because it commonly gives rise to profound gastro-intestinal disturbance, but because the diminished power of suction which accompanies it endangers the whole process of lactation. The suction of the infant, hurried and intermittent because of the dyspnoea, fails completely to empty the breast; the yield declines; the flow becomes increasingly scanty, and the inco-ordinate efforts of the infant result only in the distension of the stomach with swallowed air (Fig. 1).

But a still more frequent cause of excessive aerophagy is to be found in what may be called the vicious circle of nervous unrest. The reflex act of suction in the young infant only proceeds powerfully and effectively when the child is quiet and at rest. When, on the other hand, the child is too eager and too excited, as it is apt to be after much hungry crying and persistent sleeplessness, a voluntary effort at suction seems to be attempted and takes the place of the more instinctive reflex act. Like all other voluntary movements at this early age, such suction, though violent and eager, is inco-ordinate and ill controlled. The infant greedily grasps at the nipple, sucking, swallowing, choking, and even crying, all at the same moment. Such a procedure rapidly leads to a distension of the stomach with air. Suddenly the violent efforts at suction cease, and the restlessness and crying break out afresh. Ineffective suction of this sort causes a rapid deterioration in the quantity and quality of the milk. Hunger grows apace. The persistent sleeplessness and restlessness of the child, because of the immensely increased expenditure of energy, raise the needs for food far above the normal at a time when the natural powers of suction are inhibited by the emotional disturbance, and when the mother's milk is diminishing in amount.

Such is the vicious circle which accounts for by far the greater part of the failures in the early weeks of lactation to establish and continue breast-feeding. It involves, it is true, a failure on the part of the distracted mother, but a failure, I think, not primarily of her mammary secretion, but of her power to quieten and control the restless nervous system of her infant. It has always seemed to me that the emotional instability of the human infant, to which in the animal kingdom we find nothing at all comparable, accounts for the comparative frequency of its failure to win sustenance from its mother's breast.

The most striking instances of distension of the stomach with air which I have encountered have all been in infants suffering in this way from sleeplessness, hunger, nervous unrest, and inco-ordinate suction (Fig. 2). In states of primary inanition, where the initial fault is a failure of the mammary secretion and not a failure of nervous control in the infant, I do not think aerophagy is common.

If suction is powerful and effective, as it is in a strong and placid infant, aerophagy is at a minimum while the yield of milk is at a maximum. In these circumstances, when, some time after the conclusion of the meal, the stomach contracts in the so-called peristole, there is apt to be a gentle regurgitation into the mouth of a little milk, mixed with the swallowed saliva and gastric juice. This is the so-called possetting. In every country, as might be expected, we find a proverb to the effect that possetting is the mark of the thriving, well nourished, and contented child. On the other hand, with a greater admixture of the stomach contents with air, the repeated eructation of air may be necessary before comfort is assured. In some cases the eructation is accompanied by the forcible regurgitation

of a considerable part of the stomach contents. The peristolic contraction of the stomach is exaggerated and violent and the resultant vomiting forcible and explosive. The sound of the escaping air is usually audible. Habitual vomiting due to aerophagy is apt to be mistaken for that due to pyloric spasm or even for that due to hypertrophic pyloric stenosis. Visible peristalsis, pyloric tumour, and the characteristic inanition stools are, however, here wanting.

Different authorities have estimated very differently the importance and frequency of aerophagy as a cause of habitual vomiting. Marfan, who has recently dealt very fully with the whole question, regards the aerophagy, not as a primary, essential, and constant factor, but as something secondary, contingent, and variable. According to his view the essential cause is to be found in a hyperaesthesia of the gastric mucous membrane, a hyperaesthesia which may favour the purposive swallowing of air and the secretion of excess of saliva, while the distension of the stomach with the swallowed air may favour the vomiting. On the other hand, Lesage, Guinon, and others in France, Rosenstern and Usener in Germany, have argued convincingly for the importance of air-swallowing as in itself a cause of habitual vomiting. Certainly the results of treatment directed to control and prevent aerophagy, but in no way calculated to allay gastric hyperaesthesia, are sufficiently constant to suggest that the air-swallowing is of primary importance in causing this variety of habitual vomiting.

The Treatment of Habitual Vomiting due to Aerophagy.

1. Thus it is by no means unusual to find that the infant, invariably sick after a breast-feed, will retain the feed without difficulty if it is given carefully from a bottle, even when the contents of the bottle are composed of the same breast milk which is vomited when sucked directly from the breast.

2. If the infant in whom the aerophagy is due to inco-ordinate suction as a result of nervous unrest is fed, not when hungry and excited from long crying, but when drowsy and quiet, there may then be no aerophagy and no subsequent vomiting. In the out-patient department at Guy's Hospital I have very often demonstrated this point. In an infant 1 or 2 grains of chloral hydrate given a few minutes before the meal is usually sufficient to secure a quiet and drowsy state. If then the mother's nipple is gently inserted into the mouth of the slumbering child, without awakening it and without provoking the restless emotional state, the breast may be drained steadily and well, there may be no subsequent vomiting, and the infant may continue to sleep soundly after the meal.

3. Recently Rogatz and others have studied under the x rays the effect of giving a small amount of a thickened food before the usual feed of breast milk. The characteristic x-ray appearance of the stomach of the infant is determined, not by anatomical peculiarity, but only by the circumstance that the diet is always and invariably fluid. Under ordinary conditions the stomach of the infant shows no tendency to contract down upon the entering milk, while the fundus remains distended with a huge ball of air. The contraction of the stomach, the peristolic contraction, can be stimulated by giving comparatively small amounts of a semi-solid substance—one or two tablespoonfuls, for example, of a very thick gruel. A paste of farina, in the proportion of 10 grams of farina with 100 c.cm. of skim-milk and 100 c.cm.

of water, boiled for an hour until sufficiently thick to adhere to an inverted spoon, may be given in doses of 30 c.cm. before the breast-feed. A semi-solid mixture of this sort is capable of producing a brisk contraction of the stomach, so that its distension by air during the subsequent suction at the breast is prevented. On several occasions I have found this device completely successful in allaying habitual vomiting of long duration and great severity. In one case the infant was sent to me at the age of 9 weeks with the suggestion that it was suffering from congenital hypertrophic stenosis. The mother reported to me some weeks later that on no occasion had the baby ever been sick when the gruel had first been given, although vomiting still almost always followed breast-nursing if this preliminary was omitted.

The success of treatment upon one or other of these lines is in keeping with the assumption that aerophagy by itself may be the essential cause of some cases of habitual and violent vomiting.

FIG. 1.—Showing extreme distension of the stomach with swallowed air after a breast feed, in an infant with nasal obstruction and mouth breathing.

that the infant who suffers from hyperemesis is almost always tense, nervous, emotional, and more than usually unstable. Such infants, indeed, seem to suffer from a generalized hyperaesthesia. A loud sound, a bright light, or a sudden movement in their neighbourhood produces a maximum response. From the first, too, the heightened sensibility of the nervous system is apt to show itself in an extreme sensitiveness in the matter of taste. The slightest alteration in flavour—the prescription, for example, of dextrimaltose instead of the lactose to which it has become accustomed—may cause resistance or refusal or vomiting. Sleep is almost always scanty and superficial.

In response to the slightest stimulus, instantly the child is wide awake, the anxious strained expression flows back into the face, and the inevitable crying begins again. In these neuropathic infants the muscles generally show a certain degree of hypertonus. The abdominal wall tends to be rigidly contracted, with the outline of the recti abdominales clearly visible. Opisthotonos is common, while the hands are nearly always held tightly clenched. Such infants may appear to suffer from a veritable gastric hyperaesthesia. The presence of food in the stomach may evoke every appearance of extreme pain and discomfort and may be followed regularly by vomiting, whether the infant was fed upon the breast or the bottle. Habitual vomiting of this sort may occur in such children even when there can be no question but that the food is suitable in amount and in composition. Sometimes in later years other troubles arise which give the clue to the constitutional weakness which first

FIG. 2.—Showing extreme distension of the stomach with swallowed air, in a breast-fed infant with inco-ordinate excited suction and nervous unrest.

manifested itself in this infantile gastric disorder. In inquiring into the past history of children with such functional nervous disturbances as enuresis, asthma, stammering, habit spasm, and so forth, a considerable proportion will be found to have suffered in this way in early infancy. Again, the appearance of eczema in later infancy has been noted by Finkelstein and others.

The Treatment of Vomiting due to Nervous Unrest.

The treatment of this nervous vomiting may be a matter of great difficulty. One thing makes itself very clear—that it is always an unwise and unsuccessful manoeuvre to attempt to allay the vomiting by prescribing a hunger

period or by diluting the food or curtailing the total amount given. Such devices, essential in treating the ordinary form of infantile dyspepsia, only serve to make this habitual vomiting of the nervously unstable child very much worse. Indeed, it is remarkable that in many cases the weight curve will continue to ascend and the nutrition will remain unimpaired in spite of violent and persistent vomiting. In practice it is common to find that serious malnutrition is caused not so much by the vomiting as by unwise efforts to control it by the prescription of an inadequate diet or a diet modified to such an extent as to be deficient in certain essentials. It is, however, usual to find that the stomach is especially intolerant of a diet with a high proportion of fat. It is apparently the volatile fatty acids which especially possess for these infants an emetic action. One such infant under my care was almost invariably sick after the breast, and after the fifth month of life, when weaning took place, after a meal of cow's milk, even in considerable dilution. Upon a diet of milk from which fat was removed until the percentage was never higher than 1.5, and which was then soured with a lactic acid bacillus, vomiting was only occasional, and a satisfactory growth of weight was achieved. In all, three attempts were made to return to a diet with a higher fat percentage, but always with renewal of the vomiting. With these restless, hypersensitive infants it is above all necessary to avoid the stimulus of excessive hunger, and to see to it that the needs for food are amply covered. In this we are reminded of what is found to be the rule by Hurst, Fairbairn, and others in the treatment of hyperemesis gravidarum and certain other forms of nervous vomiting in adults. Treatment, if it is to be successful, must aim, not so much at controlling the vomiting as at allaying the nervous unrest. Such vomiting often ceases as if by magic when the infant is admitted to a hospital or when the confident handling of an experienced nurse succeeds to the too timid and anxious control of an inexperienced mother. Rest, quiet, and the absence of all stimulation are essential. Prolonged immersion in a hot bath, or a hot pack, may secure sleep and start the habit. Enveloping in a tight and restraining shawl—the primitive wisdom of all peoples has taught them the value of swaddling clothes, the infantile strait-waistcoat, in securing rest—is often helpful. The habitual vomiting of nervous unrest ceases only when deep sleep is secured and the restlessness sensibly diminishes.

Other forms of persistent vomiting due to nervous causes are occasionally encountered. Thus, in older infants, we sometimes meet with vomiting which might be described as due to a conditioned reflex. Thus one particular meal, although its composition differs in no way from that of the others, given at one particular time of the day, alone may be consistently rejected. Or it may be that a meal given by a particular person, or in a particular room, alone is vomited. Again, by the end of the first year it is quite common to meet with a purposive rejection of food as part of the anorexia nervosa of nervous children. With unwise management the dominating, restless child is apt to show to perfection the symptom which has been called "negativism." Whenever the maternal traction in one direction is exercised too obviously and insistently the child seems forced into a posture of resistance. As might be expected, the struggle waged between the child and its elders is apt to involve the question of the intake of food. The more the child is urged and entreated to take the food, the more resolute is the opposition. Many mothers have told me that in such circumstances the only way in which they have succeeded is by feeding the baby when it is asleep. They have crept to the side of the cot and aroused the child just sufficiently to admit the teat of the bottle into its mouth and to provoke the act of suction. But if they have accidentally awakened the child too thoroughly so that complete consciousness of its surroundings has returned, the first waking thought has been of the habitual refusal, and the bottle has been pushed away with every sign of determined rejection and resistance. It is characteristic of this negativistic attitude to food that when the unwise urgings of the anxious mother cease food may be taken with avidity. Thus older children,

having refused all food at the table, will descend upon the floor and greedily scavenge for crumbs. Two mothers told me recently that the best meal their children made in the day was when, with a parcel of unappetizing crusts for the ducks in the park, they took their walks abroad. Most of the crusts were then consumed by the children, and one of the mothers had even got into the way of including certain nutritious pieces of brown bread-and-butter in the parcel in the sure hope of its consumption by the child. If, in dealing with such a trying case, force is attempted and a strong-minded woman with uplifted spoon attempts to feed the child against its will, vomiting almost certainly results, and I have met with more than one case in which vomiting, clearly originating in this way, has persisted as an inveterate neurosis for many years. In some cases the sight or sound of the preparation of food has sufficed always to produce vomiting. It is clear that the more attention that is paid to vomiting of this sort, the more it is discussed and deplored in the child's presence, the more inveterate does it become. Such disturbances are not, however, difficult to control if their nature is clearly understood and the faults of management to which they owe their origin are corrected.

HABITUAL VOMITING AND IDIOSYNCRASY AGAINST COW'S MILK.

Something must be said of the views, expressed in an extensive modern literature, that the explanation of a large part of the difficulties which are encountered in attempting to feed the infant upon a diet of cow's milk is to be found in a frequent intolerance for the protein of the foreign milk whereby certain anaphylactic reactions are determined. Certainly from time to time we do meet with infants who exhibit the most extreme intolerance for even minimal amounts of cow's milk. Kleinschmidt, Finkelstein, Park, and many others have studied and recorded cases of this nature. The characteristic symptoms are sudden extreme pallor, drowsiness, a rapid almost imperceptible pulse, pyrexia, vomiting, and diarrhoea, often with the passage of blood-stained stools. Less usually scarlatiniform or morbilliform rashes are added to the picture, or transient oedema. Glycosuria may occur. This violent and characteristic shock may be provoked by minimal amounts of cow's milk. Thus in Park's case a considerable reaction was produced by the ingestion of four drops of milk. An appreciable reaction has even been produced by a single drop. The symptoms may begin immediately after the intake of the milk, or rather unaccountably they may be delayed for several hours. They may occur the first time cow's milk is given to the infant instead of the breast, on which it has so far thrived, or the trouble may develop at any time subsequently throughout infancy. Recovery is rapid when milk is withdrawn. Goat's milk may be perfectly well tolerated when cow's milk produces dangerous symptoms. Schloss, who has devoted great attention to these cases, finds that many infants, who show profound disturbance when given raw cow's milk, can tolerate boiled or dried cow's milk without difficulty. In the majority of these cases, although not in all, a positive cutaneous test has been found. Schloss is of opinion that the lactalbumin rather than the casein is the protein usually responsible. Many infants recover spontaneously, but success is claimed both for desensitization by the subcutaneous injection of graduated amounts of sterilized milk, and for desensitization by ingestion of graduated amounts by the mouth. Such severe cases of intolerance for cow's milk, although they undoubtedly occur, are admittedly of extreme rarity. They fall into line with cases which show a similar intolerance for the protein of eggs and for certain vegetable proteins.

Recently, however, Weill and others in France have gone much further and have found the explanation of many cases of habitual vomiting in infancy, as well as of many cases of urticaria, eczema, atrophy, and malnutrition, in a similar but mild form of anaphylaxis against cow's milk, and even against the milk of the mother. According to Weill, subcutaneous injections of milk may give rise to the most remarkable and unmistakable improvement. The first symptoms to improve are those of the nervous system.

Within twenty-four or forty-eight hours the agitation and insomnia are greatly lessened. The vomiting is more slow to disappear, but improvement is likely to appear within a week or ten days. For a cure some three or four injections are usually necessary.

Professor Marfan has not been able to substantiate such precise claims. My own experience of treatment in this way is altogether too slight to enable me to speak either in its favour or otherwise. I feel that the whole subject is in need of careful investigation, in view of the work and claims coming from many quarters.

HABITUAL VOMITING AND RUMINATION.

The phenomenon of rumination in the adult and in the older child has been dealt with with great fullness in an interesting paper by Brockbank in 1907. In most of the recorded cases the peculiarity is familial, acquired involuntarily in later childhood, and persistent throughout life or at least for a great part of life. The act of regurgitation is partially under the control of the will. With an effort it can be prevented, and the ruminator whose aesthetic sense is offended by his infirmity may for long escape detection. Brockbank does not discuss the relationship between his cases of rumination in adults and the much more common rumination of infancy. Probably they are not closely connected. In no case of rumination in infancy have I found a family history of rumination, and the after-histories of infants who show this symptom do not disclose, unless it be in exceptional and so far as I know in unrecorded cases, persistence of the habit into later life. In general it is characteristic of infantile rumination that it ceases when solid food replaces the fluid diet. Adult rumination, on the other hand, appears to begin after the milk period, and to occur only with solid food. But the most striking difference would appear to lie in the attitude of mind of the sufferer. The adult ruminator suffers no discomfort; Brockbank even records cases in which the act was pleasurable. But, in general, in adults the regurgitation is not the culmination of a series of movements, voluntarily undertaken and steadily pursued until success is achieved. The adult does not seem impelled to evoke the act in order to achieve a sense of present satisfaction, nor does he evince signs of nervous irritation if thwarted in his purpose. In the infant, on the other hand, it is very evident that achievement of his purpose produces a sense of beatitude, while failure results in nervous unrest and irritation.

Pathogenesis.

In early infancy, when sensation is awakening, certain stereotyped movements, calculated to evoke certain sensations, are apt to become fixed by repetition until they grow habitual. Since the mouth and tongue are most richly endowed with sensory nerve endings, as might be expected, the most common action of this sort is thumb-sucking or lip- or tongue-sucking. Head-banging, thigh-rubbing—that is, infantile masturbation—and rumination have precisely the same significance. No doubt in these latter instances there may have been originally some transitory local irritation which led to the first movements being practised—in thigh-rubbing vulvar irritation, in head-banging irritation from slight otitis media, in rumination some trivial gastric discomfort. But long after the local irritation has subsided the act may persist with ever-increasing frequency. In sucking thumb or lips it is not necessary to suppose the existence of any preliminary irritation which has attracted the child's attention to the part. The act of suction alone is instinctive, and needs nothing to provoke it except the presence of something to suck.

These lowly forms of gratification from sensory stimulation are normally found only in infancy. As the mind awakens and the level of intellectual enjoyment arises, as the child's thoughts become filled with recollections of yesterday's happenings and anticipation of to-morrow's, these habits and these joys are forgotten. They are perpetuated only when unwise forbiddings and expostulations or the injudicious use of mechanical restraint, the object of which is appreciated by the child, have served to waken ungratified longing, to focus attention on the fault, and to

impress it deeply upon the memory. Finally, if the grown-up people around the child show distress or anxiety, the child very readily catches the general restlessness and apprehension. No one of these stereotyped acts shows better these general characteristics than does rumination.

Ylppö and others have maintained that aerophagy plays an important part in the production of rumination, but the consensus of opinion is against this view. Gastric disorders of all varieties may serve as predisposing causes, but no connexion between rumination and any particular gastric disorder can be clearly established. Gött appears to me right in arguing that all the features of rumination show its relationship to the stereotypias, not to the dyspepsias. *Post-mortem* observations have disclosed only a stomach in extreme systole.

Symptomatology.

The onset is perhaps never before the fourth month of life. It is seldom well developed or typical before the sixth month. I have had the opportunity of studying carefully five well marked cases, besides a number of slighter and less developed examples, in infants who, for all their efforts, never perfected themselves in the practice. All my cases have been in artificially fed infants. After taking the meal quite in the ordinary way the baby, as a rule, lies quiet for a time. Then begin certain purposive movements, by which the abdominal muscles are thrown into a series of violent contractions—the head is held back, the mouth is opened, while the tongue projects a little and is curved from side to side so as to form a spoon-shaped concavity on its dorsal surface. After a varying time of persistent effort, sometimes punctuated by grunting or whimpering sounds, expressive of irritation at the failure to achieve the expected result, with each contraction of the abdominal muscles milk appears momentarily in the pharynx at the back of the mouth, as the column of fluid is pressed upwards through the stretched oesophagus. In this way the head of the column of milk may be momentarily visible many times as it attains its highest point, only to fall back again out of sight when the pressure is relaxed. Finally a successful contraction ejects a great quantity of milk forwards into the mouth. The infant lies with an expression of supreme satisfaction upon its face, sensing the regurgitated milk and subjecting it to innumerable sucking and chewing movements. Some of the milk may escape from the mouth and in that sense be vomited. In a well marked instance much the greater part is caught and retained.

The power to ruminate successfully is not suddenly acquired. In the earliest stages, before dexterity has been achieved, the act differs relatively little from that of vomiting. Similarly the number of masticatory movements as a rule progressively increases. At first there may be ten or twelve, later several hundred such movements may follow the regurgitation. In its earlier development, therefore, rumination is very apt to be mistaken for habitual vomiting due to other causes, and it may require careful observation to make the distinction evident. Nor are such babies easy to observe. It is characteristic of the ruminating child that it sins its sin only in secret. To watch it openly is to put a stop to the whole procedure. Hence the great difficulty of securing a satisfactory radiographic examination. On every occasion on which I have tried to secure a radiograph the infant has shown no disposition whatever to indulge. I had hopes of being able to enliven this lecture by a cinematograph display of a well marked case, but my failure was again complete for the same reason. Only when the child is alone and in a drowsy, vacant state, while nothing distracts attention or excites curiosity, does the act take place. Ruminating infants are almost always alert, excitable little creatures, their faces lit with an unusual variety of expressions. As a rule, rumination can only be observed by stealth, by peering through peep holes, between screens, and so forth.

The nutrition commonly suffers to some extent, and the infants tend to be considerably under weight. This is especially marked in the early stages, when regurgitation is accompanied by the escape of a great part of the food. Under the impression that the disorder is a true vomiting

indicative of some form of dyspepsia, many of the cases have undergone severe restriction in their diet, or the food may have been modified, with unfortunate results. The condition may persist for many months. In the most severe, death from hunger or from intercurrent infection may occur.

Treatment.

For a time to distract the infant's attention seldom fails, but always to carry the infant around after meals or to arouse its interest by means of rattles or musical boxes is apt ultimately to exhaust both nurse and child. Strauch achieved success by the simple method of plugging the nostrils, since the resulting mouth-breathing renders it difficult to express the column of fluid into the pharynx. This succeeded perfectly in one of my cases, in the others it failed. It is further recommended that the infant should always be placed upon the abdomen after a meal. Others have endeavoured to prevent rumination by forcible closure of the mouth. A cap and a chin-piece are connected by two side-pieces of webbing, each bearing a buckle, and after the feed the mouth is held securely shut by tightening the side-pieces. This again has proved a successful device in some, but not in all the cases in which I have tried it. Probably the most uniform success has been achieved by thickening the child's food to the consistency of a thick gruel. I have used successfully farina boiled with milk until it was thick enough to adhere to an inverted spoon. In infants after the seventh or eighth month it is often sufficient to anticipate by a month or two the change to a mixed diet and to feed them as the normal child would be fed at the beginning of the second year. Rumination of this sort is prevented, or at any rate made much more difficult, when solid replaces fluid diet.

Finally, it is well to emphasize that in rumination, as indeed in almost all the conditions of habitual vomiting considered in this lecture, the personal factor of the nurse is of supreme importance. Rumination, like aerophagy, like the vomiting due to idiosyncrasy for cow's milk, and like the vomiting of nervous unrest, is found most commonly among infants of psychopathic inheritance and in a psychopathic environment. Isolation, handling by a competent self-confident nurse, the reduction of emotional disturbance to a minimum, are all of the greatest importance if recovery is to follow. The nervous disturbances of infants, like the infective disorders of infants, are apt to display themselves for the most part by symptoms referred to the sensitive gastro-intestinal tract. The infant has indeed but one function highly organized and therefore capable of showing complex disturbance—the function of digestion. It is in disorder of that function that throughout infancy nervous instability, inherited or acquired, especially shows itself.

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BIBLIOGRAPHY.

- Brockbank: Rumination in Man, *BRITISH MEDICAL JOURNAL*, February 25rd, 1907.
 Finkelstein: *Säuglingskrankheiten*, second edition, Berlin, p. 338.
 Gött: *Zeit. f. Kinderheilk.*, xvi, 1917, p. 177.
 Guinon: Sur une cause de vomissements du nouveau-né. Vomissements par aérophagie. *Revue mensuelle des maladies de l'enfance*, December, 1904, p. 537.
 Hurst: *Lancet*, March 18th, 1922, p. 528.
 Kleinschmidt: Ueber milch Anaphylaxie, *Monats. f. Kinderheilk.*, xi, 1913, p. 644.
 Lesage, Levet et G. Barret: Les vomissements du nourrisson aérophage, *C. R. Soc. de Biol.*, November 21st, 1908.
 Marfan: *Les Affections des Voies Digestives dans la première Enfance*, Paris, 1923, pp. 120, 684.
 Park: *Amer. Journ. Dis. Child.*, January, 1920.
 Rogatz: Roentgen-ray Studies of Stomach Function, *Amer. Journ. Dis. Child.*, 28, 1924, pp. 52, 69, and 582.
 Rosenstern: *Deut. med. Woch.*, 1912, No. 39.
 Schloss: *Amer. Journ. Dis. Child.*, xix, 1920, p. 433.
 Strauch: *Journ. Amer. Med. Assoc.*, lxx, 1915, p. 678.
 Usener: *Zeit. f. Kinderheilk.*, v, 1912.
 Weill: Traitement de l'intolérance du nourrisson pour le lait par l'injection sous-cutanée du lait, *Presse Médicale*, October 18th, 1919, p. 601.
 Ylppö: Ueber Rumination mit Luftschlucken beim Säuglingen, *Zeit. f. Kinderheilk.*, xv, 1917, 84.

TREATMENT OF INOPERABLE CARCINOMA OF THE CERVIX UTERI WITH RADIUM:

DESCRIPTION OF THE MORE RECENT METHODS EMPLOYED.*

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THE purpose of this paper is to demonstrate that the results of radium treatment in inoperable carcinoma of the cervix uteri are so promising that it is imperative that as many of us as possible should join in combined and organized research on these lines.

Medical opinion in this country is extremely sceptical of the value of radiotherapy, and I cannot help thinking that this is because so little systematic work has been done on the subject. I would ask the profession to keep an open mind, as much harm is done by the expression of very optimistic or very pessimistic views on a method which is, comparatively speaking, so new. Many people think of radium as a drug, of which there is only one dose and one method of administration, and that if this does not prolong the patient's life the treatment is of no value. Many years will elapse before we reach any final judgement on the value of radiotherapy, and meanwhile, in order to make progress, we must compare the value of the different techniques, not only as judged by complete cure of the patient, but also by lesser standards. These standards are: (1) histological; (2) rate of disappearance of symptoms, such as haemorrhage; (3) rate of disappearance of the local growth and healing of the malignant ulcers; (4) duration of the patient's life after treatment.

Next I would appeal to those working at this subject to make their reports on uniform lines, and, when mentioning the dose, to give the fullest details as to whether radium element is used or radium emanation, and, if the former, whether the number of milligrams relates to the salt or the element; the exact material and thickness of the filters; the form of the applicators; the exact number of hours during which the radium is applied; and as far as possible the distribution of the radium in relation to the growth. If emanation gas is used, additional notes should be quoted—namely, the number of millicuries at the commencement of the treatment and the number of hours. It is of little or no value to talk about milligram hours or even millicuries of emanation destroyed.

[The work here described has been carried out with radium kindly lent by the Medical Research Council.]

DESCRIPTION OF TECHNIQUES.

Speaking generally, there are two schools of technique—one which believes in external application only, the other which believes in burying the radium close to or within the growth. The arguments for the different opinions may be summarized as follows.

Those who advocate external application consider—

1. That any incision, even the introduction of needles, may disseminate the growth.
2. That the injured normal tissues may be affected by the radium to an undue extent, as it is well known that radium affects cells which are about to go into mitosis.
3. That the tissue extracts produced by injury to the normal cells may stimulate the growth of the tumour.
4. That the burying of needles may produce sepsis under conditions very suitable for the growth of organisms.

Those authorities who advocate the burying of needles do not consider that these objections are in any way comparable to the advantages of the greater intensity obtained by placing the needles near the growth, and, further, that if the radium is used from outside, the doses have to be so large that there is a considerable likelihood of damaging the skin and other intervening tissues. The Radium Institute of Paris is, on the whole, inclined to believe in external application. The Radium Institute of Brussels believes in buried radium. Most of the American institutes

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