SEVENTEEN CASES OF CONGENITAL MALFORMATION
OF THE RECTUM AND ANUS

WITH REMARKS ON
THE PATHOLOGY AND TREATMENT OF THE CONDITION.

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M.B. C.M. Edin. 1892

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The following cases of congenital malformation of the rectum and anus which I have chosen as a subject for my Thesis have been treated at the Liverpool Children's Infirmary during the last four years.

I have to tender my cordial thanks to Mr. Murray, Honorary Surgeon to the Institution, for allowing me to make use of the cases.

I propose first to refer briefly to the classification of the cases and to give some statistics as to the frequency of the condition.

I will then give the notes on the various cases, and will afterwards enter at some detail into the treatment.

Finally in commenting on the Post Mortem Examinations I shall give a brief sketch of the development of the parts involved.
I have adopted with slight modifications the classification suggested by Papendorf, and given by Ball in his work on the Rectum and Anus, p. 23.

The cases consist of:

A. Six cases of imperforate rectum: in these the anus was normal but the rectum terminated blindly at a variable distance from it.

B. Three cases of Atresia Ani Urethralis, in which the rectum terminated in a cul-de-sac which communicated with the urethra: in two of these cases the anus was completely absent.

C. Six cases of Atresia Ani Vaginalis, in which the rectum opened into the vagina; in all these cases the anus was completely absent.

D. One case in which the rectum terminated by a narrow sinus at posterior aspect of scrotum, the anus being absent.

E. One case in which although anus and rectum were normal there was also a narrow sinus leading from rectum to skin in coccygeal region.

One is at once struck by the large number of cases, nine out of seventeen, in which there was a communication with the genito-urinary tract, and it is quite possible that in some of the other cases a communication existed.
as in three of the cases of imperforate rectum we were unable to obtain a Post Mortem examination. I shall have to this point again and will now only say, that I think in cases of imperforate rectum in males a communication with the genito urinary tract is more common than is generally supposed, as it frequently gives rise to no symptom during life, and is only discovered on making a careful post mortem examination.

CAUSATION.

In none of these cases was there any history of any other members of the family having been similarly affected, and in no case was deformity attributed to any "Maternal Impression."

In none of the cases was there, as far as could be ascertained, any other congenital malformation: but in April, 1894, Mr. Murray described a case at the Liverpool Medical Institution in which there was congenital atresia of the small intestine and also a single hare lip and complete cleft palate.

STATISTICS.

Rectal malformations are decidedly rare. Ball (page 22) quotes the Statistics of Zöhrer at the Vienna Lying-in-Hospital and Collins at the Dublin Lying-in-Hospital which jointly reach a total of 66,654 deliveries
and of these only three were born imperforate or about 1-22,000.

During the last ten years there have been about 197,000 children born in Liverpool, and of these sixteen have been admitted at the Liverpool Children's Infirmary suffering from imperforate anus or rectum or about 1-12,000 and of course others must have been treated at home or at other Hospitals.

It is perhaps worth noting that during the same period 110 children born in Liverpool and suffering from hare-lip have been treated here or about seven hare-lips to one imperforate.
<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Varieties of Malformation</th>
<th>Operation</th>
<th>Admitted</th>
<th>Discharged</th>
<th>Result</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>George B.</td>
<td>3 days</td>
<td>Imperforate Rectum</td>
<td>Perineal incision</td>
<td>Feb. 27/95</td>
<td>Feb. 27/95</td>
<td>Death</td>
<td>Post Mortem Examination.</td>
</tr>
<tr>
<td>Walter O.</td>
<td>3 days</td>
<td>Imperforate rectum</td>
<td>Perineal incision - colotomy</td>
<td>Jan. 10/96</td>
<td>Jan. 11/96</td>
<td>Death</td>
<td></td>
</tr>
<tr>
<td>Edward J.</td>
<td>4 days</td>
<td>Imperforate rectum</td>
<td>Perineal incision - colotomy</td>
<td>Sept. 19/96</td>
<td>Oct. 23/96</td>
<td>Death</td>
<td></td>
</tr>
<tr>
<td>Leslie R.</td>
<td>1 day</td>
<td>Imperforate Rectum</td>
<td>Perineal incision</td>
<td>Oct. 24/96</td>
<td>Nov. 9th</td>
<td>Cured</td>
<td></td>
</tr>
<tr>
<td>Amelia S.</td>
<td>2 days</td>
<td>Imperforate rectum</td>
<td>Perineal incision</td>
<td>Jan. 20/97</td>
<td>Jan. 21/97</td>
<td>Death</td>
<td></td>
</tr>
<tr>
<td>Robert J.</td>
<td>1 day</td>
<td>Atresia ani Urethralis</td>
<td>Perineal incision - colotomy</td>
<td>Sept. 24/94</td>
<td>Sept. 27/94</td>
<td>Death</td>
<td></td>
</tr>
<tr>
<td>William T.</td>
<td>3 days</td>
<td>Atresia ani Urethralis</td>
<td>Colotomy</td>
<td>Nov. 15/94</td>
<td>Nov. 21/94</td>
<td>Death</td>
<td></td>
</tr>
<tr>
<td>Henry P.</td>
<td>3 days</td>
<td>Atresia ani Urethralis</td>
<td>Colotomy</td>
<td>May 11/95</td>
<td>May 12/95</td>
<td>Death</td>
<td></td>
</tr>
<tr>
<td>Helen T.</td>
<td>3 mos</td>
<td>Atresia ani Vaginalis</td>
<td>Nil</td>
<td>April 4/94</td>
<td>April 30/94</td>
<td>Unrelieved</td>
<td>Died May 17/94 of Asthenia.</td>
</tr>
<tr>
<td>Josephine C.</td>
<td>3 mos</td>
<td>Atresia ani Vaginalis</td>
<td>Perineal incision - recto-vaginal fistula</td>
<td>June 25/94</td>
<td>July 30/94</td>
<td>Relieved</td>
<td>No permanent relief.</td>
</tr>
<tr>
<td>Margaret S.</td>
<td>7 mos</td>
<td>Atresia ani Vaginalis</td>
<td>Perineal incision</td>
<td>June 13/95</td>
<td>June 26/95</td>
<td>Relieved</td>
<td>No permanent relief.</td>
</tr>
<tr>
<td>Gertrude J.</td>
<td>14 mos</td>
<td>Atresia ani Vaginalis</td>
<td>Rectum freed from surrounding structures and fistulous opening brought back to perineum</td>
<td>Aug. 26/95</td>
<td>Sept. 16/95</td>
<td>Relieved</td>
<td></td>
</tr>
<tr>
<td>Ernest B.</td>
<td>7 mos</td>
<td>Rectum terminates at back of scrotum</td>
<td>Incision in perineum</td>
<td>Oct. 18/93</td>
<td>Oct. 24/93</td>
<td>Relieved</td>
<td></td>
</tr>
<tr>
<td>Francis T.</td>
<td>3 mos</td>
<td>Sinus from rectum to region of coccyx</td>
<td>Curettage</td>
<td>Dec. 18/93</td>
<td>Dec. 24th</td>
<td>Cured</td>
<td></td>
</tr>
</tbody>
</table>
CASE I.

Robert M. age - 4 days.
Admitted - October 5th. '93.
Discharged - " 6th. '93.
Suffering from - Imperforate rectum.
Result. - Death.

History. The child has had no motion since birth.
Has vomited persistently the last twenty-four hours.

State on Admission. The child is rather collapsed, and
the abdomen is considerably distended.
There is a well formed anus in usual position,
but the finger can only be passed up it a ½ of
an inch when it is stopped by a complete
obstruction which gives no impulse when the child
cries.

Chloroform given and an incision made from
the anus to tip of coccyx, but although it was
extended deeply no bowel was reached.
Left Inguinal Colotomy was at once performed,
no difficulty in finding the descending colon
which was sutured to the edge of the wound and
opened.

Much bile stained faeces was evacuated,
materially lessening the abdominal distension.
The child did not seem very collapsed, but
towards midnight the respirations became very rapid and child died soon after.

*Post Mortem examination* showed that the descending colon had been opened at the operation just above the sigmoid flexure, which, together with the rectum, was full of faeces.

The rectum ended in a dilated pouch and the perineal wound had only missed the gut by a very short distance, but if carried deeper it would probably have entered the peritoneal cavity.
CASE 2.

George B. - aged 3 days.
Admitted - February 27/95.
Discharged - " 27/95.
Suffering from - Imperforate Rectum.
Result - Death.

History. Is the first child, both parents healthy, has been vomiting for two days.
State on admission. The child is pale and collapsed, extremities cold. The anus is naturally formed but finger can only pass up for half an inch. A distinct bulging is felt by finger in anus when the child cries.
Operation performed at once: a tenotomy knife passed from anus, upwards and backwards (i.e. in direction of the impulse) meconium escaped freely. Opening dilated with dressing forceps and a rubber tube inserted. No anaesthetic was given.

The child died four hours after the operation from exhaustion.

Post Mortem Examination. The rectum was exceedingly dilated and had only been separated from the anus by a thick membrane. Rectum did not communicate with bladder or urethra.

Rectum came down below level of anal canal lying behind it.
CASE 3.

Walter O. - aged 3 days.
Admitted - January 10th, 96.
Discharged - January 11th, 96.
Suffering from - Imperforate Rectum.
Result - Death.

History. Parents healthy, six other healthy children. No motion since birth, anus was naturally formed when born. Was seen by a doctor this afternoon (Jan. 10th) who incised the perineum to depth of about $\frac{3}{4}$ inch without reaching the bowel. Has been vomiting for two days.

State on admission. The child is very collapsed, extremities cold, frequent vomiting of bile-stained fluid - abdomen distended. No impulse felt at bottom of wound.

Operation on admission. Chloroform given and perineal incision deepened, no impulse felt.

Left Inguinal Colotomy at once performed, a piece of large intestine drawn into the wound and incised, and rubber drainage tube inserted, then fastened to gut with safety pin and silk ligature.

Gut not sutured to edges of wound.

Meconium escaped freely from the tube during the night: none leaking into the wound.

The child died of exhaustion early the next morning.
CASE 4.

Edward J.  age 4 days.
Admitted. - Sept. 19th./96.
Discharged - Sept. 23/96.
Suffering from - Imperforate Rectum.
Result - Relieved.

History. Two other children quite healthy. Has taken nothing since birth except a little tea and sugar. No motion since birth; cries a great deal admitted late at night.

State on Admission. The infant is well nourished, there is anus in natural position, up which finger passes ⅜ of an inch. No impulse felt. Abdomen moderately distended.

Sept. 20th. Operation. Chloroform given, incision from posterior wall of anus to tip of coccyx, but although a deep dissection was made no impulse could be felt, so left inguinal colotomy was at once performed; the colon presented at the wound much distended. The colon was incised and the edges of the incision tied round a glass nozzle which was connected with a piece of drainage tubing, care being taken by sponging to prevent any meconium entering the peritoneal cavity. The colon was not sutured to the wound but was kept in contact with it by the dressings which were arranged round the nozzle.
Sept. 21st. Meconium escaping freely from the tube: a little found in contact with colotomy wound. Child sleeps and takes its milk well. No vomiting.

Sept. 23rd. Very little meconium has escaped during the last 24 hours: no tube removed, colon adherent to abdominal wound.

Sept. 24th. Plenty of yellow faeces escaping, wound dressed twice a day: child takes its food greedily and sleeps well.

Sept. 27th. Doing well, wound in perineum nearly healed - weight 8 lb.

Oct. 5th. Wound quite satisfactory. Weight 8½ lb.

Oct. 23rd. Child was discharged to-day. It is in excellent health and weighs 9½ lb. The wound is quite healthy and there is no prolapse. The friends were carefully shown how to dress the wound, and were instructed as to feeding the infant.

Oct. 28th. Child brought up to out-patient department, an re-admitted. It was very collapsed and wasted, weighing 5 lb. 5 oz. The parents said that it was taken ill the day after it was discharged, and had vomited everything they gave it.

Oct. 29th. Child took small quantities of Horlick's Malted Milk and brandy without vomiting, but gradually became weaker and died during the evening.

Post Mortem examination Oct. 30th.

The body was much wasted. Small intestine pale and empty.
Descending colon firmly adherent to abdominal wall at site of colotomy wound - no peritonitis. Length of small intestine 8 ft. 6 in. Length of large intestine 1 ft. 10 in. Artificial anus situated 12 inches from caecum.

The rectum ended in a dilated pouch 2½ inches in diameter and separated from anus by ¾ inch of tissue.

No communication with bladder or urethra.

September 1896

19 20 21 22 23 24 25 26 27 28 29 30

Dressed | Dressed | Take out

Weight 82.5

Temperature remained at normal until discharged.
CASE 5.

Leslie R. - age - 1 day.

Admitted - Oct. 24/96.

Discharged - Nov. 9/96.

Suffering from - Imperforate Rectum.

Result - Cured.

History. Parents healthy, 4 other healthy children, has been fed with milk and lime-water but has vomited after each feeding.

State on Admission. A small healthy-looking baby, not much abdominal distension. There is an anus, in natural position, up which a catheter can be passed ½ an inch. Distinct bulging can be felt at end of anal canal when child cries.

Operation soon after admission. Chloroform was given and an incision made from half an inch in front of anus to tip of coccyx - the bowel was opened about a ½ inch above end of anal canal - meconium escaped freely - the edges of the bowel were then brought down and stitched to the edges of the skin incision with silkworm gut.

The subsequent history was uneventful - temperature never rose above 99° F. - the sutures held and were removed on Oct. 30th. Faeces escaped freely and there was no contraction - general health was excellent.
Child was discharged Nov. 9th. and was afterwards seen twice as an out-patient: unfortunately he died suddenly of "convulsions" on Nov. 30th.
CASE 6.

Amelia S. - age - 2 days.
Admitted - Jan. 20/97.
Discharged - Jan. 21/97.
Suffering from - Imperforate Rectum.
Result - Death.

History. Has had no motion since birth and has vomited all its food.

State on Admission. Is a small baby slightly jaundiced, very collapsed, extremities cold, abdomen very distended and tympanitic - well formed anus, catheter passes up ¾ inch. A distinct bulging felt when child cries.

Operation - immediate. No chloroform given, incision from anus to coccyx reached rectum which was separated from anus by half an inch of tissue; as child was very collapsed no attempt was made to suture bowel to skin.

Infant died of exhaustion four hours after operation.

No Post Mortem examination could be obtained.
CASE 7.

Robert C. - age - 1 day.
Admitted - Sept. 24/94.
Discharged - Sept. 27/94.
Suffering from - Atresia Ani Urethralis.
Result - Death.

History. A healthy looking infant, has vomited everything since birth.

State on Admission. The anus is absent, no impulse felt when the child coughs: abdomen slightly distended.

Chloroform given and usual perineal incision made but rectum not reached and no impulse felt. Perineal wound stitched up and left inguinal colotomy at once performed. A piece of the colon presented at the wound, a glass tube was inserted, and a silk ligature firmly tied round gut and tube. Colon was not sutured to edge of wound - a rubber tube was fastened to the glass tube and the other end placed in a test-tube and the wound dressed with gauze and wood wool.

Sept. 25. Wound healthy - adhesions forming - drainage free - child takes milk well.

Sept. 26th. Child is jaundiced - has been vomiting a little bile-stained fluid - very free discharge of meconium - wound dressed and tube removed.
There is a little redness and puffiness round wound: dressed two hourly with lint soaked in carbolic oil.

Sept. 27th. Jaundice has disappeared - meconium escaping freely - no change in wound - pulse feeble. Died at 6:30 p.m. apparently from inanition.

Post Mortem Examination Sept. 28.

Child presented a well-developed and well-nourished appearance. Post mortem rigidity absent. Post-mortem lividity well marked. No icteric tinge.

Abdominal wound quite healthy. Peritoneal cavity contained about two drachms of blood stained serum.

The intestines showed no inflammation and were not matted together.

The perineal incision could not have been carried any deeper without opening into the peritoneal cavity.

The opening into the intestine was found to have been made into the descending colon just above the sigmoid flexure.

The rectum was represented by a dilated pouch which communicated by a small opening with the prostatic urethra.
There was no evidence during life that any communication with the urethra existed.

Other organs presented no abnormality.
CASE 8.

William T. - age - 3 days.
Admitted - November 15/94.
Discharged - November 21/94.
Suffering from - Atresia ani Urethralis.
Result - Death.

History. Parents healthy - three other children alive and well. The infant has vomited last twenty-four hours and has cried a great deal.

State on admission. Infant very collapsed - abdomen much distended - anus absent, no anal dimple. No impulse felt when child cries - the ischial tuberosities are very close together - only sufficient space between them to admit little finger.

Operation: left inguinal colotomy at once performed, some trouble being experienced in finding the colon, the small intestine presenting at the wound: but colon was traced up from brim of pelvis and a portion drawn out of wound and opened. A Keith's glass drainage tube was tied in, and the colon sutured to edge of wound with several catgut sutures - rubber tubing fastened to glass tube and wound dressed.

Nov. 16th. Meconium escaping fairly well - great
improvement in general conditions.

Nov. 19th. Tube removed, wound healthy, meconium escapes well, general condition fair.

Nov. 21st. Has been gradually getting weaker: died this evening - temperature 104° F. just before death.

Post Mortem examination Nov. 22nd.

Colotomy wound healthy, colon firmly adherent.
No peritonitis.

The lower portion of the descending colon.

Rectum terminates at base of bladder: there is a minute communication with prostatic urethra through which water can be syringed from rectum.

Length of small intestine - 7½ ft.

" " Large " - 18 inches.

The rectum could not have been reached by a perineal operation.

Other organs normal.
CASE 9.

Henry P. - age - 3 days.
Admitted - May 11/95.
Discharged - May 12/95.
Suffering from - Atresia Ani Urethralis.
Result - Death.

History. Child has vomited everything since a few hours old, and has had no motion of bowels in spite of aperients.


Anus is in normal position and finger passes up 1⅛ inches. No impulse felt. Ischial tuberosities are very close together.

Operation. An incision made for left inguinal colotomy but as there was great difficulty in finding the colon and the child was very collapsed the most prominent piece of distended gut was opened, although it had not the appearance of large intestine. Much flatus and meconium escaped, care being taken to prevent it entering the peritoneal cavity by careful use of sponges.
A glass drainage tube was tied in and rubber tube attached - gut was not stitched to side of wound.

The child was taken home as the friends refused to allow it to remain in.

May 12th. Child re-admitted this morning much collapsed. Very little meconium has escaped.

In spite of restoratives child died this afternoon.

Post Mortem examination May 14th.

Much flatulent distension of abdomen.

No escape of faeces into peritoneal cavity and no peritonitis.

The rectum formed a dilated sac which communicated by a minute orifice with the prostatic urethra. The rectum could not have been reached by any perineal operation.

The descending colon which had a very long mesentery was opened at the operation.
CASE 10.

Helen T. - age - 3 months.
Admitted April 4th./94.
Discharged - April 30/94.
Suffering from - Atresia Ani Vaginalis.:.
Result - Unrelieved.

History. Two children died of convulsions.

State on Admission. There is no trace of anus in usual situation: the rectum terminates by a narrow opening in posterior wall of vagina close to its orifice.

The child is very feeble and badly nourished.

Faeces escape freely.

April 30th. Discharged too weak for operation.

May 17th. Died of Asthenia.
Josephine C. age - 3 months.
Admitted - June 25th./94.
Discharged - July 30th./94.
Suffering from - Atresia Ani Vaginalis.
Result - Relieved.

History. Mother died when child was born. Is an only child. Child has passed motions per vaginum since birth.

State on Admission. Anus is completely absent, rectum opens into posterior wall of vagina just inside the orifice.

Child seems healthy - faeces escape freely.

July 5th. Operation. Chloroform given - a bent director was passed in at vaginal opening and made to protrude the skin at the usual position of the anus. The rectum was cut down upon in the perineum, two silk sutures were inserted and the rectum was incised and the edges of gut stitched to edge of perineal wound, and a large rubber tube inserted.

The edges of the recto-vaginal opening were pared and brought together with silk sutures.
July 9th. The stitches in recto vaginal fistula have given way - faeces pass almost entirely by perineal opening.

There is inflammatory swelling of both buttocks which was incised pus found to have burrowed below the skin.

July 30th. Abscesses in buttocks have healed - faeces passed entirely by anal opening - child discharged, Mother instructed to dilate anal opening with finger.

Aug. 16th. Child seen as out-patient. The friends say that for first week after infant was taken home the motions were passed almost entirely by anal orifice, though leaking slightly through recto-vaginal opening.

Latterly the motions have passed by the recto-vaginal opening only - the anal opening has practically closed.
Oct. /94. The parents left England, taking the child with them. The small opening had entirely closed.
CASE 12.

Lilian C. age - 5 months.
Admitted - Aug. 11/94.
Discharged - Sept. 13/94.
Suffering from - Atresia Ani Vaginalis.
Result - Relieved.

History. A healthy baby with good family history.
The Mother only noticed the malformation three weeks ago.

State on Admission. The anus is completely absent, the rectum opening into posterior vaginal wall just inside orifice. Opening admits dressing forceps.

Operation Aug. 19th. A director passed into rectum and caused to protrude skin of perineum, an incision then made in perineum exposing rectum: silk sutures passed through rectum which was then incised and stitched to the margin of wound with horse-hair sutures. Rubber tube passed into rectum. No attempt made to close the recto-vaginal opening.

Sept. 13th. patient discharged. She is in good health. Faeces discharge through both openings,
The Mother was shown how to dilate the opening with her finger.

Oct. 10th. Re-admitted. Faeces escape almost entirely through the vagina, the operation wound having contracted very much.

Oct. 16th. Condition much improved: anal opening has been regularly dilated and now faeces pass chiefly through it.

Oct. 26th. Discharged: it having been decided that an operation for repair of the recto-vaginal fistula is not practicable at present, and the perineal wound is now so well dilated that nearly all the faeces pass through it.

April 95. Died of broncho-pneumonia. She attended for some weeks as an out-patient. The Mother kept the wound well dilated and as the faeces became more formed they passed entirely by perineal opening.
CASE 13.

Margaret S., age - 7 months.

Admitted - June 13/95.

Discharged - June 26/95.

Suffering from - Atresia ani vaginalis.

Result - Relieved.

**History.** Faeces have always escaped freely from vagina.

**State on Admission.** There is a sulcus at usual site of anus, the rectum opens into posterior wall of vagina, close to its orifice, by a narrow sinus just admitting closed dressing forceps - child cries when it defaecates.

**June 13th.** Incision made from perineum into rectum and mucous membrane stitched to skin around wound: large drainage tube inserted.

**June 22nd.** Stitches removed. Wound looks healthy.

**June 26th.** General health of child excellent - faeces pass chiefly through new opening. Child discharged. Mother shown how to dilate wound.

**February, 1897.** Child seen. The Mother says that shortly after the child left Infirmary it had an attack of inflammation of the lungs and they ceased dilating the opening and it soon closed up.
The perineal wound has now quite closed: child has complete control over her motions.

Parents are opposed to any further operation.
CASE 14.

Gertrude J., age - 14 months.
Admitted - Aug. 26/95.
Discharged - Sept. 16/95.
Suffering from - Atresia ani vaginalis.
Result - Unrelieved.

History. Four other healthy children. Mother first noticed abnormality when child was nine weeks old, and child has been twice operated on unsuccessfully.

State on Admission. There is a dimple where the anus should be, probably the result of an old operation.

The rectum opens into posterior wall of vagina just at its orifice.

September 2nd: an incision made from anal dimple to fourchette, end of rectum dissected from surrounding tissues and opening in rectum brought back and stitched to skin at proposed site of anus - skin from anus to fourchette sutured.

Sept. 10th. Wound has broken down: all the sutures have given way.

Feb./97. The child is in good health but is in same state as before the operation. She has no control over her motions.
CASE 15.

Elizabeth R. age - 3 weeks.
Admitted - Jan. 26/97.
Discharged - Jan. 27/97.
Suffering from - Atresia Ani Vaginalis.
Result - Death.

History. Four other healthy children - since birth the child has passed small motions daily per vaginum: has vomited frequently. Had two teaspoonsful of castor oil on Jan. 25th.

State on Admission. A small baby badly nourished, slightly jaundiced, very collapsed: temperature 95° F: no trace of anus in normal position: no recto-vaginal opening to be seen: finger was passed up vagina but failed to discover communication with rectum. Vaginal injections of water given: no result. The infant was so collapsed that nothing further was done - there was no passage of faeces or flatus: child died in about an hour.

Post Mortem Examination.

Abdomen much distended.

Large intestine and lower part of small intestine much dilated with gas and faeces, especially large
intestine.

The large intestine ends in a sac-like dilatation six inches in circumference connected with the posterior wall of the vagina just below the cervix by a slit-like aperture half an inch long. It had apparently become narrowed into a slit by the sac dilating.

Length of large intestine 20 inches.

" small " 61 "

Other organs normal.
CASE 16.

Ernest B., age - 7 months.
Admitted - Oct. 18/93.
Discharged - Oct. 24/93.
Suffering from - Rectum terminates at back of scrotum.
Result - Relieved.

History. Since birth the motions have passed by
an abnormal passage. Was operated on unsuc-
cessfully when three months old. Has daily motions
which cause him pain.

State on Admission. There is no trace
of an anus in the natural position,
but distinct impulse on coughing.
The rectum terminates just behind
scrotum by a narrow sinus.

Nov. 2nd. Chloroform given - incision made into
rectum at natural site of anus and edges of
gut sutured to skin.

Nov. 6th. Motions passing almost entirely through
new opening.

Unfortunately this case was lost sight of, and
I have been unable to trace the subsequent history.
CASE 17.

Francis T. - age - 3 months.
Admitted - Dec. 18/93.
Discharged - Dec. 24/93.
Suffering from - Congenital rectal fistula.
Result - Cure.

History. Mother has noticed since birth faeces escaping from a sinus behind anus as well as from anus: three other healthy children.

State on Admission. Anus is normally situated but narrower than normal just admitting tip of little finger. There is a narrow sinus an inch in length extending from just in front of tip of coccyx to rectum, just admitting a director.

At each motion the faeces pass chiefly by normal anus but slightly by other opening.

The sinus is not connected with the coccyx: it is lined with mucous membrane.

Dec. 20th. The sinus destroyed with thermo cautery and anus well dilated.

The child was cured, but died of "convulsions" when two years old.
In discussing the treatment the cases may be conveniently divided into three groups.

**Group 1.** The cases in which there is complete obstruction to the outlet of faeces.

**Group 2.** The cases in which the rectum terminates in the vagina.

**Group 3.** The cases in which the rectum reaches the surface of the body by a sinus in the perineum.

**Group 1.** includes six cases of imperforate rectum and three cases of Atresia ani Urethralis in which although there was a communication with the urethra it was too small to allow the passage of meconium.

On referring to the accompanying table it will be seen that all the cases have died: but it should be remembered that cases one, two, and six were in a very collapsed condition when they were admitted and any chance which case nine might have had was lost when the friends insisted on taking it out. Again case 5 lived for five weeks and died of convulsions and case 4 lived for about the same time and would in all probably have lived if the friends had not grossly neglected it.
When the infant is first seen the surgeon must decide whether to attempt to reach the bowel from the perineum or to proceed at once to a colotomy. Of course if an impulse can be felt in the perineum or per anus when the child cries a perineal incision should be made, and if no impulse can be felt, but the perineum is normally developed an attempt should still be made to reach the bowel. If on the other hand as in cases 8 and 9 the coccyx, ischial tuberosities, and pubic symphysis are very close together, it is better to at once perform a colotomy.

Ball (page 29) gives the following measurements of the infant pelvis - one tuberosity of the ischium to the other, 1 inch to 1 inch 1 line, and from tip of coccyx to symphysis pubis, 1 inch 1 1/2 lines to 1 inch 3 lines. I have found these measurements approximately correct but have found even more variation than he gives.

If it is decided to try to reach the bowel from the perineum the infant should be held in a good light in the lithotomy position: it is of great importance to keep the child warm and a good plan is to lay it on a rubber hot water bottle. In cases in which the finger in the anus detects a distinct impulse and it is evident that there is
only a membrane occluding the rectum, it will only be necessary to pass a tenotomy knife up the anus in the direction of the impulse and afterwards dilate the opening with dressing forceps and insert a piece of rubber drainage tube. This was all that was required in case 2, but the infant was unfortunately so collapsed that it died in about four hours.

In most cases however, a more extensive operation is necessary: an incision should be made from the anus back to the tip of the coccyx, keeping carefully to the middle line: it should be remembered that the rectum lies in the hollow of the sacrum and is not covered by peritoneum posteriorly except at the upper part whilst the peritoneum descends to a much lower level in front: also in most cases in which the rectum fails to meet the anus it is usually situated rather behind as well as above it. This was especially noticed in case 2 when the rectum came down below the level of the top of the anal canal. For these reasons the dissection should be kept well back towards the sacrum. The dissection may be safely continued until the sacral prominence can be felt, a finger being placed in the wound frequently to feel for
the impulse. The child should be allowed to come out of chloroform a little at this stage as by crying it renders the impulse much more distinct. If the impulse is distinctly felt a puncture with a tenotomy knife in that direction will be followed by a gush of meconium. The opening should be dilated with dressing forceps, the edges of the bowel seized with forceps and drawn down and stitched to the skin at the edge of the wound, a piece of large drainage tube being then inserted.

Mr. D'Arcy Power in his book on Surgical Diseases of Children, page 428, says that the lower end of the bowel should not be sutured to the skin but the surface allowed to granulate. I do not agree with this as I think there would be great danger of the opening contracting to a mere faecal fistula as in fact occurred in a case reported by Mr. Steven Paget in the Transactions of the London Pathological Society for 1886, Vol. 37, page 260, in which he was unable to bring down the bowel.

An important question here arises, viz: the advisability of removing the coccyx in order to carry the dissection still deeper.

In my opinion removing the coccyx is only
advisable if the bowel has been already reached from the perineum, but is situated so high up that it cannot be brought down and stitched to the skin. In such cases, there is great danger of the parts below the bowel contracting and leaving only a narrow sinus communicating with the rectum as in Mr. Paget's case, but in cases in which you have failed to reach the bowel from the perineum I think it better to abandon that operation and at once do a colotomy as it is by no means certain that the bowel can be reached; even if coccyx be removed and valuable time may be lost, and it adds materially to the severity of the operation.

We now come to those cases in which the surgeon has failed to reach the bowel from the perineum. In my opinion the immediate performance of a left inguinal colotomy offers the best chance of saving life. Mr. D'Arcy Power, page 428, says that the child should be put to bed for twenty-four hours to recover from the shock of the first operation before a colotomy be performed. I strongly disapprove of this treatment. The longer the child remains unrelieved the weaker will it become and the worse will be its chance of surviving.

If it be granted that a further operation should be performed immediately, is inguinal colotomy the best operation? I think it is.
It is true that Dr. J. W. Elliot in the Transactions of the American Surgical Association, page 46, records a most successful case in which he operated on a child two days old, in which he was unable to reach the bowel by the perineum although he removed the coccyx, and lower half of sacrum on left side up to third foramen. He performed a median laparotomy, found the lower bowel to consist of a greatly distended pouch spreading over the pelvis but not entering it on account of the distention, he passed a trochar into the bowel from the sacral wound and was then enabled to push down the bowel, open it, and stitch it to the edges of the sacral wound. The child made an uninterrupted recovery. It must be remembered however that the little patient is probably by this time very collapsed, that a colotomy is the quickest method of relieving the obstruction, and that even if the bowel could be reached from the perineum it is probable that the opening would contract to a narrow sinus if, as is probable, you failed to unite skin and mucous membrane.

An inguinal colotomy is better than the lumbar operation as in the latter there is a considerable chance of finding a mesentery to the colon and having to open the peritoneal cavity after all: also if a
permanent artificial anus is established it is more conveniently managed in the inguinal region. Greig Smith in his work on Abdominal Surgery, page 468, advocates a median laparotomy but I think that if there was much distension there would be more difficulty in finding the colon in this situation.

The child lying on its back, make an incision about an inch and a half long parallel to the outer half of Poupart's ligament and an inch above it. The peritoneum is pinched up with two pairs of forceps and opened, and usually the dilated colon presents at the wound. It is easily recognised by the presence of longitudinal bands and appendices epiploicae. If the colon is not seen it should be searched for passing over the brim of the pelvis, and if it cannot be found and the infant is much collapsed it may even be necessary to open a coil of small intestine.

Ball, page 395 advises suturing the parietal peritoneum to the skin all round the wound but I think this is an unnecessary expenditure of time.

The next step is to open the peritoneum and provide intestinal drainage, and a method should be chosen which is capable of rapid application, and which will allow the opening to be easily closed if later on the bowel is reached from the perineum.
I think that the method described by Mr. Greig Smith in the British Medical Journal 1895 Vol. 2, p. 122, is decidedly the most satisfactory. We employed it in case 3 and it answered very well for the few hours the child lived, and I have since tried it successfully on the dead subject.

The arrangement is shown in the accompanying diagram.

The only apparatus required is a piece of stout walled rubber tubing about a foot long and with an internal diameter of about a quarter of an inch.

A fold of colon is drawn through the wound and incised, care being taken that no faeces get into the peritoneal cavity. The tubing is introduced stretched on a director into the incision, which should be so small that the tubing puts it on the stretch. Then a safety pin is made to transfix the gut and the side of the tube and a silk ligature is run round the edge of the gut and looped round the pin.

The other end of the tube is placed in a test-tube by the patient's side - there is no need to suture the gut to the wound as it is kept in position by
the dressings which are arranged around the tube and pin.

The following advantages may be claimed for the method.

1. It admits of rapid application.

2. The opening could be easily closed if the rectum was subsequently reached from the perineum.

3. If the tube becomes blocked it can be cleared by "milking" its contents onwards.

4. There is no danger of the intestinal contents escaping at the side of the tube, as the tube is of a larger calibre than the opening into the bowel.

5. There is no danger of the gut sloughing around the wound as the ligature is not applied very firmly.

In four of the cases some form of glass tubing was used, the gut being tied round it; this answered well but there is always the danger of a ring of gut sloughing away, as the ligature has to be tied very firmly. This happened in case 4, but fortunately after adhesions had formed between the colon and parietal peritoneum.

A good form of glass tube is a glass nozzle such as is supplied to fit on a Higginson's syringe. One of these was
successfully employed in case 4.

In all cases in which a glass tube is employed, some rubber tubing must be fitted to the free end to drain away the meconium.

It is not necessary to suture the colon to the wound with this method. Sutures were only used in one out of the four cases and in none of them was there any peritonitis or escape of meconium into the peritoneal cavity.

In case 1 the gut was sutured to the edge of the wound and opened. This method takes a long time and the colon in a newly born child is so thin that when distended it is very difficult to pass stitches through the two outer coats without including the mucous coat.

I will only mention one other method: that of Reclus. It consists in withdrawing a coil of colon and passing a rigid rod through the mesentery close to the gut. The gut might then be incised and a rubber tube inserted: the disadvantage of this otherwise excellent method is that it would be more difficult to afterwards establish an artificial anus.
There is not much to be said about the after treatment. The infant should be kept very warm and fed at frequent intervals: stimulants in small quantities are generally required; but the children like those with hare-lips appear to be generally ill-developed and a large proportion die from inanition with no apparent cause and if they survive the operation succumb to some childish ailment.

**Group II.** contains six cases. One of them, case 15, to which I shall refer again, was admitted in a dying condition from intestinal obstruction, the opening into the vagina being situated high up on the posterior wall.

In the other five cases the opening was in the usual position in this malformation, viz. in the posterior wall of the vagina just at its orifice, the anus being completely absent in every case.

In case 13 there was some pain on defaecation but in none of the other cases was there any symptom whatever: in fact, in two of the cases the condition was not noticed until the child was several weeks old.

The opening was in every case fairly large,
admitting at any rate the closed blades of dressing forceps.

In case 10 the child was in such a feeble state of health that an operation was not considered advisable, and the child died from asthenia three weeks after it left Hospital: in the other four cases some form of operation was performed at an age varying from three months to fourteen months: in case 12 the result was quite satisfactory although the recto-vaginal opening was not closed: in the other three cases there was no permanent relief to the condition.

Two questions now arise:-

(1) Is an operation required?
(2) At what age should it be performed?

I think that an operation should always be performed. The parents are generally anxious that something should be done and even in those cases in which the parts around the opening have taken on a sphincter action, by performing Rizzoli's operation there will be no danger of causing incontinence, and even if the operation does not succeed the patient will not be in a worse condition than before.

As regards the age of the patient I think it is a mistake to operate on very young children:
of course much depends on whether the child suffers from faecal incontinence and also on the method of operation chosen: if the child does not suffer from faecal incontinence I think five years quite soon enough to operate. The parts will then be less easily injured and better able to stand the tension to which Rizzoli's operation will probably subject them: if on the other hand it is proposed to cut down on the bowel from the perineum the operation may be performed much earlier, say, from one to two years. It is important that the operation should succeed as the child's parents are often averse to a second operation.

In these cases three different methods of operation were employed.

1. Perineal incision, stitching the bowel to edge of the wound.

2. Closure of recto-vaginal opening and cutting down on bowel in perineum, and stitching it to edge of wound.

3. Rizzoli's operation.

The first method is useful in those cases in which there is quite a small recto-vaginal opening, and it may be employed at a much earlier age than the other methods.
The operation is performed as follows:-
a longitudinal median incision is made in the perineum about an inch in length over proposed site of anus, a curved probe is then passed in at recto-vaginal opening and caused to push forward the rectum at the bottom of the incision. Two silk sutures are then passed through the rectum from the perineum, and this is an important step as if it is neglected the wall of the rectum slips back as soon as the probe is cut down upon, and there may be some difficulty in finding it. After inserting the silk sutures open the rectum between them and stitch it to the edge of the skin wound and insert a large drainage tube.

The after treatment is very important, and a great deal depends on the child's mother. She must be clearly impressed with the great importance of dilating the opening every day with her finger and it must be explained to her that even if the child cries she must persevere with the treatment.

In case II the friends neglected to dilate the opening and it closed completely. In case 12 the child had to be re-admitted as the Mother had allowed the opening to contract but it afterwards was kept dilated. In case 13 the Mother
allowed the opening to close.

As the motions become more formed they tend to pass by the perineal opening if it be kept patent, and the recto-vaginal opening tends to get small. I saw a girl recently who was operated on ten years ago by a perineal incision, and it is now impossible to find any communication between the rectum and vagina, and she has perfect control over her motions.

In the second method in addition to the perineal operation the edges of the recto-vaginal opening are pared and stitched together. This method was only employed in one case and then all the stitches in recto-vaginal opening gave way. I consider this a very unreliable method and would prefer either to perform Rizzoli's operation or open the rectum from the perineum and leave the repair of the recto-vaginal opening for a future operation.

In the third method originally suggested by Rizzoli an incision is made from the vaginal anus backwards through the perineum as far as proposed site of anus, care being taken not to open the rectum. The rectum is then carefully dissected from the posterior wall of the vagina and brought back, and the opening in rectum is stitched to the
skin at proposed site of anus. Superficial and deep sutures are then inserted in front of rectum to stitch up the vaginal and perineal wound. This is the ideal operation for this malformation, but in practice dissecting the end of the rectum from the vagina is often a tedious and difficult task, and there is often considerable tension before the rectum can be got back into position: so I think it is better to wait until the child is four or five years old before attempting it. The advantages of this operation are that there is less danger of faecal incontinence as advantage is taken of a natural opening which will probably be provided with some sort of a sphincter: that a recto-vaginal septum is built up, and that the rectum is completely cut off from the vagina. Mr. Swain in the Lancet, 1891, Vol. 1, page 143, records a most successful case, a girl six years old, with Atresia ani Vaginalis, and faecal accumulation extending up into left hypochondriac region. He first performed right inguinal colotomy, and after having got rid of the faecal accumulation he three months after successfully performed Rizzoli's operation. The colotomy wound closed, and except that there was a small recto-vaginal
fistula, and slight incontinence after taking castor oil she was perfectly well five months after the operation.

In this operation it is important that the lower bowel should be empty and an injection of oil should if possible be given before the operation. After the operation the bowels should be confined for three days and then moved by small doses of castor oil.

Case 15 was an example of a somewhat rare condition, the rectum communicating with the vagina high up on the posterior wall. A colotomy might have afforded relief but the infant was so collapsed that it would almost certainly have died under the operation: attempts were made to find the opening into the rectum with a gum elastic catheter and vaginal injections were given, and it is difficult to see what more could have been done.
Group III. In this group I have included two cases which have not a great deal in common. They are very interesting from a developmental point of view but only require a passing reference as to the treatment.

In case 16 the rectum terminated by a narrow sinus opening at the back of the scrotum. The treatment obviously was to cut down on the rectum in the perineum in the usual position of the anus, and stitch rectum to the edge of the wound. If this is not successful the original sinus should be slit up as far back as artificial anus and the mucous membrane lining the sinus dissected away; to avoid injuring the urethra a sound might be passed into the bladder to act as a guide, the front part of the wound would then be united by deep and superficial sutures and the rectum stitched to skin at intended site of anus. Unfortunately I have been unable to trace this case but the would probably have brought the child back if the operation had not succeeded.

Case 17 is a very rare condition. There was a normal anus and in addition a narrow sinus reaching the surface just in front of the coccyx. The object of the operation was to destroy the sinus without interfering with the sphincter of the normal anus, or causing faecal incontinence.
The thermo cautery was employed and the result was quite satisfactory. In similar cases it might be a help to keep a tube in the normal anus for a few days to prevent the collection of flatus interfering with the closing of the sinus.
SUMMARY OF POST MORTEM EXAMINATIONS.

Perhaps it will be as well to first glance briefly at the development of the anus and rectum.

The mucous membrane of the alimentary canal is developed from hypoblast and is represented in the early embryo by a straight hollow tube called the mesenteron which terminates at both ends in a cul-de-sac. The mesoblast afterwards invests it forming the muscular and peritoneal coats.

At the posterior end of the embryo an invagination of epiblast occurs, forming the anal and genito-urinary opening and called the Proctodæum. At the 7th. to 8th. week the anus becomes separated from the genito-urinary opening by the rudiments of the perineum and by the end of the tenth week the anus is well formed and separated from the genito-urinary opening by a distinct perineum.

The proctodæum reaches the mesenteron at a very early stage of foetal life.

Post Mortems were obtained in seven cases.

In cases 7, 8 and 9, a communication with the urethra was found to exist, although there had been no evidence during life of any such communication.
The urine was examined in all these cases and found to be quite clear. It is worth noting that out of the ten cases in which the perineal septum was deficient and there was a communication with the genito-urinary passages, viz. cases 7-16, in only one case was there a normally developed anus, whilst in cases 8 and 9 the outlet of the pelvis was so contracted that a colotomy was performed without attempting to reach the bowel from the perineum. On the other hand in the seven cases in which there was no communication with the genito-urinary passages, viz. cases 1-6 and case 17, there was a normally formed anus.

This seems to point to the conclusion that although in simple cases the fault may be merely due to the Proctodeum and Mesenteron failing to meet, in the cases in which the perineum is affected there is a more serious state of affairs and an actual absence of that part of the Proctodeum which should form the anus.

In none of the cases was any evidence of peritonitis found post mortem: in fact there was no apparent cause of death, the infants dying from what for want of a better name we call inanition.

The only other point to which I need refer is the length of the intestinal tract in these cases.
In Billing's National Medical Dictionary, Vol. 1, p. XXIX the length of the small intestine in a new born child is said to be 109 inches and of the large intestine about one sixth that length or 18 inches and in Quain's Anatomy Vol. 3, part 4, page 103, Treves gives the average length of the small intestine in a new born child as 9 ft. 5 in. and he adds that it grows two ft. in the first month. I have myself measured it in five children the ages varying from six days to a month and I found the average length of the small intestine to be 10 ft. 10 in. and of the large intestine 1 foot, 10 in.

In the three cases in which measurements were taken they were as follows.

<table>
<thead>
<tr>
<th>Age</th>
<th>Length small intestine</th>
<th>Length large intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 8. 6 days</td>
<td>7 ft. 6 in.</td>
<td>1 ft. 6 in.</td>
</tr>
<tr>
<td>Case 11. 6 weeks</td>
<td>8 ft. 6 in.</td>
<td>1 ft. 10 in.</td>
</tr>
<tr>
<td>Case 15. 3 weeks</td>
<td>5 ft. 1 in.</td>
<td>1 ft. 8 in.</td>
</tr>
</tbody>
</table>

It would appear from these figures that the small intestine is distinctly shorter than normal. The large intestine does not appear to be affected to quite the same extent, but if more measurements were obtained, I think it would probably be found to be
shorter than normal.

I am not aware that any measurements of the length of the intestinal canal in cases of rectal malformation have been published, but they would certainly be of great interest.