ENTRY FOR

THOMSON MEMORIAL MEDAL

CASES OF

CONGENITAL PYLORIC STENOSIS

James A.L. Gilbert
Summer Session 1941
NAME - DAVID THOMSON
AGE 32
ADMITTED 29/8/40
DISCHARGED 23/11/40
DISEASE - PYLORIC STENOSIS.

RESULT - OPERATION - RECOVERY.

SUMMARY
Vomiting at 10 days - weaned at 2 weeks. Admitted at 3 months of age.
B.W. 8 lbs 5 oz. Height on admission 6 lbs 4 oz.
Operation on 35 day.
Recovery slow. Double stitus mediae.
Artificial sunlight seemed to be beneficial.

HISTORY
F.T. 3 D. B.W. 8 lbs 5 oz. Born in Kirkcaldy Hospital.
Breast fed for 2 weeks but stopped on account of vomiting, on artificial food 4 days.
Began vomiting after discharge home after 9 days. Vomiting after every feed and impossible. Losing weight. He is eager for his food, but little satisfies him. Bowels constipated for last 10 days - one motion every second day - sometimes green.

FAMILY
FATHER 24 Painters
MOTHER 23
CHILDREN 3/2 (patient)
EXAMINATION

GENERAL CONDITION  AGE 52
General condition fairly good
Rather a small baby.

SURFACE
Head well shaped - small R
Fontanelle adheres to fingers - sulci overlap slightly.Thorax and limbs proportionate.
Face small and wrinkled like an old man.

SURFACE
Skin rather pale - rather dry & scaly
on abdomen. Mucous membranes moosh &
good color.

NUTRITION
- This baby is considerably less of subcutaneous
  tissue

MUSCULATURE
- Poorly developed.

MENTAL CONDITION
- Active baby - with rather an
  anxious look.

AILMENTARY SYSTEM
Abdomen moves on respiration
Upper abdomen rather full. No definite peristalsis
seen. No hemor rhage. Liver & spleen not palpably
enlarged.

CARDIO VASC. SYSTEM
Pulse regular -
Heart sounds closed.

RESPIRATORY SYSTEM
Expansion fairly good.
Perfusion - Note resonant.
Auscultation - B.S.

RENAL SYSTEM
Kidneys not enlarged
Urine - alkaline - No albumen - No sugar - No deposit
NERVOUS SYSTEM: No neck rigidity. Pupils equal and react to light. No twitchings.

GASTRIC JUICE:
- Free HCl: 14.3 c.c. N/10
- Total Acid: 53 c.c. N/10

3.9.40 - Barium meal. Barium series shows considerable gastric retention up to 6 hours, suggesting a pyloric stenosis.

Continually vomiting. The vomit was yellowish and frothy due to frequent vomiting. No peristalsis seen and no more than suspicion of tumour on palpation.

PROVISIONAL DIAGNOSIS: Vomiting, Pyloric Stenosis

5.9.40 - Vomiting and Barium meal suggests pyloric stenosis but clinically no peristalsis seen or tumour felt. It was considered that this might be a rare case of peptic ulcer causing vomiting. Lomotil / anti-smoking operation performed by Sir John Stacee. Typical tumour of moderate degree. General anaesthetic.

10.9.40 - Doing very well.
16.9.40 - Check in progress for no known reason. Not taking fluids as well as before but looks very well.
23.9.40 - Progressing well now.

30.9.40 SUMMARY TO DATE

This case of pyloric stenosis came in to the ward in relatively poor condition and despite frequent vomiting his condition was improved before operation. He presented some difficulty in accurate diagnosis due to the absence of peristalsis and inability to feel tumour. But at operation a typical tumour was present. Child is making satisfactory progress.
5.10.40 Rashes has been increased. 48 stools in night.
7.10.40 Rashes reduced. Turner stools.
8.10.40 No gain in weight. Not so well.
9.10.40 Both ears discharging. Thin yellow pus.
          Special taken.
14.10.40 Ear discharging again.
16.10.40 Increased discharge from ear.
20.10.40 Not gaining well. Ear still discharging badly.
27.10.40 Refuses to gain weight. Ear discharging. Orsosteos.
30.10.40 Ear discharging less. Not gaining weight.
5.11.40 Gaining weight. Improving. W.B.C. 10,000
          Hb. 52% R.B.C. 3,980,000.
11.11.40 Improving slowly.
12.11.40 Alternate feeds of Nestles 1 1/2 + milk 1/2 when 3 of
          Feed increased to 4 oz. Only 1 Nestle feed in day.
20.11.40 Gaining weight. Ear drying up.
22.11.40 Still gaining weight. - for discharge.
23.11.40 Discharged home.

**SUMMARY**

A case of pyloric stenosis which was operated on, and did not respond immediately to operation. Both ears discharging and he was slow to gain weight. However Nestles milk helped him greatly and at time of discharge he was progressing favourably.
NAME    WHITE THOMAS
AGE     8½
ADMITTED 10.1.41
DISCHARGED 7.4.41
DISEASE  PYLORIC STENOSIS

RESULT  -  OPERATION RECOVERY

FAMILY  HOME
FATHER  -23 ARMY
MOTHER  -23
CHILDREN - 1

HISTORY

PRESENT ILLNESS
R.S.M.P.  F.T. Foetuses 7. reason - labour only 4 hours.
Baby probably shocked at birth.  B.W. 6lbs 8½ oz.
B.7.3 hrs.  went home on 9½ day.  3-4 days
later vomiting began.  Mouthfuls 4-57 hours
after most feeds.  Bowels moved regularly
soft yellow motions.  Flatulence until 2 weeks
ago.  Vomiting has continued and now
occurs usually 3 minutes after a feed.
Sometimes "shook out on the floor" - often fairly
large quantity.  Baby hungry for feeds.
appears to be losing weight.  No constipation

Family History
EXAMINATION

GENERAL CONDITION

WEIGHT 8lbs 3oz

STRUCTURE  Slightly undersized

for age. Fontanelle admits 1 finger

T 98.8°

Average tension. No congenital

abnormality. Oval head.

HEIGHT 21"

NUTRITION  Fairly well nourished.

SURFACES  Face pale. Mucous membranes

moderately good colour. Throat clean. Tongue

moist but slightly furred. Very little hair.

MUSCULAR CONDITION  Normal activity.

Hands satisfactory. Eyes bright.

MENTAL CONDITION  Appears of average intelligence.

Not irritable.

ALIMENTARY SYSTEM  Tongue as above. Abdomen

rounded - moves with respiration. Gastric

peristalsis visible - definite. No tumour

felt. Livers and spleens not enlarged. No

tenderness. No rigidity.

RESPIRATORY SYSTEM  Breathing normal.

Chest moves well on respiration. Note

resonant throughout. Sounds vesicular

with no accoutrements.

NERVOUS SYSTEM  Pupils equal - regular

reaction to light. No neck rigidity. No

spasticity. Reflexes normal.
RENAL SYSTEM - Kidneys not palpable. No tenderness. URINE - No pus, no albumin, nothing abnormal.

CARDIOVASCULAR SYSTEM - Pulse regular, good volume. A3 not localised. Sounds closed and pure in all areas.

12.3.41 Syncope minor T.d.s. Pastix residue 31
14.3.41 - Stained weight. Constant residue.
16.3.41 - Emetic vomitus. Nasal saloon.
17.3.41 - Vomiting. Projectile vomitus. Stools improving. 37 residue very thick. No tumours felt.
21.3.41 - Prepared for operation.
21.3.41 - Luminal 8½ pre op.
operation - Rammeled

Anæsthetic - Ethyl Chloride + ether

Tumours small and hard, up very high. Baby very newy. General anæsthetic for stitching abdomen.

PROVISIONAL DIAGNOSIS

Condition at end of operation fair.
21.3.41 No vomiting. Taking feeds well.
22.3.41 Going on well. Rise of temperature yesterday, considered mostly due to electric heat.
23.3.41 - Has passed several large stools.
Buttocks red. Going on well.
27.3.41 - Satisfactory - hungry.
30.3.41 - Has passed several large stools - six - Petroleum emulsion & glucose saline. Stitches out. Wound satisfactory.

31.3.41 - Feared to have loose stools. To go on milk + water mixture.

5.4.41 - Stools rather frequent. Not gaining weight. Feed increased to 4 oz. Looks fairly well.

7.4.41 - Taking feed well - gaining weight. Stools normal. Wound well healed.

**SUMMARY**

This baby had a fairly typical history of a pyloric stenosis - starting about second week. Visible peristalsis. No tumor felt. He was treated with saline for 10 days but vomiting continued and he began to lose weight. Ramstedt's operation was therefore done. Post-operatively the child did well. No vomiting. Stools became normal. The gained weight.
NAME BELL KEITH  ADDRESS % COMBE I WARD PLACE
AGE 52
ADMITTED 13.2.41  BIRTHDAY 18.1.41
DISCHARGED 17.4.41  RECOMMENDED M.O.P.D
DISEASE PYLORIC STENOSIS

RESULT OPERATION

SUMMARY

FAMILY HOME
FATHER 25 - SAILOR
MOTHER 23
CHILDREN 2
F 3 mo. 3.11 weeks. Pyloric Sten.
M 3 3/52

HISTORY

PRESENT ILLNESS

FT. S.D., E.I.M.M.H. B.W. 6lbs 10oz. B.F.

For 19 days but artificial feeding started because
baby's clothes caught fire and although only the
baby's little toe was burned! The mother got such
a fright that she had no milk.
2 3/5 milk and water + teaspoonful sugar
4 hourly. When at breast last day vomited
after each feed. Vomiting is increasing
sometimes while being fed and at other
times 1/2 hour after - projectile "right into the
fireplace" large quantity. Bowels move
every second day - dark green motions
constipated. Baby hungry and cries
for its feeds. Losing a lot of weight.
Does not pass much water.

Family History.

Previous child died at 52 two
years ago - "went same way" and had operation.
in flux for "twisted bowels" and "blockage of stomach at 32."

**EXAMINATION**

**GENERAL CONDITION**

**AGE** 35y  
**WEIGHT** 5' 5 lbs 14 0z

**HEIGHT** 19 1/2"

**Temperature** T 98.4°F  
**Pulse** P 132  
**Respiration** R 36

**Structure** - Average length and proportion. No congenital abnormalities. Fowkember admits two fingers - Normal

**Tension.**

**Nutrition** - Very poor. Has lost considerable weight.

**Subcutaneous Fat.** Left small toe - Scalp. Left forearm one septic spot. Umbilicus satisfactory.

**Mucous Membrane.** No lesion. Skin dry and indurated. Mucus membranes relatively good colour.

**Exterior.** Clean but dry. Hyper pulsatil.

**Muscular Condition.** Tone not much impaired.

**Mental Condition.** Irritable


**Cardiovascular System.** Pulse rate x volume fairly good over breast not localized. Sounds closed & pure in all areas.
NERVOUS SYSTEM  Pupils equal and regular, and to light. No neck rigidity. No spasticity.

RENAAL SYSTEM  - Kidneys not palpable.
- Urine - Neutral. No albumen. No sugar

14.2.41 - Has had two projectile vomits. S.S. 60cc
G.L. 37  - Lumbar drain 1 T.D. B.N.O. To have daily S.S.
15.2.41 - Less vomiting. No residue. B.O.T
16.2.41 - Still very large projectile vomits.
17.2.41 - Has gained a very little weight. Still vomiting. B.O. several times.
19.2.41 - Gastric Residue 3 x 1/4. Slightly loose stool.

22.2.41 - Pre-operative Treatment. S.S. 9 R.36. B.O.

OPERATION - Ruminobestino - Miss Mackay.
- Anaesthetic: Novocain, R. paramecanum injection.
- Small, but very hard Tumour found. Stomach much enlarged. Proved diagnostic. Pyloric Stenosis.
- Abdomen closed with continuous silk.

Condition at end of operation good.
21.2.41 - Doing very well. Taking glucose + Nestles. B.O. No vomiting.
23.2.41 - Doing well. Takes few feeds. B.O.
24.2.41 - Has lost a little weight.
26.2.41 - Pus from lower end of wound.
- Taking feeds well. B.O. One vomit.
27.2.41 - Pathological Report. Pus - 1 protein + Staphylococci as culture.

Lower end of wound gaping - fair amount of pus.
- To have saline + glucose + a small of hydrogen 3ss
28.2.41 - Lost weight. Fair amount of pus from lower end of wound. To have oxygenations.
2.3.41 - 31/311 nestles 1/8. Still taking feeds well
a little cough. Nil in chest. Less discharge from wound. Fusol dressing.

3.3.41 — Stitches taken out. 1/2 at lower end of wound not adhering. Less pus. Baby weaker.

4.3.41 — Lost weight.

5.3.41 — Green loose stools. Wound healing. Fusol 3 1/2 b.d. Nestles milk 6 feed. Skin

milk and water 2 feeds.

6.3.41 — Stop Bismuth. Baby weaker.

7.3.41 — Very frequent stools. Poor condition. Cough makes him vomit.

8.3.41 — Nestles 1-10. Very weak. Mouth open. Taking feeds very very slowly.

9.3.41 — No cough. Stools I.S.O.


12.3.41 — Faeces laverage — please vomit.


15.3.41 — Gained more weight. Taking feeds well. Infrequent cough. Stools frequent and
still improving. Satisfactory slow improvement.

17.3.41 — Has gained a little more weight.

21.3.41 — Lost a little weight. Taking feeds well.


27.3.41 — Gained weight again.

5.4.41 - Wound practically healed. Baby much better, has gained weight. Soon ready for home.

9.4.41 - To have 3/4 feeds milk 2/4 water and 1/4 feeds Nestle.

12.4.41 - Feeding weight. Taking feeds well. Wound quite healed.

14.4.41 - On to whole milk o water feeds.

16.4.41 - Feeding weight. Stools satisfactory. Now ready for home.

Final Diagnosis - Pyloric stenosis (Ramsay Hunt's operation).
Present Illness: Possible meningitis for 3 days.
Baby was one of twins born at Simpson Maternity Pavilion 6 weeks ago.
First pregnancy 3rd premature.
B.W. 5 lb 3 oz - Breast fed while in Hospital for 3 days.
No vomiting, stools normal. Practically regained birth weight on discharge from Hospital. Since leaving Hospital has been fed on Nestle's - 1 heaping 1/2 tablespoon, 3 hourly - gained weight and was satisfied - just an occasional vomit with flatulence - 3 days ago vomiting started and he has vomited persistently since. Bombsos prospectile - very large amounts and swelled - very hungry for feeds.
Bowelts moved once daily - not constipated. Passing urine normally - sleeps well.
Has lost weight during last three days.
Patient also seen at the Clinic in Simpson Maternity Hospital Thos afternoon.
Twin brother - healthy B.W. 5 lb 6 oz now 9 lbs.
Family History - no family history - quite healthy.
EXAMINATION

STRUCTURE - average size baby. HEIGHT 20"
Normal proportions. Fontanelle open and normal tension.

NUTRITION - very thin. Skin loose and wrinkled over body and limbs.

SURFACES - relatively good tone and of fair color. Tongue slightly dry and reddened. Stool healthy.

MUSCULAR CONDITION - surprisingly good tone and strength. Moves freely.

MENTAL CONDITION - appears bright. Eyes bright.

Temperature 97.8°  Pulse 124  Resp. Rate 28.

DIGESTIVE SYSTEM - abdomen thin and retracted. Difficult to palpate due to emphysema.
On examination no peristalsis seen, and no tumour felt. Liver and spleen not enlarged.

GENITO URINARY SYSTEM - kidneys not palpable.

URINE - albumen negative. Nil microscopically.


CIRCULATORY SYSTEM - Pulse regular and of normal volume. Heart sounds pure and closed in all areas. No murmurs.
CENTRAL NERVOUS SYSTEM – No week rapidly.
Knee jerks present.

PROVISIONAL DIAGNOSIS - ? PYLORIC STENOSIS

TREATMENT + PROGRESS
15.4.41 Peristaltic seen today. No humps felt. Vomited 3 times in night. But not projectile.
Gastric residue 12 oz. mane 8 oz. rose.
To have subcutaneous saline 3 c.c.
Hemoglobin M.T.C.I.D.
16.4.41 Has not vomited so frequently today. 3 times - not definitely projectile.
Gastric residue 8 oz. mane, 16 oz. rose.
General condition slightly improved.
Fontanelle still slightly depressed.
19.4.41 General condition much the same.
Fontanelle not quite so depressed. Gastric residue 8 oz. mane. Projectile vomit in evening.
18.4.41 Has had 3 large vomits during night. Gastric residue 8 oz. Condition, since admission, has not really improved.
19.4.41 Three large vomits during night.
Gastric residue 8 oz. General condition rather poorer – 30 c.c. blood given intra-
fontanelle.
20.4.41 Ramsay-Hunt Operation - Hans Herzfeld
Kaminal ½ gr. Novocain -2½% Chloride a ½ sit.
Rgpm. paramedial incision - Tumor ½ longa firm mucous membrane of stomach perforated.
Two sublines to close the perforation. Peritoneum stitched.
Abdomen then became very distended and in spite of passing stomach tube the distension was not relieved – 2 gas in peritoneal cavity. General anaesthetics then
Given—Peritoneum opened but no gas found. Distension was then partly relieved by stomach tube. Abdomen closed with 4 deep Through and through sutures. Condition after operation amazingly good. Pulse not good. 

But operationally to have nothing by mouth for 8 hours. Subcutaneous saline 4 hourly. 

2 a.m. To have first feed. Glucose 1/2 Normal saline 3/8. Took feed well. Then Nestlé 1:10 3/4 hourly.


22.4.41 — Satisfactory — Taking feeds well. One small vomit at night. B.O. 

23.4.41 — Not so well 10-day colour poor. Blush grey round mouth. Fontanelle not sunken. Pulse quite good. Vomited once. Stools loose and frequent. Blood Transfusion 75c.c. Blue saline 40 c.c. 10 a.m. Condition slightly improved. TB 68°

24.4.41 — A slight improvement in general condition — does not look so grey 10-day. Taking feeds quite well. Stools rather loose and green.

25.4.41 — Slight improvement. Still has occasional vomitus — Face not so grey. Spooned has quite a healthy cry. 10 p.m. Does not look so well tonight. Fontanelle slightly sunken. Stools still frequent and green.

26.4.41 — General condition appears worse today. Slow with feeds. Green loose stools during night. Continuous drip started.

27.4.41 — Died.
PATHOLOGY REPORT

NAME: MICHAEL M  AGE: 5/2
WARD: PROF MCNEIL  P.M.: 28.4.41
DIED: 27.4.41

EXTERNAL APPEARANCE: The body was that of a small emaciated male infant. There was a recent surgical incision in the epigastrium not yet fully healed. Abdomen was a little full but not tense.

ABDOMEN: Peritoneal sac. There were unorganized fibrinous adhesions between the pyloric portion of the stomach and the inferior surface of the right lobe of the liver. Also between the transverse colon and stomach, and between the omentum and anterior abdominal wall at the base of the incision. There was also a little fibrinous exudate on the surface of the spleen but the rest of the peritoneal sac was quite healthy and the serous membrane was smooth and glistening.

Stomach was moderately dilated and rather thick walled. The pyloric canal was greatly hypertrophied and very hard. Ramist's operation had been performed. The incision in the stomach was covered with rather purulent looking fibrinous exudate and was adherent to the livers as described. Two stitches had been inserted in the mucous membrane at the proximal end of the incision.
in the mucous membrane was still detectable but it was partly healed and there was no leak that could be seen. Intestine showed some patches of congestion especially in the ileum but nothing of much significance. Livers, spleen, kidneys and other organs showed nothing except a somewhat parasitic appearance.

**THORAX**

Serous pleas were healthy. Lungs were congested and oedematous. Pneumonia was not obvious but there might have been as little as the extreme base.

Upper respiratory passages, mouth, pharynx and oesophagus were healthy. Heart showed nothing to note.

**SUMMARY**


**BACTERIOLOGICAL REPORT**

Faeces: No organisms of dysentery or enteric groups isolated.
NAME  MACKIE GILBERT
AGE  62
ADDRESS  13 BRIANBANK TERRACE
BIRTHDAY  8.3.41
RECOMMENDED BY: DR. BRUNELL
ADMITTED  18.4.41
DISEASE  PYLORIC STENOSIS
RESULT  RECOVERY

SUMMARY

Family
Father  36 yrs
Mother  35 yrs
Children
♀  2½ yrs
♂  6½ yrs

PRESENT ILLNESS

Vomiting for 9 days.

Breast fed baby at birth weight 9 lbs. Gained 1½ lbs weight in the first week and 9 oz weekly for next 3½ weeks. Has taken feed well since birth. No vomiting until 9 days ago after 4½ weeks. Then he started vomiting after 2-3 feeds, either directly or within an hour - practically the whole feed. During the last 6 days he has vomited after every
feed - vomits hourly every possible - takes feeds greedily at first. Up till recently has been very good sleeper between feeds now he cries often for an hour before the feed is due. His mother does not think he is thinner now. Bowels have been loose mustard action since birth until 6 days ago when they became constipated. Has had only 2 motions within the last 4 days and has been quieter behaviour. Blood stained vomits 3 days ago - occult blood.

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<tr>
<th>FAMILY HISTORY</th>
<th>Healthy</th>
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<tbody>
<tr>
<td>GENERAL CONDITION</td>
<td>Well nourished healthy looking baby.</td>
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<tr>
<td>STRUCTURE</td>
<td>Head well shaped. Fontanelle admits 2 fingers - normal tensility Thorax normal contours - no hearing. Limbs proportionate.</td>
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<tr>
<td>NUTRITION</td>
<td>Well nourished - subcutaneous tissues have good No obvious loss. Face not pinched</td>
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<tr>
<td>SURFACE</td>
<td>Skin smooth and elastic - healthy pink colour - Mucous membranes moist and good colour. Tongue moist and clean. Eyes glistening. Ears healthy</td>
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<tr>
<td>MUSCULAR CONDITION</td>
<td>Muscles tone good</td>
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<tr>
<td>MENTAL CONDITION</td>
<td>Not unduly wakful or irritable Noisy - just before feeds.</td>
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AILMENTARY SYSTEM  
- Abdomen moves on inspiration. 
- Abdominal muscles very active. 
- No peristalsis seen. 
- No umbilical reflex. 
- Liver and spleen not palpably enlarged.

RENAL SYSTEM  
- Kidneys not palpable. 
- Urine - alk. alk. Sugar.

RESPIRATORY SYSTEM  
- Chest expansion good. 
- Percussion resonant. 
- Auscultation B.S. 
- No accompaniments.

CARDIO- VASCULAR SYSTEM  
- Pulse regular. 
- Apex beat within normal limits. 
- Heart sounds closed.

CENTRAL NERVOUS SYSTEM  
- No neck rigidity. 
- Three jerks present not equal. 
- Pyelitic Encephalitis.

PROVISIONAL DIAGNOSIS

TREATMENT & PROGRESS
18.4.41 - Vomited during 2 o'clock feed. Retained 1 3/4 oz. 
- Vomited fairly forcibly.
19.4.41 - No vomiting during night. 
- F. R. 6 drs.
20.4.41 - Some peristalsis seen. Projectile vomiting. 
- F. R. 6 drs.
21.4.41 - Very little F. R. but thick - B. M. O. Has had one projectile vomit. Peristalsis seen.
22.4.41 - Large thick F. R. 10 drs. Two projectile vomits. 
- Takes feed eagerly. One small constipated motion.
23.4.41 - Looks Thinner today. Starting Enemata 
- mi T. D. S. Comited twice - projectile. 
24.4.41 - Has not looked well today. Pale and eyes 
- look sunken. Would not seek at
2 o'clock feed. Subcutaneous saline given. Seems very collapsed.

Took 6 o'clock feed slightly better.

Slight improvement in general condition since yesterday. Large gastric residue. Not eaten for 18 am. feed but look it better than feeds yesterday.

To have subcutaneous saline B.D.

6 P.M. Ramped up operation - Miss Hersfeld

Removal 348.4. Ethylchloride & Ether

Right paracentesis incision. Considerable amount of subcutaneous fat. Time needed about 34 m. in length.

Peritonaeum closed & continuous suture. Baby became rather restless during closure of peritonaeum and general anaesthesia was given. Muscle and sheath closed with continuous suture. Skin sutured with continuous silk suture.

Baby rather pale and pulse poor immediately after operation. 3cc given.

Recovered well within half an hour.

26.4.41 General condition very satisfactory

Taking glucose & ½ normal saline well.

No vomiting. Starting breast milk this morning.

27.4.41 Satisfactory. Taking feeds well.

Has not been put to breast yet.

Bowels normal.

28.4.41 Taking from breast 3 hourly fairly well. Not very eager at night.

29.4.41 Feeds today 4 hourly. Taking very well. Has gained a little weight.
NAME       LEISHMAN ALISTAIR    ADDRESS     84 MARCHMONT Rd. ED.
AGE         152          BIRTHDAY   21.3.41
ADMITTED   7.4.41          RECOMMENDED BY Dr. HENDERSON
DISCHARGED  DEATH 15.4.41.
DISEASE     PYLORIC STENOSIS
RESULT        OPERATION DEATH   SECTIO
SUMMARY        REASON OF DEATH - PERITONITIS

FAMILY        HOME
FATHER        36
MOTHER        35
CHILDREN      2 ½/52.

PRESENT ILLNESS
Breast feed for 1 week. Not enough milk - No vomiting during first week. Now on Nestle's 1, 10%
and 2% thrice. During last 6 days vomiting frequently - projectile, but no peristalsis seen. Hungry for foods. Bowels gradually becoming more constipated. No motion for last 2 days. Losing weight. Two last week.

He family history.
GENERAL CONDITION

Age 2½

WEIGHT 5ft 10½

HEIGHT 19½

an active lively little baby.

Structural - Small but well proportioned. R

head good shape. Fontanelle widely
open - occipito & infra. Thorax and
limbs proportionate.

Nutritional - Rather a thin baby with slight loss of subcutaneous tissue.

Surface - Skin elastic - good colour

Limbs - Some blood stained discharge.

Mucous membranes moist - good colour.

Mouth clean. Eyes bright.

Muscular - Not greatly developed.

Mental condition - Lively baby.

Alimentary System - Abdomen moves on

respiration.

No visible peristalsis.

No hums felt in R E

Liver rather rigid.

Liver & spleen not enlarged.

Respiratory System - Chest moves freely.

Percussion note good.

Auscultation 3 sounds.

Respiratory - No accompaniments.

Cardio Vas. System - Pulse regular

Heart sounds closed.
Renal System - Kidneys with palpable
knee -

Central Nervous System - Pupils react
Knee jerks present.

Provisional Diagnosis - Pyelonephritis.

TREATMENT + PROGRESS
8.4.41 - Has taken feeds well since yesterday. No
vomiting. No peristaltic seen. Gastric Residue 8 oz.
9.4.41 - Has had one vomit but not proctektile.
No peristaltic seen. Has only had one stool
since admission. Gastric Residue 8 oz.
10.4.41 - Gastric Lavage 5 oz. Two vomits - proctektile
Has lost 2 oz weight.
11.4.41 - Peristaltic seen this morning. Small
timour felt. General condition good. Three
vomits - proctektile. 3 stools.
For operation tomorrow. Substantialous Paline 15 cc.
12.4.41 - Gastric Lavage. Small residue 2 oz.
Substantialous paline 90 cc. Humeral 1/4 cc.
Ranesteds operation miss-traceful.
Anesthetics - Novocea.

Right paramephian incision. Small lfit very hard
white inversion found. Peritoneum stitched with
continuous picture. Three interrupted sutures
in post-stickes phale. muscle and skin layers
closed with continuous silk.
Condition after operation very good.
13.4.41 - Liver satisfactory. No vomiting.
Taking glucose & Nestles
14.4.41 - Rather pale but has never had much
colour. Pulse not good. Rather slow with
afternoon feeds. Abdomen distended with
wind but became relieved later.
11.30 pm: pulse good. abdomen less distended
bounced after 9 o'clock feed.
15. 4. 41: 3 am: suddenly collapsed & died.

POSTMORTEM FINDINGS
Post-operative peritonitis following Ramstedt's operation

SUMMARY
A case of pyloric stenosis with early angina
and shock history. While breast feed for first
week that was no vomiting but within a week of
artificial feeding vomiting began. The history
then soon became that of a typical pylorus.
While in Hospital the baby was not given
enemisum. The pylorus became projectile
3 days after admission and persisted up
then pellet. Ramstedt operation was done
5 days after admission. The condition of the
baby was quite satisfactory. Two days after the
operation baby was taking feeds reluctantly
and it was noticed that the abdomen was
rather distended. This death during the
night, however, was sudden and unexpected.
At post-mortem fairly extensive peritonitis was
found.
NAME ALISTER LEISHMAN AGE 3 WEEKS

DIED 15.4.41 P.M. 15.4.41

EXTERNAL APPEARANCE The body was that of an emaciated and under-sized male baby. The umbilicus was healed and healthy. The paramedians, stitched surgical incision, was present in the epigastrium.

ABDOMEN - Peritoneal cavity contained a considerable amount of semi-serulent fluid. Inflammatory exudate was present between the adjacent aspects of the liver and stomach, and in the region of the spleen. The anterior abdominal wall in the area of the incision was oedematous and congested and adherent to underlying mesenteries, and related peritoneum.

Stomach was slightly distended with yellow curdly contents. Cardiac opening was normal. The pylorus was much thickened. Rameshett's operation had been performed. There seemed to be no actual leak of stomach contents but there had been haemorrhage into the layers of the stomach at the upper posterior end of the incision, and the mesenteries on its inferior aspects were exceedingly oedematous and inflamed. The duodenal mucosa was much congested but showed no actual ulceration. The mucous membrane of the rest of the intestinal canal was also much congested. The whole of the intestine was very friable, and in some parts oedematous.
CONGENITAL HYPERTROPHIC PYLORIC STENOSIS

1. Hypertrophy of circular muscle fibres.
2. Fold of redundant mucous membrane.
DISCUSSION

ETIOLOGY
In this short series of six cases, it will be noted that all are boys. In series dealing with large numbers of cases such as that of Rehm and Mjolsness there in 500 cases the proportion of boys to girls was 10:1.

The disease is usually one of the first born and in this series it occurred in first born in 70% of cases, and in second born in the remaining cases. In this respect it conforms to the general rule that this congenital abnormality is more frequent in first born children than in subsequent ones.

There is little evidence to suggest a hereditary factor at work.

PATHOLOGY + PATHOGENESIS
The question of the origin of muscular hypertrophy in this disease and its relation to pyloric obstruction are still matters of dispute.

The hypertrophy affects mainly the circular muscle layer of the pyloric region of the stomach, the longitudinal muscle to a less extent. According to Fraser, the actual circular pyloric sphincter ring is not included in hypertrophy.

The hypertrophy takes the form of a firm, glistening swelling, and such or more in length of pale color and reduced vascularity. The submucous coat is usually increased in thickness, and the mucosa is squeezed
into folds which still further occlude the narrowed lumen. Proximally, the overgrowth lessens gradually to normal thickness at the incisura angularis; distally, it terminates abruptly at the pyloric ring. Frequently the pyloric swelling projects into the first part of the duodenum with a covering of duodenal mucosa, very much as the os uteri projects into the vagina. The projection into the duodenum with the "duodenal diverticulum" around it, is a source of danger in the operative treatment.

Numerous theories of pathogenesis have been elaborated, but none of these theories attempts to explain why the patient is a boy in 9 cases out of 10, or why the majority of cases are in first-born children. In only six percent of cases is there a family incidence. It even remains doubtful whether the hypertrophy is truly congenital. In most cases, the child is born healthy and thrives well for a week or two after birth. Symptoms of obstruction do not arise until some weeks after birth. On one or two occasions recently the condition has, however, been found in a still-born, premature child.

Most modern theories of the pathogenesis of congenital pyloric stenosis are based on the original theory of John Thomson — "pre-natal inco-ordination with post-natal hypertrophy." Thomson maintained that in
the normal child there was required, even in utero, a certain amount of co-ordination at the pylorus, for the passage of swallowed amniotic fluid. Thomson believed the prime cause of hypertrophic stenosis to be a loss of pyloric co-ordination in the foetus. Pyloric inco-ordination resulted, according to Thomson, in an ill-timed, abnormal, forcible, and prolonged contraction of the pyloric muscle. Thomson believed, on the authority of Hunter, that the power to hypertrophy in response to overaction was a property of all muscle. He believed therefore that pyloric inco-ordination before birth was followed by pyloric hypertrophy after birth.

Frasier blames a sympathetic-parasympathetic imbalance at the pylorus in the direction of relative sympathetic overactivity with consequent interference at the gastric evacuation. According to Frasier, the inco-ordinated sphincter is not itself hypertrophied. The antral muscle hypertrophies in an attempt to overcome pyloric spasm. In cases of mechanical occlusion of the duodenum at birth, the antral wall may be almost as hypertrophied as it is in hypertrophic stenosis.

A theory has recently been elaborated to explain the condition rather as a developmental failure. Kestin and Hall have pointed out that in the
<table>
<thead>
<tr>
<th>NAME</th>
<th>PLACE IN FAMILY</th>
<th>AGE AT ONSET</th>
<th>LENGTH OF HISTORY</th>
<th>WEIGHT ON ADMISSION</th>
<th>WEIGHT ON RECOVERY</th>
<th>DURATION OF RECOVERY</th>
<th>BIRTH WEIGHT</th>
<th>WEIGHT ON DEATH</th>
<th>DURATION OF DEATH</th>
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<tr>
<td>David Thomson</td>
<td>1</td>
<td>3 weeks</td>
<td>10 days</td>
<td>6 lbs 4 oz</td>
<td>8 lbs 30 oz</td>
<td>5 days</td>
<td>6 lbs 8 oz</td>
<td>5 lbs 6 oz</td>
<td>7 days</td>
</tr>
<tr>
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<td>1</td>
<td>14 days</td>
<td>4 days</td>
<td>6 lbs 4 oz</td>
<td>8 lbs 30 oz</td>
<td></td>
<td>6 lbs 8 oz</td>
<td>5 lbs 6 oz</td>
<td>7 days</td>
</tr>
<tr>
<td>Keith Bell</td>
<td>2</td>
<td>17 days</td>
<td>4 days</td>
<td>6 lbs 4 oz</td>
<td>8 lbs 30 oz</td>
<td></td>
<td>6 lbs 8 oz</td>
<td>5 lbs 6 oz</td>
<td>7 days</td>
</tr>
<tr>
<td>Michael MacRae</td>
<td>1</td>
<td>5 weeks</td>
<td>6 weeks</td>
<td>6 lbs 8 oz</td>
<td>8 lbs 10 oz</td>
<td></td>
<td>6 lbs 12 oz</td>
<td>5 lbs 4 oz</td>
<td>7 days</td>
</tr>
<tr>
<td>Gilbert Mackie</td>
<td>2</td>
<td>6 weeks</td>
<td>6 weeks</td>
<td>6 lbs 8 oz</td>
<td>8 lbs 10 oz</td>
<td></td>
<td>6 lbs 12 oz</td>
<td>5 lbs 4 oz</td>
<td>7 days</td>
</tr>
<tr>
<td>Alistair Leishman</td>
<td>1</td>
<td>2 1/2 weeks</td>
<td>6 weeks</td>
<td>6 lbs 8 oz</td>
<td>8 lbs 10 oz</td>
<td></td>
<td>6 lbs 12 oz</td>
<td>5 lbs 4 oz</td>
<td>7 days</td>
</tr>
</tbody>
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The pyloric portion of the stomach is relatively thick-walled, out of proportion to the calibre of its lumen, and he has suggested that this disproportionately thick wall may be maintained in the pars pylorica until after birth in children who suffer from (pyloric) hypertrophic stenosis, just as it is maintained normally even after full development in certain lower orders - the edentata, for example.

**Clinical Features**

Since successful treatment depends upon detection of pyloric obstruction at an early date, diagnosis should not now be delayed until the late stages when projectile vomiting is almost continuous and the child dehydrated and cachectic. Vomiting, followed by constipation, arising a week or two after birth should raise the strong suspicion of congenital pyloric stenosis. In this series the average age of the child at the onset of vomiting was seventeen days and the average duration of vomiting before child was admitted to hospital was seven days. Occasionally diarrhoea occurs, and when it does occur the prognosis is bad. In one of the two deaths in this series diarrhoea was a marked symptom. The cause of this diarrhoea is not known. Since the introduction of ergotamin it appears to be more common, visible peristalsis and a palpable tumor are not as a rule, present; before the sixteenth or eighteenth day, but they should always...
<table>
<thead>
<tr>
<th>Name</th>
<th>Visible peristalsis</th>
<th>Palpable tumour</th>
<th>Enlargement of liver</th>
<th>Enlargement of spleen</th>
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<td>+ Gastric peristalsis</td>
<td>NEG</td>
<td>NEG</td>
<td>NEG</td>
</tr>
<tr>
<td>David Thomson</td>
<td>NEG</td>
<td>NEG</td>
<td>NEG</td>
<td>NEG</td>
</tr>
<tr>
<td>Keith Bell</td>
<td>+ Gastric peristalsis</td>
<td>PALPABLE</td>
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<td>Michael Maguire</td>
<td>NEG</td>
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<td>Gilbert Mackie</td>
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<td>Alistair Keishman</td>
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In this series I found that gastric peristaltic waves were present in two cases and in palpable hemo's in only one. An important practical point in the detection of visible peristalsis is to avoid prolonged exposure of the infant's abdomen to the air. A small feed is given, and then a little later the abdomen is uncovered and examined. Visible peristalsis takes the form of a swelling the size of a golf ball arising under the left costal margin and passing across the abdomen to disappear just beyond the midline. At the point of disappearance of the peristaltic wave, an attempt may be made to palpate a pyloric tumour. Sometimes two or three peristaltic waves may be observed together.

**AIDS TO DIAGNOSIS**

Radiological examination has proved helpful in doubtful cases. Gastric dilatation may be obvious on the screen, and it may be an hour or more before the barium passes the pylorus. A residue of barium may remain in the stomach for as long as six hours after the meal is taken. The stomach above the obstruction presents, as a rule, a curious cone-shaped termination towards its pyloric end, which is displaced some way to the right.

No less efficacious than radiological examination is simply the passage of a stomach tube four hours after a normal feed. In pyloric stenosis, as much as fifty per cent of the feed may be recovered.
In late cases of the disease, the child passes into a state of dehydration, chloride depletion, and alkalosis, and there is a terminal elevation of the non-protein nitrogen of the blood. The degree of dehydration and demineralisation is indicated by the dryness of mouth and skin, hollowness of the cheeks and temples, the amount of urine, and the chloride content of urine and blood.

**Differential Diagnosis**

Gastric, pyloric, pylorospasm, and enteritis must be excluded. These are due, as a rule, to unsuitable diet, and are no uncommon in boys, though in girls. In all these conditions there is no accumulation of food in the stomach, and peristalsis is not observed. In enteritis, diarrhoea accompanies vomiting, as a rule, but it should be remembered that occasionally diarrhoea may occur in cases of congenital pyloric stenosis. Congenital narrowing of the duodenum, valvular obstruction of the duodenum, duodenal adhesions, and other forms of congenital duodenal obstruction give vomiting from the day of birth, as a rule, the vomitus being bile stained. The constipation and projectile vomiting of early infective peritonitis have sometimes been mis-diagnosed as congenital pyloric stenosis.

**Treatment**

In most centres an attempt is made to employ a combination of medical and
surgical measures in the treatment of pyloric stenosis. Probably it is safer to make a rule to operate in all cases early rather than to continue conservative treatment persistently over a prolonged period. Rummett records that in the Dusseldorf experiment 92 cases were treated conservatively with a mortality of 18.8%. In the five years after 1928 - 110 consecutive cases were treated by early surgery with a mortality of 5.6%.

CONSERVATIVE TREATMENT

The proponents of this method, who have been getting the worst of it during the past few years, will take heart from the reports of Boddie & Mackay on their results of their experience with eumydrin i.e. atropin methyl nitrate. The use of this drug which has about half the anti-spasmodic action, and about 50 of the toxicity of atropin was originally suggested by henneses some fifteen years ago. In 1935 Eversgaard of Copenhagen compared her results in sixty-one cases treated with eumydrin, with those of surgery and of medical treatment with atropin. She concluded that eumydrin was more effective and less toxic than atropin but that better case better results than surgery. There was only one death in the eumydrin group but workers in Britain, Germany and Sweden have been less fortunate. Dodds & Mackay of London have each treated forty cases...
and have each had five deaths - a fatality of 12.5%. Compared with this Tompson & Peiris's treated 209 cases surgically, mostly in Hospital, with a fatality of 13.4%. Raman found himself as has been mentioned above had a mortality rate of 3.6%.

The technique of the eumydrin treatment is to be carried on for as long as the child gains weight. Small feeds to begin with gradually worked up to an adequate diet is advised by Dodds. The stomach is emptied by lavage a little before each feed so that no residue collects in it. Care should be taken to use for lavage saline as was used in this period, or a salt solution because there is present as a rule a degree of alkalosis. It is essential in these children to overcome dehydration as quickly as possible for serious intoxication may result from the giving of eumydrin to a dehydrated child. Dodds and Bøengaard both give subcutaneous saline until there is a satisfactory passage of urine. However, this administration of subcutaneous saline is not universally approved. Mackay is convinced that too high a fluid intake reduces both effectiveness of the drug and the baby's appetite. Except while there is obvious dehydration she therefore advises fluids by mouth only and limits them to 3 ounces per pound of body weight in the first 24 hours, and thereafter gives only as much as the baby
really needs, the eucymidin 1-10,000 of water is given half an hour before each feed, beginning with 5 cc and working up to 20 cc.

**TOXIC SYMPTOMS** Though less common than with atropin poisoning, especially fever and abdominal distension, and must be an indication for omitting at least one dose of the drug. The working solution of eucymidin does not keep well and must be made each week. This difficulty is overcome by Wallgren's method. He uses a 6% alcoholic solution which is stable. This solution is given in drop doses on the tongue. It need be given only twice a day. The case should be completely recovered at the end of a week and if no decisive improvement is evident, operation is indicated.

**SURGICAL TREATMENT** Here there is a diversity of opinion. There are those, such as Ramstedt who advise operation in all cases as soon as diagnosed, the rationale of this method being that there is no evidence from the appearance of a child as to whether or not it will respond to conservative treatment, i.e., eucymidin. Valuable time may be lost and the child's condition deteriorate thus making operation a hazardous undertaking carrying with it a high mortality. Most clinicians would agree a conservative treatment should be continued for 8 or 10 days in the
average case, and if after this period no gain in weight is recorded operation should be performed.

**PRE-OPERATIVE TREATMENT**

Subcutaneous saline 80c.c. 3-4 hours before operation and 80c.c. 1 hour before operation. Luminal 3% 2-3 hours before operation.

**OPERATION**

The Rammstedt operation is now universally used. Before this operation was perfected the gastro-enterostomy was performed with a high mortality. As in all abdominal operations in infants the patient's limbs are swathed in gauze wool and he is stretched over an electric hot blanket on an aluminium plate to whose corners his wrists and ankles are tied.

**ANAESTHESIA**

In all this series the same anaesthetic was used - that was local anaesthesia with novocain. At the same time a nurse stands at the infant's head and allows him to sip from time to time the juice of a rubber glove dipped in glucose water. An argument sometimes raised against local anaesthesia is that anaesthetic infiltration of the dehydrated tissues of the abdominal wall makes for slow healing and increases the liability to post-operative bursting of the abdominal wound - a complication to which pyloric babies are in any case prone.
The abdomen is opened by a regular paramedian incision. The pylorus is palpated and drawn into the wound by a blunt hook or forceps. When the lumina is inspected a bloodless area is found on the anterior surface. A longitudinal incision is made down through the muscle coat towards the operator. Care should be taken to carry this incision as far proximally as the swelling extends, but distally only as far as the pyloric vein. If it is carried further, the "mucocele fornix" which may surround the distal extremity of the overgrowth is likely to be opened. When the incision has been made through the muscle, a blunt dissector is insinuated under each of its edges, so that the mucosa, widely separated from the muscle, bulges freely forwards, and the mucosal folds are undone. With the blunt dissector any remaining muscle fibres left undivided beyond the pyloric vein are broken through if the stomach is now gently squeezed, gas should pass readily through the patent pylorus, and if the "duodenal fornix" has been opened a leak of gas will indicate the site of the perforation, which may be immediately and meticulously closed by two layers of sutures. When the muscle division is complete the pylorus is returned to the abdomen, and no attempt is made to close the gap in the muscle coat. Rupture of the unprotected mucosa never occurs.
POST OPERATIVE TREATMENT

The post operative period is most important. The great value of breast feeding during this period should be stressed. Frequent small feeds should be given of some readily assimilable food such as peptonised milk. Nothing should be given by mouth for 4 hours after the operation. It was our practice to give 2 drs of glucose hourly for 4-6 hours and thereafter 10g peptonised milk may be prescribed at 2 hourly intervals. The amount of the feed and the length of the interval are gradually increased until by the third day the infant is receiving a feed appropriate to its age and weight.

PROGNOSIS

The outlook in confirmed pyloric stenosis depends on the nutritional state of the infant when the operation is performed. Barrington ward has shown that the heaviest of the child at the time of operation the greater the prospects of cure. In most centres the mortality figure is 12% -25% though in this short series of six consecutive cases the mortality rate was 33%. In general it may be said that the surgeon's mortality figures are best where the operation is done early. In centres where only the worst cases come to the surgeon and where conservative treatment is continued obstinately in spite of loss of weight
The mortality of the Rammstedt operation must be heavy. Post operative resection should be carried out in all cases in order to cut down the risk of gastro-enteritis. In private practice there is practically no mortality in surgical treatment of pyloric stenosis.

**POST OPERATIVE COMPLICATIONS**

Entéritis is the most dreaded of these. The cause of this is probably as follows - it is due to the sudden release of hydrochloric acid into the intestinal mucosa which is not accustomed to it and causes intense irritation. As well as this it seems possible that there is a bacterial infection superadded. One of the two deaths in this series was due to severe post operative gastro-enteritis. Peritonitis was the cause of death in the other case. This patient was a poor operative risk - had lost much weight and unfortunately at operation the mucosal fornix of the pylorus was nicked. Some peritoneal poisoning resulted and at post mortem a peritonitis of the upper peritoneal cavity was found.

Hyperpyrexia, vomiting, haemorrhage and other rare complications, none of which were encountered in this series.

**SUMMARY**

From this series we draw the following conclusions:

1. Excessive pyloric stenosis is a
disease predominating in male children first born. The onset of symptoms is from 17-20 days after birth.

2. As regards physical signs in only one of our cases was the uterus palpable and in only two was peripheral pulsation seen yet when the abdomen was opened in all cases a very definite tumour was present.

3. Regarding treatment we adopted the operative procedure as soon as diagnosis was evident. The mortality rate was 33% which is rather higher than that based on a larger series of cases done in this Hospital where it was found to be 20%.

Ultimate prognosis definitely governed by the weight of the child when it goes to operation. Two deaths in our series were in infants in whom the diagnosis had been delayed and in consequence they had suffered from loss of weight.