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HYPERTROPHIC PYLORIC STENOSIS: AN ATTEMPT TO STUDY  
THIS IN GENERAL PRACTICE.

PART ONE.

THE DISSERTATION.

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Part I.

THE DISSERTATION.

In such a study one feels most of all the inability to explain satisfactorily many of the signs and symptoms observed, and the conclusions arrived at are in the greater part incomplete, more in the nature of questions, food for further thought, rather than definite results.

One gets a series of impressions in the course of such investigation, and, looking back to the earliest mental impression of the condition such as the memory of Hypertrophic Pyloric Stenosis on leaving College, the impression at that time was: a disease of infants occurring in the first few weeks of life, and

characterized by a hypertrophied pyloric muscle, the treatment for which was Rammstedt's operation - incising the hypertrophied muscle. With regard to the course and prognosis nothing else was realised than that such a condition, necessitating operation in a young infant, was accompanied by the usual operative risks in the new-born.

The next association with the condition was only after a lapse of two years, when it was brought to notice in the course of post graduate study, and one learned that the case shown was being "medically treated" so obtained a further impression of the disease, the treatment of which thus came to be classified as medical or surgical.

With more intimate contact and enquiry into the course and results which came with opportunity of examining one's own cases in practice, the further impression of the relative prognosis and success in the different modes of treatment was the most important factor.

To begin with, these early cases were all medically treated and the results, as experience grew, were improving; so that one thought of surgical treatment rather in the nature of a heroic experimental trial especially as the patient was a baby, extremely

ill looking, emaciated, feeble in movements and only a few pounds weight with apparently no reserve whatever. So one felt more than content to persevere with medical treatment in which long efforts of supervision and attention did save lives which at first appeared lost.

Then with the occasional inevitable runs of failures after weeks even months of treatment, one naturally, almost unconsciously searched for any shorter and more safe method and surgery apparently offered such a remedy.

Impressions changed, the treatment sphere widened in possibilities and the early surgical results seemed to be most heartening, saving all that long period of anxious nursing with frequent set-backs and signs of supervening complications.

But just as with the medical treatment there was initial success, so later some of these surgical cases did not respond to treatment when apparently technique was sound and all methods to minimise shock and infection were adopted.

Gradually one drifted back more towards at least a combination of surgical and medical treatments, finding that in some cases medical treatment was very successful, in some others surgery was always satisfactory, while others were doubtful in their response to either, though happily there was no real group or

class that appeared hopelessly beyond any form of treatment.

So far the most general conclusion on analyzing all these impressions was that:-

- (1) Hypertrophic Pyloric Stenosis was a curable disease and
- (2) that the results so far obtained were sufficient to encourage further efforts in this direction.

The next step is the more systematic study of the condition with the observations of the various cases which form the subject matter of this thesis.

From the naturally limited scope which is offered in general practice in the following of any such cases, and lack of opportunity of carrying out research into the more specialised examinations of the pathological processes of such a condition; these cases are few and the data which serve as a basis are comparatively scanty; but at least they are illustrative of the condition in all its usual phases, and, I think, show sufficiently the difficulties and complications met with, and the results obtained in their treatment, indicate the lines on which progress might be made.

The cases here reviewed, after the condition was definitely recognised, and home treatment was failing; were removed and treated in a hospital for babies - children under three years of age - so that the nursing care received was the same in all, and more personal



supervision was possible than would have been the case in a general children's hospital.

Various observers, among them Professor Leonard Findlay<sup>1</sup>, and Dr. John Thomson<sup>2</sup> have emphasised the difference in successful results obtained in cases treated privately and in hospital.

Professor Findlay's % Cures were:

Private      Surgical 50%,    Medical 83%.

Hospital      "      25%,      "      38%.

and Dr. Thomson's results showed:

Mortality    Hospital    Surgical 75%,    Medical 74.2%.

Private      "      18.2%      "      21.7%.

The cases under discussion probably take up a position somewhat between these two conditions, and taking into account that the babies were from the poor and working classes, the balance is more towards Hospital than Private.

With regard to the various points in the classical descriptions of Hypertrophic Pyloric Stenosis as seen in these cases, one can only hope to enlarge on certain aspects of the generally accepted facts and cannot point to anything in the nature of a discovery.

Definition. Richter's<sup>3</sup> definition " A mechanical obstruction of the alimentary canal due to simple hypertrophy and hyperplasia of the circular muscle of Pylorus,

of congenital origin, showing soon after birth by usual symptoms of intestinal obstruction, modified by location of the lesion", appears too comprehensive in so far as the mechanical element due to simple hypertrophy and hyperplasia of the circular muscle may or may not be the only factor. The spasm factor, which other observers regard as the real causal factor is left out.

One might define it as: an obstruction of the alimentary canal at the pylorus, showing soon after birth, and characterized by hypertrophy and hyperplasia of the circular muscle of the pylorus.

Such an open definition not including definitely the cause brings one next to the discussion of cause.

Cause. This is still a matter of theory and the chief views are:-

- (1) A work hypertrophy from spasm, spasm being the chief element.
- (2) A congenital malformation with oedema.

The first view held by many observers - Findlay<sup>1</sup>, Haas<sup>4</sup>, Still<sup>5</sup>, Thomson<sup>2</sup> is supported by

1. The operative finding of a pyloric muscle much hypertrophied.
2. Success in medical treatment.

3. X Ray evidence showing in certain cases undoubted spasm contractions before any food is allowed through. Whether the hypertrophy found is due to spasm or the spasm, as Still<sup>5</sup> suggests is similar to other spasmodic conditions such as hiccough, stuttering etc., met with in children, does not immediately concern:

As for the other view - Scudder<sup>6</sup> (1907), Fowler<sup>7</sup> (1925), Cautley<sup>8</sup> - holding a malformation with oedema as the cause, I have never found such anatomical changes of oedema in any of the cases I have seen operated nor in Post-mortem examination.

Downes<sup>9</sup> (1916) stated "oedema in varying degrees involving the pylorus and pyloric region of the stomach was present in all cases. We believe the presence of this oedema is the factor which determines the definite onset of symptoms."

Practically, the difficulty is an obstruction, whether due to spasm or mechanical fault in development, which if untreated in severe cases will cause death from starvation. For a successful cure the cause should be known, that it may be removed, and although at present the exciting cause is doubtful, the effect of that - the grossly hypertrophic, hyperplastic pyloric muscle, which may be regarded as extremely

likely to spasm - is capable of treatment and shall be dealt with.

Occurrence. These cases recorded only go to show the already recognised factors in the type and frequency of the disease.

3 cases were breast fed throughout,  
16 cases had artificial feeding for the greater part,  
Males predominate in numbers and severity, males, 15,  
females, 4.

First-born children are in greater proportion. Eight were first-born. Time of appearance of symptoms is generally not till about the third week, with an initial period after birth without visible signs or symptoms, though cases appear as early as ten days, and as late as five weeks. In one case (V med) one female twin was affected, the other (male) was healthy.

In no case of this small series has the condition been found in more than one child of the same family. Two mothers have had babies since the patients were born, but these have shown no signs of it.

Type of child. Was invariably active, intelligent and only one case (II Surg. Died) was underdeveloped and weakling from birth.

Symptomatology. In no case could one discover any preliminary or predisposing symptoms before the onset of the classical ones, though this was searched for in the cases seen from birth. The vomiting at first was not typically projectile for ten days or so, and might be accounted for by lack of fluids, insufficient time for much muscle hypertrophy to have taken place.

The classical trio of symptoms, (1) Projectile Vomiting, (2) Visible Peristalsis, (3) Constipation, was seen in all for some period and loss of weight was always present.

The Pyloric Tumour was palpable in more than half (11 cases). In one case (VI Med. Died) this was definitely so and could be rolled under the finger, yet the Post-mortem showed the pylorus tucked up under the liver, out of reach. This may be said to show the unreliability of this symptom, or might it not be possible for a pylorus so placed Post-mortem still to become palpable in life in its hypertrophied contractile state - such an explanation cannot be given for the case of Dalziell's quoted by Findlay<sup>1</sup> where a "palpated" Pylorus was found in life to be hidden, inaccessible.

The only frequent addition to these symptoms was:-  
Evidence of Pain. This was present in eleven cases and was shown not only by crying but facial expression and wrinkled forehead. The symptom was present in all severe cases and was most evident during and after feeding.

In one case seen recently - not here quoted - in a three months old baby already operated on, one was impressed by a non-emaciated baby with wrinkled forehead, happy and smiling when attracted but with this "Pyloric Frown" as it might be called, most marked. The frown appeared to be the only remaining evidence of the pain suffered.

Thomson<sup>2</sup> (Edinburgh) and others say pylorics rarely show signs of pain and regard it as a means of differentiating Pyloric Stenosis from Pyloro-spasm, in which condition it is said to be frequent. However, several of these cases showed it and were undoubtedly true Hypertrophic Pyloric Stenosis.

Symptoms of hyperexcitability of all motor functions - myotonia, spasmophilia or vagotonia as the condition is called - described by Haas<sup>4</sup> were present occasionally; especially marked in one case (VI Med) with tendency to spasm, tetany,

and minor convulsions; also in other cases (II, III, IV Med. Died) where the convulsions ended fatally.

The more indefinite general symptoms mentioned by Haas as a part of the above syndrome: "Pallor, lividity, loss of turgor, circumoral cyanosis, cold clammy hands and feet, subnormal temperature" etc were present in most of the severe cases (seven cases); but whether such were truly indicative of a vagotonic condition, one could not determine. Rogatz<sup>11</sup> (1928) regards such as little more than due to malnutrition.

Reference to the individual cases recorded show the mode of onset of the symptoms of the disease and such in the main, correspond to the classical descriptions with time of onset similar. Vomiting was always projectile at some part and none of the cases even suggested anything in the nature of true rumination. Constipation was never extreme, either in the maternal history of the case or from observation - though was always present in some degree.

The different cases fell into a severity classification such as Thomson's<sup>2</sup> - acute, ordinary and mild - the only difference being in severity

and rapidity of course.

Diagnosis: was obtained from these classical symptoms and although varying periods - two days to two weeks - were taken definitely to establish the real diagnosis, the cases always proved correct later, at operation or when they went to Post-mortem.

More doubtful cases bordering on Pylorospasm were not included in this series. Ordinary clinical methods were sufficient for the diagnosis in all these cases and X Rays though used in two cases was of value only in confirming the diagnosis and measuring progress. In other operated cases a delay as long as forty minutes was found after operation though the child was gaining and symptomless.

Prognosis: depends on severity and duration of the condition and is so intimately related to treatment that it will be discussed in various lights under that head.

Untreated the disease is said to prove fatal from exhaustion and inanition, generally within four or five months - Fraser<sup>11</sup>, Richter<sup>5</sup> quoting Beardsley's<sup>12</sup> original case.

On the other hand, Robert Hutchison<sup>13</sup> has shown that the disease is self-limited and that the Pylorus



will ultimately open itself and the child recover, if it does not die in the process.

Although one has no record of such, one wonders how many mild unrecognized cases of Pyloric Stenosis, whose only symptoms are vomiting, of a mild but persistent character and tardy gain in weight, really run this natural course.

Such a view coincides with what is found in treating these cases: if the child can be kept alive till it is six months old then it will be cured spontaneously.

Apart altogether from the mode of treatment employed, several factors have been shown to influence prognosis:- (1) Duration, (2) Sex, (3) Social condition, (4) Presence of complications which will be dealt with later.

Death rarely seems to occur from uncomplicated inanition (see case VI Med. Died), almost always from the complications or at least with complications, and I think in most complicated cases the secondary trouble is at least the deciding factor in proving fatal.

#### Complications.

(1) Convulsions: This was the most frequent complication, occurring both as tetany and general

convulsions, the former tending apparently to lead to the latter. Fatal convulsions occurred in three cases - all medically treated. In case (II Med. Died) they began four days before death but continued at intervals throughout till the end. In the others (III Med. Died) they appeared suddenly without warning, first as tetany and rapidly proved fatal with collapse. In no case was there any causal evidence on cerebrospinal examination etc.

Convulsions were only definitely present to any extent in one cured case (VI Med.) though most of these babies besides being of an active disposition, appeared unduly sensitive to outside and inside disturbances, often being noticed to start as if frightened by trivial causes. This case was twitchy and inclined to spasm from the first and had one definite spasmodic attack after feeding which nearly proved fatal, and was exactly similar to the attacks which preceded death in the cases above. None of the surgically treated cases had convulsions.

(2) Bronchopneumonia and Chest Complaints (Bronchitis, Asthma). Bronchopneumonia proved fatal in one case (I Med. Died). Of the cured cases one (Case III Med.) had a Bronchopneumonia severe and

causing the child to be desperately ill for a fortnight, never absolutely clear, but remaining as chronic diffuse bronchitis

Another (Case I Med.) had a severe Bronchitis (without definite signs of Pneumonic nature) early and never cleared. At one time was very ill and very doubtful as to recovery, at age three years showed marked signs of bronchitis with evidence of Rickets, the bronchitis never having cleared in the meantime.

A third case (V Med) had "Asthma" attacks of coughing and wheezing which continued without freedom for two months. Since then at home has had similar attacks during which the child went blue and had difficulty in breathing.

None of the surgical cases had chest complications.

(3) Diarrhoea proved fatal in one case (II Surg) a female child and did not begin till four weeks after operation. Only one case (I Med.) of the medical cases had diarrhoea of any moment.

(4) Inanition uncomplicated seemed to cause one death (Case V Med. Died) where death seemed from heart failure after it had become slower and slower, with the child gradually becoming pale and losing strength in feeding.

(5) Post-operative Shock was thought to be the cause of death in one case (I Surg. Died) in which the operation was done under unsuitable circumstances necessitating conveyance to and from a General Hospital with fatal collapse immediately on return for nursing treatment.

(6) Post-operative Pyrexia occurred in all operated cases and in most amounted to about 102 F. In one case (III Surg.) it amounted to 108.4 settling to normal in seventy-two hours. In no case did this Pyrexia appear serious and generally settled in forty-eight hours. It was not accompanied by any physical signs in chest or elsewhere.

(7) Other complications such as transient otitis were rare and of no moment.

The surgical cured cases were remarkably free from serious complication.

Incomplete Relief of stenosis was incomplete at first in one case (I Surg.) but readily improved.

Treatment: falls into two large categories of medical and surgical.

Medical: The most important part in this is the dietetic. Feeding should, if possible, be natural breast feeding, but generally by the time one had seen cases which were

available for medical treatment, the mothers had diagnosed the infants' trouble as due to some food defect and had transferred to one, or very often, most of the artificial foods; each with a temporary very short improvement.

In this series all the medically treated cases here had artificial feeding - modified cow's milk, with equal amount of water and Dextrimaltose, increasing with progress.

Breast milk was used only for short intervals in one or two cases. Thickened feeds with cereal, farola, etc - after the method advocated by Sauer<sup>14</sup> - were used to any extent only in two cases (IV<sup>1</sup> and VI<sup>2</sup> Med.); (1) from the age of four months on, (2) from the age of eleven weeks on.

Such foods were not thickened to the extent advocated by Sauer - "So thick as not to fall from an inverted spoon" - for, when such was approached great difficulty was found in feeding; the babies being inclined to cough and splutter with considerable difficulty in swallowing. Apart from this disadvantage, one could not form any further conclusions from the short trials given.

The ordinary regular feeding was given in amounts from 2-3 oz. In the very ill babies, at first it was found that small feeds of 1 oz. to  $1\frac{1}{2}$  oz. were

retained when a larger feed seemed more apt to be vomited.

In some, however, with larger 3 oz. feeds, although vomiting continued, the amount returned did not equal the whole given so that in cases which had troublesome vomiting irrespective of the amount given, more progress was made by baby retaining some of the food and getting sufficient through to maintain weight.

It was always found that the feeds immediately following washouts were readily retained, and that if fed immediately after a large vomit the second feed was retained almost completely. Findlay<sup>1</sup> relates that a mother showed him this and regards it due to exhaustion with disappearance of symptoms at this time.

At the age of five months whole milk was being given in all. Lavage until the returns were clear was given twice daily at first, gradually <sup>reducing</sup> in frequency as the results became clearer.

In no case was any ill effect or distress found from this treatment, though in one case (VI Med.) it was not continued once the child was seen to be twitchy and inclined to spasm.

Medicinal treatment was used as an adjuvant in four cases and took the form of antispasmodic remedies after the mode of Haas<sup>4</sup>.

He recommends doses of Atropin. Sulph. 1/1000 gr. after each feed (or 1/2000 as a minimum) - 16/1000 after each feed was his maximum dose corresponding to 1/8 gr. of Atropin. Sulph. P.d.

In the cases in which Atropin was given, it was generally 1/100 gr. Atropin. Sulph. six times a day, amounting to over 1/16 gr. P.d. as maximum. In other cases (I, II Med.) Belladonna (-1/100 gr. Belladonna) in the form of tincture was given in mXX dose P.d. and in both of these had undoubted benefit, but case (II Med.) had sudden collapse while on this maximum dose, which was regarded as due to this therapy. No other ill-effects were noticed. In four other cases, with shorter trial, no definite improvement was observed.

Medicinal treatment other than this was only in the nature of symptomatic for the complications - chiefly chest - from which the medical cases suffered.

Surgical: Breast feeding was maintained and continued entirely wherever possible. This was so in three cases (III, IV, V Surg.), and these were the most successful of all, two of them requiring less than three weeks systematic treatment.

The other four cases included case (II Surg. Died). Human milk was given for the first few days, in fact as long as it was obtainable, but then a cow's milk mixture

equal parts, was substituted.

Medicinal Reinforcement treatment was only required in one case (I Surg.), where symptoms of persistence of the obstruction were present for ten days, and in this case lavage and Belladonna Therapy helped to a successful result.

Preoperative Salines and anti-shock measures were all important.

Operation was Rammstedt's. Time was seven to fifteen minutes.

Postoperative Salines and anti-shock measures were invaluable.

Feeding very soon (always within 24 hours) after operation proved highly successful and in one case (IV Surg.) first feed was 9 hours post operation.

Observation on Treatment Effects and Results.

Observations on this tend to a comparison between the two general methods of treatment - medical (non-operative) and surgical (operative); and several factors have been shown to influence the varying success of these two.

Some are quoted by Downes and Kerley; and Goldbloom and Spence<sup>15</sup> have given their results of factors influencing success of operation in 163 cases.



With their figures, quoted below, is a comparison of total mortality of this small series; but it has to be acknowledged that these are not of value in showing prognosis and mortality. (1) Small numbers, which as Findlay<sup>1</sup> shows are dangerous for statistics, (2) the later cases reaped the benefit of the early failures from inexperience, so the later case mortality is better. With these reservations a comparison is made.

<u>Goldbloom Spence Series</u>		<u>Present Series</u>	
		<u>Mortality</u>	<u>Mortality</u>
1. Duration	(a) Less than 4 wks.	13.4%	(a) 50%
	(b) More " " "	35.42%	(b) 66.7%
2. Feeding	(a) Breast	11.3%	(a) 0%
	(b) Artificial	35%	(b) 43%
3. Weight	(a) 7 lbs. or more	8.7%	(a) 16.7%
	(b) Less than 7 lbs.	28%	(b) 46.2%
4. Weight	(a) Less than 20% best weight	6.58%	(a) 20%
Lost	(b) More do.	37.25%	(b) 55.6%
5. Mortality increased directly with weight lost.			

1. How does medicine cure?

By relieving the spasm sufficiently to allow enough going through the pylorus to maintain nourishment till spontaneous cure takes place.

2. How does surgery cure?

By breaking the continuity of the grossly hypertrophied muscle causing the occlusion of the pylorus.

Why do medical cases die?

Inanition, which is so severe in these cases, is not efficiently relieved in the severe by this form of treatment. Thus unrelieved it favours secondary infection often proving fatal. Infection prolonged permits the spasmophilic tendency which these cases undoubtedly show, to have effect, with fatal convulsions.

Why do surgical cases die?

Firstly, as a direct shock of operation in a young, often grossly emaciated baby. Secondly, complications, chiefly Infective Diarrhoea; less often Postoperative Pneumonia.

Rarely, from want of success in operative procedure.

In asking oneself the above questions and attempting to answer them, one sums up the difficulties met with in treatment and is brought to a further analysis of several factors which influence the decision of which mode of treatment to adopt in a particular case.

The differences are stated in the table below:

<u>Factors for Non-operation</u>	<u>Factors for Operative Treatment.</u>
1. Mild type of case.	1. Severe acute case.
2. Long retreatment period.	2. Recent onset of symptoms.
3. Late or apparently late onset.	3. Early onset of disease.
4. Artificially fed baby.	4. Breast fed baby.
5. Female case.	5. Male case.
6. Baby from good class, family with sensible mother.	6. Baby from poor home.
	7. Failure of response to medical treatment.

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Of the factors enumerated above: 1. Type of case, 2. Mode of feeding, and 3. Home conditions; might be considered.

1. Type of case.

The acute severe type occurring early in a boy, rapidly advancing with progressive emaciation, requires urgent attention. If medical treatment is first attempted, it seldom meets with success, does not arrest the progress of the disease and results in a baby suffering from inanition which becomes the prey of intercurrent disease which proves fatal.

Surgical treatment in such acute circumstances,

before emaciation has become **extreme** and infection arisen, meets often with immediate success and rapid recovery.

2. Mode of feeding.

(a) **Artificial:** such can be carried on under supervision in hospital or elsewhere over a prolonged period with the changes in feeding which may be found necessary from time to time according to the stage of the disease. If such cases are subjected to operation, they are more liable to infective diarrhoea complications which may prove fatal.

(b) **Breast fed:** are better operated. Most of these are seen early, and can be kept on the breast, the mothers always being able to accompany the babies into hospital for the few weeks necessary for treatment. These cases do well at home later and can be discharged from trained care in two weeks.

3. Home conditions.

This, I think, is a big factor which accounts for the difference in results of hospital and privately treated cases of Findlay<sup>1</sup> and Thomson<sup>2</sup>.

With very few intelligent poor or working-class mothers is it possible to impress sufficiently to carry on breast-feeding their babies at home; even after

warning them that the vomiting and other symptoms will continue for several weeks or months. Nearly all fall victim to the advice of their neighbours and friends who persuade them to try the latest patent food or cure all: but with better-class cases such prolonged medical treatment at home will be possible especially with the older and more chronic type of case, and such home treatment minimises the risk of the infection to which they are exposed in hospital.

Surgical Advantages

1. Short hospital treatment.
2. Early opportunity for child to get sufficient nourishment.
3. Rapid cure.
4. Less frequent complications.

Surgical Disadvantages

1. Postoperative shock.
2. Diarrhoea complications.

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Medical Advantages

1. No operative (and postoperative) risks.
2. No postoperative shock.

Medical Disadvantages.

1. Long hospital treatment.
  2. Long period of inanition.
  3. Cure slow and tedious.
  4. Early and late complications especially chest complaints.
-

The medically treated cases in this group show the above points and in treating, one experiences chiefly the slowness of the cure which as in cases (III and IV Med.) drags on; one day a little better, the next worse without any appreciable advance over months.

The inability to prevent and deal with complications is very evident, chiefly the liability to the tragedy of convulsions without apparent cause, even when progress appears otherwise satisfactory.

Cure, when ultimately achieved, is permanent.

Surgery, impresses one with its rapidity in relieving symptoms and quickness in gaining weight. Of the cases studied, three (II, III, IV Surg.) showed steady disappearance in signs and symptoms from the time of operation. One most satisfactory case (IV Surg.) when symptomless, on being X-rayed showed no evidence of food passing the pylorus even after fifty minutes, yet progress was uninterrupted.

The younger, more severe cases stand operation relatively much better than those subjected to medical treatment for any prolonged period beforehand.

Complications do not appear frequently.

Recurrence of condition is very seldom.

Cure appears permanent.

The results with the two methods, as regards the stomach condition, are equal and permanent but, whereas medical measures take several months before a happy though undersized baby, suffering from chronic or recurrent bronchitis is the result; on the other hand surgery rapidly, even in weeks results in a healthy, actively growing child free of complications.

These, I think, are the essentials, and with the more early recognition and further experience, the group of doubtful cases in which one is undecided between medicine and surgery - where a prolonged medical trial is given without success (only resulting in further emaciation and infection) and later resort to surgery not wholly successful - will become much less frequent. A definite line of procedure will be possible and further indications for change of treatment recognised.

So far, apart from rate of emaciation, there is little to help in the decision of when to cease medical treatment in favour of surgical. Various factors such as - (1) Rate of Peristalsis, (2) Presence or absence of dilation of stomach, may have some influence. Thus may become fixed a standard time for transference to surgery or a definite decision for or against.

Many questions remain unanswered: such as -

1. In after life is there any difference in artificial **breast fed** and ~~human~~ babies?
2. Will it become advisable to examine carefully at least all male babies for premonitory or very early signs?
- 12 3. <sup>^</sup>What is the cause of convulsions; are they brought on by pain.
4. Is vomiting only typically projectile when the pylorus is hypertrophied; are doubtful atypical cases really true pylorics minus this?

Conclusions and Results.

1. Even early impressions lead one to conclude that this is a curable disease.
2. Such a small series only suffices to show difficulties and complications met, and general lines of procedure.
3. No evidence of the true cause is shown.
4. The practical difficulty to be overcome is an obstruction of the alimentary canal at the pylorus, which if untreated will in the severe cases prove fatal.
5. The disease though self-limited, in any case of fair severity, untreated, will prove fatal within four to five months.



6. No premonitory symptoms could be discovered.
7. Symptoms of note are only those already described in the classical works on the disease.
8. Pain is a prominent factor in nearly all the severe cases, and when persistent appears to predispose convulsions.
9. The spasmophilic symptoms described by Haas are typical in at least one case of the series.
10. Clinical methods alone are sufficient for the diagnosis which is seldom long in doubt.
11. Prognosis is shown to depend on factors such as age at onset, sex, breast or artificial feeding, duration of symptoms and mode of treatment.
12. Death is nearly always from complications, especially convulsions; seldom from pure inanition uncomplicated.
13. Chief complications are (a) Convulsions, (b) Bronchopneumonia Bronchitis, (c) Diarrhoea. (a) was most fatal.
14. Complications are most evident in medical cases.
15. Post operative pyrexia, though occurring constantly in varying degree, never seems to have permanent ill effect.
16. Medical treatment is successful especially in

milder older cases.

17. Thick feeding - after Sauer - is difficult to achieve and met with difficulty in swallowing, coughing etc.

18. Lavage is beneficial and without ill effect.

19. Atropin. when tried for long was undoubtedly of some benefit.

20. Surgical treatment is best for young, severe, breast fed.

21. Rammstedt's operation is most suitable, being speedy and sufficient to relieve obstructive symptoms.

22. Pre and post operative anti-shock measures are most important.

23. Breast fed babies are particularly suited to surgical treatment with home treatment as early as two weeks.

24. Home conditions appear of marked importance in decision between medicine and surgery.

25. Comparative time in effecting a cure was striking; surgery as little as two weeks; medicine as long as five months.

26. Complications, dating in onset from time of treatment were active as late as at two years old in three medical

cases. No such in surgical cases.

27. In time the group of cases where procedure is doubtful will be lessened.

28. Scope for advancement in the treatment of Hypertrophic Pyloric Stenosis lies more in the field of surgery than medicine, and in a co-operation of the two methods according to the type of case and the conditions of living.

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PART TWO.

THE SUBJECT MATTER.

MEDICAL CASES.

MEDICAL.

CASE I. Jean Cockrell, age 6 months. First seen 30.7.25.

Reason for seeking advice:- Loss of weight, vomiting,  
constipation.

Family History:- Pregnancy: labour normal, full time.

Parents and two other children healthy.

Personal:- Breast 2 months. Weaned on account of losing  
weight. Cow's and dried milks later.

Vomited frequently, projectile in type, less  
severe now than in first 3 months.

Bowels: constipated all the time.

Weight: 9 lb. 12½ oz. at 6 months.

Examination:- General: average size and development for  
age. Slightly bluish. Little subcutaneous  
fat. Rib ends not enlarged. No epiphyseal



enlargement.

Abdomen: stomach moderately dilated.

Peristalsis definite at intervals.

Bowels: constipated - sometimes a day without a motion.

Lavage: curdy wash, takes 4 pints to clear.

Chest: cough occasional. Rales, few scattered at the base of right lung. No dulness.

Impression:- Pyloric Stenosis in chronic stage.

Progress:-From time of commencing systematic treatment - age 6 months - till end of period of continual observation - age 12 months - progress was slow and hindered by complications.

Weight: increased from 9 lb. 9 oz to 17 lb. 2 oz.

Gain was slow and gradual. The only periods when it remained stationery or underwent a temporary loss were characterized by exacerbations of a fine bronchitis which was never entirely absent.

Vomiting and Peristalsis: were only present during the first months of treatment, i.e. from 6-7 months of age.

Complications:- Bronchitis: of a fine nature nearly proved fatal and was troublesome throughout, with rhonchi and rales on examination,

but never dulness. Feverish at intervals according to condition of chest.

Treatment:-Lavage twice per day, washings very dirty at first. Tincture of Belladonna up to M XXX in 24 hours.

Feeding: beginning with cow's milk and water, equal parts, 30 oz. in 24 hours.

Grading via milk: = 2:1 with butter fat mixture to whole milk and mixed feeding at 1 year.

Condition when last seen:-

Age 3 years 1 month. 11.2.28. Mother says child has been in excellent health except for recurrent attacks of bronchitis which has been present more or less all the time, and mother regards this as inevitable.

On examination: happy child, breathing wheezy. Fine general bronchitis, well marked at present. Fontanel closed.

Evidence of rickets with

- (1) Pronounced enlargement of radial ephiph-  
ysis.
- (2) Tibia bowed,
- (3) Teeth softening,

Fine bronchitis.

Summary and Conclusions.

*Case of  
Pyloric  
Stenosis*

1. Fairly mild but definite Pyloric Stenosis.
2. "Pyloric" symptoms were present for a longer time than usual, perhaps due to the length of time which elapsed before regular treatment was obtained.
3. Progress delayed by bronchitis which appeared to become early established and permanent, and at one time sufficient to endanger life.
4. Of the factors in treatment which seemed to influence Belladonna undoubtedly met with ready response and long interval (4 hourly) feeds were better than short.
5. The rickets, although the child's home conditions were not of the best, might be presumed to be in some measure at least due to the prolonged period of undernourishment which the slow progress caused, together with the early onset of bronchial catarrh.
6. No sign of permanent stomach trouble.
7. (a) Duration of systematic daily treatment - 6 months.  
(b) Age at cessation of daily treatment - 1 year.

CASE II. Norman Kirby, age 4 months. First seen 14.9.25.

Reason for Seeking Advice:- Intermittent vomiting.

Family History:- Parents healthy. First child. Normal labour.

Personal:- Breast 3 weeks. Weaned on account of vomiting after feeds. Fed on cow's milk and various dried milks without success. Vomited after every feed at first month. Intermittent with suggestion of projectile once daily.

Bowels not constipated. Birth weight = 10 lbs.

Examination:- General: no marked emaciation or dehydration.

Crying, unhappy and in pain. Under birth weight = 9 lb. 6 oz.

Abdomen: stomach a little distended.

Peristalsis: distinctly seen.

Pylorus definitely palpable.

Lavage:  $4\frac{1}{2}$  oz. residue at first attempt.

Chest: negative.

Impression:- Pyloric Stenosis of mild degree.

Progress:- After 8 weeks steady treatment, weight = 10 lb. 11 oz. Gain of 1 lb. 5 oz. and had passed through an attack of diarrhoea with loss of weight during part of that period. Projectile vomits gradually ceased.

Peristalsis still very definite after vigorous feeding. Evident enough to be photographed. Seen personally on three or four different occasions recently.

Later - age  $6\frac{1}{2}$  months - gained 2 lb. 3 oz. to 12 lb. 12 oz. More rapid gain under Belladonna. Vomiting and peristalsis steadily lessened and disappeared.

Complications:- Were absent apart from the early diarrhoea and transient bronchial catarrh (temperature = 99) for 3 or 4 days.

Treatment:- Lavage daily and rapidly cleared.

Tincture of Belladonna beginning in  $\bar{V}$  b.a. up to m  $\bar{XX}$  per diem in first month.

Recommenced in last month m  $\bar{XX}$  per diem, only short intervals without it.

Feeding: beginning with cow's milk and water 2:1 to thickened feeds with gruel, farola, etc . in last month.

Condition When

Last Seen:- age, 3 years (in 2 weeks time). 5.5.28.

Since leaving systematic treatment has been absolutely healthy. (1) Never sick once. (2) Never had doctor once. (3)

Never had cough of any note.

Now a healthy child. No evidence of rickets. Weight -  
2 stone, 9 lbs.

Summary and Conclusions.

1. A mild case of Pyloric Stenosis.
  2. Appeared to be suffering pain.
  3. Symptoms responded fairly well to ordinary dietetic measures and careful nursing.
  4. Belladonna Therapy appeared definitely to hasten cure. At one period, on <sup>m</sup>XX per diem got very collapsed but recovered without any other definite symptoms of intolerance.
  5. Clear of all symptoms at 6 months of age.
  6. No sign of permanent stomach or general health weakness resulting from the Pyloric Stenosis.
  7. Duration of systematic daily treatment -  $2\frac{1}{2}$  months.
- Age at cessation of daily treatment -  $6\frac{1}{2}$  months.

CASE III. Thomas Doona, age 8 weeks. First seen 5.12.26

Reason for Seeking Advice:- Vomiting, rapid loss of weight.

Family History:- Parents healthy. Pregnancy showed no signs of **maternal** toxæmia, no nervousness; attitude fatalistic.

Two other girls healthy. Two died, both premature.

Personal:- Vomiting began at 3 weeks, persistent, increasing in severity in spite of all changes  
Projectile after each feed.

Diet: breast 10 days, then "milk went away".

Dried milks since.

Bowels: very constipated, small every 2-3 days.

Weight: loss steady. Birth weight 8 lbs;  
now 6 lb. 3 oz.

Examination:- Type: thin, bright, intelligent, active and alert baby.

Condition: emaciated; marked loss of subcutaneous fat and typical facial appearance of Pyloric Stenosis with dehydration. Very ill.

Expression: hungry, in pain, face twisted, crying.

Abdomen: marked wasting, flaccid in lower

half, with loss of subcutaneous fat and distension over stomach.

Peristalsis visible. Palpable mass at side of pylorus.

Liver edge and spleen not palpable.

Motions: None for 2 days. Ennema returned constipated faeces.

Chest: lungs no signs or symptoms. No cough.

Feeding: always hungry. Takes feeds well, but returns the greater part. Vomiting is forcible.

Impression:- Typical severe case of Pyloric Stenosis in an ill-looking baby.

Progress:- For first week under treatment child remained very ill, with frequent vomits, ravenous hunger, appeared in pain and movements weak. Improved temporarily and then developed a complicating broncho-pneumonia lasting 2 weeks, ill with blue pinched drawn face, but took feeds well.

Continued well for one month when had a less serious setback on account of diffuse bronchitis.

Further progress steady.

Weight: dropped as low as 5 lb. 11½ oz.



During the broncho-pneumonia it remained  
around 6 lb. 7 oz.

Increased to 11 lb. 2 oz. at 6 months.

" " 20 lb. at 1 year.

Vomiting and peristalsis: marked features for  
the first two months under treatment then  
cleared well.

Complications:- Broncho-pneumonia: very severe and sus-  
tained. Lung signs were general, most  
marked left.

Albuminuria: was present during the  
complications.

Diffuse bronchitis: Similar though less  
severe than initial attack, and without  
definite consolidation. Symptoms  
cleared readily and well-being regained  
in a few days, but physical signs,  
wheezing and cough remained almost till  
6 months old.

Treatment:- Lavage twice daily for three weeks, then twice  
a week. Belladonna up to m  $\overline{\text{XXX}}$  in 24 hours  
for short periods only. Ultra violet rays  
every 3rd day after first month.

Feeding: cow's milk and water, equal parts

with Dextrin maltose - 20 oz in 24 hours.

Breast milk 20 oz. during broncho-pneumonia.

Later cow's milk: water as 2:1 with New Zealand Cream, butter fat etc. added - 30 oz. in 24 hours.

Condition When

Last Seen: - Age 1 year 10 months, 9.8.28. Weight= 30 lbs.

Fat and flabby, but healthy. Fairly frequently gets bronchitis.

Chest: very "wheezy". Rhonchi continual, confined to larger bronchi.

Fontanel: 2 finger breadths.

Appearance suggestive of early rickets.

No vomiting for well over a year.

Younger

Brother: - Age 2 months. Though 2 lbs. under weight, this child has had no symptoms or signs of Pyloric Stenosis; his only complaint being transient attacks of diarrhoea and vomiting.

Summary and Conclusions.

1. Typically severe case; very ill even before complications.
2. Facial appearance and behaviour gave the impression of the child being in considerable pain when the condition was at its worst.
3. Chest complications, which began at the age of three months caused child's life to hang on the

balance for about a month, and appeared to lay the foundation of a chronic bronchitis which is still troublesome at nearly 2 years of age.

4. The cure of the original pyloric condition seems to be complete with no secondary trouble arising from it.

5. Belladonna Therapy showed no marked improvement.

6. The prolonged period of inanition, besides leaving the child open to serious illness in the early stages; later tended to have interfered with nutrition and growth; showing signs suggestive of early rickets.

7. Duration of systematic daily treatment 6 months.

Age at cessation of do. 8 months.

CASE IV. Reginald Brooks, age 3 months. First seen 4.4.27

Reason for Seeking Advice:- Vomiting since one week old.

Family History:- Parents healthy. Pregnancy normal.

First child.

Personal:- Never breast fed. Cow's milk and water 3 hourly.

No night feeds.

Vomiting: began when one week old; after every feed. Fairly large and definitely projectile.

Constipated: one motion every second day.

Examination:- Small under nourished, very pale.

Typical appearance of Pyloric Stenosis.

Weight = 7 lb. 5 oz.

Abdomen: contour normal. Stomach shows no marked enlargement.

Peristalsis definite but not grossly marked.

Pyloric mass distinctly palpable.

Motions normal since under observation.

Feeds: finished 4 oz. feed but returned certain amount after each feed - definitely projectile.

Chest: negative. **Urine: nil.**

Impression:- Pyloric Stenosis of moderate severity.

Progress:- After 2 weeks began to improve steadily with

steady gains, but symptoms did not clear so quickly.

Projectile vomits were still present for 8 weeks.

Peristalsis : still marked on occasion after 8 weeks.

Washouts clear in 6 weeks.

Motions one to two per day throughout.

Weight: rose steadily to 7 lb. 7 oz. at 3 months; to 10 lb. 5½ oz. at 6½ months, and 19 lb. 12 ¾ oz. at 1 year.

Complications:- Apart from a cough with a temperature of 100 on occasions for a fortnight was free of trouble.

Treatment:- Lavage twice daily for a week, then daily and less often.

Belladonna was only tried for a week without appreciable benefit.

Ultra violet rays from age of 4 months onwards

Feeding: cow's milk and water, equal parts with New Zealand Cream; later plus Dextrin-maltose - 27 grs. in 24 hours. From age of 4 months onwards 30 oz. feeds thickened with Farola. Thickened feeds continued, with milk puddings at 6 months.

Condition When

Last Seen:- Age 1 year, 8 months. 31.8.28, weight =  
23 lb. 13 $\frac{1}{2}$  oz.

Intelligent active child; talking and responding well. Mother thinks he is not heavy enough. Teeth symptoms normal.

Fontanel closed. Not much appetite. No sickness.

Bronchitis very bad three months ago - lasted 2 weeks. Mother says he was very ill and she was afraid of pneumonia.

No signs of rickets.

Chest and abdomen: negative.

Summary and Conclusions.

1. Of distinct severity, but not too emaciated when treatment began.
2. Having reached the age of 3 months, with vomiting from 1 week old, the condition must have been slow-advancing and not acute at any stage.
3. Ready response to ordinary careful dietetics and nursing.
4. Belladonna Therapy did not influence.
5. Free of serious complications.
6. No sign of permanent stomach trouble or

general weakness.

7. Duration of systematic daily treatment 3½ months

Age at cessation of do. 6½ "

CASE V. Mary Cheyne, age 3 weeks. First seen 29.9.27.

Reason for Seeking Advice:- Vomiting and loss of weight.

Family History:- Parents healthy. Healthy children  
aet. 14, 12, 10.

This child is a twin - the other twin  
a healthy boy, weight 7 lb. 12 oz.

Both premature. Labour normal.

Personal:- Well for 2 weeks, thriving.

Vomiting: 1 week, very forcible, often  
down nose.

Bowels: often every day, with one good  
motion, greenish. Has lost weight.

Examination:- Small, undersized but intelligent child.

Well marked wasting. Weight = 5 lbs.

Abdomen: distended especially in upper  
half. Stomach very evidently dilated.

Peristalsis well marked. Tumour not  
palpable at first examination.

Chest: negative.

Impression:- Mild Pyloric Stenosis or Pylorospasm.

Progress:- Improved well in first month.

X-ray at  $5\frac{1}{2}$  weeks old. Showed free passage in oesophagus and cardia.

Pyloric delay- over 20 minutes, none had left.

Peristalsis vigorous, tone increased.

Vomiting: very slight after first two weeks .

Peristalsis: distinctly evident at  $3\frac{1}{2}$  months.

Washouts; began to clear after 3 weeks treatment.

Motions: 1 or 2 normal during most of the time. Slight period of 2 to 3 abnormal per diem.

Weight: gained from 5 lbs. at 3 weeks to 8 lb. 13 oz. at 6 months, and 10 lb.  $12\frac{1}{2}$  oz. at 7 months. Loss of  $\frac{1}{2}$  lb. and stationary during "chesty" attacks.

Complications:- At age of 13 weeks (after 10 weeks treatment) had attacks of coughing and wheezing for 2 days. Temperature 100. Attacks: short expiratory coughs 50.60 per minute for  $\frac{1}{2}$  hour; immediately after food. Quite

7  
1

h



of feeds or anything I have seen

R.M. Sibilant. Fine rales and crepitations.

Till age of 5 months attacks continued most days after food, with little gain in weight for two months.

Double ear discharge: at intervals.

Treatment:- Lavage twice daily, then once and later twice a week. Atropin. Sulph. in a mixture (m VI p.d.) 6 times a day for 2 months during the "asthmatic" spell.

Ultra violet rays once a week till chest complications arose.

Feeding: cow's milk and water equal parts 14 g. per diem. Later extra sugar and thickened with cereal. Later lactic acid and New Zealand Cream. At 6 months milk: water as 2:1. Extra sugar.

New Zealand Cream, lactic acid - 30 oz. p.d.

Condition When

Last Seen:- Age 1 year. 31.8.28. Weight 14 lb. 10 oz.

Considerably under weight (other twin was 17 lbs. at 5 months), but a bright, contented baby.

Fontanel:  $1\frac{1}{2}$  finger breadths.

No sickness. Normal motions twice daily.

Fed on goat's milk and patent barley.

When in a cold wind she pants a lot.

One month ago had "attack" with cough - the same cough as when under systematic treatment - says mother - and definitely feverish.

Abdomen: negative.

Chest: now sibilant, rhonetic; suggesting astham rather than bronchitis.

Summary and Conclusions.

1. At first mild and indefinite enough to be regarded as Pylorospasm, but under observation proved to be definite Hypertrophic Stenosis of mild character.
2. Showed interesting point of Stenosis in a female twin; the boy remaining healthy and showing no signs whatever.
3. Early onset of typical vomiting but not a severe "acute" case.
4. Improvement satisfactory until chest complications when 3 months old.
5. Atropin. benefited and appeared to act on the asthma as well on the spastic pylorus. Ephedrin in  $\frac{1}{2}$  co. was not a success.
6. The coughing attacks with chest signs were extraordinary in appearance, and approached most

closely to asthmatic attacks. They occurred with greatest severity after food.

7. The aural discharge occurred without any sign of ear pain, and during its height child appeared in a weak state, and seemed ill apart from the stomach condition, and losing ground.

8. Stomach trouble has cleared completely.

9. Chest "weakness" with definite recurrences of asthma at one year old.

10. Duration of systematic daily treatment  $5\frac{1}{2}$  months  
Age at cessation of do. over 6 months.

CASE VI. Russell Brown, age 10 weeks. First seen 15.3.28.

Reason for Seeking Advice:-Vomiting after every feed.

Lost 1 lb. in last week.

Family History:- Parents healthy. Boy at  $2\frac{1}{2}$  years healthy. Mother was worrying a lot when carrying this child, but not with first child. Normal labour. Full time.

Personal:- Birth weight = 7 lbs. Breast 1 month, then Cow & Gate. Always hungry.

Vomiting: after every feed, sometimes in middle of feed. Began even in first week, forcible down nose, water with curds in it, never a single feed without vomit.

Bowels: not constipated on breast but later.

One motion per day; crumbly yellowish.

Chest: negative.

Examination:- Pale and toxic appearance; appears to suffer pain in feeding. Not much loss of subcutaneous fat. Puffy under eyes; bluish around mouth. Face plumper than the rest of the body; not typically anxious look with wrinkled forehead. Weight = 7 lb. 10 oz.

Abdomen: flaccid, easily palpable.

Peristalsis: not visible at present; tumour easily palpable.

Sucks very well, some air swallowing.

Chest: negative.

Impression:- Dyspeptic, toxic from constipation, very twitchy and nervy.

Progress:- Improved very well at first, but from the earliest was "twitchy", irritable, jumpy, easily upset and goes into spasms when cries or on examination.

Vomiting: was typically projectile for 3 weeks.

Peristalsis: constant and very marked in first 2 weeks.

Washouts: flaky, clearing within 3 weeks.

Motions: constipated at first, later loose and inclined to be relaxed throughout.

Weight: gained well in first month at 9 lbs.

Stationary for 3 weeks at 9 lb. 7 oz. Improved after feed changes and at 5 3/4 months was 12 lb. 2 oz.

Complications:- Twitchy and inclined to go into spasm from the earliest. At the age of 3 weeks was found in his cot, bluish and gasping for breath. Large projectile vomit when picked up and bowels moved. Very collapsed, with marked loss of tone, lasting about 8 hours. No crying. Pulse 180 per minute. Return to normal gradual but complete; seemed to have vomited into his trachea. Similar bouts for a week or two, but then settled.

Treatment:- Lavage once a day; not encouraged on account of the spastic nature of the child. Calcium and Potassium Chloride unless bowels loose - up to gr. XV per diem. Feeding: cow's milk: water as 2:1; plus New Zealand Cream, 24 oz. per diem. One week

later, half ounce of cereal added.

At the age of 15 weeks, Benger instead of cereal;  
30 oz. food per diem; later peptonised.

At 5 3/4 months whole milk 20 oz; butter fat  
mixture 10 oz. per diem.

Condition When

Last Seen:- Age 8 months. Weight = 15 lb. 9 oz.

31.8.28. Happy healthy baby. Has gained steadily, 3 teeth. No cough or chest symptoms. No sickness.

Mother says she dare not let him cry, for when he does, he goes black in the face.

Sometimes cries suddenly without warning and next minute begins to laugh. This seen marked during examination.

Abdomen and chest: negative.

Feed: whole milk 4 1/2 oz, 4 hourly.

Summary and Conclusions.

1. At first thought to be pure dyspeptic with constipation, but later showed classical signs of a definite mild Hypertrophic Stenosis.
2. Onset slow but progressive.
3. Gave evidence of suffering pain.
4. An unusually sensitive child from the beginning

who had spastic convulsive attacks continually; which at the time one thought might develop and prove fatal.

5. One severe attack following some time after food with blueness and extreme collapse.

6. Inclination to spasm lessened about the age of 16 weeks.

7. Responded quickly to any change in food, gaining quickly for a few days, then returning to own slow rate of progress.

8. No chest signs or symptoms; even after cyanotic attacks.

9. Oral Calcium and Potassium Therapy did not appear to influence the condition.

10. At 8 months a happy, healthy baby, but still inclined to spasm.

11. Duration of systematic daily treatment  $3\frac{1}{2}$  months.

Age at cessation of                      do.                      5  $\frac{3}{4}$  months

SURGICAL CASES.



SURGICAL.

CASE I. Violet Clennan, age 2½ months. First seen 1.7.26.

Reason for Seeking Advice:- Vomiting from birth.

Family History:- Parents and three other children healthy.

Personal:- Full time: "big baby at birth".

Breast 1 month, weaned on account of vomiting.  
Then dried milks.

Vomiting: after every feed from birth, big  
and projectile, "white curdy", foul smell.

Peristalsis: first noticed by mother in 2nd  
month immediately after food.

Bowels: constipated.

Weight: fallen steadily from birth, now 6 lb.  
8 oz.

Appeared healthy until 2nd month, but "never

warm." Sleep undisturbed, even after a vomit.

Examination:- Wasted baby that has obviously lost ground. Facial appearance typical, does not seem in pain.

Abdomen: distension in upper half; stomach dilated.

Peristalsis: typically visible;

Pylorus: readily palpable.

Chest: negative.

Impression:- Pyloric Stenosis; losing ground.

Operation:- Hammstedt's; first day after observation Pylorus was definitely thickened.

Progress:- For first 3 weeks after operation, no obvious progress; visible peristalsis as before operation though less marked. During next 3 weeks progressed well, having lavage and atropin. Vomiting: slight occasional for 2 weeks, never projectile. Peristalsis: present for 1 month after operation. Motions: 2 per diem and normal throughout. Weight: gained from 6 lb. 8 oz. to 9 lbs. in  $1\frac{1}{2}$  months. Gained most during belladonna therapy. At  $4\frac{3}{4}$  months was 9 lb. 14 oz.

Complications:- Nil. Postoperative temperature

101.4; normal in 24 hours.

Treatment:- Operation, salines first 24 hours.

Belladonna m  $\overline{\text{iii}}$  per diem from 3-7 weeks post operation. Mist. Atropin drachm one, 4 times per diem later.

Lavage once daily.

Feeding: human milk 18 to 24 oz. for 2 weeks; then cow's milk and water, equal parts, 30 oz.

At the age of 4 months milk and water as 2:1  
24 oz.

" " " " 4 1/4 " " " " " " plus  
Farola.

Summary and Conclusions.

1. Persistent case of moderate severity in female child.
2. Symptoms dated from birth.
3. Mother herself described typical peristalsis from the second month.
4. Late in seeking treatment.
5. Operation did not meet with rapid improvement expected.
6. Medical reinforcements, especially Belladonna met with ready response.
7. Free from complications; postoperative

temperature rise slight (101.4)

8. Recovery steady; cure apparently permanent.
9. Duration of systematic daily treatment 2 months.  
Age at cessation of " " " 4 3/4 months.

CASE II. Thomas Beattie, age 7 weeks. First seen 13.7.27.

Reason for Seeking Advice:- Lost weight during the past  
14 days.

Vomiting and constipation.

Family History:- Parents healthy. First child.

Personal:- Full time. Birth weight = 8 lbs.

No breast milk. Cow's milk and water, equal parts,  $1\frac{1}{2}$  oz. 3 hourly.

Vomiting: large and projectile, not every feed. No vomiting till 5 weeks. No cough.

Motions: constipated, 2 to 3 days without a motion.

Examination:- Typical pyloric facies; emaciated, pained, hungry.

Wasting: extreme; dehydration marked.

Weight: 6 lb. 10 oz.

Abdomen: marked loss of subcutaneous fat.

Peristalsis: visible during and immediately after feed.

Tumour: not palpable.

Motions: smooth, dark in colour.

Chest: negative.

Impression:- Fairly severe Pyloric Stenosis, with late onset.

Operation:- Rammstedt's - after 3 day's observation pylorus very definitely thickened; stomach not markedly dilated.

Progress:- Child ill and very dehydrated before operation. Remarkably little post-operative shock.

Took salines and milk well since the evening of the operation. Retained rectal salines and glucose well.

Vomits: 6 small in first 24 hours post operation.

4 " " second " " " "

Later 2 " " five days, then ceased.

Peristalsis: never visible since operation.

Lavage: not found necessary.

Motions: 2 per day green and relaxed pre-operation.

2 " " normal for 2 weeks post operation.

Abnormal for only one day after this.

Weight: preoperative -	6 lb. 11 oz.
10 days postoperative	7 lb. 3 oz.
24 days later	8 lb. 2 oz.
5 weeks " age 12 weeks	8 lb. 11 oz.

Improvement was steady but slow for 3 weeks,  
then quickened and was fit and well at 12 weeks.

Complications:- Nil. Postoperative temperature to 102  
normal in 48 hours.

Treatment:- Operation. Salines, oral and rectal, and  
breast milk, dilute after 12 hours: at  
first hourly, then 2 hourly.  
5 days post operation cow's milk and water  
with extra sugar 21 oz.  
5 days later, cereal added.  
3 weeks post operation milk and water with  
sugar and cereal, 30 oz. per diem.  
At age of 12 weeks milk and water as 2:1  
plus extra sugar and mixed cereal - 30 oz.

Condition When

Last Seen:- Age 5 months. 10.10.27. Weight = 13 lb. 12 3/4  
oz.

Has improved steadily and is now happy and  
free of all symptoms. No complications.

Summary and Conclusions.

1. Severe case of late onset in male child.
2. No sign of any symptoms before 5 weeks old.
3. Onset rapid appeared to be in pain.
4. Operation followed by remarkably little shock.
5. Postoperative rise of temperature moderate -102-
6. No complications.
7. Postoperative progress satisfactory without any set back.
8. No medical reinforcing treatment required.
9. Cure apparently permanent.
10. Duration of systematic daily treatment 5 weeks.  
Age at cessation of " " " 12 weeks.

CASE III. Frank Allen, age 6 weeks. First seen 19.9.27.

Reason for Seeking Advice:- Losing weight, vomiting.

Family History:- Parents healthy. First child healthy and breast fed.

Personal:- Full time. Normal birth. Birth weight = 10 lbs.

Has lost 2 lbs.

Vomiting: began at 3 weeks and since then has continued. Certain of the vomits have been projectile down the nose - others small.

Rapid loss of weight.

Constipated: at outset 2 to 3 days, occasional green stool however.

Breast: feeds well.

Cough: nil.

Examination:- On the breast. Weight= 7 lbs.

Bright, hungry, active baby. Fairly good condition. Obvious loss of weight, but not toxic or dehydrated.

Mouth: slight thrush. Test feed  $1\frac{1}{2}$  oz. in ten minutes.

Abdomen: peristalsis very definitely visible. Pyloric tumour palpable.

Chest: nil.

Impression:- Typical Pyloric Stenosis in good condition.

Operation:- Kammstedt's. 2 days after observation, stomach very dilated, pylorus hard small, characteristic. Time 7 minutes.

Progress:- Very marked hyperpyrexia after operation - 108.4. Temperature settling to normal slowly in 72 hours. Improved steadily once temperature became normal and took breast feeds 3 hourly.



Vomits: 1st postoperative projectile vomit 9th day after operation.

2nd " " " 11th " "

Later small vomits for 5 days.

Lavage: small curdy returns for a week.

Peristalsis: never visible after operation.

Motions: two or three normal throughout.

Weight: preoperative ... .. 7 lbs.

1 week postoperative ... .. 7 lb. 4 3/4 oz.

3 " " 7 lb. 14 oz.

3 1/2 " " age 10 weeks 8 lb. 2 1/2 oz.

At the age of 5 months 14 lb. 1 oz.

Improvement has been uninterrupted and mother says child is contented.

Complications: nil. Postoperative hyperpyrexia 108.4

Treatment:- Preoperative salines. Postoperative salines 2 to 4 hourly.

Breast milk plus water 24 hours after operation.

" " 3 1/2 hourly undiluted 6 days after "

3 weeks after operation breast plus cereal.

Condition When

Last Seen:- Age 9 1/2 months. 1.6.28. Weight = 18 lb. 15 oz.

Looks well; mother says perfectly contented.

Teething normal. No vomiting. No peristalsis. Motions normal since ceased

observation. Chest negative.

Summary and Conclusions.

1. Congenital Hypertrophic Pylorus in fair condition.
2. Has lost 3 lbs. from birth till observation.
3. Symptoms appeared typically at 3 weeks old.
4. Operation followed by little shock.
5. Postoperative hyperpyrexia marked - 108.4
6. Progress good without any trouble.
7. No medical reinforcing treatment.
8. No complications.
9. No continuance or recurrence of stomach symptoms.
10. Duration of systematic daily treatment 4 weeks.  
Age at cessation of " " " 10 "

CASE IV. Leslie Reid, age 5 weeks. First seen 19.10.27.

Reason for Seeking Advice:- Vomiting and wasting.

Family History:- Parents healthy. Pregnancy normal.

First child.

Personal:- Healthy born. Full time. Birth weight = 7 lb.

8 oz. 1st week weight 7 lb. 13 oz.

3rd " " 7 lb. 5 oz.

4th " " 6 lb. 10 oz.

Breast fed. Thrived well to 3rd week when vomiting started.

Vomiting: usually projectile, large and curdy. Large and forcible early a.m. and usually after every feed.

Motions: normal till vomiting commenced; small and green after that, now very constipated.

Examination:- Active, intelligent child. Weight = 6 lb. 10 oz.

Fair condition, losing slowly, no gross emaciation. Hungry expression; no pain; crying a lot. Well developed.

Abdomen: stomach moderately distended.

Peristalsis: definite; tumour not definitely palpable.

Motions: constipated, scanty.

Chest: negative. Cough and sneezing after

vomiting. Mother thinks this is due to food coming down nose.

X-ray examination: 2 examinations. (1) Meal of sugar, water and Barium. None left in stomach in 40 minutes; no peristalsis visible.

(2) 5 days later, large stomach. Peristalsis visible but not active.

No regurgitation into oesophagus.

Nothing passed pylorus in 25 minutes.

Impression:- Pyloric Stenosis regarded necessary for operation.

Operation:- Rammstedt's. 5 days after observation, moderate stomach dilatation, definite pyloric thickening and stenosis.

After operation stomach contents could be expressed freely through the opening.

Time 13<sup>u</sup> minutes.

Progress:- Little, if any, postoperative shock. Post-operative temperature to 102; settled in 24 hours. Made good headway; happy, feeding and sleeping well.

Vomits: 3 slight yellow vomits since operation.

Peristalsis; never visible after operation.

Lavage: not required.

Motions: 2 per diem, occasionally abnormal.

Weight: preoperative ... .. 6 lb. 10 oz.  
1 week postoperative ... 6 lb. 10 oz.  
2 " " ... 6 lb. 14 oz.  
3 " " 9 weeks old. 7 lb. 15 oz.  
At the age of 5 months 13 lb. 12 3/4oz

Improvement has been well maintained throughout.

Never sick once.

Complications:- Nil. Postoperative temperature to 102.2.

Treatment:- Preoperative salines. Postoperative salines hourly; gradually reduced to 4 hourly.  
Dilute breast milk 3 hourly in first 24 hours.  
First feed 9 hours post operation.  
Undiluted breast milk 3 hourly after first 24 hours.  
Thickened feeds and cereal added when seen at the age of 9 months.

Condition When

Last Seen:- Age, 1 year. 3.9.28. Weight = 21 lb. 12 oz.  
Healthy, well developed child. Fontanel closed. Mixed feeding. No sickness, vomiting or cough. No symptoms of any kind - perfectly healthy.

Summary and Conclusions.

1. Pyloric Stenosis with characteristically typical history, time of onset, etc.

2. In spite of sensible mother and good care, after initial gain steadily lost ground.

3. Appeared suitable for operation.

4. Little or nor postoperative shock.

5. Little postoperative pyrexia - 102.2.

6. No medical remedies or reinforcement required.

7. No complications; nor recurrence of symptoms.

8. Duration of systematic daily treatment  $2\frac{1}{2}$  weeks.

Age at cessation of " " "  $7\frac{1}{2}$  weeks.

CASE V. Thos. O. Thornton, age 6 weeks. First seen 9.12.27

Reason for Seeking Advice:- Vomiting, loss of weight.

Family History:- Parents - age 28 and 25 - healthy. First child.

Personal:- Full time, healthy born. Birth weight =  $8\frac{1}{2}$  lb.  
Thrived for 3 weeks with 2 to 3 motions per diem.  
Feeding: well at breast.  
Vomiting: at 3 weeks noticed a little, strong forcible after every feed. Since then has decreased to 2 per diem.  
Constipation: one motion every two days, more for last four days.  
Loss of weight: obviously progressive for past 2 weeks.

Examination:- Active, intelligent type. Weight = 6 lb. 12 oz.  
Facies typical of pyloric. Hungry, crying, in pain. No skin sepsis.  
Mouth: some thrush.  
Abdomen: stomach visibly dilated.  
Peristalsis: not evident at first; typical seen after 1 oz. of warm saline.  
Pyloric tumour: readily palpable.  
No evidence or history of convulsions.  
No chest signs.

Impression:- Definite Pyloric Stenosis.

Operation:- Rammstedt's. One day observation, pylorus definitely hypertrophied and stenosed. To closing peritoneum, 5 minutes. Total time 11 minutes.

Progress:- Very well after operation. Little post-operative shock. Postoperative temperature 103.2.

Progressed without any set back.

Vomits: one projectile vomit after operation.

Peristalsis: never seen on examination after operation.

Bowels: normal since operation.

Chest: negative.

Weight: preoperative	...	...	6 lb. 12 oz.
1 week postoperative			7 lb. 5½ oz.
2 " "			7 lb. 12 oz.
At age of 3½ months			12 lb. 1 3/4 oz.

Complications:- Nil. Postoperative pyrexia 103.2. Settled well.

Treatment:- Preoperative salines plus breast.

Postoperative salines. Breast dilute after 24 hours. Breast: 3 hourly after 48 hours.



Condition When

Last Seen:- Age  $3\frac{1}{2}$  months. 6.2.28. Weight = 12 lb. 1  $\frac{3}{4}$  Oz.

Wound soundly healed.

Appears to be satisfied with breast feeds  
and is happy in between.

No vomiting. No cough.

Summary and Conclusions.

1. Definite case at suitable stage for operation.
2. Typical history with evidence of pain.
3. Operation caused little shock; progress rapid.
4. Postoperative temperature 103.2.
5. No medicines required.
6. Cure apparently permanent. No recurrence of symptoms.
7. No complications.
8. Duration of systematic daily treatment 2 weeks.  
Age at cessation of " " " 8 weeks.

CASE VI. Eric Elgee, age 8 weeks. First seen 9.5.28.

Reason for Seeking Advice:- Vomiting and losing weight.

Family History:- Parents healthy. One other child aet.  
1 year 7 months, healthy.

Personal:- Healthy born. Birth weight =  $6\frac{1}{2}$  lbs.

Breast 5 weeks. Present weight = 6 lb. 7 oz.

Weaned on account of milk disappearing. Then various dried milks.

Vomiting: began at 2 weeks; worse in last 2 days.

Motions: green and constipated; now brown and choppy.

Examination:-Pale and pseudojaundice, listless, drowsy.

Looks very ill. Wasting, with much loss of subcutaneous fat.

Skin: moist and thin. Mouth: nil.

Chest: negative, but whistling expiration, right side.

Abdomen: prominent. Pylorus: palpable.

Peristalsis: very marked after a feed.

Motions: constipated.

Lavage: very dirty, curds and mucus.

Feeding: takes well but not over hungry for next feed as some are.

Impression:- Pyloric Stenosis of late onset of distinct severity.,

Operation:- Rammstedt. After 4 days observation ,  
Stomach: much dilated and hypertrophied.  
Pylorus: very short but gristly and stenosed as usual. Cardiac end not hypertrophied.  
Time 10 minutes.

Progress:- Showed little shock; sleeping and taking feeds well immediately after operation.  
Temperature rose to 101 settling in 48 hours.  
Vomits: 3 small projectile vomits in first week after operation.  
Lavage: dirty in first few days.  
Peristalsis: never visible after operation.  
Bowels: normal 2 to 3 per diem.  
Chest: negative.

Weight: preoperative	...	...	6 lb. 7 oz.
1 week postoperative			7 lb. 2 oz.
3 weeks	"		8 lb. 1 oz.
4 "	"		8 lb. 8 oz.
At age of 13 $\frac{1}{2}$ weeks			9 lb. 1/4 oz.

Developed a stitch abscess which caused weight to be stationary for 3 to 4 days.

After going from observation developed very

frequent greenish motions regarded due to doubtful cow's milk. Relieved by dried milk.

Complications:- Nil except this temporary diarrhoea.

Treatment:- Preoperative salines 4 hourly.

Postoperative " 1 to 2 hourly in first 24 hours.

After 72 hours post op. cow's milk and water, equal parts plus glucose 2 drachms -  $27\frac{1}{2}$  oz. per diem. 2 weeks after operation increase to 30 oz. in 24 hours.

On diarrhoea - dried milk.

Summary and Conclusions.

1. Fairly severe; seen late but onset early - 2 weeks.
  2. Did not respond to preliminary medical treatment.
  3. Operation caused little shock; postoperative pyrexia - 101.
  4. Improvement slowish and upset by stitch abscess.
  5. Potassium Chlorate tried for slight vomiting with apparent effect.
  6. Cure apparently permanent.
  7. No complications when under treatment.
- Diarrhoea accounted for and remedied by dried milk.

8. Duration of systematic daily treatment  $4\frac{1}{2}$  weeks.

Age at cessation of " " "  $12\frac{1}{2}$  weeks.

MEDICAL DEATHS.

MEDICAL DEATHS.

CASE I. John Dickinson, age 6 weeks. First seen 9.2.27.

Reason for Seeking Advice:- Not thriving, vomiting, lost  
much weight.

Family History:- Parents healthy. Pregnancy and labour  
normal. 2 other children - one died at  
2; other aet. 4 healthy.

Personal:- Full time baby. Birth weight =  $8\frac{1}{2}$  lbs.

Breast since birth.

Vomiting: large after every feed, not  
definitely projectile.

Constipated:

Examination:- Underdeveloped, no craniotabes.

Face pinched and very drawn; very fretful and pained. Emaciation marked, almost complete loss of fat.

Skin: dry and wrinkled, lips and mucous membranes abnormally red. Hands and feet blue and cold. Weight = 6 lb. 8½ oz.

Abdomen: not distended at present.

Peristalsis: not visible at present.

Liver and spleen: not palpable.

Feeds: always hungry, sucks well.

Chest: nil.

Impression:- Typical history and appearance of fairly severe Pyloric Stenosis; though none of the classical symptoms yet visible.

Progress:- Appeared to hold his own for first week, though did not take feeds well after first day.

Vomiting: at first slight returns. One week after, large projectile vomits after most feeds.

For 4 or 5 days continued vomiting more than 1½ oz. at a time.

Lavage: twice daily and very dirty every time.

Bowels: normal for first week, then more constipated; never oftener than once per diem.



Peristalsis: very well marked but only after child began to gain strength - one week after treatment stated.

Weight: gain never exceeded  $2\frac{1}{2}$  oz. from weight at beginning of treatment and only for a short period of 4 days. After first week strength weakened, and sucking slower and becoming very feeble with onset of complications.

Complications:- One week after treatment started - age

$6\frac{1}{2}$  weeks - breathing became laboured and wheezy. Temperature 99.

2 days later wheezy,

and rales general. Temperature 98.4

2 days later signs of bronchopneumonia, temperature 97.4. Strength failing rapidly, hardly able to suck.

At the age of 8 weeks strength failed even with spoon feeding.

Died with well-marked bronchopneumonia.

Treatment:- Lavage: twice per day until signs of strength failure. No definite evidence of distress from lavage.

Feeding:- Breast, 3 hourly with complimentary feeds of cow's milk and water, equal parts.

(only  $\frac{1}{2}$  to  $\frac{3}{4}$  oz. from breast per feed.

Later breast feeds made up to 14 oz. per diem.

" " " " " " 15 oz. " "

When weaker was spoonfed with breast milk.

Summary and Conclusions.

1. History definite; signs at first indefinite.
  2. On observation proved a Pyloric Stenosis of severe degree, suffering considerable pain.
  3. In spite of breast feeding throughout, never made progress.
  4. Late in obtaining treatment with resultant starvation and dehydration.
  5. General strength began to fail - as shown by sucking and movements - before evidence of chest infection - age  $6\frac{1}{2}$  weeks.
  6. Very poor reaction to bronchopneumonia, with temperature never above 99 and subnormal - 97.4 - before death.
  7. No sign of twitchings, spasm or tetany.
  8. Treatment dietetic and lavage.
  9. Duration of systematic treatment 2 weeks.
- Age at death ... .. 8 weeks.

CASE II. John Wilson, age 9 weeks. First seen 16.4.27.

Reason for Seeking Advice:- Failure to gain, persistent vomiting.

Family History:- Not obtained.

Personal:- Breast 2 weeks, then milk left mother.

Then dried milks.

Vomiting:- persistent with slow feeding, frequent small feeds etc.

Examination:- Small, under nourished. No gross emaciation. Weight=7 lb. 4 oz.

Abdomen: normal shape and contour.

Stomach: no marked dilatation.

Peristalsis: grossly marked.

Feeds: sucks hard, hungry but appears in pain while feeding.

Motions: constipated - one in 2 days.

Chest: negative.

Impression:- Pyloric Stenosis in a weakly looking baby.

Progress:- Did not improve with treatment.

Vomiting: after each feed for first 4 to 5 days. Large vomits typically projectile, lessened in severity on smaller feeds.

Continued one projectile per diem till death.

Peristalsis: very marked at first, always present but appeared to lessen with strength of child.

Lavage: two per diem, very dirty at first and never really clear.

Bowels: constipated throughout, and one constipated motion per diem.

Weight: at 9 weeks ... .. 7 lb. 4 oz.

Never rose above ... .. 7 lb. 6 oz.

Complications:- 24.4.27, age 10 weeks at 4 p.m. had a convulsion, temperature 103.4 and a second at 9 p.m.; constant twitching; crying.

25.4.27 "status epilepticus" till mid-day following.

26.4.27 improved a little, less pinched appearance, colour better. Pulse rapid, rate doubtful but stronger. Acetone very marked. Temperature 101.6 to 100.

27.4.27 worse. Pulse rising and thready. Head retracted, limbs rigid, twitching face and eye muscles, temperature 103.5 to 104.

Lumbar Puncture: not under pressure.

Fluid showed. No definite increase of white cells; no organisms.

28.4.27. Died at 1.40 p.m. No post mortem examination.

Treatment:- Lavage: twice a day. Bromide - gr. 1  
four hourly.

Feeding: cow's milk and water, equal parts  
plus New Zealand Cream - 24 oz.-

Reduced to 20 oz. per diem - 10 feeds of 2 oz.

One week later - 1 oz. of breast milk hourly  
by mouth. Rectal salines 2 hourly.

Summary and Conclusions.

1. Pyloric Stenosis in a weakly baby.
2. Commencement of treatment late - age 9 weeks.
3. No response to medical treatment.
4. Operation not considered.
5. Definite signs of pain in feeding.
6. Remained stationary till onset of convulsions  
at the age of 10 weeks.
7. Convulsions constant for 24 hours without  
marked hyperpyrexia - temperature 104.
8. No chest complications.
9. No tendency to twitchings, spasm etc. noticed  
before the convulsion immediately before death.
10. Treatment dietetic; lavage and nervous  
sedatives.

11. Duration of systematic treatment 12 days.

Age at death under 11 weeks.

CASE III. Jared Harvey, age 4 weeks. First seen 25.5.27  
(birth)

Reason for Seeking Advice:- Vomiting, loss of weight.

Family History:- Parents healthy. Mother complained of fairly severe vomiting of pregnancy, and was nervous during pregnancy. Labour precipitate. One other child - boy aet. 4; delicately built but no serious illness.

Personal:- Feeds: breast 2 days, "milk left then".

Modified cow's and dried milks for 3 weeks.

Vomiting: began at one week - first slight returns, later more forcible, then projectile in extreme, curdy; often food in stomach for 2 hours before he vomits.

Motions: constipated in first 4 weeks, now normal.

Cough: slight, and baby very often vomits after cough.

Sleeps: well, not fretful.

Wasting: has been steady and all downhill from the start.

Examination:- At birth bright, contented baby, weight = 7 lbs. Now ill-looking, face pinched and drawn, wrinkled, "old man expression". Very wasted and dehydrated, colour poor, skin cold. Weight = 5 lb. 4½ oz.

Abdomen: stomach dilated. Pylorus: not palpable.

Peristalsis: very definite and marked.

Mouth: very dirty with "Thrush".

Chest: cough, no physical signs.

Feeds: takes well, appears nervously hungry. Pained expression towards end of and after feed.

Vomiting: appears to collect for 3 to 4 hours each time.

Motions: relaxed, dark brown in colour.

Impression:- Severe Pyloric Stenosis becoming progressively worse.

Progress:- Extremely ill appearance when systematic treatment commenced. Lost ground from the start. No response to changes in treatment. After 1 week very ill and in pain.

" 2 " seemed to be just holding his own and if anything, less dehydrated.

Vomiting: after every feed, projecting 3 to 4

feet. Then 3 to 4 per diem large collected feeds after several hours. Continued pronounced large and projectile and collected at least one per diem.

Lavages: remained extremely dirty for first week then only slight improvement at best.

Peristalsis: even at 2 hours after a feed very marked; very seldom absent all through.

Bowels: constipated, one motion per diem at best.

Loose for 2 days at age of 6 weeks.

Weight = birth weight - 7 lbs. 4 weeks 5 lb. 4½ oz.  
6 weeks - 4 lb. 10 oz. 7 weeks (died) -  
4 lb. 10 oz.

Complications:- After 1 week temperature rose some part of every day to 99; to 100.

After remained normal or below till terminal temperature 100 to 106.

No obvious cause for initial rise.

Chest: negative. Only appeared weak dehydrated baby after 3 weeks treatment - age 7 weeks- when he had seemed a little more restful and had battled hard for two weeks, suddenly collapsed with convulsions and large projectile vomit. Never rallied and died at 10 a.m. Temperature 106.



Treatment:- Lavage: twice per diem then lessened.

Mist. Atropin.  $\frac{1}{2}$  oz. for one week.

1 week later Atropin. recommenced and continued.

Feeds: cow's milk and water as 1:2 plus

New Zealand Cream - 15 oz. per diem.

10 days later human milk whenever possible.

Summary and Conclusions.

1. An extremely severe case of early onset.
2. Course progressively down hill.
3. Feeding changes unaffected course; pain toward end of feeds.
4. Atropin. therapy had no beneficial effect.
5. Weight dropped  $\frac{3}{4}$  lb. at first, then remained stationary.
6. In spite of being obviously very ill, held his ground for two weeks.
7. Death resulted after sudden collapse, with convulsions following on large projectile vomit - terminal temperature 106.
8. No evidence of twitchings, tetany etc. in spite of death ultimately in convulsions.
9. Treatment chiefly dietetic and lavage, with Atropin therapy for a week.

10. Duration of systematic treatment 3 weeks.

Age at death 7 weeks.

11. Mother has baby girl now age 7 weeks.

Pregnancy similar to above case recorded. No signs or symptoms of any Stenosis.

CASE IV. Edwin McLean, age 10 weeks. First seen 25.7.27.

Reason for Admission:- Vomiting and loss of weight.

Family History:- Parents healthy. Pregnancy normal. First child.

Personal:- Healthy born. Breast fed at first, feeding well then

Vomited: everything from breast; temporary relief from cow's milk.

Vomiting and constipation: began at 5 weeks, with 2 to 3 vomits per diem.

Examination:- Extremely poor child, seems pained, wasted, dehydrated, toxic - brightened considerably after hyperdermic salines.

Weight = 5 lb. 13 oz.

Abdomen: stomach distended and appears low down.

Peristalsis: definitely palpable.

Tumour: definitely palpable with waves of

peristalsis leading up to the site.

Chest: negative physical signs but has severe cough.

Mouth: clean. Urine: negative.

Impression:- Severe, longstanding and of late onset.

Progress:- Very ill from the start with severe hacking cough, without visible physical signs, seemed to gain ground during the first 10 days and after one week's treatment, surgeon agreed to wait a day or two and consider operation.

Vomiting: projectile; one or at most twice per day. Based off after first week.

Lavage: twice per diem, dirty all along.

Bowels: very constipated at first, after first week 2 motions - abnormal - per diem.

Weight: at age of 10 weeks	5 lb. 13 oz.
"      "      "11      "	6 lb. 4 oz.
Died      "      " 11 $\frac{1}{2}$ "	6 lb. 9 oz.

Complications:- Cough remained troublesome from the beginning, but lessened in severity after first week of treatment. Absence of physical signs with occasional rise in temperature to 99.8.

At age of almost 12 weeks appeared to be

gaining strength and was more active, when at 2 a.m. convulsions started; unconscious; pin-point pupils; stomach distended - a visible swelling showing left to right and downwards. Nil in rectum - small motion after the finger. Stomach wash of curds and greenish fluid. Right arm began to twitch, wrist flexed, fingers flexed, curled in on thumbs, then general convulsions. Died 4 a.m. never regaining consciousness.

Treatment:-

Lavage twice daily throughout.

Subcutaneous 5 to 10 oz. and rectal - 4 to 8 oz. salines throughout.

Mist. Atropin. Sulph. 3 VI per diem only for 2 days before death.

Feeding: cow's milk and water, equal parts plus extra sugar - 21 oz. per diem.

4 days later human milk plus sugar  $\frac{1}{2}$  oz. and lactic acid 2 drachms - 21 oz. per diem  
4 days later returned to milk mixture.

Summary and Conclusions.

1. A severe case, late in onset and treatment.
2. Child very toxic, dehydrated, in pain and ill when treatment started.

3. Troubled throughout with severe cough without any evidence of gross signs in chest.

4. Progress, all things considered, was satisfactory for 10 days.

5. No signs of restlessness, twitching or tendency to spasm.

6. General improvement with gain in weight 12 oz. in 2 weeks.

7. Apparently well when, without premonitory symptoms, had convulsions, beginning as Tetany and later extending to general convulsions, which proved fatal 2 hours after commencement. Terminal temperature 101.

8. Treatment was simply dietetic with lavage, the Atropin therapy only being started a day before death.

9. Duration of systematic treatment 2 weeks.

Age at death

12 weeks.

CASE V. Robert Speedy, age 4 weeks. First seen at birth  
19.2.28.

Reason for Seeking Advice:- Loss of weight and vomiting.

Family History:- Illegitimate.

Mother: in pregnancy showed mental symptoms from third month onwards with tremendous appetite especially for carbohydrates - urine negative - would eat a whole jar of jam or treacle. Periods of acute depression and excitement alternating. Frequent threats of suicide and statements that she had poisoned herself. Labour normal.

Personal:- Full time. Healthy baby. Birth weight = 8

1/4 lbs. Artificially fed, dried milks.

Vomiting: began with returns at 10 days.

Projectile during last 4 days, first of all after last feed at night regularly.

Bowels: 2 motions per day, not abnormal.

Wasting: Grandmother remarked that baby looked "like an old man".

Examination:- At 10 days happily active. Abdomen: negative (definitely). Now aet. 4 weeks active but

hungry and crying. Emaciated and becoming dehydrated; does not appear in pain.

Weight = 5 lb. 14 oz.

Abdomen: full above, narrow below, doughy feel.

Stomach shows little distension.

Peristalsis: has been definitely seen though negative on 4 occasions.

Vomiting: definitely projectile.

Tumour: not palpable.

Washouts: dirty and blocks the tube.

Bowels: constipated.

Feeds: well; cries in between as if hungry; sleeps well.

Urine: scanty; scarcely any in one 24 hours.

Impression:- Severe case of early onset, without early signs.

Progress:- For the first 14 days did no more than hold his own, and even during this period looked extremely ill and losing ground at times. Later became very slow with feeds, appearing to lose strength and showed signs of circulatory failure becoming very pale, with cyanosed lips. Vomiting: definite projectile vomits with smaller returns at least once per day in first

2 weeks. Then eased a little apparently with failing strength.

Lavage: was very dirty throughout, at first blocking the tube.

Peristalsis: definitely visible every day for first two weeks and pylorus was definitely felt to harden and could be rolled under the finger.

Bowels: became very constipated after 10 days.

Weight:- Birth weight: 8 1/4 lbs.

At one month            5 lb. 14 oz.

" 6 weeks            6 lb. 2 oz.

Died at 7 weeks        6 lbs.

Complications:- Failure of general strength first noticeable by slow feeding and ill appearance at 7 weeks. Became white with blue lips. Heart rate slowed from its normal - 110 to 120 - to 54 per minute - appeared to rally when crying. Later pallor returned and died apparently from heart failure an hour after first attack.

Death: was quiet and slow, with heart becoming gradually slower and slower, and then ceasing to act. No convulsions



or other disturbance.

Post Mortem Showed:- Gross emaciation, small amounts of free fluid in the body cavities. Heart small, no congenital abnormality, left ventricle apparently in systole. Thymus very small.

Stomach: very large, extended completely across abdomen and was partly dilated.

Pylorus: much hypertrophied; was behind and divided towards vertebrae on right side.

Small bowel: apparently normal.

Iliac and sigmoid colons markedly distended, with hard faeces throughout. Ureters showed well marked spindle dilatation. Nil else.

Treatment:- Lavage twice per day. Pot. Chlorate gr. XV per diem.

Feeding: cow's milk and water, equal parts with New Zealand Cream -  $22\frac{1}{2}$  oz.- Then

reduced to 18 oz. 1 week later, cereal added to thicken.

Summary and Conclusions.

1. Severe case with early and insidious onset - 10 days.
2. No physical signs on examination for the condition at seven days and 10 days old; although was then beginning to return some feeds.
3. Very weakly when systematic treatment started.
4. No evidence of tendency to spasm or convulsions.
5. Loss of strength and failure to recover first shown by slow feeding.
6. Death appeared to come on suddenly from Heart Failure, with a preceeding minor attack of Cardiac Failure.
7. Such heart failure occurred in spite of no post-mortem signs of congenital heart disease or later degeneration. Ventricle apparently stopped in systole.
8. Death seems to have been due to inanition uncomplicated.
9. Pylorus, though in post-mortem, it was behind and directed back towards vertebrae could be distinctly felt in life, to be hypertrophied.

10. Treatment practically purely dietetic with lavage.

11. Duration of systematic treatment  $3\frac{1}{2}$  weeks.

Age at death  $7\frac{1}{2}$  weeks.

SURGICAL DEATHS.

CASE 1. John Graham Koper, age 7 weeks. First seen 20.5.27

Reason for Seeking Advice:- (1) Steady loss of weight.  
(2) Projectile vomiting since  
14 days old.  
(3) Constipation for the **past**  
week.

Family History:- Parents healthy. Normal in pregnancy.

Four other children alive and well.

Personal:- Full time baby; has lost steadily.

Birth weight = 8 lbs. Fed on breast 2 hourly.

Appeared pained during feeds.

Vomiting: definitely projectile, began at 14  
days old.

Motions: green and **relaxed** till this week;  
now constipated.

Examination:- Long, thin child. Now weighs 6 lbs.

Impression - old and haggard, appears  
pained; marked emaciation, poor colour,  
ill and listless, cold with cyanosed  
extremities.

Abdomen: long, thin, emaciated.

Spleen: not palpable.

Peristalsis: well marked.

Pyloric tumour: definitely palpable.

Stomach: large, dilated to below umbilicus.

Chest: R.M. very feeble, no cough.

Impression:- Severe case now in very poor condition,  
and apparently suffering considerable pain.

Operation:- Rammstedt. - 4 days observation - showed  
large dilated stomach with gross thickening  
of pylorus.

Progress:- When under observation (4 days) pre-operation,  
child did not gain but remained in poor  
condition, wizened in appearance and seemed  
to be in great pain at times.

Vomiting: projectile once or twice a day.

Peristalsis: marked throughout.

Pylorus: palpable throughout.

Lavage: very dirty from the first, with much curds

Bowels: constipated, dark in colour, no sign of  
blood.

Weight: Birth weight = 8 lbs.

At 7 weeks, weight = 6 lbs.

Died at  $7\frac{1}{2}$  weeks " = 5 lb. 12 oz.

Complications:- Collapsed suddenly one hour after return  
from hospital the day after operation.-  
This child had to be taken to and from the

General Hospital for operation, having nursing elsewhere. Peristant vomiting, rapid feeble pulse, marked blanching of the face for four hours. No rigidity of the abdomen.

Died 11.30 p.m.

Treatment:- Preoperative lavage, salines etc.

Operation: Hammstedt.

Summary and Conclusions.

1. Severe case, early in onset, late in receiving treatment.
2. Had been 5 weeks without treatment.
3. Very definite signs of being in pain; especially at feeds.
4. Observation under medical treatment showed no headway at all.
5. Operation performed late, under unfavourable circumstances; such that the child had to be conveyed to the General Hospital for operation and conveyed back for nursing attention - severe test-.
6. Post operative shock apparently the most direct cause of death.
7. Post operative temperature not recorded.
8. Duration of treatment 5 days.

Age at death

7½ weeks.

CASE II. Phyllis Atkinson, age 6 weeks. First seen  
6.7.27

Reason for Seeking Advice:- Persistent vomiting and loss  
of weight 14 days duration.  
Previously well and thriving.

Family History:- Mother suffering from marked anaemia.  
In poor health while carrying this child.  
5 other children - 4 alive, one died at  
3 months -. The child older than the  
patient has always been difficult to  
rear and does not walk or talk yet.

Personal:- Full time baby, never breast fed. Birth  
weight =  $6\frac{1}{2}$  lbs.  
Feeding: cow's milk and barley water - 2  
hourly feeds -  
Vomiting: commenced 14 days ago -  $\frac{1}{2}$  hour to  
1 hour after every feed. History suggests  
projectile.  
Motions: dark green and very foul smelling.

Examination:- Anaemic small type, emaciated.  
Weight = 5 lb. 13 oz.  
Under normal development. Expression:  
frowning and pained.  
Abdomen: stomach not markedly dilated.  
Spleen: not palpable.



Peristalsis: markedly visible; tumour: not palpable.

Bowels: relaxed, normal colour.

Chest: no cough history, no physical signs.

Impression:- Typical Pyloric Stenosis in an underdeveloped female baby. Extremely frail in appearance rather than grossly toxic.

Operation:- Rammstedt; after observation of 8 weeks -

Stomach: not much dilated.

Pyloric antrum: hard and thickened, requiring 2" incision to free all hypertrophied muscle.

Bleeding troublesome, both from mucous membrane and stomach wall. Pyloric required suturing.

Progress:- At first child was very listless with poor colour and did not make any progress over a period of 7 weeks.

Vomiting: large projectile vomit at least once every day for 7 weeks. Small vomits and returns once or twice per diem. Postoperative no further projectile vomits, and even no vomits terminally.

Peristalsis: at first very marked 1/4 hour after food. For 5 weeks definite and typical.

Pylorus: palpable on two or three occasions.

Bowels: at first motions relaxed, of good colour.

Inclined to constipation, with one normal motion a day for four weeks.

4 weeks after commencement of treatment - age 10 weeks - 2 and 3 abnormal motions per diem for a week. Normal till after operation, gradually increasing in severity.

Weight: age 6 weeks - start of treatment	5 lb. 12 oz.
" 8 "	5 lb. 10 oz.
" 13 "	5 lb. 5½ oz.
" 14 " at operation	5 lb. 7 oz.
" 16 "	6 lb. 8 oz.

Complications:- After operation was doing well, active and hungry, feeding well.

1 week post operation oedema around eyes definite

4 weeks " " diarrhoea came on without apparent cause, gradually increasing in severity. Had 3,4,5,6 then more than 10 motions per diem finally terminating fatally.

Temperature: preoperative rose to 100 without apparent signs or symptoms.

Postoperative rose no higher than 100.

Normal 4 days then occasionally to 99.

After diarrhoea onset, was 100.8 to 103.2 terminal.

Treatment:- Feeding: cow's milk and water, equal parts plus New Zealand Cream - 15 oz.-

After one week extra sugar and cereal added.

At age of 13 weeks 20 oz. of mixture with  $\frac{1}{2}$  oz. cereal and 5% sugar.

First day postoperative: human milk and water equal parts with  $\frac{1}{2}$  oz. extra sugar.

Two weeks postoperative: 26 oz. feeds per diem thickened feeds. Cereal  $\frac{1}{4}$  oz., New Zealand Cream 2 drachms.

On diarrhoea onset: skimmed milk or lactic acid milk. Atropin. therapy  $\frac{1}{2}$  m. 6 times a day, only for a limited period pre-operation.

Ultra violet light for 3 weeks pre-operation.

Summary and Conclusions.

1. Definite case of Hypertrophic Stenosis in a delicate underdeveloped female child.

2. Pre-treatment period not unduly long - 14 days - but considering the weakling child is equivalent to longer.

3. Maternal health poor in pregnancy and since, with probably ill effect on home case of the baby.

4. Symptoms typical with signs of suffering pain.

5. Long preoperative medical treatment with child losing ground from the start.

6. ultra violet rays were not of appreciable value.

7. Operation late - age 14 weeks - immediate result good.

8. Postoperative temperature not above 100.6 - could it be weak reaction of a poorly developed child?

9. Diarrhoea proving fatal did not begin till 4 weeks after operation.

10. Delay in operation meant still lowering the resistance of an already ill developed child.

11. Duration of treatment 10 weeks.

Age at death                      16 weeks.