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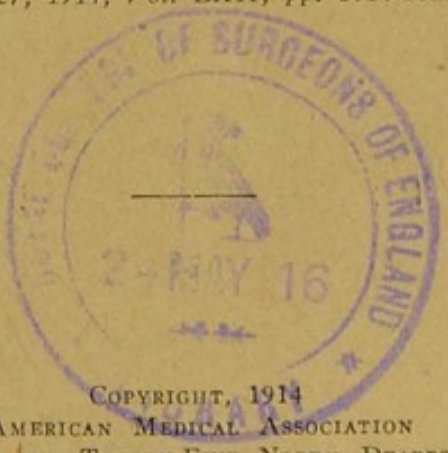

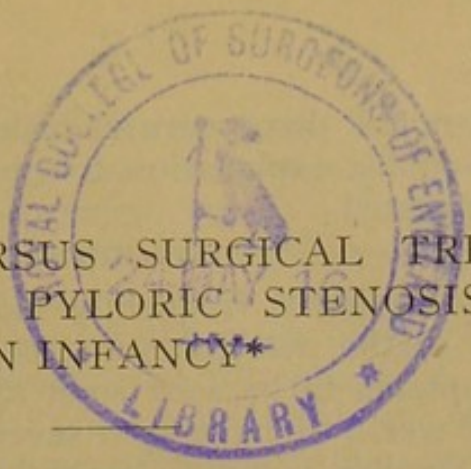

MEDICAL VERSUS SURGICAL TREATMENT OF PYLORIC STENOSIS IN INFANCY*

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Nearly all that we know of pyloric stenosis in infancy has been contributed since 1897. It seems surprising, in view of the definiteness of the clinical picture and the frequency of this condition as shown by the number of reported cases since that time, that it was so long unrecognized; even now it can hardly be called common, although almost every one in active public or private practice among infants is likely to meet one or more cases each year.

My own experience with pyloric stenosis of infancy includes fifty-seven cases, of which number eighteen were seen in private practice and the remaining thirty-nine were inmates of the Babies' Hospital. The steadily increasing number of cases seen would seem to indicate that we now often recognize this condition where formerly it was overlooked.

Pyloric stenosis in infancy presents many interesting and curious features. In the first place, it occurs nearly always in those who are breast-fed. In one of my cases the previous feeding is not given; of the remaining 56, 52 were breast-fed; of these, 40 had nothing else, while 12 had some breast-feeding and some bottle-feeding; only 4 had nothing but the bottle. Bad feeding can hardly be invoked as a cause of this condition — a point of considerable importance in distinguishing it from gastric indigestion, which its symptoms most frequently resemble.

The predominance of the male sex has been noted by all writers. Of 55 cases of my own in which the

* Read before the New York Academy of Medicine, April 16, 1914.

sex was noted, there were 49 males and but 6 females. No reasonable explanation for this difference has yet been suggested.

SYMPTOMS

The condition is frequently spoken of as congenital stenosis of the pylorus; yet it is very exceptional for the symptoms to be seen soon after birth or even in the first week. I have seen several infants with persistent, forcible vomiting beginning on the first day of life and with other symptoms which were suggestive of pyloric stenosis; but not one of them proved to be examples of this condition. Such an onset speaks strongly against this diagnosis. In four-fifths of my cases the first definite symptoms began in the third, fourth or fifth week and in only two during the first week of life.

In the great majority of the patients the symptoms begin abruptly. The mother can frequently give not only the day, but also the hour when the symptoms began. An abrupt onset of forcible vomiting with no history of previous vomiting was present in 30 of 57, or over half the cases. In 9 of the remainder there was an abrupt onset of forcible vomiting, though occasional vomiting of the ordinary type had been present for some time before.

This abrupt development of symptoms, coming in most patients some weeks after birth, admits of only one explanation: that in the production of symptoms at least, pyloric spasm plays a most important part. Again, the complete recovery, or to speak more exactly, the disappearance of all symptoms, which occurs in a certain proportion of instances in the course of a few weeks, points in the same direction. On the other hand, when the stomach has been examined at necropsy, there has, I think, been invariably found marked hypertrophy of the pylorus, principally involving the circular muscular layer, whose fibers are increased not only in size but also in number. It is to this hypertrophy, say the pathologists, that the stenosis is chiefly due. The symptoms according to this view have an organic rather than a functional basis.

It is difficult to reconcile satisfactorily the clinical symptoms and the pathologic findings with either one of these views alone, although one or the other view has been adopted by different writers in support of a

method of treatment. Some have sought to escape the difficulties by dividing cases into two groups, hypertrophic and purely spasmodic cases. A study of the cases reported by different writers shows that they do not at all agree with regard to the symptoms on which a case is placed in one or the other category. Some would make the presence or absence of a palpable tumor the differential point, while others contend that a tumor is usually found when the patient is carefully examined by an experienced observer in cases which others would class as spasmodic. Nor can the fact of recovery without operation be considered diagnostic; we know that patients having identical symptoms with those that have shown hypertrophy at necropsy or operation do recover and, so far as one can judge by symptoms, they recover completely.

On the other hand, if spasm were in a large proportion of the cases the only factor, why should recovery be, as we find it, a matter of weeks, often of months? A temporary pyloric spasm undoubtedly occurs in many conditions, as in the projectile vomiting of cerebral disease, *but definite, persistent spasm of the pylorus without hypertrophy* is, I believe, yet to be proved. At necropsy, hypertrophy has been in my experience invariably present. It was found in every one of twenty-six necropsies on this condition made at the Babies' Hospital, the description in the record being almost always as follows: A firm, hard, cartilaginous tumor was present. It would be well if the term "pylorospasm," as defining a group of these cases, were dropped from our nomenclature. Its use as indicating the sole pathologic condition present has led to much confusion of thought on the subject, especially regarding the indications for operation. It is, I believe, responsible for neglect of operation when operation might have saved life.

There has been too much discussion of terms in this disease. No two men will agree in the classification of cases seen at the bedside, for no sharp division into spasmodic and hypertrophic types is possible. The real question is whether or not there exists an obstruction sufficient to endanger the child's life, and how it may best be relieved.

A better division is into mild and severe cases. The two elements, the spasmodic and the hypertrophic, are

probably present in every case, sometimes one and sometimes the other predominating. It is my own view that the essential difference between the groups of cases is one of degree rather than a difference in kind, but the same elements are present in the two.

Many points in the pathology of pyloric stenosis are still very obscure, and we find it hard to believe that the spasm is the cause of the hypertrophy, and difficult to explain why it is, if the essential condition is hypertrophy, that symptoms are so infrequently seen during the first ten days or two weeks of life.

When we come to the clinical aspects of the disease, however, we find no such divergence of views. The clinical picture is distinct and with careful observation easily recognized in the great majority of cases. In a typical case an infant, usually breast-fed, who has previously shown few or no signs of disturbance of digestion, begins to vomit persistently and forcibly. These symptoms have their most frequent beginning in the third or fourth week of life, and in most cases the onset is abrupt and without assignable cause. To the forcible vomiting are added marked constipation, steady loss in weight and all the symptoms belonging to failing nutrition. Careful examination reveals definite gastric peristaltic waves and in most cases a palpable tumor in the pyloric region about the size of a peanut. In a certain number of cases the vomiting becomes less and less frequent, all the symptoms gradually abate and the child very slowly regains its lost weight. This may require only a few weeks, but more often it is several months. At other times the vomiting is persistent and uncontrollable, the loss of weight is progressive, and unless surgical relief is given, the child dies of failing nutrition.

DIAGNOSIS

Since the question of exact diagnosis and early diagnosis is so important, the essential diagnostic symptoms may be advantageously considered in greater detail. The most constant and usually the earliest symptom is vomiting. So characteristic is it in these cases, as to the time of its occurrence, the manner in which it takes place and the matter vomited, that one can often make his diagnosis from this symptom alone. It differs markedly from the usual vomiting seen in

young babies, in that it occurs soon after nursing, often while the child is still at the breast. It is forcible and projectile; the food is fairly shot out of the mouth, sometimes for a distance of 4 or 5 feet. It is in large amounts, usually the entire contents of the stomach, and generally it is repeated after each feeding. If the vomiting is infrequent and does not occur after every feeding, the amount ejected at one time is often much larger than the amount taken at the last feeding. The frequent regurgitation of small amounts of food is seldom seen. The vomiting is unaccompanied by fever or pain, and in the beginning and usually for some time there is no impairment of appetite. Immediately after emptying the stomach the child may seem so hungry as to take a full feeding. Finally, the vomiting is persistent. Nearly all the changes of food have a surprising effect in temporarily lessening the vomiting, but in a day or two it returns and is as severe as ever.

The waves of gastric peristalsis have been so often described that a repetition is hardly necessary. Intestinal peristalsis may be mistaken for them, though very rarely indeed. In the great majority of cases they are typical, unmistakable and readily made out, though in some they may not be observed unless the patient can be frequently seen and closely watched under the most favorable conditions, the most important one being that observations are made immediately after filling the stomach. Sometimes in hospital patients, though both the doctors and nurses were on the watch for waves, it has been a day or even two days before they were observed. I believe visible gastric peristalsis to be the most important symptom for diagnosis and I should hardly be willing to make a diagnosis without it.

While a palpable tumor cannot be considered essential to the diagnosis, it will usually be found by an experienced and careful observer under favorable conditions. But not always: I have seen men, experienced in these cases, unable to feel a tumor when one was afterward shown to be present, and then again, on the other hand, I have known men to be quite sure that they felt a tumor when none could be demonstrated at necropsy or operation. The tumor is more distinct in the most severe cases and where the obstruction is complete. It may persist for weeks

or even months in cases in which recovery occurs without operation. In two of my patients who recovered, it was noted as late as the sixth month of the child's life; the patients were seen at 4½ and 5 years, respectively, and both were well. The tumor is usually more evident just before or during the act of vomiting, and it may not be easily felt at other times. It usually hardens during active peristalsis and may be difficult to feel at other times. It may then rise and meet the hand lightly pressed on the abdomen, somewhat as the spleen may do when forced down by full inspiration. It may be displaced from its usual position and so missed. In my opinion, too much has been made of this symptom not only in classifying these cases, but also in deciding the treatment to be followed. The presence of a tumor, because so frequent, is an important symptom in diagnosis, but the decision as to operation should not rest on finding or not finding it, but rather on how much obstruction is present. While the tumor is naturally more prominent when much hypertrophy exists, in the absence of a palpable tumor we are not justified in deciding that only spasm exists, for operation in these cases has often disclosed a typical tumor.

One of the most important means of determining not only the fact of pyloric obstruction, but also its degree, is by measuring the amount of gastric retention. The child is fed a measured quantity and the stomach is emptied by aspiration three hours after this. The ordinary apparatus used for stomach washing will hardly answer the purpose. The little apparatus suggested by Hess for aspirating the duodenum is much better. A food not coagulating in the stomach in large masses must be given, that is, boiled milk diluted at least twice with barley water or condensed milk, or simply by a barley gruel. If, for example, three hours after feeding, the stomach is found to contain nearly as much as the quantity taken or more than this, or if, after no food has been given all night, the following morning 4 or 5 ounces can be removed, as in a case I saw recently, one may be sure that obstruction exists. A determination of the amount of retention is of especial value in the rather rare cases in which vomiting occurs only infrequently. Aspiration is also useful during the progress of the case medically

treated to determine just how well a given food is being taken care of.

As a means of deciding the fact of obstruction and its degree, aspiration of the stomach is in my opinion much more valuable than the Roentgen ray, besides being much simpler and always ready at hand. The Roentgen findings may even be quite misleading. Bismuth may pass out of the stomach, as may food, through an exceedingly narrow opening, and yet the symptoms may be of an aggravated type. It can show at most only the rate of discharge from the stomach, and aspiration can show that quite as well and much easier.

Constipation, as uniformly present, is mechanical and depends only on the absence of food from the intestine. In the severe cases nothing comes through, and the stools resemble meconium. In most cases something does pass and we have simply very small stools which may be fecal. More than once I have been amazed to find at necropsy a pylorus which admitted only a fine probe and yet during life fairly good-sized fecal stools had been present.

Other symptoms are always present in this condition though they are not diagnostic; there is progressive wasting which often amounts to 1 or 2 ounces a day. Its rapidity depends on the completeness of the obstruction. The appetite is often unimpaired until the prostration becomes considerable. Muscular weakness and anemia are proportionate to the loss in weight. There is usually a marked reduction in the quantity of urine, and where there is a complete obstruction there may be anuria for twenty-four hours or more. Under such circumstances I have seen a diagnosis of a renal condition made, the vomiting being regarded as a symptom of uremia.

THE QUESTION OF TREATMENT

Given a fairly definite case of pyloric stenosis in an infant a few weeks old, what treatment shall be advised? At present the profession is by no means in agreement regarding this point. Even among those who have had a large experience with pyloric stenosis a wide divergence of view exists. Physicians have reported quite large series of cases treated by medical measures alone with so low a mortality as to lead to

the inference that nearly all these patients recover if properly treated, without resort to surgery. Thus, Robert Hutchison in England reports, in twenty cases treated in private practice, eighteen recoveries. German writers, Heubner, Bendix, Starck and others, also give about the same proportion of recoveries in series of cases treated without operation.

On the other hand, quite an opposite view is taken by surgeons. They consider the disease a surgical one and urge that the patient be turned over to them for operation as soon as the diagnosis is made. They argue that medical treatment in a very large number, probably in most instances, is only a waste of time and that the life of the patient is often jeopardized because the surgeon does not see the case until the general condition has become very grave, while with earlier operation nearly all could be saved. In a recent publication Richter of Chicago reports twenty-two operations with but four deaths.

Pyloric stenosis in infancy is accredited with a general mortality of about 50 per cent. if we accept the reports of those who have written most widely on the subject. Of the 57 cases in my series there were 26 recoveries and 31 deaths, a mortality of 55 per cent. There were operated on 28 patients, with 14 deaths; treated medically 29 patients, with 17 deaths. It should be remembered, however, that three-fourths of these were hospital patients and that every case of pyloric stenosis admitted was included, though a considerable number were in so wretched a condition as to be hopeless, and four were practically moribund. The very bad cases were treated medically or operated on in about equal numbers.

To what is this difference of opinion due? Does it mean that with proper medical treatment surgery is unnecessary, or does it mean that different conditions have been considered by the different writers? In looking over case-reports one is unable to see that there is any very great difference of opinion in regard to the symptoms essential for diagnosis. These are pretty well established, and there is very general agreement among both physicians and surgeons.

Some writers take the ground that cases of pylorospasm do not require operation, but that it may be necessary in cases of hypertrophic stenosis. If a child

recovers without operation it is evident, they say, that the condition was one of pylorospasm only. This argument is not very convincing. I have already stated my belief that no sharp division of the cases into spasmodic and hypertrophic is possible either on pathologic or on clinical grounds, and that a better practical division is into mild and severe types. In the former, improvement frequently begins in a few days when proper treatment is instituted, and recovery may follow in a few weeks. In the latter also there is a strong tendency to recover from the symptoms of obstruction, and I believe from the pathologic condition also; but the course is so protracted that, owing to the tender age and feeble resistance of these patients, not a few succumb, although to use a Hibernianism, they would all get well if they lived long enough.

Against operation are the following considerations: A large number recover without it, and the essential surgical risks of operation, even in the best hands, are considerable.

The crux of the whole question between medical and surgical treatment of pyloric stenosis seems to me to be: Are the symptoms and conditions such as to make it probable that the patient will or will not live long enough for the pathologic condition to subside? There are medical risks and there are surgical risks; in the individual case one must decide which are greater; the two must be carefully weighed one over against the other.

MEDICAL RISKS

The medical risks in an infant with pyloric stenosis are not to be ignored; they are, I think, not sufficiently considered.

First, there may be death from acute inanition; this in the most acute cases occurs quite rapidly. I have seen a number of cases with such prostration and so rapid a loss in weight that delay in operation even of a few days would, I believe, have cost the child its life.

Second, there is the danger of marasmus or slow inanition from the prolonged duration of the symptoms. While this risk is not so great in private practice, it exists, and in hospital practice and also among patients in poor surroundings it is very serious. The

problem is one of infant nutrition with a very heavy handicap, and the difficulties are often great, even when all possible resources are at our command. There are considerable risks in waiting day after day and sometimes week after week when a child is barely holding his weight or losing but 1 or 2 ounces a week. The physician frequently does not realize on what thin ice he is skating, and how near the danger-line he is. Especially is this likely to be the case if the vomiting has become infrequent and fecal stools are present. It is hard to estimate how much resistance these little patients have. To allow the weight to fall gradually from 8 pounds to 7, to 6, or even lower, is to take great chances; and although possibly the majority of the patients may recover, every now and then an unexpected death occurs without warning.

Third, there is the risk of intercurrent disease developing while a child is in a greatly enfeebled condition. This is a very important consideration in a hospital where treatment must usually be continued from six to ten weeks, and it has some weight even in private practice.

Fourth, there is the risk of sudden death, which may come without any assignable cause. It has happened two or three times in my experience that children who seemed to be doing fairly well have collapsed suddenly and died in a few hours, the necropsy giving no explanation. This has occurred when the food taken seemed adequate so far as its caloric value was concerned, when the weight was stationary or showed only an insignificant loss and when the vomiting had practically ceased.

One other question deserves some consideration in this connection, namely, if these patients get well without operation do they recover completely or does a lesion remain which may subsequently give trouble?

During the last few weeks I have either seen personally or had reliable reports from seven patients who were under my observation during infancy with typical pyloric stenosis and who recovered without operation. One, a boy of 9, has had no gastric symptoms since he recovered from his attack, and is the most robust member of a family of four children. A second is now 7 years old; he had to be fed carefully during the first few years, but for two years past he

has "eaten everything" and has had no digestive symptoms. A third, whose active symptoms lasted until he was 8 months old, whose weight at 7 months was but 7¼ pounds, and whose pyloric tumor was noted as late as the seventh month, was, at 5¼ years, a husky boy weighing 60 pounds. There had been no gastric symptoms since he left the hospital at 9 months of age. The same was true of three others seen, whose ages were 4½, 4¼ and 3½ years, respectively. None had had gastric symptoms since infancy; all were well developed, and two were robust. A report from another child, 17 months old, tells that his weight was 30 pounds and that he had been absolutely free from symptoms since he left the hospital at the age of 3½ months. These include all the cases of recovery from pyloric stenosis without operation which I have been able to follow. In no instance was there a persistence of symptoms into childhood. After these children recovered from their malnutrition their subsequent progress and development was quite average. The period of malnutrition lasted in most of them until they were nearly a year old and in some it persisted well into the second year.

Is there any evidence that subsequent trouble does occur in later childhood in these patients? We know that hypertrophy disappears slowly, and we have abundant proof that the cessation of symptoms does not mean that hypertrophy no longer exists. Howland found a typical hypertrophic tumor still present in a child who died of acute diarrhea four months after recovery from symptoms of pyloric stenosis. A patient operated on by Downes at the Babies' Hospital, died of diphtheria six months after gastro-enterostomy; hypertrophy of the pylorus still existed. Morse also has reported a similar case; the child recovered from operation (gastro-enterostomy), but died of acute disease six and one-half months later; the necropsy showed that the pyloric tumor and the obstruction persisted.

Pyloric stenosis in infancy was long overlooked, and possibly, as Graham suggests, we are still overlooking pyloric stenosis of later childhood. He reports a case of pyloric stenosis in a child of 6½ years and cites many others from literature which were proved by necropsy. How often these cases occur, or in what

proportion of the patients with pyloric stenosis in infancy these late symptoms follow, we are as yet unable to say. Evidence that they suffered from symptoms of pyloric stenosis in infancy is wanting. I have seen but one case of pyloric stenosis in an older child, a girl of 4½ years; but there was no history of protracted vomiting in infancy, and definite gastric symptoms did not begin until the patient was 3 years old.

A connection between the pyloric stenosis of childhood and that of infancy has been assumed. It is yet to be established that they have the same pathologic basis. The final word on this subject has not yet been spoken, and it may be that further experience may cause us to revise our opinion regarding the ultimate outcome of the cases of pyloric stenosis in which recovery occurs without operation. At present the evidence is that patients who get well without operation recover completely.

SURGICAL RISKS

The surgical risks in operations for pyloric stenosis are partly essential and partly accidental. The essential risks are those of shock, of non-union because of the child's poor nutrition, and the danger of exhaustion owing to the fact that the difficulties of feeding have not been altogether removed by the operation. These dangers exist in every case no matter how experienced the surgeon. Of much greater importance are the accidental risks largely due to faulty technic; these are of course greatly lessened by experience on the part of the operator. Then there are the risks of hemorrhage, of leakage, of obstruction, of infection and other accidents which may follow any abdominal operation. On the whole, it is my belief that the medical risks, particularly in hospital patients, have not been sufficiently considered, and that the surgical risks have been exaggerated. With an operator experienced in these cases and a patient in fair condition, the operative risk is much less than one would anticipate. It is to me a constant surprise to see in these patients how small is the amount of shock of an abdominal operation which rarely lasts less than forty or forty-five minutes. The younger the infants the less the shock appears to be, which perhaps is not

to be wondered at when we remember what prolonged operations can be done on a new-born infant with little or no shock.

In private practice, if the best environment, good nursing and proper medical attention can be commanded, I believe that the risks of the medical treatment are small and that very many patients will recover without operation. But there will, I believe, always be a certain number of patients for whom surgical intervention will be required. The favorable conditions such as I have mentioned in private practice can be obtained for only a small proportion of the patients with pyloris stenosis. For the others, if the symptoms are severe, I think early operation offers more chances of recovery. Even if the surgical risks are considerable they are short, while the medical risks are prolonged and the dangers multiply with the duration of the symptoms.

An early diagnosis adds much to the chances of success by any method of treatment. In some cases the symptoms have lasted so long and the condition is so critical in consequence of the rapid loss in weight that immediate operation should be advised as offering the only chance of recovery. Under other circumstances every child should have the benefit of a fair trial with medical treatment. The duration of this in hospital practice will depend on the conditions present. If the symptoms are severe, a day or two may suffice; if less acute, a delay of a week or ten days may be permitted. Operation should be done not because a case is classed as spasmodic or as hypertrophic, but because mechanical obstruction of a dangerous degree exists, whatever its suspected nature.

The indications for operative interference are (1) no diminution of the vomiting or the gastric peristalsis by stomach washing and diet; (2) a steady loss of weight of from 1 to 2 ounces a day; (3) marked gastric retention, and (4) absence of fecal stools. The presence of a tumor I do not regard as essential.

My early personal experience led me strongly to favor the medical treatment of these cases. I was greatly influenced by two or three very conspicuous successes in patients treated without operation, and also by the results of the first seven cases in which I

saw operation done, five of the seven having been fatal.

Increased experience, however, has shown that the average case medically treated, unless it shows improvement almost at once, is likely to run a very prolonged course even though the child may ultimately recover. From six to twelve weeks of continuous treatment has usually been found necessary in the cases I have seen. This is in marked contrast to the rapid improvement which has taken place in all the children who have recovered after operation.

In looking over the histories of the patients observed during the past six years, I find that in a constantly increasing number I have advised early surgical interference. My greatest regret in this review is that operation was delayed in so many and in some not done at all. In this connection it is interesting to note the length of life after admission to the hospital of patients not operated on. In fourteen such cases it was as follows: 69 days; 44 days; 24 days; 22 days; 17 days (two patients); 13 days; 10 days; 9 days; 6 days; 5 days; 3 days, and two moribund patients. I feel sure that with our present experience a very considerable number of these patients might have been saved. No doubt the technical skill which the surgeons have acquired in the operation has contributed much to these later results, but our experience in the management of the patients after operation has also been a factor.

The postoperative treatment is very important. Emphasis should be laid on four points: hypodermoclysis, feeding, castor oil and posture.

Hypodermoclysis is useful immediately before or after operation as a means of introducing water into the body. It is greatly to be preferred to the Murphy drip. I have employed a normal saline solution with 4 per cent. dextrose; of this from 100 to 200 c.c. are slowly introduced either between the shoulders or into the abdominal walls.

In feeding, breast-milk is indispensable. We begin food as soon as the child has fairly recovered from his anesthetic, or about four hours after operation, giving 2 teaspoonfuls of breast-milk every two hours, alternating this with 2 teaspoonfuls of boiled water. On the following day the interval is made three hours.

and the milk and water are each increased to ½ ounce. At the end of forty-eight hours, 1 ounce of breast-milk is given every three hours alternating with 1 ounce of water. By the end of a week the child is usually taking from 2 to 3 ounces of pumped breast-milk every three hours alternating with boiled water. By the tenth or twelfth day in most cases the child is put to the breast, but the amount of milk allowed is limited for the next week or two.

A teaspoonful of castor oil is administered at the end of thirty-six hours and is usually followed by free evacuation from the bowels, which in many cases have not been freely moved up to that time.

The child's bed is inclined at an angle of about 135 degrees or more, the head being raised. This posture facilitates the expulsion of gas from the stomach and greatly diminishes the chances of vomiting. The child is usually kept in this position for four or five days.

CHOICE OF TREATMENT

Whether in a given case we shall decide in favor of operation or medical treatment will then depend largely on the severity of the symptoms and the conditions under which the child is seen. To subject every infant with pyloric stenosis to so serious an operation as laparotomy for a condition in which at a low estimate 50 per cent. recover without it, seems hardly justifiable. I believe it to be a mistake to turn every case over to the surgeon as soon as the diagnosis is made, as some would have us do. On the other hand, the position taken by Hutchison, that "operation is never under any circumstances justified" in these cases is, I believe, untenable. I do not think that the physician realizes how well these patients do surgically, or that the surgeon appreciates how many of them recover when treated medically.

Given an early diagnosis, a patient in private practice under conditions which make the best medical treatment possible, operation may not in most cases be required; but in hospital practice, in cases seen late, in those with the most acute symptoms who are losing rapidly, and when circumstances do not admit of the best medical treatment, there is no question in my mind but that immediate resort to surgery offers a better chance of recovery. Again, to persist with

medical treatment week after week when forcible vomiting and marked peristalsis are either continually present or keep recurring, when the weight shows only a slight loss, seems to me to be incurring far greater risks with the child than those of operation.

The medical treatment for patients not operated on consists in careful feeding and stomach-washing. The gastric lavage should be practiced twice a day; it serves the purpose of emptying the stomach thoroughly of mucus and fermented food; the water should be used warmer than usual, that is, up to 112 F. If it can be secured, breast-milk is the preferable food, but one not rich in fat is essential. The common practice of weaning as soon as symptoms develop is most unwise. In default of breast-milk a modified milk mixture low in fat should be employed.

With respect to quantities and intervals of feeding, cases respond differently. We have usually depended on from 1 to 3 ounces at three- or four-hour intervals, water being given in small quantities between feedings. There are seen, however, some children who seem to do better on much smaller quantities, that is, ½ ounce every hour, especially if the food is breast-milk. In greatly prostrated patients hypodermoclysis may be used twice a day as described in the postoperative treatment. Rectal feeding is little assistance except for a very short time. The bowels are moved readily by an enema, and the rectum does not discriminate between those things which are to be retained and those which are to be expelled. At most, it is of assistance only for a day or two. Drugs I believe to be of little or no value, nor can I say more for local applications of heat over the epigastrium as advised by many.

Every case of pyloric stenosis medically treated must be very closely watched; daily weights should be taken, as these children have a way of slipping away unless the most careful observations are made.

Aspiration of the stomach to determine the degree and rate of emptying is of much assistance in deciding the frequency with which these children should be fed and the amount of food offered at one time. Its value is not appreciated.

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