HERNIA
into
THE FORAMEN OF WINSLOW.
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II. Report of Post-mortem.
Mrs. Mary Jane Phin.

Age. 41.
Occupation. Housewife.
Date of Admission. Monday, 8th. March, 1909.
Date of Death. Wednesday, 10th. March, 1909.
Complaint. "Great pain over the stomach".
Duration. 4 days.

History of Present Illness;-
Patient has always enjoyed good health, and never had a doctor, except at confinements.

On Friday afternoon (5th. March), she was suddenly seized with severe pain referred to the umbilicus. Previous to this she had been constipated for about six weeks. Before this she was regular as regards her bowels, but for the last six weeks she has only had a motion every other day. She can assign no cause for this sudden attack. She went to bed, and sent for a doctor, who came twice on Friday and gave her a white powder to be taken 15 minutes before food (barley water and milk); but as the pain became so severe she had to be given morphia. She only vomited a little this day.

Saturday, 6th. March;— She passed a very restless night, sleeping very little and was in great pain. On Saturday morning the sickness continued, and she tried to get a motion by giving herself an enema, and later with castor oil, but both completely failed. All Friday she passed no flatus or feces, and
on Saturday a swelling began to appear in the middle line under the sternum. A large blister was applied for 10 hours, but failed to relieve the pain. On Saturday night she got a little sleep by means of morphia.

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**Sunday, 7th. March:**

The pain was so severe on Sunday morning that the doctor was again sent for, and gave her morphia. She had again great sickness and retching, but no vomiting. Neither flatus nor faeces was passed all day, although an enema had been again given.

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**Monday, 8th. March:**

The pain was again so very severe that the doctor was sent for at 5 a.m. and morphia was again administered hypodermically. No flatus or faeces had been passed. The doctor now suggested that she should come to the infirmary, and she was sent at once, and arrived at Ward 8 early on Monday morning.

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**FAMILY HISTORY:**

- **Father:** 74, alive and well.
- **Mother:** Died of "rheumatism", age unknown.
- **Brothers:** One, alive and healthy.
- **Sisters:** Two, alive and healthy.
- **Children:** 4; all alive and healthy. Eldest 13, three years between each.
PREVIOUS ILLNESSES:

Patient cannot remember any previous illnesses. She has always been very healthy.

CONDITION ON ADMISSION:

Patient is small and rather poorly developed, but states that she has not been falling off in weight recently. Her last period was at the middle of February, and she has always been regular.

The abdomen shows marked general distension, the maximum being just above the umbilicus. There is a slight tendency to ladder pattern. The abdomen is quite soft, and nowhere rigid; there is no pronounced tenderness over the sigmoid, but it is slightly tender above the umbilicus. There is no alteration in the liver dulness.

Nothing is to be found at any of the ordinary hernial apertures.

On admission:

pulse 140.
temp. 98.8.
resp. 24.

An enema of 2½ pints could be introduced, with some pain at the end of this.

PROVISIONAL DIAGNOSIS:

Obstruction of the great intestine;
possibly carcinoma of the sigmoid.
OPERATION:

Patient was operated on on Monday evening.

The abdomen was opened by a mesial incision below the umbilicus and the hand was passed in towards the sigmoid, but the sigmoid and the rectum were both found to be empty. The hand was then passed to the right side (to examine for carcinoma of the coecum) but the coecum could not be found. The incision was now prolonged upwards above the umbilicus for several inches, and the stomach was now found to be distended and the transverse colon quite collapsed. On now examining the right hypochondrium the appendix was found and appeared to be very much congested, so it was now thought that the condition was one of appendicitis. A transverse incision was now made outwards to the right, dividing the rectus muscle. The coecum could not be found, but the small intestine was greatly distended and was incised and emptied. A large bladder-like swelling was now found under the gastro-hepatic omentum of a greenish colour, obviously a viscus in a state of gangrene, and simulating on palpation a much enlarged and distended gall-bladder. The gastro-hepatic omentum was now lacerated, and this mass was found to be the coecum which had passed through the foramen of Winslow and had become strangulated and gangrenous. At this stage some gas was noticed escaping from a perforation of its anterior wall, where the gangrenous bowel had given way, and the anterior surface was now punctured and the contents evacuated. Some of the faecal matter was spilt on to the anterior surface of the liver but this was immediately wiped clean again. The cannula was now
withdrawn, and the opening clamped; the packing was now removed and the contents of the lesser sac withdrawn through the foramen of Winslow. The gangrenous part of the bowel was now resected. The necrotic area is shown in the shaded portion in the following figure. The small intestine, above the ilce—coecal valve and the ascending colon were then clamped, and divided, about 18 inches of bowel being removed. A Paul's tube was then tied into the divided small intestine, the divided large bowel being clamped, and the wound was stitched up with the clamp in position and the end of the small intestine protruding from the wound. The small intestine was evacuated of its contents, both fluid and gas, and before closing the wound a quantity of sterile vaseline oil was poured over the bowel.

During the operation a pint of normal saline was transfused into the patient's left arm. The pulse at the conclusion of the operation was 130.

Later;— The pulse became more rapid again and was scarcely palpable. Patient was given ½ gr. morphia. At II p.m. she was again transfused, and the pulse again became stronger. She vomited once after the operation.

March 9;— Patient had very little sleep during the night. No flatus or faecal matter had passed through the Paul's tube. The pulse was not to be detected. She was given ½ gr. strychnine every 4 hours. She was again transfused at one
o'clock. The stomach was greatly distended so Prof. Caird aspirated through the anterior abdominal wall which gave her great relief. She steadily sank all afternoon, and died in the course of the evening.

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PREVIOUS CASES.


Glandin was the first to record a case of this condition. The case was that of a man who was admitted to 'la Charité' in 1833, with an angry and severe peritonitis, which rapidly terminated fatally. At post-mortem, it was found that the greater part of the large bowel, after having escaped a croûte, was in general catarrhal, and a large portion of it, which on histological examination were seen, were at one time in the peritoneal cavity, and some were in the mesenteric vessels. There was no diverticulitis.


The condition in this case was also found at the autopsy on the body of a woman aged 30. The foetus of Winckel was found to be atresia ilealis, and the intestines were atresia ilealis. There was no diverticulitis. The pylorus passed directly into small intestine. The mesentery of the small intestine was so long that it stretched below the symphysis pubis; the colon also had a distinct termination, and was situated in the pelvis. The lesion of

3. Borkman. ————————

This observation concerns only at the different reference.


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I. BLANDIN. (1834).

Blandin was the first to record a case of this condition. The case was that of a man who was admitted to 'la Charite', in 1823, with all the signs of a violent peritonitis, which rapidly terminated fatally. At the autopsy, it was found that "la plus grande partie du paquet de l'intestin grele, après avoir remonté à droite, dans la region epigastrique, s'était introduite par l'hiatus de Winslow dans l'arriere-cavité des epiploons; puis elle était sortie par une ouverture étroite anormalement établie dans le mesocolon transverse; cette ouverture exercait sur l'intestin une constiction forte, qui en avait determiné le sphacele".

2. ROKITANSKY. (1843).

This observation consists only of the following reference; "J'ai vu une fois une grande portion de l'intestin grele engage par le trou de Winslow qui la separait du reste du tube intestinal".

3. TREITZ. (1857).

The condition in this case was also found at the autopsy on the body of a woman aged 32. The foramen of Winslow was found to be "tres large", and the intestines were abnormal. There was no duodenum, the pylorus passing directly into small intestine; the mesentery of the small intestine was so long that it stretched below the symphysis pubis; the coecum also had a distinct mesentery, and was situated in the pelvis. Two loops of jejunum were situated in the lesser sac.
4. **Wilson Moir.** (1868). 

Records a short note on an autopsy upon a case in one of the hospitals in Vienna. "A l'ouverture de l'abdomen l'intestin etait invisible; une inspection plus attentive montra qu'il avait passe dans l'arriere cavite peritoneale par l'orifice de Winslow".

5. **Alpago Novello.** (1882). 

Mentions that he found the following condition in a case of undiagnosed abdominal obstruction after death:—

"Une anse de l'intestin grele, en correspondance avec l'hiatus de Winslow, a la suite d'une forte pression exercée sur le ventre du malade, avait penetre dans cet hiatus, entrainant avec elle plus de 3 metres d'une autre anse, favorisée par les contractions peristaltiques".

6. **Majoli.** (1884). 

This case is of interest on account of the long duration of the illness, an interval of six weeks elapsing from the commencement of the symptoms to the fatal termination. 

The patient was a man, aged 44, who had always been in good health, except for a slight tendency to be constipated at times. On the 31st. of May, 1888, after returning from his work in a great state of perspiration, he was suddenly seized with intense pain in the abdomen. He was unable to eat much dinner, and was unable to sleep that night. Next morning the pain was no better, but he returned to his work, when the pain again became so intense that he was unable to
continue it, and came home. He passed a rather better night than the preceding one. Next day he tried to return to his work, but found it was quite impossible on account of the pain, and he was forced to stay in bed. For the next three weeks he stayed in bed, the pain coming and going in spasms; for a short time he would be quite free from pain, when he would suddenly be seized with intense pain which gradually passed off again. He remained in this condition until the 20th. of June, when the pain suddenly stopped. On the 5th. of July he was suddenly seized with severe pain again, and this time a swelling appeared in the eprgastrium, and he began to vomit. The pain increased in severity, and visible peristalsis was noticed. He could take scarcely any food, and became steadily worse, ultimately dying on the 16th. of July, 46 days since his first severe attack of pain, and 11 days since the second attack.

At the autopsy, it was found that part of the transverse mesocolon had entered the foramen of Winslow, which does not appear to have been enlarged. The mass had become gangrenous.

7. ELLIOT SQUARE. (1886).

A man, aged 27, previously in good health, was suddenly seized with intense pain in the upper part of the abdomen a few hours after partaking of a very hearty meal. All the symptoms of intestinal obstruction supervened, the pain never diminishing in intensity, and he died three days and seven hours after the commencement of the attack.

At the sectio, it was found that eight inches of ileum about two feet from the coecum had become so tightly
strangulated in the foramen of Winslow that it could only be withdrawn with difficulty. The foramen of Winslow admitted two fingers easily.

8. TREVES. (1888).

The following case is of special interest, since it is the first case in which operation was attempted.

The patient was a man, aged 26 years, who was suddenly seized with intense abdominal pain two hours after eating an unusually large meal. The pain was more or less intermittent, the intervals, however, being very short. He had very frequent vomiting. As the pain was becoming more and more severe, the patient rapidly going down hill with all the signs of intestinal obstruction, it was decided to open the abdomen on the 17th. of April, eight days after the commencement of the attack. By this time, however, the man was very nearly moribund. It was then found that a large extent of both small and large intestine had passed through the foramen of Winslow, and was lying inside the lesser sac. It was only possible to reduce two or three feet of the small intestine, and as nothing else could be done, the wound was then closed; the man died six hours later.

At the autopsy, it was found that the lower end of the small intestine, the cecum, the whole of the ascending colon, and part of the transverse colon had all passed through the foramen of Winslow, and had entered the lesser sac, and become strangulated. The cecum and ascending colon had mesenteries, and the foramen of Winslow was very considerably enlarged.
Man, aged 57 years, a wheelwright, was suddenly seized with intense pain and vomiting, without any appreciable cause to account for it. His previous health had always been good, except that four years ago, he had had a similar attack of severe pain which passed completely away in a few days. As the pain in this attack was most severe, causing complete prostration, and showing no signs of diminishing, it was decided on the fourth day to open the abdomen. On doing so, it was found that a part of the small intestine was firmly fixed in a circular opening in the upper part of the abdomen, and could not be withdrawn. In fact, nothing could be done except close the wound. The patient died three days later, and, at the autopsy it was found that about 5 feet of small intestine had passed through the foramen of Winslow, and had become gangrenous, so that the whole of the peritoneum lining the lesser cavity was in a state of violent peritonitis.

Man, aged 77, a 'rural constable' (garde champêtre), was suddenly seized with great vomiting and severe pain in the abdomen after drinking much cider. On examination he was delirious, had a greatly distended abdomen but no definite evidence to point to the seat of the obstruction. As there was no sign of improvement it was decided to operate upon the third day, and it was then found that a loop of small intestine, 6 inches in length, had become fixed in the foramen of Winslow. It was withdrawn with difficulty, and the abdomen was then closed.
Unfortunately that evening the patient was given an overdose of morphia, and died two days later. At the autopsy, it was found that the lesser intestine was distended, that there was a well-defined constriction mark, and below this the intestine was empty and collapsed. There was no signs of peritonitis, and it was considered that the patient had died from paralysis of the bowel, no doubt, partly due to the effect of the overdose of morphia which he accidentally been given.

II. ARTHUR NEVE. (1893).

This case is of special interest since it is the first case in which recovery took place after the operation. During the operation it was found impossible to reduce the condition, but shortly afterwards spontaneous reduction apparently took place, and the man left the hospital 'completely cured'.

The patient was a man, aged 17, who came to the Mission Hospital, at Kashmir, complaining of great pain and vomiting of 7 days duration. The symptoms remained more or less constant, but he was able to take a little food, and he gradually passed into a more or less chronic state. At the end of six weeks his general condition was better, but he was unable to carry out his usual work, and his friends desired an operation in order to try and discover the cause of the condition, and improve it. The abdomen was accordingly opened, and it was then discovered that part of the transverse colon was firmly impacted in the
foramen of Winslow, and could not be withdrawn. There thus remained nothing to be done, but to sew up the wound. The patient stood the operation well, but on the second night following the operation he was suddenly seized with most violent pain which completely passed off 24 hours later, and did not return. The following day he was sitting up in bed, and left the hospital 'completely cured' 26 days later. Apparently spontaneous reduction had occurred.

13. **PICADO.** (1893).

A boy, aged 8 years, was seized with severe pain in the upper part of the abdomen above the umbilicus after eating an unusually large dinner. The father was a very alcoholic man, and did not call in a doctor until the sixth day, although the boy had been in continuous pain and vomiting the whole time. He was taken to the hospital, but as he grew steadily worse, it was decided on the third day to open the abdomen. This was accordingly done, but, while incising the peritoneum, he suddenly died.

At the autopsy next day, it was discovered that about six feet of ileum had passed through the foramen of Winslow and could be withdrawn without incising the foramen. It was considered at the autopsy, that, if the operation had only been attempted earlier, it would probably have been successful.
Man, aged 63, was suddenly seized with severe pain in the epigastrium without any manifest cause. The next day, the abdomen began to swell, and he vomited repeatedly. A swelling then began to appear above his umbilicus, and a smaller swelling in his left iliac fossa, both swellings being tympanitic on percussion. On passing the stomach pump, a large amount of liquid faecal matter was drawn off, and it was decided to perform a laparotomy. On opening the abdomen, it was found that scarcely any small intestine was visible, and on tracing it backwards from the caecum, it was found that nearly the whole of the lesser intestine had passed through the foramen of Winslow, and was lying in the lesser sac. It could not be withdrawn, and the wound was closed. The patient expressed himself better that night, but next day the vomiting again began, and he died three days after the operation.

At the autopsy, it was found that nearly the whole of the smaller intestine was lying in the lesser sac, and could not be withdrawn, since part of the omentum had also passed into the foramen and had become adherent to it, thus preventing the mass being withdrawn.
I4. REYNIER. (18—).  

gives a few notes on a case of a man who was 
suddenly seized with severe pain in the abdomen. He was 
admitted into the hospital two days latter in such a 
very bad condition, that it was necessary to perform a 
laparotomy at once. On opening the abdomen it was found that 
a great part of the small intestine had passed through the 
foramen of Winslow, and was lying in the lesser sac. It 
had become gangrenous, but could be withdrawn. The patient 
however, died during the day.

I5. MONI. (1898).  

Man, aged 50, a peasant, was suddenly seized during the 
night with intense abdominal pain round about the umbilicus. 
As he showed no improvement by the end of four days, he was 
sent to the hospital, which he reached in a very serious 
condition. On examination the most characteristic feature 
was a great swelling in the upper part of his abdomen. It 
was decided to operate at once, and on opening the abdomen 
it was found that the caecum and ascending colon had both 
passed through the foramen of Winslow, and were lying in the 
lesser sac. They were withdrawn without any great difficulty, 
and the wound closed. The patient made a more or less 
uninterrupted recovery, and left the hospital completely 
cured two months later.
This case is also of great interest, since it also resulted in a complete recovery from the operation.

The patient, a woman, aged 47, was suddenly seized with severe pain and vomiting, later succeeded by the signs of intestinal obstruction. In this case there was no localised tumour above the umbilicus. As she was steadily getting worse, the abdomen was opened upon the fourth day from the beginning of the attack. It was then found that the whole of the lesser intestine was enormously distended, and the descending colon and sigmoid empty. On following the transverse colon, it was found that a small part of it had become caught in the foramen of Winslow, which was sufficiently large to admit two fingers. They succeeded in reducing the hernia, but it was necessary to do an end-to-end enterectomy. The small intestine, and caecum were emptied by a small incision through the walls, and the wound closed. The patient was then sent back to bed; and ultimately returned home 'in perfect health'.

This case is of very great interest, not only on account of the fact that recovery followed the operation, but also from the condition which gave rise to the hernia, namely it began about half-an-hour after the end of a labour following a normal pregnancy.

The patient was a woman, aged 22, who, after a normal labour, was suddenly seized with severe pain in the epigastrium
along with intense vomiting, and complete cessation of the bowels. She remained for six days in this state, and as she was getting worse, she was sent to hospital. The abdomen was opened on the following day, when a most curious state of affairs was found. The large intestine was found to be greatly distended, and on tracing it downwards, it was found that the sigmoid flexure had passed upwards and had passed through the foramen of Winslow; and that this had been rendered possible through the great, and quite unusual length, of its mesentery. On examining the rest of the intestines, it was then discovered that the large intestine had a mesentery of its own continuous with that of the lesser intestine. The foramen of Winslow allowed three fingers to be passed through it. Reduction was easily effected, and the patient left the hospital five weeks later cured.

18. JÉANBRAU. (1906).

A man, aged 17, was suddenly seized with severe pain in the epigastrium and vomiting. As all the usual signs of intestinal obstruction supervened, the abdomen was opened upon the third day. It was then found that a loop of small intestine, close to the duodeno-jejunal junction had become fixed in the foramen of Winslow, and could not be withdrawn. The patient died on the third day after the operation. There was no autopsy.
The patient, a man, was suddenly seized with severe pain in the central and lower parts of the abdomen after defaecation. It was paroxysmal and severe. Vomiting commenced that evening. No flatus was passed. That evening the abdomen was found to be moderately distended and slightly tender just to right and below the umbilicus, but not rigid. There was marked intestinal splashing, but no distended coils were seen. As the symptoms of acute intestinal obstruction were obvious, laparotomy was carried out on the third day. The last two feet of the ileum were empty, but all the rest of the small intestine was red and greatly distended. On tracing the empty bowel, it was found to pass through some fixed structure, which from its position was found to be the foramen of Winslow. The intestine was drawn out without any great difficulty. A Paul's tube was tied into the distended small intestine, and the wound closed. The patient made a good recovery after the operation, but died very suddenly on the 7th. day from peritonitis the result of a leakage round the Paul's tube.

At the post-mortem, it was found that although it had apparently been a case of hernia through the foramen of Winslow, yet the foramen only admitted one large finger, and there was no abnormality of the mesocolon or mesentery; but he also states that "possibly the mesentery may have been unduly long".
A man, aged 53, in excellent health, after a sharp fit of coughing, was suddenly seized with violent pain in the upper part of the abdomen, the lower part of the chest, and the back. An action of the bowels followed this seizure, and then constipation was absolute for faeces and flatus. Vomiting was neither frequent nor severe. There was no rigidity of the abdominal wall, and no distension for the first two days, and it could not be said that any definite epigastric swelling existed. On the morning of the operation (third day), an ill-defined swelling existed in the epigastrium free from tenderness. The patient found most relief by lying on his face, and pressing his hand on the upper part of the abdomen.

This case is of great interest, since it is the only recorded case in which the diagnosis of this rare form of hernia has been made before operation.

The abdomen was opened upon the third day, and it was then found that two and a half feet of small intestine had passed through the foramen of Winslow, and was lying in the lesser sac. The margin of the foramen tightly constricted the gut, but by gently dilating it with the finger, it was possible to withdraw the jejunum with ease. The wound was closed, and "the patient was about again within three weeks".

This case has already been described, and is the occasion of this paper.
<table>
<thead>
<tr>
<th>No. of Case</th>
<th>Name</th>
<th>Date of Publication</th>
<th>Sex</th>
<th>Age</th>
<th>Result</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blandin</td>
<td>1834</td>
<td>Male</td>
<td></td>
<td>Death</td>
<td>Almost all small intestine. Discovered at autopsy.</td>
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<td>2</td>
<td>Rokitkanyan</td>
<td>1842</td>
<td>Male</td>
<td></td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>3</td>
<td>Treitz</td>
<td>1857</td>
<td>Male</td>
<td></td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>4</td>
<td>Wilson Moir</td>
<td>1858</td>
<td>Male</td>
<td>44</td>
<td>Small intestine and transverse colon.</td>
<td>2 yards of small intestine.</td>
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<tr>
<td>5</td>
<td>Novello</td>
<td>1864</td>
<td>Male</td>
<td>26</td>
<td>Recovery</td>
<td>?</td>
</tr>
<tr>
<td>6</td>
<td>Majoli</td>
<td>1868</td>
<td>Male</td>
<td>57</td>
<td>Death</td>
<td>Died two days after operation.</td>
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<tr>
<td>7</td>
<td>Elliot Square</td>
<td>1883</td>
<td>Male</td>
<td>25</td>
<td>Small intestine.</td>
<td>5 feet of ileum.</td>
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<td>8</td>
<td>Traves</td>
<td>1888</td>
<td>Male</td>
<td>30</td>
<td>Death</td>
<td>Almost all small intestine. Discovered at autopsy.</td>
</tr>
<tr>
<td>9</td>
<td>Gangolphe</td>
<td>1890</td>
<td>Male</td>
<td>57</td>
<td>Death</td>
<td>Died two days after operation.</td>
</tr>
<tr>
<td>10</td>
<td>Rehn</td>
<td>1892</td>
<td>Male</td>
<td>77</td>
<td>Death</td>
<td>Died during operation.</td>
</tr>
<tr>
<td>11</td>
<td>Neave</td>
<td>1892</td>
<td>Male</td>
<td>17</td>
<td>Recovery</td>
<td>Transverse colon.</td>
</tr>
<tr>
<td>12</td>
<td>Picado</td>
<td>1893</td>
<td>Male</td>
<td></td>
<td>Death</td>
<td>Died during operation.</td>
</tr>
<tr>
<td>13</td>
<td>Steinfeld</td>
<td>1894</td>
<td>Male</td>
<td></td>
<td>Death</td>
<td>Died during operation.</td>
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<tr>
<td>14</td>
<td>Seaver</td>
<td>1896</td>
<td>Male</td>
<td></td>
<td>Death</td>
<td>Died during operation.</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Year</td>
<td>Sex</td>
<td>Age</td>
<td>Outcome</td>
<td>Cause of Death</td>
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<td>14</td>
<td>Reynier</td>
<td>1899</td>
<td>Male</td>
<td>20</td>
<td>Death</td>
<td>Nearly all small intestine.</td>
</tr>
<tr>
<td>15</td>
<td>Mori</td>
<td>1893</td>
<td>Male</td>
<td>50</td>
<td>Recovery</td>
<td>Caecum and ascending colon.</td>
</tr>
<tr>
<td>16</td>
<td>Groves and Marten</td>
<td>1901</td>
<td>Female</td>
<td>47</td>
<td>Recovery</td>
<td>Trans. colon (part of Sigmoid flexure).</td>
</tr>
<tr>
<td>17</td>
<td>Delkeskamp</td>
<td>1905</td>
<td>Male</td>
<td>22</td>
<td>Death</td>
<td>Small intestine.</td>
</tr>
<tr>
<td>18</td>
<td>Jeanbrau &amp; Riche</td>
<td>1903</td>
<td>Male</td>
<td>17</td>
<td>Death</td>
<td>Small intestine.</td>
</tr>
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<td>19</td>
<td>Morton</td>
<td>1909</td>
<td>Male</td>
<td>56</td>
<td>Recovery</td>
<td>Small intestine.</td>
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<td>20</td>
<td>Sinclair</td>
<td>1909</td>
<td>Male</td>
<td>58</td>
<td>Recovery</td>
<td>Caecum and ascending colon.</td>
</tr>
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<td>21</td>
<td>Caird</td>
<td>1909</td>
<td>Female</td>
<td>41</td>
<td>Death</td>
<td>Small intestine.</td>
</tr>
</tbody>
</table>

| 22  | Hardouin           | 1911 | Male | 95  | Recovery| Nearly all small intestine.     |

Died same day as operation.

Died from leak at artificial anus, on 7th day.

Died on third day after operation.

Death Recovery, Recovery.
ANALYSIS OF PREVIOUS CASES.

CLINICAL SYMPTOMS AND DIAGNOSIS.

There appears to be no particular age at which this form of hernia is most frequent. The earliest case on record was 8 (Picos), and the latest was 75 (Lohn), the remainder being more or less indiscriminately scattered between these two extremes, there being perhaps a slight increase about the age of 50 and 60, but not sufficient to be of any great importance.
Analysis of Previous Cases:

Hernia into the foramen of Winslow is a very rare form of hernia, since there are only 21 cases on record, (including the present case of Mr. Caird's). The reason of the extreme rarity of this condition is due to the fact that under normal anatomical conditions, it is scarcely possible for it to occur, a fact which I shall discuss fully later on.

The first 7 cases were undiagnosed during life, and were not operated upon, the condition being discovered at the autopsy. The first case of recovery from operation is that of Heave (eleventh case); here the hernia was found to be irreducible, but several days later it appears to have spontaneously reduced itself, and the patient left the hospital cured. Since this case, there are four other cases of recovery following the operation, (Groves and Marten, Mori, Delkeskamp, and Sinclair). Only one case has ever been diagnosed before operation, namely that of Sinclair, (1909).

I now propose to analyse the above list of cases, as they present several very interesting points;—

I. Age.

There appears to be no particular age at which this form of hernia is most frequent. The earliest case on record was 8, (Picado), and the latest was 77 (Behn), the remainder being more or less indiscriminately scattered between these two extremes, there being perhaps a slight increase about the ages of 20 and 40 but not sufficient to be of any great importance.
3. **Sex.**

This form of hernia is far commoner in the male than in the female. Of the 19 cases in which the sex is known, 4 were females and 15 were males. The reason of this would appear to lie in the next paragraph;

3. **Occupation.**

In many of the cases the occupation was not recorded, but in most of those in which the occupation is mentioned it consists of some form where violent effort is required. In Majoli's case the man was accustomed to carry heavy weights of coal upon his abdomen, and it was following this that the condition arose; in Novello's case the symptoms commenced after an attempt to raise an unusually heavy weight. And the greater frequency of this condition in the male, compared to the female, is due probably to the male being more subject to such violent efforts than the female. In many cases it is interesting to note that the symptoms suddenly came on after eating an unusually large meal, (Picado, Rehn, Treves), or after a severe fit of coughing (Sinclair), and it is particularly interesting to note that in Delkeskamp's case, it followed parturition. We may therefore conclude that in the great majority of cases on record there has been some violent effort or increase in abdominal pressure, either externally or internally, which has been the direct cause of the hernia; but it is quite another question (which I shall discuss later) whether such an increase in the abdominal pressure alone, can be sufficient to cause such a hernia, and whether it is not also necessary that there should be some other factor or factors present as well; suffice
it to say for the present, that such an increase in the abdominal pressure appears to have been in many cases the immediate cause of the hernia.

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In all the cases (except that of Mezali) the first symptom was sudden and intense pain in the upper part of the abdomen. In one or two cases there was a history of previous constipation, but this is of very little diagnostic value; and in one case (denoloke) there appears to have been a previous attack of the same condition which evidently spontaneously remitted itself shortly afterwards. The great characteristic feature is the sudden attack of intense pain without any cause to account for it, and without any previous warning. In almost every case it is referred to the epigastrium or the umbilicus; it is usually absent below the umbilicus, and may be intense also in the intercostal region. In some cases the patient tries to get most relief by lying on his face, and pressing firmly in the region of the epigastrium. The intensity of the pain usually reaches its maximum at the beginning of the attack, and may tend to diminish inter ozęryfically due to the general diminution of sensibility which follows the first acute attack. In only one case (Mezali) was the pain of a sharp character, never being very intense, and this probably was due to the fact that the intestine was not very fibrous, against in the majority of cases at first.
Clinical Symptoms and Diagnosis:—

As I have already pointed out, hernia into the foramen of Winslow has only once been diagnosed before operation. The symptoms to which attention should specially be drawn are as follows:—

I. Pain.

In all the cases (except that of Majoli) the first symptom was sudden and intense pain in the upper part of the abdomen. In one or two cases there was a history of previous constipation, but this is of very little diagnostic value; and in one case (Gangolphe) there appears to have been a previous attack of the same condition which evidently spontaneously reduced itself shortly afterwards. The great characteristic feature is the sudden attack of intense pain without any cause to account for it, and without any previous warning. In almost every case it is referred to the epigastrium or the umbilicus; it is usually absent below the umbilicus, and may be intense also in the interscapular region. In some cases the patient appears to get most relief by lying on his face, and pressing firmly in the region of the epigastrium. The intensity of the pain usually reaches its maximum at the beginning of the attack, and may tend to diminish later probably due to the general diminution of sensibility which follows the first acute attack. In only one case (Majoli) was the pain of a chronic character, never being very intense, and this probably was due to the fact that the intestine was not very firmly caught in the foramen of Winslow at first.
3. **Complete Cessation of the Action of the Bowels:**

Immediately after the sudden seizure of pain, there may be an action of the bowels, i.e. of the contents of the intestine below the lesion; but after this there is absolute stoppage, both for flatus and faeces. In the case of Majoli and of Neave, after the acute symptoms had passed off, the patients settled down to a chronic stage, in which small motions were passed at varying intervals for some considerable time, but here it appears that the intestine was not very firmly caught in the foramen, and there was thus sufficient room for the passage of small quantities of faeces.

3. **Vomiting:**

This is a fairly common symptom, and usually begins early, about the first day. In some cases it is completely absent, though this is not very common, and in a few it consists of faecal matter, the site of the lesion determining this factor to a considerable extent.

4. **Swelling in the Epigastrium:**

A swelling in the region of the epigastrium or in the region of the umbilicus has been recorded in 9 of the cases. It is not a constant feature, but is nevertheless very frequently present, and is of diagnostic value. It is not usually present in the first day, but may appear about the second day, and be fairly marked by the third day.
This swelling may either be found in the epigastrium, or in the umbilical region, according as the occlusion consists of small intestine or large intestine. The epigastric swelling is associated with occlusion of the small intestine, and the umbilical swelling with occlusion of the large intestine. The position of these two swellings is shown in the following two figures:

Therefore, in a case of hernia into the foramen of Winslow, the points to which attention should be drawn in regard to the diagnosis are;

1. Sudden and violent pain in the epigastrium or umbilicus, and in the interscapular region.
2. Complete cessation of the action of the bowels.
3. Vomiting.
4. Swelling in the epigastrium, or umbilicus. Of these, the two most prominent features are the sudden pain, and the stoppage of the bowels. Vomiting may not be a very marked feature, although it usually is present to a very considerable extent, and the swelling in the epigastrium does not, as a rule, develop until the third day or so.
DEVELOPMENT OF THE INTESTINES AND MENSETERIES IN MAN.

CONDITIONS NECESSARY TO ALLOW OF A HERNIA THROUGH THE FORAMEN OF WINSLOW.
That hernia through the foramen of Winslow is a very rare form of hernia, as evidenced by the fact that there have only been 21 cases recorded since Blandin first published his case in 1883; and when we come to consider the reason why this form of hernia is so rare, it is at once apparent that the usual conditions favouring a hernia are not present. The foramen of Winslow is exceedingly small as a rule, and in many cases is closed altogether. It may be represented by merely a narrow slit, or as is normal, it will admit only one finger. Also it is situated above the intestinal area, and thus would appear to be ill-adapted for the development of a hernia. The loop of intestine which lies nearest the foramen, the duodenum, is firmly fixed, and has never been found in the foramen of Winslow. The hepatic flexure and the transverse colon are the only other segments of bowel which may be considered as normally near the foramen, but, as a rule, they are so firmly fixed in position that they are not readily displaced into such a condition. It therefore would appear, that, with a normal arrangement of intestines and mesentery that a hernia of this kind is scarcely possible, (I think I might almost say is impossible), and therefore we are only left with the condition that in order that this form of hernia be able to occur, there must be present some abnormal arrangement of intestines or mesentery; and in some cases this has been a most conspicuous feature of the case. And associated with this abnormality in the intestines there is also frequently a quite unusually large foramen of Winslow, e.g. in this particular case of Mr. Caird's it was possible to
put four fingers easily through the foramen.

In order to understand how it is possible for such an abnormal condition of the mesentery, etc. to exist it is necessary to follow the development of this part.

At an early stage of foetal life, the alimentary canal consists of a single straight tube suspended in the mesial line, by a fold of peritoneum attached along the posterior abdominal wall. At first this tube is in connection with the region outside of the abdominal cavity by means of a prolongation through the navel, known as the vitelline duct. This duct later becomes detached from the navel, but is sometimes still evident in adult life as Meckel's diverticulum. While still attached to the umbilicus, however, it pulls the formerly straight intestinal canal forward in a U-shaped projection, the arms of the U being known as the upper and lower. (See fig.1). When the intestinal tube is thus pulled forward, the closed peritoneal sac is pushed in front of it by the intestine, which becomes more or less completely covered by the peritoneum, still retaining, however, an extraperitoneal surface through which it receives its blood vessels and nerves. The two folds of peritoneum covering these structures, as they pass to the intestinal tube, are known as the mesentery. The upper part of the primitive intestinal tube, close beneath the diaphragm, becomes dilated, and forms the stomach; at first it lies longitudinally in the abdominal cavity, and somewhat resembles the bulb of a hand syringe in its relation to the rest of the tube. Its greater curvature lies posterior, and the pylorus is its lowest part.
That portion of the primitive intestinal tube just below the stomach forms the duodenum, and from its anterior wall the liver grows out, as a compound tubular gland. The duodenum at this period of development has already a mesentery of its own, slight in extent, lying between it and the posterior abdominal wall, and continuous above with the gastric mesentery and below with the jejunal mesentery. The pancreas grows backwards from the duodenum between the layers of this duodenal mesentery.

Now commences a complex process of rotation of all the abdominal viscera. The lower limb of the U-shaped intestinal tube, in which the caecum begins to bud, rotates upward in front and above the upper limb, and the caecal portion passes first through the umbilical region to the left hypochondriurn, thence to the right hypochondriurn, and finally at birth settles down toward the right iliac region of the abdomen. This rotation of the intestine takes place from left to right around the superior mesenteric artery as an axis in such a manner that the colon crosses the commencement of the small intestine transversely. While in this way the commencement of the large intestine is thrown over to the right side, the small intestine for the greater part assumes a position on the left, and the former right side of the mesentery becomes the left and vice versa. Thus the lower part of the duodenum is carried to the
left and the commencement of the large intestine is carried across it, an explanation of the position of the duodenum behind the transverse colon in the adult and of the passage of the superior mesenteric artery over the front of the duodenum. The influence that the rotation of the intestinal loop has upon the mesentery may be readily appreciated; the attachment of the mesentery of the small intestine (the upper limb of the U-shaped digestive tube) remains practically unchanged, while that of the large intestine assumes attachments corresponding to the ascending, transverse and descending mesocolon. At the same time that this intestinal rotation is taking place from left to right, the stomach likewise undergoes rotation in the same direction so that its left side becomes anterior, and its right side posterior in position. The liver passes to the right hypochondriac region, and the pancreas is shifted posteriorly and slightly to the left. The pyloric end of the stomach ascends, and the greater curvature becomes the inferior border, while the lesser curvature becomes the superior border of the stomach. The stomach has now therefore an anterior and a posterior wall, both covered with peritoneum; but whereas the anterior is in free communication with the general cavity of the peritoneum, the posterior wall has become more or less isolated, and is in relation with the pancreas, the lesser peritoneal cavity
separating them. This lesser peritoneal cavity retains its only connection with the general peritoneal cavity at its right extremity through the foramen of Winslow. Above the stomach the gastro-hepatic omentum stretches from its lesser curvature to the liver, while from its greater curvature the great omentum passes downwards between the stomach and the transverse colon, at first consisting of two double folds of peritoneum. Later these folds fuse and become adherent to the transverse colon, so that the adult type is found shortly after birth. The duodenum and pancreas are by this process of rotation sequestrated behind the stomach and transverse colon, and being subject to no movement of any consequence lose their posterior mesenteries by absorption, and become in extrauterine life retroperitoneal organs. It is a law that when two serous surfaces are approximated, and little or no motion exists between them, that they fuse. Thus the duodenum and its mesentery are pressed by the transverse colon against the posterior abdominal wall, and unite extensively with the peritoneum covering the latter. Growing apace with the gut, the mesentery of the small intestine is thrown into fan-shaped folds, since at its vertebral attachment it remains short. Carried by the colon transversely across the end of the duodenum, the transverse mesocolon obtains secondary attachment to the latter and to the posterior abdominal wall, in a line from left to right, and remains permanently as a well-marked mesentery. Thus the transverse colon with its mesocolon divides the abdominal cavity into an
upper part that includes stomach, liver, duodenum and pancreas and a lower which contains the small intestine. The mesenteries of the ascending and descending colon become obliterated by fusing with the parietal peritoneum of the posterior abdominal wall, so that in the mature condition these parts of the gut are, as a rule, covered by peritoneum only in front and at the sides.

Steenh, and Leytner) nearly the whole of the small intestine was found in the lesser sac. In the remaining 7 cases where the large intestine was involved, it consisted in 4 of the transverse colon, in 2 (Vetl and Oaiat), it was the ascending and ascending colon, and in 1 (Bilhouschop), it was the lower part of the small intestine, and considerably more than half of the large intestine. In the case of Trae and the hernia was a very large one, including the lower end of the small intestine, the sac, the ascending colon and part of the transverse colon. In only two cases (Wajoll, and SteenEL) has a part of the omentum also been present.

Small intestine.

The greater frequency in the presence of the small intestine is undoubtedly due to the fact that it passes through the omentum and is freely movable in the abdominal cavity. The only barrier to its upward movement is the great omentum which lies down in front, and if this be not developed as in the case in Helm's patient, or if displaced to one side, as in displaced upwards, then there is nothing to prevent the passage of the small intestine upwards, and none of the cases
CONDITIONS ALLOWING THE HERNIA.

If we now come to analyse the contents of the sac in this form of hernia, it will be seen that the small intestine is far more frequently present than the large; in fact, out of the 21 cases, the small intestine was present in 14, i.e. twice as often as the large intestine. In three cases (Blandin Stecchi, and Peynier) nearly the whole of the small intestine was found in the lesser sac. In the remaining 7 cases where the large intestine was involved, it consisted in 4 of the transverse colon, in 2 (Mori and Caird), it was the caecum and ascending colon, and in 1 (Delkeskamp), it was the lower part of the small intestine, and considerably more than half of the large intestine. In the case of Treves, also, the hernia was a very large one, including the lower end of the small intestine, the caecum, the ascending colon and part of the transverse colon. In only two cases (Majoli, and Stecchi) has a part of the omentum also been present.

Small intestine.

The greater frequency in the presence of the small intestine, is undoubtedly due to the fact that it possesses a mesentery and is freely movable in the abdominal cavity. The only barrier to its upward movement is the great omentum which hangs down in front, and if this be not developed as was the case in Rehn's patient, or is displaced to one side, or is displaced upwards, then there is nothing to prevent the passage of the small intestine upwards, and once it has passed
upwards, and the foramen of Winslow is large, there is nothing to prevent a coil passing into it on some sudden exertion, or increase in the abdominal pressure. But, probably, in all these cases, there is an unusual length of the mesentery also, and, in fact, with a normal length of mesentery it is not possible for this hernia to occur.

3. Transverse colon.

The transverse colon has been present in four cases. In order to permit of this, there are two conditions necessary: first, an unusually long transverse meso-colon allowing undue mobility of the transverse colon, because in the normal condition, the transverse meso-colon is too short to allow of such a displacement.

And secondly, there is necessary some anatomical peculiarity, or error in development of the transverse colon itself.

Buy, (Anatomie du colon transverse; Paris, 1901;) divides the transverse colon into two parts, a right and a left, its division being at the duodenum. He states that out of an examination of 100 subjects, he found that in 22, while the 'right transverse colon' was normal, the 'left transverse colon' was greatly lengthened and possessed an unusually long mesentery in consequence. When this is present, the part of the transverse colon which is so lengthened becomes displaced, and this displacement is usually into the epiastrium. It then passes to the right, finally coming to lie under the liver (see figure on next page), and once it is in this position,
it will be at once clear, that, if the foramen of Winslow should be large, and some sudden increase in the abdominal pressure should occur, we have all the necessary requirements for such a hernia to develop.

C. Caecum and ascending colon.

In this case of Caird's, these were occluded, and it is interesting to note that there was an almost exactly similar condition of affairs in the case recorded by Mori in 18 . In two other cases, a somewhat similar condition was present. Treves found the smaller part of the lesser intestine, the caecum, the ascending colon, and part of the transverse colon all present in the lesser sac in his case, and Dolkeskamp found the end of the ileum, the caecum and more than half of the large intestine present in his case. In all these cases the there was an abnormal condition of the mesentery, since the caecum and ascending colon both possessed a mesentery continuous with that of the small intestine, and thus were freely movable in the abdominal cavity. The presence of this mesentery is due to a development error, the nature of which I have previously
discussed. Just before the rotation of the intestine takes place there is a mesentery to the caecum, ascending colon and transverse colon, and after the rotation has been effected this mesentery disappears from the large intestine, which becomes fused to the posterior abdominal wall; and in these four above cases this latter event had not taken place, the earlier mesentery persisting, and in consequence the colon being freely movable in the abdominal cavity was able to pass upwards and if the conditions was to be possible, to pass through the foramen of Winslow.

When we now come to consider the result of the above facts, it is probable that a hernia into the foramen of Winslow cannot take place when there is a normal arrangement of the intestines and mesenteries. The lesser intestine which is most frequently found in the foramen, probably always has an unduly long mesentery in such cases; and the transverse colon and caecum and ascending colon are never found in the foramen of Winslow, unless some very great developmental abnormality is present, the nature of which I have just discussed, and which allows such a hernia to take place.
As in all cases of acute abdominal obstruction, it is necessary to open the abdomen, and this must be done early. A long incision should be made in the middle line, or on one side of it as preferred, and if necessary, any distended coils of intestine inflated and emptied. After the incision has been recognised, we come to the question of the best means of dealing with the condition:

A. Reduction by taxie.

This should always be attempted first. The liver is raised to give more room, and the meso-gently pressed from left to right until all the intestine has been liberated. The pressure which is exerted must be very gentle, since it is very easy to injure the intestine with the finger, and also the bowel may be in any stage of decay. After it has been liberated, the finger should be passed through the peritoneum of Wrislow in order to determine that all the intestine is actually out of the case, and also it may happen that a piece of omentum may have become attached to the wall of the lesser sac, and cannot be reduced. In one case this actually took place, the patient dying from the result of such a band of omentum constricting the bowel after it had all been safely retracted from the lesser sac.

B. Operation.

If the intestine cannot be withdrawn from the peritoneum, the next problem is - how are we to enlarge the greater peritoneal cavity? We cannot do this unlike the lesser range of the intestine, since...
TREATMENT.

As in all cases of acute abdominal obstruction, it is necessary to open the abdomen, and this must be done early. A long incision should be made in the middle line, or to one side of it as preferred, and if necessary, any distended coils of intestine incised and emptied. After the lesion has been recognised, we come to the question of the best means of dealing with the condition:—

A. Reduction by taxis.

This should always be attempted first. The liver is raised to give more room, and the mass gently pressed from left to right until all the intestine has been liberated. The pressure which is exerted must be very gentle, since it is very easy to injure the intestine with the finger, and also the bowel may be in any stage of decay. After it has been liberated, the finger should be passed through the foramen of Winslow in order to determine that all the intestine is actually out of the sac; and also it may happen that a piece of omentum may have become attached to the wall of the lesser sac, and cannot be reduced. In one case this actually took place, the patient dying from the result of such a band of omentum constricting the bowel after it had all been safely removed from the lesser sac. (Stecchi).

B. OPERATION.

If the intestine cannot be withdrawn from the foramen, the next problem is—how are we to enlarge the foramen of Winslow? We cannot here divide the constricting band, since
It contains the portal vein, bile duct and hepatic artery.

It is always possible to dilate the orifice a little by gently stretching it with the finger, and this may be sufficient to allow of the withdrawal of the intestines.

Jeanbrau and Riche, after a series of experiments upon the cadaver, consider that they have demonstrated a method by which the foramen can be enlarged by operative treatment.

It is impossible to enlarge the foramen from behind, owing to the inferior vena cava; it cannot be enlarged from either the right or left side of the anterior margin, owing to the bile duct and hepatic artery; and it cannot be enlarged from above owing to the liver. Jeanbrau and Riche, however, consider that it can be enlarged from below. They recommend the following procedure:

An incision is made as here, between the inferior vena cava and the duodenum, a space of loose connective tissue, which may safely be opened up.
over and parallel to the first part of the duodenum, incising the anterior layer of the lesser omentum. The duodenum can then be turned downwards and forwards, and the space containing the bile-duct, hepatic artery and portal vein opened into. This part is then taken between the fingers and thumb, and the finger thus protecting the inferior vena cava, the posterior layer of the lesser omentum is perforated. The hole is then enlarged into a longitudinal button-hole parallel to the bile duct, and large enough to admit of the introduction of the finger. The finger is then introduced into this button-hole, and pressed downwards, when it will be found easy to enlarge the floor of the foramen, owing to the laxity of the retroduodenal tissue. And now, the foramen being enlarged, it is possible to withdraw the intestine. Jeanbrau and Riche have shown that the above operation is perfectly possible upon the cadaver, but Moynihan
states that it is quite impossible, in his opinion, to carry it out upon the living subject. He considers that it is much easier to make an incision in the gastro-hepatic or gastro-colic omentum, and thus enter the lesser sac. The distended coils may then be incised and emptied of their contents, etc., or if there is any twisting or kinking of the intestine it can in this manner be very easily corrected; and, by this means, an easier method is reached for reducing the hernia without attempting such a difficult and dangerous operation as the above described operation of enlarging the foramen of Winslow.
CONCLUSIONS.

1. Hernia through the foramen of Winslow is a very rare form of hernia. This case of Mr. Guindon is the 91st case on record.

2. In this case, the contents of the lesser sac consisted of cecum and ascending colon. They both possessed a long distinct mesentery, and the foramen of Winslow was large enough to admit four fingers easily.

3. Of these 81 cases, 51 consisted of the small intestine in 40 cases, of the large intestine in 7. The transverse colon was found in the lesser sac 4 times.

4. Hernia into the foramen of Winslow is probably impossible unless there is some anatomical malformation or error in development present. This may consist in one or more of the following points:
   1. A common mesentery to the whole intestine.
   2. Absence of secondary fusion of the ascending colon to the posterior abdominal wall.
   3. Abnormally large size of the foramen of Winslow.
   4. Abnormal length of mesentery giving rise to undue mobility of the intestine.

5. The clinical symptoms and signs consist of:
   1. Sudden and violent pain in the epigastrum or round the umbilicus (and in the interscapular region).
   2. Complete cessation of the action of the bowels.
CONCLUSIONS.

4. Epigastric or umbilical swelling.

I. Hernia through the foramen of Winslow is a very rare form of hernia. This case of Mr. Caird's is the 21st case on record.

2. In this case, the contents of the lesser sac consisted of caecum and ascending colon. They both possessed a long distinct mesentery, and the foramen of Winslow was large enough to admit four fingers easily.

3. Of these 21 cases, the hernia consisted of the small intestine in 14 cases, of the large intestine in 7. The transverse colon was found in the lesser sac 4 times.

4. Hernia into the foramen of Winslow is probably impossible unless there is some anatomical malformation or error in development present. This may consist in one or more of the following points:
   1. A common mesentery to the whole intestine.
   2. Absence of secondary fusion of the ascending colon to the posterior abdominal wall.
   3. Abnormally large size of the foramen of Winslow.
   4. Abnormal length of mesentery giving rise to undue mobility of the intestine.

5. The clinical symptoms and signs consist of:
   1. Sudden and violent pain in the epigastrium or round the umbilicus (and in the interscapular region).
   2. Complete cessation of the action of the bowels.
   3. Vomiting
4. Epigastric or umbilical swelling. Of these, the first and second are always found, the third is usually present, and the fourth usually appears about the third day.

6. The condition has only once been diagnosed before operation, and of the cases which have been operated upon, only four have recovered.

7. The treatment consists in operating early. A large incision should be made, and the intestine should first be tried to be reduced by taxis, and if this fails, then the gastro-colic or gastro-hepatic omentum should be incised. Operative attempts to enlarge the foramen of Winslow by taking advantage of the loose cellular space between the inferior vena cava and the duodenum should not be attempted.
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Mary Pain.
Age 41.

Infirmary Register, No. 4540.

Date of Section: 10 March 1902.
Permission to open wound only.

Abstract of Record.

Removal of Hernia or gangrenous caecum through the Foramen of Winslow. Plastic adhesions around operation area.
No general peritonitis.

REPORT-

Body is that of a small poorly developed middle-aged female. Major cutting passing off from neck, present in lungs.
Post-mortem lividity in dependent parts. Dilatation of medium sized veins in groin and over legs. Square blister 2 by 2, over epigastrium. Recent surgical incision from umbilicus to pubis and horizontally from middle line to above anterior superior spine. Central part of the incision left open, several end of small intestine protruding. Upper and lower ends of first incision left open and stuffed.

In opening aboumen region of operation is cut off by keuze stuffing. No general peritonitis. Early plastic adhesions of loops of small intestine in neighborhood. Cause exists in region of right kidney and under aspect of liver to some extent. No asculation or fluid.

Structures around Foramen of Winslow, which admits four fingers readily, preserved for Dr. Wadd.
Mary Phin.
Age 41.
Infirmary Register, No. 4949.
Date of Sectio. 10 March 1909.
Permission to open wound only.

Abstract of Record.

Removal of Hernia of gangrenous Caecum through the Foramen of Winslow. Plastic adhesions around operation area. No general peritonitis.

REPORT:-

Body is that of a small poorly developed middle-aged female. Rigor mortis passing off from neck, present in limbs. Post-mortem lividity in dependent parts. Dilatation of medium sized veins in groins and over legs. Square blister 2 by 2, over epigastrum. Recent surgical incision from umbilicus to pubis and horizontally from middle line to inch above anterior superior spine. Central part of the incision left open, severed end of small intestine protruding. Upper and lower ends of first incision left open and stuffed.

On opening abdomen region of operation is cut off by gauze stuffing. No general peritonitis. Early plastic adhesion of loops of small intestine in neighbourhood. Gauze drains in region of right kidney and under aspect of liver to lesser sac. No accumulation of fluid.

Structures around Foramen of Winslow, which admits four fingers easily, preserved for Mr. Caird.
1. History of Present Case.
2. Commentary on Carcinoma of the Male Breast.
3. Comparison of Carcinoma of the Male and Female Breast.
4. Treatment.
5. Literature.

CARCINOMA OF THE MALE BREAST.

St. Ninian Bruce.
CONTENTS.

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1. History of Present Case.
2. Commentary on Carcinoma of the Male Breast.
3. Comparison of Carcinoma of the Male and Female Breast.
4. Treatment.
5. Literature.
6. Plate.

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HISTORY OF PRESENT CASE.
HISTORY OF PPFGFHT CASH.

HISTORY OF PRESENT CASE.

Patient began to notice about 18 months ago that his left breast was painful. There was no swelling of the breast, but he thought that it felt hard and he had a curious pain in it at times. This pain was not always present; it came and went without any reason, and sometimes came in great starts and then it usually did not last very long. He could give no reason why this pain should have arisen, and was not aware of having had any previous injury to his breast. As the pain was never very severe, it did not alarm him to any great extent, so that he did not consult a doctor, and thus received no treatment. As the pain, however, did not pass off, and rather tended to be increasing, he consulted Mr. Shanlay, St. Ninian's, who examined his breast and told him it would be necessary for him to go the University for proper treatment, and he accordingly did
Matthew Paton.

| Age:       | 75. |
| Occupation:| Gardener. |
| Address:   | St. Ninian's, Stirling. |
| Admitted:  | Decr. 22nd. 1906 to Ward 9. |
| Recommended by: | Dr. Chalmers, St. Ninian's. |
| Complaint: | "Pain in left breast". |
| Duration:  | 12 months. |

**History of Present Illness:**

Patient began to notice about 12 months ago that his left breast was painful. There was no swelling of the breast, but he thought that it felt hard and he had a curious pain in it at times. This pain was not always present; it came and went without any cause, and sometimes came in great starts and then it usually did not last very long. He could give no reason why this pain should have arisen, and was not aware of having had any previous injury to his breast. As the pain was never very severe, it did not alarm him to any great extent, so that he did not consult a doctor, and thus received no treatment. As the pain, however, did not pass off, and rather tended to be becoming worse, he consulted Dr. Chalmers, St. Ninian's, who examined his breast and told him it would be necessary for him to go the Infirmary for proper treatment, and he accordingly did
so, arriving in Ward 9 on Dec. 32nd, 1908.

Patient is a strong, well-developed, healthy looking man.

**Previous Health.**

Measles, in childhood.

Rheumatism, at irregular intervals.

Epithelioma of nose, removed by Dr. Buchanan of Glasgow 25 years ago, from the right lateral aspect of his nose.

Pleurisy and pneumonia, 15 years ago.

**Family History.**

Father; dead, age and cause unknown.

Mother, dead, 86, "old age".

Brothers: 2; one died at 46 from consumption; the other alive and healthy.

Sisters: 0.

Children: 3, all alive and healthy.

**Social History.**

Patient is a gardener. He has always had steady employment, but has been much exposed to damp and wet weather. He lives in a two-roomed house, and sleeps in a room by himself. He always keeps the windows open in hot weather. He has always plenty of good food. He takes beer and spirits in moderation, and smokes from $\frac{1}{2}$ to 2 ounces of black tobacco weekly.
Condition on admission:—
Patient is a strong, well-developed, healthy looking man.

Examination of breast:—
There is nothing abnormal to be noted about his right breast.

In the left breast, he complains of pain which is not constantly present. There is no redness of the skin, nor pitting on pressure. There is no tenderness and no heat. The left nipple is retracted and very dark in colour. On palpation a hard mass can be detected in the upper and outer quadrant. The skin is tacked down over it and thus cannot be moved over the tumour, but the mass itself can be moved upon the deeper structures. There is no pain or tenderness on doing so. The mass is rather smaller than a walnut.

One enlarged lymphatic gland about the size of a pea can be palpated in the left axilla.

Circulatory System:—
The heart is rather irregular in its action, but there are no murmurs. The second mitral sound is unduly accentuated. The vessels are neither thickened nor tortuous; and the pulse is 68.

Respiratory System:—
Nothing to note.
Digestive System:—

His teeth are all very bad, and many are absent from both jaws. The tongue is covered with white fur; he has not a good appetite, and has a tendency to be sick after taking food. The stomach is dilated and he is very constipated.

Haemopoietic System:—

The liver and spleen are not enlarged. The thyroid also is normal in size. The glands in the right inguinal region are enlarged. There are no glands to be palpated in the neck, supra-clavicular or infra-clavicular regions on either side. There are also no glands in the right axilla, but there is one gland to be felt in the left axilla about the size of a pea.

Genito-urinary System:—

Patient has no frequency or pain on micturition. Neither kidney is palpable. The urine is of a dark amber colour, acid, sp. gr. 1012, deposit of mucous, no blood, albumen or sugar, urea 5 grains to the ounce.

DIAGNOSIS.

Carcinoma of the left mamma, with glandular enlargement.
Operation:—


Chloroform and ether.

The whole of the left breast was removed, together with the pectoral fascia right down as far as the rectus and the lymphatic contents of the axilla were cleared out, when several more small lymphatic glands were also found. A drainage tube was inserted, and the wound was closed.

(As the operation is similar to that carried out in removal of the female breast, I have not considered it necessary to describe it in detail).

Progress:—

Dec. 23. evening. Patient is very comfortable.

Jan. 4. On dressing the wound a large haematoma was found, and part of this was squeezed out.

Jan. 6. Wound dressed. A stitch or two were removed at the lower end of the incision, and a large blood clot was expressed. A second clot was removed from the upper end of the incision in the axilla, and a new tube was inserted. The wound looked healthy, with a slight discoloration of skin round about.

Jan. 7. Wound dressed. A slight opening was made about the middle of the incision and some more of the clot was expressed.

Jan. 8. The deep dressing was found saturated with serum. The wound looked well; two tubes were inserted
in the lower and upper third respectively. An area of discolouration was noted over the ninth and tenth ribs.

Jan. 10. Wound again dressed, and looked well. The deep stitches were removed, and there was a slight discharge of serum.

Jan. 11. Wound again dressed, and looked very well.

Jan. 13. Wound dressed and remaining stitches removed; at the upper end of the incision an irregularly shaped sloughing area, well defined and of a blackish yellow colour was seen, with a slight purulent discharge coming from it. There was no pain.

Jan. 15. Slough shows signs of separating and the discharge is much less.

Jan. 19. Patient got up to-day, and feels very well.

Jan. 22. All tubes removed, and no discharge found. Gangrenous area sloughing out well.

Jan. 24. Slough cut out with scissors leaving a cavity about 2 inches by 1. Everywhere else the wound had quite healed.

Jan. 26. The margins of the cavity were pared and three deep silk-worm gut sutures put in, and the edges drawn together.

Jan. 30. Patient discharged in above condition, feeling very well.

EXAMINATION OF TUMOUR.

The tumour on examination was found to be a typical
carcinoma of the breast of a fairly malignant type, the cells showing active proliferation.

The axillary glands were very extensively involved, showing on section a similar condition.

I have made a drawing of the tumour showing its microscopical appearance. This figure will be found at the end of the paper.
Carcinoma of the Male Breast.

Carcinoma of the male breast is a condition of sufficient rarity to deserve notice, when a case is found. In most textbooks of surgery carcinoma of the male breast is dismissed in a few lines. This is very unsatisfactory, since there are a large number of well recorded cases, and fuller information on this subject is most desirable, not only on account of the growth in the male breast itself, but also as a factor in the solution of many problems relating to cancerous disease in general.

Carcinoma of the female breast is a condition very frequently found, and presents a number of different features which distinguish carcinoma of the male breast.

(1) Carcinoma of the breast of the female rarely occurs as frequently as that of the male, and in the great majority of cases between 35 and 50. For practical purposes it may be considered that cancer of the breast is one hundred times as common in the female as in the male, in the St. George's Hospital records for 50 years, it was found that the proportion of male cases is exactly 1%. Some writers put the percentage higher and some lower, and it is obvious that the experiences of different surgeons will differ. The following lists give the main statistics:

Roger Williams.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1757</td>
<td>1</td>
</tr>
<tr>
<td>1763</td>
<td>2</td>
</tr>
<tr>
<td>1773</td>
<td>3</td>
</tr>
<tr>
<td>1783</td>
<td>2</td>
</tr>
<tr>
<td>1793</td>
<td>1</td>
</tr>
</tbody>
</table>

Muir, Scott, Reports.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1796</td>
<td>1</td>
</tr>
<tr>
<td>1800</td>
<td>2</td>
</tr>
<tr>
<td>1806</td>
<td>2</td>
</tr>
</tbody>
</table>

Gren.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1810</td>
<td>1</td>
</tr>
<tr>
<td>1820</td>
<td>2</td>
</tr>
<tr>
<td>1830</td>
<td>3</td>
</tr>
<tr>
<td>1840</td>
<td>2</td>
</tr>
<tr>
<td>1850</td>
<td>1</td>
</tr>
</tbody>
</table>
Carcinoma of the Male Breast.

Carcinoma of the male breast is a condition of sufficient rarity to deserve notice, when a case is found. In most textbooks of surgery carcinoma of the male breast is dismissed in a few lines. This is very unsatisfactory, since there are a large number of well recorded cases, and fuller information on this subject is most desirable, not only on account of the growth in the male breast itself, but also as a factor in the solution of many problems relating to cancerous diseases in general.

Carcinoma of the female breast is a condition very frequently found, and presents a number of different features which distinguish it from carcinoma of the male breast.

(I). Carcinoma attacks the breast of the female more frequently than that of the male, and in the great majority of cases between the age of 35 and 50. For practical purposes it may be considered that cancer of the breast is one hundred times as common in the female as in the male. In the St. George's Hospital Records for 30 years, it was found that the proportion of male cases is exactly 1%. Some writers put the percentage higher and some lower, and it is obvious that the experiences of different surgeons must differ. The following lists give the main statistics:

Roger Williams. 1 - 102.
Paget. 2 - 93.
Gross. 3 - 102.
Mid. Hosp. Reports. I - 200 (in 790 cases between 1875 and 1893.)
so that, although the average varies considerably, one in a hundred cases is a very fair estimate. This demonstrates very clearly the law that obsolete structures have very little tendency to take on cancerous or other neoplastic action.

(2). Carcinoma is not, however, the only tumour which is met with in the male breast. Shield (Diseases of the Breast) states that "most of what has been said about the maladies of the female breast applies also to the male. The main difference is merely in frequency". This statement is not quite correct, as I shall afterwards show.

Milton in 1657 counted 40 cases of cancer in the male breast;
Wagstaffe in 1876 added 21 more;
Poirier in 1883 found 62 cases of carcinoma, sarcoma, tubercle, etc.
Schuchardt in 1885, after a most laborious compilation of the literature of neoplasms of the male breast, describes 172 neoplasms, and mentions about 100 more.

Of these 172 cases, all were carcinomatous except 25, which were as follows:-

15 cystic,
  3 fibromata;
  2 adenomata;
  2 tubercular
  1 myoma;
  1 enchondroma;
  1 cutaneous deposit;
showing that quite clearly a great variety of tumours may occur
in the male breast. He considers that carcinomata are the most common tumours in the male breast, but Narmaduke Shield considers that, from his own researches, fibro-adenomata are rather more common. I shall return to this subject later in discussing the different varieties of carcinoma met with in the male breast.

(3). The earliest age at which carcinoma of the male breast has been recorded is 20, the latest 82, the mean being 50. The following table shows very clearly the number of cases during the different quinquennial periods between 20 and 70, with the comparable number in the female;—

<table>
<thead>
<tr>
<th>Age Period</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-25</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>25-30</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>30-35</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>35-40</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>40-45</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>45-50</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>50-55</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>55-60</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>60-65</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>65-70</td>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td>Over 70</td>
<td>10</td>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean Age</th>
<th>Earliest</th>
<th>Latest</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.</td>
<td>20.</td>
<td>82.</td>
</tr>
<tr>
<td>48.</td>
<td>22.</td>
<td>84.</td>
</tr>
</tbody>
</table>

From this table it will be noticed that there is a very great increase in the number of cases of carcinoma in the male breast after the age of 70, as compared to the female, and that the average age is two years later in the male.

Keyser (Lancet, 1904, p. 1493) in a list of 9 cases, gives the average age for the male breast as 61.5.

The principle records of the average age in the female are
as follows;-

<table>
<thead>
<tr>
<th>Source</th>
<th>Age Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shield</td>
<td>40 - 60.</td>
</tr>
<tr>
<td>Leaf</td>
<td>49 years, 2 months. (100 cases).</td>
</tr>
<tr>
<td>Bland-Sutton</td>
<td>40-50.</td>
</tr>
<tr>
<td>Watson-Cleyne</td>
<td>35 - 60.</td>
</tr>
<tr>
<td>Pick</td>
<td>35 - 55.</td>
</tr>
</tbody>
</table>

so that it is quite clear that the average age is older in the male than in the female.

(4). **Side affected:**

In the female, carcinoma of the breast is more common on the left side. In the male it is more commonly the right.

Wagstaffe, out of 31 cases records 16 on the right, and 12 left.

Keyser, out of 11 cases, records 8 on the right, and 3 left.

Roger Williams out of 62 cases, records 35 on the right, and 33 on the left. In 4 both breasts were affected, but not both primarily.

(5). **Presence of Ulceration.**

It is rather interesting to note that in far the greater number of cases in the male, at the time they were first examined, ulceration was present. In 12 cases where this was recorded, 7 were ulcerated, 2 were of a dusky red colour, and one ulcer was 5 inches long. Schuchardt found ulceration in 61 out of 70 cases; and Wagstaffe gives the proportion as more than half. The number of cases of carcinoma in the female in which ulceration is found at the first examination is very small when compared to the above figures.
6. Social Relation:-

In considering the relation of cancer to the sexual condition in men, it is interesting to note that it is more frequent in married men. Out of 13 cases, in which this was recorded, the statistics stand as follows:

- married 7,
- widowers 2,
- single 3.

and it is interesting to note that in this case of Mr. Caird's the patient was married.

7. Duration:-

In 13 cases in which the length of time the growth has been noticed by the patient is mentioned, the longest period is 10 years, and the shortest 3 months; the average being 3.36 years. Roger Williams gives the average period as 3.16 years. In the female the average duration is considerably less.

8. Initial lesion:-

This has not often been recorded, but in those cases in which this has been done, there is a very interesting condition found, namely, it is usually the central area where the disease began;

- central;
- below nipple, and to axillary side;
- below nipple, and to sternal side;
- above nipple, and to axillary side.

I shall discuss the full significance of this later.
We now come to consider two very important facts in regard to carcinoma of the male breast, namely, its causation, and its nature, i.e. the variety of carcinoma present.

(9). Causation;—

Carcinoma of the male breast is far more frequently found in association with some previous injury, or chronic irritation of the breast, than is the case in the female. Out of a list of 30 cases recorded by Roger Williams, some previous injury or disease was present in 16, i.e. 53%. (The highest percentage which I have found recorded in the female is 48.) Of these 16 cases, the 'previous injury' was as follows:—

- contusions 10;
- recurrent pressure from work 2;
- strain 2;
- long standing exsena of nipple 2.

This association of carcinoma of the male breast following a previous injury, is well shown in the following cases:—

"A police constable, aged 50, while arresting a prisoner received a kick on the left breast, causing a bruise round the nipple. Ten weeks after, some hardness appeared, which steadily increased. Rather more than a year after, he entered hospital with a malignant tumour the size of a foetal head growing in the part. The skin was dusky and adherent, and there were two enlarged axillary glands". (Shield).

"A patient aged 65, attributed his condition to a blow he received from a stone on the breast during an election" (Hawkins).

"A rough rider, aged 50, was admitted into St. George's..."
Hospital in Oct. 1888 with a tumour of the left breast. He had received a severe kick upon the gland four years previously, for which he had attended some time as an out-patient. He had noticed the present tumour for four months. On examination a hard movable tumour was found just behind the nipple which was free from it, and not retracted. On removal it was examined by Prof. Delepine, who reported it to be a typical fibro-adenoma, with the glandular structures well marked, and in many places a tendency to papilliferous arrangement. In conjunction with this case it may be mentioned that there is a specimen in the Museum of Charing Cross from the breast of a healthy young man in the navy, which followed a blow from a spar.

Carcinoma of the male breast has also followed upon continued pressure necessitated by the occupation or trade of the patient; e.g.:

"A silversmith, who suffered from carcinoma of the breast, attributed his growth to the pressure exercised by the exigencies of his trade upon the mammary region"; and

"A brassfounder, aged 58, suffered from carcinoma just below the left nipple. This was the situation where for many years pressure had been applied in his daily work" (Shield).

(10). Varieties of Cancer:

A predisposing cause to cancer, and other tumours of the male breast may be due, as Creighton suggests, to the persistence in certain cases of an unusual amount of glandular parenchyma, together with corresponding impulses to imperfect functional activity.

Of 15,481 neoplasms under treatment at Middlesex, St. Barts,
St. Thomas, and University College Hospitals, 2492 originated in the breast, and of these 25 were in the male, and 2397 were in the female; showing that about 15% of all neoplasms originate in the breast, and of these only about 1% originate in the male.

Cancer of the male breast, like that of the female may arise either from the acini, ducts or integuments. Roger Williams in considering his 100 cases, states that in 91 cases it was of the acinous variety (melanotic in two), six were of the tubular variety, cylinder celled duct cancers, and three were squamous celled epitheliomata (melanotic one).

\[
\begin{align*}
91 & \text{ acinous; scirrhous 88, (melanotic 2).} \\
6 & \text{ tubular, cylinder celled duct cancers.} \\
3 & \text{ Squamous celled epitheliomata. (melanotic 1).}
\end{align*}
\]

This is a very interesting distribution, as it would appear that the breast is relatively more liable to the tubular variety of cancer originating from the ducts, than the female. This, perhaps, is what one might have expected, since in the normal condition of the male breast, the ducts predominate and the acini are but poorly or imperfectly developed.

And the above list brings out another very interesting point, namely the presence of melanotic cancer thrice, and of a squamous celled epithelioma thrice also, i. e. of a cancer of the cutaneous variety. This is very interesting, when we remember that cancer of the integuments is much more common in the male than in the female, and thus it is important to notice that cancer of the mammary integument is more frequently found in the male than in the female. And the comparatively frequent occurrence of melanotic cancer in the male breast (3%) is also a
fact of great importance since growths of this kind are
much more frequent in connection with structures of integu-
mentary origin.

Roger Williams (Brit. Med. Jour. Sept. 10, 1893) gives an
analysis of 13,334 neoplasms of all parts consecutively
treated in Middlesex, University College, St. Thomas's, and
St. Bartholomew's Hospitals;-

Female; - Uterus 19.2%
Mammae 17.5%
Skin 9.4%
Connective tissue 7.7%
Tongue and mouth, 6.3%, etc.

Male; - Skin 16.4%
Tongue and mouth 15.9%
Connective tissue 9.4%
Lips 7.3%
Mammae, 0.5%, etc.

This table demonstrates very clearly the great preponderance of
integumentary cancer in the male, and out of 2,397 neoplasms
of the female breast, he does not record a single case of
either squamous epithelioma or melanotic sarcoma.

In the male breast we have to deal with a structure which has lost most of its special characters, and is in a
process of reversion to the primordial cutaneous condition
out of which it formerly evolved, and possibly it is on this
account that we find the relative predominance of this type of
cancer in the male breast.

The following are the three cases of squamous epithelioma of the male breast recorded by Roger Williams in 1889:-

I. "Patient, aged 63, came under treatment with a hard cancerous ulcer of the mammary region the size of a walnut. It was of a year's duration, and ulceration began after the disease had existed for six months. He had experienced several haemorrhages from it. The disease was extirpated. The histological examination was made by Cornil, who described it as an example of 'épithéliome pavimenteux lobulé', which probably originated in the skin of the areola."

2. "The age of the patient was 47. He came under observation with a hard cancerous ulcer of the breast and infiltration of the axillary glands. The disease was first noticed five years previously as a hard lump at the left nipple. Ulceration began 18 months ago. On microscopical examination it proved to be a "squamous celled carcinoide"."

3. "A tall, thin, dark, neurotic man, aged 41, came under observation with epitheliomatous ulceration of the areola, in the midst of which the nipple was still visible. The disease seemed to consist of indurated plaques in the skin, which were movable over the subjacent deep parts. In the edges and base of the ulcer a blackish tint was obvious. The axillary glands were enlarged. He stated that the disease began 5 years previously as a small wart in the skin of the areola; ulceration set in six months ago. The breast was amputated and the axillary glands removed. On microscopical examination it proved to be a case of melanotic cancer of the skin of the areola, and the axillary
glands were similarly affected. The patient recovered from the operation, but recurrence set in before complete healing of the wound and rapidly spread to the chest and arills."

A cutaneous epithelioma of the mamma of the female is a condition of great rarity. Roger Williams could not find one case amongst 3423 cases of cancer of the female breast. Billroth has gone so far as to deny its existance in the female breast; but Czerny has published a case, which was undoubtedly a squamous celled epithelioma and was confirmed and proved by microscopic examination. It is, as far as I am aware, the only case on record.

"The patient was 53 years old, and suffered from hereditary tuberculosis. She was the mother of four healthy children, all of whom she suckled. In Feb. 1885, a superficial swelling was first noticed which in April began to ulcerate. In Dec. the left mamma appeared full and the nipple projecting, and the skin of the areola was replaced by a hard, shallow epitheliomatous ulcer, the edges of which were hard and irregular. Its face was uneven and hard, and secreted a yellowish-red discharge. The subjacent mammary gland was hypertrophied, but not involved in the disease. There was no obvious infiltration of the axillary glands, but several of those above the clavicle were enlarged and hard. For the purpose of diagnosis a portion of the disease was scraped away with a sharp scoop. On microscopical examination of these fragments, the disease proved to be a squamous celled epithelioma, which had probably originated from the interpapillary processes of the rete. The breast was amputated shortly afterwards, and the infiltrated lymphatic glands were distinctly cancerous. The patient made a good recovery, but she returned three months and a
half later with a recurrent ulcer the size of a florin at the outer end of the scar in the chest. This was destroyed with the thermo-cautery. Czerny points out that this condition is very different from that known as Paget's disease." (Cent. f. Chir. 1886).

The above is a very interesting case. It shows the extreme rarity of the condition that it is the only case on record, and out of nearly 3,000 cases of carcinoma of the female breast there was not a single case of squamous epithelioma to be found. In the male breast, however, the condition is quite different, since in a group of 100 cases collected by Roger Williams it is found to occur three times, i.e. 3%.

But a cutaneous epithelioma is not the only integumentary growth recorded on the male mamma. Robinson (Trans. Path. Soc. 1893) has described a case of rodent ulcer of the male nipple. (I have been unable to obtain this reference). As far as I know, there is no case on record of a similar condition in the female.

And also, Paget's disease has also been found on the male nipple, as shown in the following interesting case reported by Forrest (Glasgow Med. Jour. Vol. xiv. p. 457).

"Patient, 72 years old, 9 months ago first noticed that a lactescent secretion escaped from his right nipple. This dried and formed a scab, on removing which, the subjacent skin was found red and eroded, and fresh scabs soon formed. Three months later retraction of the nipple set in; and shortly afterwards enlarged glands were noticed in the axilla. On examination six months later, scirrhus cancer was found to have developed in the breast."

A very good case of melanotic sarcoma on the skin of the male breast.
was recorded by Sutilin in the Clinical Journal for 3rd. June, 1896. The patient was a man, aged 40. He found that the skin over the breast was bluish in colour, and that "it itched very much". Finally ulceration was observed, and some bluish nodules appeared in the skin near the umbilicus.

The following is the account of the two cases, mentioned by Roger Williams in the Lancet, 1889; p. 311; and included in his list of 100 cases.

I. "The only details of this case are that the man had cancer of the breast with infiltration of the axillary glands, and that the disease followed a blow, and was of two years duration. On microscopical examination after removal, it proved to be fibrous alveolar cancer; both the cells and the fibrous alveoli were pigmented."

II. "This patient was an Italian aged 35. The disease was of one years duration. When first seen he had a large hard fungating tumour of the right breast, the nipple being still preserved. The adjacent skin and other soft parts were extensively invaded by hard cancerous nodules. The right clavicular and axillary glands on both sides were infiltrated. The right upper limb was oedematous. The patient suffered much from dyspnoea. Palliative treatment was adopted. He died of asthenia three months later. At the necropsy the whole of the soft parts of the front of the right side of the chest were infiltrated by a very hard quasi-fibrous growth of bright yellowish green colour. The muscles of the chest, the mediastinal glands, right pleura, and diaphragm were invaded by growths of a similar nature by direct extension. The right hydrothorax and lung were collapsed. These were metastatic nodules.

The following case, recorded by Shield is of considerable interest, since it appears to occupy an intermediate position between an epithelioma and a duct carcinoma.

"The patient had reached the great age of 99 years. It is noteworthy that the old man had been a shoemaker, and had used the "last" against the mammary region. The affection of the axillary gland was duct carcinoma, while that of the mammary growth was transitional from columnar in the nipple and ducts to spheroidal in the depths of the gland. It is interesting to note how the epithelium in the axillary gland copies the original type and indicates the true nature of the growth. I may remark the growth of the nipple has a strong resemblance to an epitheliomatous tumour of that region preserved in the museum of the College of Surgeons. Patient was for his years hale and healthy. The nipple became inflamed and tender about 12 months ago. It "scabbed over" and about 5 months ago began to swell and recently to ulcerate. The old man relates a blow upon the part to which he attributes his troubles. On examination a reddish, hard, circular somewhat lobulated growth, bleeding and discharging, occupies the situation of the left nipple. The tumour measures about $\frac{1}{2}$ inches in radius. Its base is a little constricted, but incorporated with the skin and mamma beneath, which, however, move freely on the
pectoral. Some enlarged glands can be felt along the pectoral. The heart and lung were in good condition, but the liver was somewhat enlarged. Growth removed by Mr. Lunn, but patient died of pulmonary oedema. Specimens shown at a meeting of the Path. Soc. of London on Jan. 5, 1897. The majority of the members believed that the growth was duct carcinoma of nipple and glands with transitional change in the breast from columnar cell to spheroidal carcinoma."

From this we may pass to the true tubular cancer arising from the ducts;—"Patient was a locksmith, aged 56. Four months ago he felt pain in his right breast, and soon afterwards he noticed a tumour there the size of a hazel-nut. Family history free from any cancerous taint. On examination a small hard tumour was found beneath the right nipple, which was retracted. There was no enlargement of the axillary glands. The diseased breast was amputated. Patient convalesced in 14 days. On histological examination of the mammary tumour, it was found to consist of duct-like structures lined with a single layer of cubical epithelium."

and also

"Patient was a stone-sawyer, aged 46. who five months previously first noticed a small area of induration in his right breast. He attributed it to pressure of the saw at work. No family history of cancer. On examination, a rounded tumour, size of a walnut was found beneath the nipple of the right breast, but the nipple was not retracted. There was no enlargement of axillary glands. Diseased breast was amputated, and he was convalescent in 18 days. He returned 12 months later with a tumour the size of a hazel-nut in his left breast, which he first noticed a fortnight ago. It was intimately
connected with the nipple. This breast also was amputated, and he left convalescent 10 days later. On histological examination the growth was found to consist of duct-like structures, lined by cells of columnar type.

This above account is quite sufficient to show that the nature of the cancerous growths found in the male breast are not quite the same as in the female, the difference consisting in the relatively larger proportion of cutaneous growths, and also in the larger proportion on duct carcinomata to the acinar type, in the male breast.
Comparison of carcinoma in the male and female breasts.

1. Carcinoma is usually found at a later age in the male than in the female breast. This is especially well seen after 70, where it is almost five times as frequent proportionately in the male.

2. Carcinoma may be regarded as 100 times as common in the female breast, compared with the male.

3. In the female, carcinoma of the breast is more common on the right side.

4. Carcinoma is far more frequently found ulcerated than in the female.

5. Carcinoma appears to be of slower growth in the male breast. The period from the first observation of the disease and the consulting of the surgeon is longer in the male.

6. The initial lesion in the male breast is usually central, and related to the nipple. In the female it is most frequently found in the upper and outer quadrant.

7. There is a greater tendency for the disease in the male breast to follow an injury, or result from recurrent infection.
(1). Carcinoma is usually found at a later age in the male than in the female breast. This is specially well seen after 70, where it is almost five times as frequent proportionately in the male.

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(3). In the female, carcinoma of the breast is more common on the left side; in the male it is more frequently found on the right side.

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(8). The nature of the growth, in the male breast, shows a larger number, proportionately, of duct carcinomata and cutaneous growths (squamous epitheliomata, melanotic etc.) than is found in the female, and this is probably related to the retrograde condition of the breast, in which the acinous elements are very poorly developed.

(9). The treatment in both conditions is the same, removal of the breasts, along with all the surrounding lymphatic tissue.
Treatment.

In regard to treatment, there is every reason for early interference, considering the close relation of the gland to the pectoral, advice removal of the pectoral region in every case with systematic clearance of the axilla. Many cases are recorded where long periods of freedom from recurrence have occurred after operation. Thus, there is a specimen in the Museum of the Roy. Coll. of Surg. which was a recurrent cancer, the primary growth having been removed more than 10 years ago. Warren records a case of an aged 56, who was alive and in good health 10 years after the operation. In Ruskine’s case, the man lived for 6 years and died without evidence of return of the disease.

Vegatative lists in follow in 20 cases:

If lived under one year:
- 8 rather more;
- I over two years;
- 3 over 3 years;
- 6 over 4 years;
- 2 over 5 years;

the average being 1.62 years.

Bevan Williams states that the mortality in very small, out of 80 operations of the breast for primary cancer, there were only ten deaths - mortality of 3.69 - both dying of metastatic about a month after the operation. The mortality in females operated in 1854, succeed in 10 fatal cases found the following results:

6 had operations, and lived 30 3, 37, 117, 27, 1.57.
Treatment.

In regard to treatment, there is every reason for early interference. Considering the close relation of the gland to the pectoral, Shield advises removal of the pectoral fascia in every case with systematic clearance of the axilla. Many cases are recorded where long periods of freedom from recurrence have occurred after operation. Thus, there is a specimen in the Museum of the Roy. Coll. of Surg. which was a recurrent cancer the primary growth having been removed more than 10 years ago. Warren records a case of a man aged 30, who was alive and in good health 13 years after the operation. In Hawkins's case, the man lived for 9 years and died without evidence of return of the disease.

Wagstaffe found as follows in 30 cases:—

II lived under one year;
3 rather more;
1 over two years;
3 over 3 years;
5 over 4 years;
2 over 5 years;

the average being 163 years.

Roger Williams states that the mortality is very small. Out of 56 amputations of the breast for primary cancer, there were only two deaths — mortality of 3.6% — both dying of septicaemia about a month after the operation. The mortality in female cases is II%.

Shield in 16 fatal cases found the following results:—

5 had operations; and lived 20,5, 27, 117, 182, 273
months; i.e. 104 months on the average. 13 declined operation, and died from II – 85 months; the average being only 38 months.

These above figures show that there is every inducement for early and extensive operation in cases of carcinoma of the male breast. The actual methods of procedure are the same as in the female. And it is important that the whole breast should be removed; the facts that these growths are often small and insignificant is no reason for limited removal.
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CONTENTS.

1. History of Present Case.
2. Surgical Treatment of Axillary Aneurism.
3. Record of Previous Cases.
4. Treatment.
5. Conclusions.

HISTORY OF PRESENT CASE.
HISTORY OF PRESENT CASE.

History of Present Illness

About two years ago patient began to have pain in his right arm, just above the elbow, and after a little time it also appeared in the right shoulder-blade. It was not always present, but when present it is of the nature of a dull pain, as if the part affected were being bared through. He especially noticed it while walking, how from his work with his arm hanging down at his side. He cannot ascribe this pain to any special cause, his work not being severe or involving any great muscular effort. Later the pain began to appear in the willie and arm of a more constant character, (the only type of dull aching pain), as pain continued and gradually not worse, but was not severe enough to prevent him from carrying out his usual work. About February of this year (1928) he began to notice that he was losing the
GEORGE MACKENZIE.

Age. 39 : Married
Born at Aberfeldy;
Address 31 Watson Crescent;
Occupation Laboratory attendant in University;
Recommended By Medical Waiting Room;
Admitted To Ward 34 on April 4th, 1909;
Complaint Pain in right shoulder, shoulder-blade and arm;
Duration Two years.

History of Present Illness:

About two years ago patient began to have pain in his right arm, just above the elbow, and after a little time it also appeared in the right shoulder-blade. It was not always present, but when present it is of the nature of a dull pain, as if the part affected were being bored through. He specially noticed it while walking home from his work with his arm hanging down by his side. He cannot attribute this pain to any special cause, his work not being severe or involving any great muscular efforts. Later the pain began to appear in the axilla and was of a more constant character, (he calls it "a dull nagging pain"). The pain continued and gradually got worse, but was not severe enough to prevent him from carrying out his usual work. About February of this year (1909) he began to notice that he was losing the
power of grasping with his right hand, and could not manage on this account to open his door with a key, etc. This weakness gradually got worse and three weeks ago he began to notice a numbness of his right forearm, which, later, spread downwards and affected the palmar aspect of his hand. During the last week before admission this numbness had rather disappeared, and a curious burning pain had appeared in the upper part of his arm, usually coming on in sharp attacks of a few minutes' duration. The pain in his shoulder-blade is now always present. The only cause to which he can assign his pain was considerable use of his arms in gymnastics and tug-of-war.

About six weeks before admission, patient went to a dispensary, and was told that he had probably got rheumatism and was given some powders. He stopped work and rested for a week, but did not benefit very greatly, so he came up to the Medical Waiting Room on April 4th, and was sent to Ward 34.

Previous Health:

Erysipelas: 22 years ago;
Syphilis: 20 years ago, while in the army in India.
He says it did not get further than the primary stage, as he got treatment at once.

Lupus: On his face, shortly after above.
Malaria fever: 4 years ago, and has had several attacks since his return to this country.
Family History:

Father: Died of cancer;
Mother: Alive and well;
Brothers: 3, all alive and well;
Sisters: 2, " " " "
Children: 1, healthy.

Social Conditions and Habits:

Patient has a comfortable home, and drinks very little. (He used to drink a great deal while he was in the army in India). He smokes about 2 ozs per week.

Condition on Admission:

Circulatory system:

1. Subjective symptoms:
   Nothing to note.

2. Pulse:
   (a) 68: regular;
       The rise is not unduly rapid, the apex is well sustained, and the fall is gradual. There is no dichrotism.
   (b) The arterial tension is not above the average.
   (c) There is no thickening of the arterial coats, or tortuosity of the vessels.
   (d) There is a most marked difference in the strength of the right and left radial pulse. The right is much weaker than the left, the
rise is slower, the apex more sustained, and the fall more gradual. The tension is much less, and they are not synchronous, the right being distinctly later than the left.

3. Inspection:

The apex-beat is well marked and is situated in the 5th interspace, 5½ inches from the middle line. There is slight systolic retraction of the area round the left nipple.

There is arterial pulsation in the vessels on the right side of the neck.

The most marked feature, however, is a large swelling about the size of an orange below the middle of the right clavicle. This swelling is round and distinctly pulsating, systolic in time. It is dull on percussion, and on auscultating over it there is a slight systolic murmur.

4. Palpation:

The apex-beat is forcible, and is situated in the 5th interspace, 5½ inches from the middle line. There is no thrill.

5. Percussion:

Dulness is reached superiorly at the third rib, on the right hand side about 1 inch from the midsternal line, and on the left side 6 inches from the midsternal line at the level of the 5th rib. The tumour is absolutely dull, and this dulness is
limited to the swelling and does not extend to the sternum, thus being separated from the heart dulness by a resonant area.

6. **Auscultation** :

The heart sounds are all clear, and no murmurs are to be detected.

The right arm shows no evidence of oedema, lividity or coldness.

The pupils are **equal**.

There is nothing to be specially noted in any of the other systems. The lungs are healthy, the breath sounds being normal all over, with no adventitious sounds anywhere. His digestive system also is good. Neither the liver nor spleen are enlarged. The stomach is not dilated and the appetite is good. The urine is of a good colour, sp. gr. 1025, and contains no albumen, blood or sugar. The urea is 10 gns to the oz.

**Synopsis** :

The features of this case are, therefore, as follows :

There is a round tumour situated below the outer half of the right clavicle. This shows most distinct pulsation, is dull on percussion and a slight systolic murmur may be detected on auscultation. There is a marked difference in the strength of the two radial pulses, the right being much weaker than the left. Associated with this there is pain in his shoulder-blade,
axilla, arm and forearm, and muscular weakness of his hand, and anaesthesia of his forearm. In short:

1. Pulsating tumour below the right clavicle;
2. Marked diminution in the right radial pulse;
3. Pain in arm, axilla and shoulder-blade;
4. Muscular weakness in the right hand;
5. Some anaesthesia of the right forearm.

Progress:

Patient was treated in Ward 34 with potassium iodide (5 grains) and sp. ammon.-aromat, (m.x.v. t.i.d.), and was given a light, dry diet.

On the 9th of April, he was sent to Mr. Caird's Ward, and it was decided to ligature the subclavian artery.

Operation:

The skin was drawn downwards over the clavicle, and an incision made through the skin, platysma, and superficial fascia, down to the bone. The skin was then allowed to retract upwards, and the deep fascia incised. The posterior border of the sternomastoid was then identified and the omo-hyoid was drawn upwards. The fascia below this was divided, and then the anterior border of the scalenus anticus was found and the subclavian artery was identified easily, as it had not undergone any marked displacement on account of the aneurism. It was ligatured in the usual manner and the wound closed.
Progress:

The patient made an uninterrupted recovery from the operation and before leaving hospital the following points were to be noted:

1. The radial pulse had not returned on the right side.
2. The hand was slightly cyanosed and rather colder than the opposite hand.
3. Pulsation ceased in the tumour after the operation and did not return.
4. Where the tumour previously was, there was now only a slight swelling.

This case, therefore, may go down on record as a successful case of ligature of the subclavian artery for axillary aneurism.

I now propose to discuss the subject of axillary aneurism from the point of view of cause, treatment, surgical interference, etc., but before considering the literature on the subject, I should just like to refer to the operation itself, or rather to the channels through which the collateral circulation is carried on after ligature of the subclavian, and the following account will be more easily understood if the figure which is at the end of this paper be here consulted. The branches of the subclavian artery are very clearly represented in the following figure:
The branches of the axillary artery are very variable in their number, but include thoracic branches to the chest and scapular branches to the shoulder, and these anastomose with corresponding thoracic and scapular branches from the subclavian artery. The collateral circulation may be divided into four main channels:

1. **Acromial branches of acromio-thoracic artery** with similar branches from the transverse cervical branch of the thyroid axis (See Fig.);

2. **Pectoral branches of the acromio-thoracic artery** and long thoracic, with intercostal branches of the internal mammary and the thoracic aorta in the upper four or five intercostal spaces;

3. **Superior thoracic artery with superior intercostal** and intercostal branches of the internal mammary in the first intercostal space.
4. **Subscapular artery**, with the intercostal branches of the **thoracic aorta** in the second to sixth spaces; and by means of its **dorsal scapular** branch with the **supra–scapular** and **posterior scapular** branches of the **subclavian**.
Prior to the year 1873, there are recorded 16 cases of axillary aneurism, of which 9 resulted in cases and 7 died fatally. This is a very high mortality, and are due in large part to the methods of sound treatment and materials for ligature which were at that period in vogue.

Bennett Way in 1865 (St. E., Oct. 5) published a case of ligature of the third part of the subclavian artery for axillary aneurism. He states that his operation was successful, but that the man was very alcoholic and died on the 6th May from delirium tremens, the result of heavy drinking before the operation. He also gives a list of cases recorded between 1872 and 1881, and on the next page I have given a short summary of these cases.

SURGICAL TREATMENT OF AXILLARY ANEURISM.

LIGATURE OF THE SUBCLAVIAN ARTERY, ETC.
Prior to the year 1873, there are recorded 48 cases of axillary aneurism, of which 23 resulted in cures and 25 ended fatally. This is a very high mortality, and was due largely to the methods of wound treatment and materials for ligature which were at that period in vogue.

Bennett May in 1885 (Lancet, Oct. 3,) published a case of ligature of the third part of the subclavian artery for axillary aneurism. He states that his operation was successful but that the man was very alcoholic and died on the 8th. day from delirium tremens, the result of heavy drinking before the operation. He also gives a list of cases recorded between 1873 and 1885, and on the next page I have given a short synopsis of these cases, 21 in all.
<table>
<thead>
<tr>
<th>No.</th>
<th>Age</th>
<th>Sex</th>
<th>Origin</th>
<th>Duration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>38</td>
<td>M.</td>
<td>Spontaneous</td>
<td>10 weeks</td>
<td>Sacculated and pulsating at outset; size of orange; was becoming diffused.</td>
</tr>
<tr>
<td>2.</td>
<td>46</td>
<td>M.</td>
<td>Strain at work</td>
<td>2 months</td>
<td>Sacculated; pulsating; small at first, was rapidly growing after a second strain.</td>
</tr>
<tr>
<td>3.</td>
<td>44</td>
<td>M.</td>
<td>Spontaneous</td>
<td>4 weeks</td>
<td>Sacculated; pulsating; large size.</td>
</tr>
<tr>
<td>4.</td>
<td>37</td>
<td>M.</td>
<td>Spontaneous</td>
<td>6 months</td>
<td>Sacculated, pulsating, medium size.</td>
</tr>
<tr>
<td>5.</td>
<td>32</td>
<td>M.</td>
<td>Spontaneous</td>
<td>2 weeks</td>
<td>Very large, no pulsation; diffuse at time of operation.</td>
</tr>
<tr>
<td>6.</td>
<td>37</td>
<td>M.</td>
<td>Spontaneous</td>
<td>3 months</td>
<td>Size of walnut; pulsating.</td>
</tr>
<tr>
<td>7.</td>
<td>60</td>
<td>M.</td>
<td>Spontaneous</td>
<td>9 weeks</td>
<td>Infraclavicular, large, sacculated and pulsating</td>
</tr>
<tr>
<td>8.</td>
<td>51</td>
<td>M.</td>
<td>Spontaneous</td>
<td>-</td>
<td>Very large; ruptured sac; aneurysmal diathesis</td>
</tr>
<tr>
<td>9.</td>
<td>49</td>
<td>M.</td>
<td>Very heavy work</td>
<td>2 years</td>
<td>Very marked.</td>
</tr>
<tr>
<td>10.</td>
<td>45</td>
<td>F.</td>
<td>Traumatic</td>
<td>2 months</td>
<td>Small size, sacculated and pulsating.</td>
</tr>
<tr>
<td>11.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Smal size.</td>
</tr>
<tr>
<td>12.</td>
<td>50</td>
<td>M.</td>
<td>Spontaneous</td>
<td>-</td>
<td>Size of orange; sacculated.</td>
</tr>
<tr>
<td>13.</td>
<td>36</td>
<td>M.</td>
<td>Spontaneous</td>
<td>-</td>
<td>Size of egg; sacculated and pulsating.</td>
</tr>
<tr>
<td>14.</td>
<td>52</td>
<td>M.</td>
<td>Traumatic</td>
<td>-</td>
<td>Large and diffuse.</td>
</tr>
<tr>
<td>15.</td>
<td>62</td>
<td>M.</td>
<td>Spontaneous</td>
<td>-</td>
<td>Sacculated; size of lemon.</td>
</tr>
</tbody>
</table>
Operation.
Lig. of subclavian. (catgut).
Lig. of subclavian. (catgut).
Lig. of subclavian, sih.
Retirr of pulsation and haem.
18th. day Araput; return at shoulder; recovery Artery tied in axilla; sih above and below sac; not opened.

Lig. of subclav. (catgut). return of pulsation; a input. at shoulder. Death.
Lig. of subclavian, sin.
Lig. of subclavian, catgut.

---

Remarks. Operation.
|   |   |   | Spontaneous. |   | Very large, sacculated and pulsating.  
|   |   |   | Traumatic. |   |    
| 18. | 60. | F. | Strain. | 12 months. | Medium-sized; pulsating and sacculated.  
| 20. | 71. | M. | Spontaneous. | 3 months. | Large size; pulsating and sacculated.  

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<table>
<thead>
<tr>
<th>Improvement in condition</th>
<th>Death</th>
<th>Death</th>
<th>Death</th>
<th>Death</th>
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<td>15 men</td>
<td>1</td>
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<td>Patient Read like a treat</td>
<td>Death</td>
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<td>Death</td>
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<tr>
<td>Digital compression; V, 9 days.</td>
<td>Death</td>
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<tr>
<td>Digital compression.</td>
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<td>Death</td>
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<td>Death</td>
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<tr>
<td>Secondary haemorrhage from</td>
<td>Death</td>
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<td>Death</td>
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<td>Death</td>
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</tbody>
</table>
If this list be now examined, the following points will be noticed:—
14 cases were treated by ligature of the subclavian, of which 10 recovered with cure of the aneurism, which in all these cases was of spontaneous origin, sacculated and pulsating; one case died from delirium tremens, one failed owing to the slipping of a catgut ligature, two failed from too free an establishment of collateral circulation (both were cases of traumatic, pulseless aneurysms, not suitable for ligature; amputation of the shoulder-joint was subsequently performed, with one recovery and one death.) One case underwent spontaneous cure. Two were cured by digital pressure, both sacculated, pulsating aneurysms. One died under galvano-puncture.

Three were treated by the old (Syne's) operation, of which one was cured (very small and spontaneous), one died of haemorrhage, (very large, traumatic and diffuse), and one was cured (traumatic, no particulars).

The part of the artery involved appears to have exercised some influence on the prognosis. Low down in the loose axillary space, aneurysms speedily attain a large size, or become ruptured, and under these conditions the results of ligature are not so favourable as when the aneurism is higher up in the axilla where the structures are not so loose, and in consequence the aneurysm does not reach such a large size.
Since 1884, I have been able to discover records of 28 other cases of axillary aneurism. This is not a complete list, however, since I have gathered it from the College of Surgeons Library owing to the courtesy of the Librarian, Mr. Alexis Thomson. The Index Medicus in this library is not complete, the volumes between 1900 and 1902 included, being absent, and thus I have probably missed some cases between these two dates. I have also been unable to obtain the references in several cases recorded in Italian, Spanish and Russian, and have not added these to the list. Apart from this, however, I think the following list is a fairly complete account of most of the cases which have been recorded during the last twenty years or so.

It is rather surprising to find how few cases there actually are on record of this condition. Axillary aneurism is either traumatic or idiopathic. It is very rare in the female, and when present is almost invariably traumatic in origin. In the male, when not of traumatic origin, it is often associated with some unusual exertion or work throwing an increased strain upon the arms; but in some cases, there is absolutely no history of anything whatever to account for its origin. It is not so frequently associated with a syphilitic history as innominate aneurism, and is fortunately far more amenable to treatment than the latter.
<table>
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<td>22</td>
<td>33</td>
<td>M.</td>
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<td>70</td>
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<td>-</td>
<td>cure</td>
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Result: The procedure was successful except for the left subclavian, where the collateral branches were not cut.
Of the above list, the following cases are of special interest, and are worthy of record:


Man, gardener, 59:

Had syphilis; not alcoholic; strained arms by hanging on to trees, wheeling barrow, etc.

First noticed lump six months ago, which since increased in size. When working hard it would get larger and throb much, causing pain down the arm and numbness of fingers.

Lump on examination, size of orange; rounded where it presented in the axilla and tailing off gradually as it passed upwards under the pectoral muscles to the clavicle. Distensible pulsation. On compressing the subclavian artery the pulsation ceased and the tumour became softer.

Operation cut down on 3rd part of right subclavian with intention of passing a ligature round it, and found it dilated and aneurismal. Scafeus anterior cut across and 2nd part ligatured as sufficiently normal. Sterilized catgut was used. The radial artery soon filled and presented fair tension to the finger, but the pulsations were slight in it and are not easily recognised even now.

Syphilis or some local strain or traumatism accounts for most of the aneurisms met with in limbs. The point of interest is the very limited portion of artery on which it was possible to place a ligature. With an aneurism half an inch to the right of ligature, and the large branches of the first part of the
artery half an inch to the left, and the artery itself in a diseased condition, it was with much anxiety I tied the ligature. Essential was primary union.

3. Unusual Case of Axillary Traumatic Aneurism. Willett, Practitioner, 1898, Vol.61, p.571

Man, 84, ship's barber. At sea thrown by lurch of ship to one side of vessel and pair of scissors in inner breast pocket driven through right armpit. Wound bled much, but patient applied a tight bandage to whole arm, and it healed in 5 days. Arm, however, became weak and numb, with wrist-drop from the too tight bandaging. Pulsating tumour, expansile and controlled by compressing subclavian. Feels firm and hard.

Treated by rest and elevation of limb for a week. Then cut down upon and found all coagulated. Elevation of limb favoured deposit of clot, so consolidation had been very rapid.


Man, 40. In December 1904 severe pain in praecordia, radiating down right shoulder and right arm. Then noticed swelling in right supra-clavicular region.

February 8, 1905, ligature of 1st part of right subclavian and common carotid. Incision along right clavicle, skin-flap
dissected upward and outward, the external jugular vein and all superficial vessels ligatured, and the sternal origin of sterno-
mastoid divided. After freeing the clavicle, its inner half was
resected. The first portion of the subclavian and first part of
common carotid were exposed, their sheaths opened, and both were
secured by temporary chronic gut ligatures. Upon tightening
these ligatured, no pulsation could be felt in aneurismal sac,
which was then opened by a transverse incision. Bleeding follow¬
ing this extremely profuse, but controlled by finger thrust into
sac, when it was found that the aneurism was one of the saccu¬
lated variety. Finger withdrawn and incision closed. Patient
made a rapid and uneventful recovery with no unfavourable symp¬
toms. Pulsation never reappeared in the aneurism, which had now
almost shrunk away.

4. **Traumatic Axillary Aneurism.** Johnson and Turner,

"The patient, a woman, aged 70, fell downstairs on to the left
shoulder, the injury being followed by much bruising of the part
and paralysis of the hand and forearm. Three weeks later a
pulsating tumour as large as a Tangerine orange was present in the
anterior part of the axilla; the pulse at the wrist was not per¬
ceptible. After several months the muscular power had much im¬
poved, and the radial pulse was again perceptible. During the
third year the aneurism gradually increased, without symptoms of
pressure, until a small bruise appeared over the posterior axillary
fold; and a few days later a considerable extravasation occurred, with intense pain and extensive discoloration of the skin. The axillary artery was tied in the first part of its course. On the morning of the operation blood began to leak through a small opening in the discoloured skin. All pulsation in the axilla was arrested by the ligature, but the circulation in the limb remained good. The opening in the skin of the axilla discharged slightly until about three weeks after the operation, when a free escape of the extravasated blood occurred, and after slightly enlarging the opening a quantity of coagulum was removed. From this time the discharge lessened, the swelling completely subsided, and the final result was very satisfactory.

The chief practical interest of the case consisted in the fact that a traumatic axillary aneurism, after extensive extravasation, was successfully dealt with by the proximal ligature. According to the usual teaching such a favourable result was hardly to be expected in such circumstances and at such an age. Probably the long duration of the aneurism had caused the collateral supply to be well established. The treatment adopted was far less severe than that of freely opening up the axilla and dealing with the artery at the aneurism.

5. Excision of an Arterio-venous Aneurism in the Axilla.

Mignon, Lancet, 1905, Vol.1, p. 1755

"The aneurism, which was the sequel of an old wound inflicted with a knife in the cavity of the axilla, resulted from a communication of the axillary artery with a collateral external vein. The
internal axillary vein was also wounded but arterial blood did not make its way into this vein, which was thrombosed for a distance of four centimetres. Hignon applied two ligatures and in the intervening space excised the collateral external vein and the axillary artery for a distance of about two and a half centimetres. Recovery followed without complications, although the axillary artery had been tied in a part of its course where there are no collateral branches — namely, below the inferior scapular, in the portion which is commonly said to be dangerous for ligature. At the present time all the signs of aneurism have disappeared, but the patient has no radial pulse". 
From the above list it will be noticed that I have been able to find records of 53 cases of axillary aneurism. Of the 28 which have been published since 1885, the results are in every way most satisfactory, since there have only been two deaths recorded (secondary haemorrhage). The operation in almost every case consisted in ligature of the third part of the subclavian. In three cases where the aneurism was situated high up in the axilla, it was not considered safe to ligature this part of the artery, and accordingly the insertion of the scalenus anticus was divided and the second part of the artery ligatured. In one case where the aneurism was unduly large, even this could not be carried out, and the difficult operation of ligature of the first part was performed successfully. In two cases where the aneurism was situated very low in the axilla, it was found possible to ligature the axillary artery in the first part of its course, with a most successful result. So that in all those cases on record of surgical treatment of axillary aneurism the result is eminently satisfactory; but unfortunately we do not know the result of other methods of treatment. In Ashhurst's Surgery, Vol. xiii, p. 491, however, there is recorded the results of 17 cases of axillary aneurism with all their different methods of treatment:

4 ligatured:
- 3 cured
- 1 died (erysipelas)

5 digital pressure:
- 3 failures
- 1 recovery
- 1 death.
Amputations 3 deaths;
Valsalva method no benefit;
declined operation 3 deaths;
old operation recovery.

These statistics point very strongly to the value of the operative treatment of axillary aneurism, since not only is the mortality only 4\% (and this has been due to slipping of ligatures etc.), but also the results of non-treatment are so extremely bad. The operation of choice is ligature of the third part of the subclavian artery, should this be involved in the aneurism, then the insertion of the scalenus anticus muscle may be detached and the ligature placed higher up the artery. In doing this the phrenic nerve must be carefully avoided.

In considering the above list, it will be at once seen that, although the age has not been recorded in a great many cases, axillary aneurism is commonest about middle life, and this is no doubt due to the greater exertion, etc., which is required of men. When it has been recorded in the female it is interesting to note that it has always been traumatic. There is one case on record of an axillary aneurism in an infant, which underwent spontaneous cure in a short time. When met with below 30, it is usually traumatic. Spontaneous aneurism of the axillary artery is usually found after the age of 40, mostly between 40 and 60. When it is found over 70 again, it is usually traumatic in origin.

(2) I have already pointed out the great predominance of
male over female patients. Out of the 34 cases in which the sex was recorded, it was only once found in a female and that was due to traumatism.

(3) Aneurism of the axillary artery may be either spontaneous or traumatic. When traumatic it is often of the arterio-venous type. It has frequently been the result of gun-shot wounds. When spontaneous in origin, there is very frequently a history of syphilis. In many cases, however, this is absent, and the condition has been ascribed to a strain, etc. received during work. Banks recorded a case in a sailmaker, which followed a strain. His arteries were markedly atheromatous.

Paul (1903, Liv. Med. Journ) records a case of a gardener, aged 59, who attributed his condition to strains which he had received while hanging by his arms to branches of trees.

Bennett Hay (1885, Lancet) describes a case of axillary aneurism in a chain-maker, which may have been due to the great exertion necessitated by his work.

In regard to traumatism, gun-shot wounds play a very large part. Wounds and subcutaneous lacerations, usually connected with the occurrence or reduction of dislocations — especially old unreduced — have also apparently been responsible for many of the so-called "aneurisms" of this region. Sharp movements without violence, e.g., trying to prevent a hat blowing off, may cause sufficient injury to be followed by aneurism, and it is probable that the frequent strains thrown upon the artery in the very free movements of the shoulder joint play a causal part in rendering true
Aneurisms of this vessel somewhat frequent, especially in men, and on the right side.

Stationary aneurisms and spontaneous cures are rare. As a rule axillary aneurisms grow fast, rupture easily and cause much pain. They grow fast because they lie in loose tissue and thus if the aneurism is low down in the axilla, it reaches a large size since the tissues are looser. In the upper part of the axilla, the axillary sheath and the strong fasciae of the floor usually direct the enlargement upwards beneath the clavicle into the subclavian or infraclavicular fossa, as occurred in this case of Mr Cairn's. The vein may be severely compressed. The nerves of the brachial plexus are either pushed aside or surround and adhere to the sac and may cause great pain.

If unchecked the swelling increases in size and may rupture subcutaneously, externally into the shoulder-joint, or into the thorax, often after eroding the clavicle, humerus or ribs.

Treatment:

Digital compression may be first tried, and is best conducted with an Esmarch's band on the limb up to the shoulder. It is best performed under anaesthesia, and should be kept up for one and a half hours, followed by compression without the Esmarch for at least as long again, (Stanley Boyd). Needling may be combined with this.

If this fails, the choice lies between ligature of the axillary artery close above the sac if the aneurism is low down in the axilla, or of the third part of the subclavian if it is a high
Axillary aneurism is usually considered to be one of the most suitable cases for excision of the sac. To excise, control the subclavian either by finger pressure, or by a loop passed under it, upon which gentle traction can be made as required (Treves). The incision must give free access. The great pectoral must be divided, if necessary. Until ready to deal with the distal end of the artery, an elastic bandage should be kept round the limb to as high a level as possible. The first thing is to find, clear and tie the artery above and below the wound; then to remove all clot and as much sac as possible, having regard to the state of the patient and the safety of veins and nerves.

But the great tendency now is not to excise the aneurism, but to carry out proximal ligature and the results, as I have shown, are most satisfactory. This operation used to be considered most serious owing to septic pleurisy and pneumonia, secondary haemorrhage, etc. These are now almost unknown, and this is now considered the operation of choice.

In small circumscribed aneurisms, proximal ligature as near the sac as possible is best. If marked evidence of pressure on nerves, excision should be considered and is possible carried out.

If the operation be rendered difficult by the proximity of the sac or the displacement of the clavicle, or if the third part of the subclavian is encroached upon by the tumour, then the second
part must be tied.

Treves recommends that it is always better to tie the subclavian rather than the axillary, as the results are more satisfactory.
Aneurism of the axillary artery is not a common form of aneurism. There are remarkably few cases on record in the literature of this country. It occurs mostly as the result of trauma, either primary or secondary. It also follows in many cases severe strain upon the arms in work, and in some cases there appears to be no cause whatever to account for its occurrence.

The symptoms are pain, numbness in the arm and shoulder, with oedema and lividity in some cases, and even wasting of muscles and paralysis.

The medicinal treatment is rarely successful. Spontaneous cure scarcely ever occurs. The aneurism tends to increase in size rapidly, owing to the laxity of the tissues in which it lies, and the most satisfactory treatment is ligature of the third part of the subclavian.
Recurrent Laryngeal Nerve
Innominate Artery
Trachea
Carotid
innom. vem.
Aorta

Ligature of innominate.
Recurrent Laryngeal N.
Innominate Artery
Trachea
Carotid
Innominate V.
Porta

Signature of Innominate
INNOMINATE ANEURISM.

St. Ninian Bruce
HISTORY OF PRESENT CASE.
Mrs. Annie Weir.

Age. 35.

Occupation. Housewife.

Address. 28 East Thomas Street, Edinburgh.

Complaint. Large swelling in neck.

Duration. 18 months.

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History of Present Illness:—

For "a long time" patient had noticed a pulsation in the episternal notch, when looking in the mirror; but, about August 1907, however, it began to throb, her attention being drawn to this by the fact that when she became excited she felt faint and had this throbbing sensation in her neck. The throbbing became rapidly more pronounced, and her friends began to remark upon it. On Sept. 16th, 1907 she was confined. She was attended by two Maternity nurses, but no doctor. Labour was normal; she had no feverish condition and got up about the tenth day. After this the throbbing became still more marked and a swelling now began to appear. This swelling was situated low down in the episternal notch, and nearer the right than the left side. This swelling also steadily increased in size. She then began to suffer from attacks of faintness, which, however, were never so severe as to cause her to lose consciousness. When such a feeling of faintness came over her she simply sat down for a few minutes and the feeling completely passed off. She thought that the swelling became larger and more tense when she stooped down; and some days it appeared to her to be larger than other days.
As the swelling increased in size, the throbbing became more pronounced. She never had any pain over the swelling itself, but she has had pain, never very severe, in the shoulder and radiating round towards the front of the chest. There was also some stiffness in the muscles of the neck. She had never any interference with her breathing, speaking or swallowing. In November the skin covering the swelling became red and inflamed. She went to the Dispensary and was seen by Dr. Pirie, who sent her up to the Infirmary for treatment. She was admitted to Ward 31, under the charge of Dr. Bruce, on the 5th of December, 1907.

**FAMILY HISTORY.**

**Father,** 63, alive and well.

**Mother,** 51, alive and well.

Brothers and sisters, 13, 3 died in infancy, others alive and healthy. (No cardiac disease in family).

**Husband,** alive.

Children, patient has had 6 pregnancies.

2 before marriage, both alive; (I healthy and I boarded out as "mentally defective"

Then I dead foetus at 7 months, (macerated)

Then I girl, at six months got wasting disease', but recovered.

Then I boy; aged 5, always healthy.

Then last child, Sept, 1907, quite healthy.
PREVIOUS ILLNESSES.

Measles and Scarlet fever while a child.

Typhoid fever when 12 years of age.

Rheumatism when 18; she states that it was not rheumatic fever, but she was in hospital for 6 weeks with it.

6 years ago, she had severe haemorrhage on the anterior aspect of the right leg, from a similar swelling to that on the neck. She has never been troubled with this since then.

Marked varicose veins on both legs while "carrying her last child".

SOCIAL CONDITIONS.

She lives in a three roomed house. The sleeping room is occupied by herself, her husband and one child. The rooms are well ventilated all the year round. She has good food, and the work is not too hard for her.

CONDITION ON ADMISSION:

Patient is rather a thin-faced, but strong looking woman.

Height 5 ft. 2\(\frac{1}{4}\)".

Weight 7 st. 3 lbs.

She is not specially anxious about herself.

The most marked feature is the swelling on the anterior aspect of the neck.

This swelling is about the size of a large hen's egg, and extends upwards from the episternal notch to the middle of...
the thyroid cartilage. It lies between the two sternomastoid muscles, and rather nearer the right than the left. (See figure). It is definitely pulsating, and the pulsation is expansile in character. This pulsation is systolic with a diastolic shock. On palpation the swelling feels rather hard and thick walled, and this along with the expansion gives it a somewhat elastic consistence. At times the patient complains of severe sharp pain in the swelling, not constant however, and apt to be brought on by movement of the neck, and is worse at night. The skin covering the swelling is markedly reddened, and slightly oedematous.

**CIRCULATORY SYSTEM.**

The apex beat is not visible, but may be palpated in the fifth interspace, 3¼" from the middle line. There is slight epigastric pulsation. On percussion the dulness is not enlarged in any direction. On auscultation:-

**Aortic area;**— 1st. sound is loud and slight systolic murmur.

2nd. " " greatly accentuated, and musical.

**Pulmonary area;**— both sounds loud and clear.

**Mitral area;**— 1st. sound loud and rumbling.

2nd. " greatly accentuated.

both 3¼" loud and clear.
Tricuspid area;— both sounds loud and clear.

Over the swelling in its lower part, both sounds are well heard, but not so distinctly over its upper part.
The first sound has a slight systolic murmur; the second is accentuated.

RESPIRATORY SYSTEM.

There is nothing abnormal to be noticed in this system.
There is no cough or sputum.
The voice is occasionally hoarse.

URINARY SYSTEM.

Urine acid reaction;
sp. gr. 1026.
contains no blood, albumen, or sugar.

DIGESTIVE SYSTEM.

There is nothing abnormal to be noticed in this system.
Patient has never had any difficulty in swallowing.

DIAGNOSIS.

A diagnosis was then made by Dr. Bruce of aneurism of the innominate artery.

TREATMENT.

She was treated with local applications to the swelling, and with potassium iodide; and Mr. Caird was asked to see
her to consider the advisability of operative interference.

PROGRESS.

There was no decrease in the size of the swelling under treatment, and as the skin over it became more inflamed and there was some indication of pus, she was removed to Mr. Caird's Ward on the 14th. of Dec. 1907.

OPERATION:—

Dec. 16th., 1907. Under local freezing, Mr. Caird inserted a tenotomy knife into the skin over the most prominent part of the inflamed area. About three ounces of yellowish serum, slightly turbid, with one or two small blood clots escaped. The wound was then dressed. A scab formed over this area and as there had been some reaccumulation of fluid, Mr. Caird reinserted a tenotomy knife and removed about 4 ounces of blood stained fluid, on the 26th. of Dec. 1907. In neither case was any growth obtained from the fluid.

On the 28th. of Dec. 1907, she went home. She was told to take things very easily, and not to do any hard work.

PROGRESS:—

She came up to report herself on the 20th. of May, 1908. The skin was red; there was no signs of pus; but the mass was still large and pulsating. She was very much thinner and now has a cough.
PROGRESS (contd.).

She suffered no further trouble until July 1903, when the surface again opened, and pus again exuded but no blood. She had no treatment, except her own dressing of boracic lint etc., but it would not heal, and the ulcer got larger. At the end of Sept. 1903 she went to the Deaconess Hospital on account of the pain and was treated as a surgical out-patient and has attended every few days there up till Jan. 7th. 1909. She had made no improvement, and on Saturday night at 9 p.m. she had a very severe headache and earache and felt sore all over. When lying down she felt something warm run along her neck and shoulders and rising found that it was blood. She at once sent for her doctor, and Dr. Shoolbred's assistant (Roxburgh Street) staunched the blood and dressed the wound. She lost no more blood that night. Her husband states that she lost about half a pint of blood before the doctor arrived. She was advised to go to the Royal Infirmary, and was admitted to Ward 8 at 11 a.m. on Sunday Jan. 10th. 1909. She lost no further blood up to the time of her admission.

ON ADMISSION.

The surface of the wound was wiped clean, and no oozing or appearance of blood was seen for about three minutes. The necrotic area was rubbed away without any bleeding. Then some iodoform gauze soaked in turpentine was gently applied and secured.

1.30 p.m. A sudden gush of blood came from the ulcer,
about 6 ozs. escaping altogether. A plug of iodoform gauze set saturated with turpentine was applied and fixed in position with strapping.

1.45 p.m. Another sudden gush of blood similar to the last occurred, but could not be controlled until about 5 ozs. had escaped. A fresh plug of iodoform and turpentine was applied.

7. p.m. Another sudden haemorrhage occurred, not checked until about 3 ozs. had escaped. After the escape of the blood, little or no pressure seemed necessary to check haemorrhage as there seemed to be no tendency to continue. It was again plugged with iodoform gauze fixed in position with a narrow bandage.

Patient is nearly always aware of the onset of a haemorrhage as she feels a dull throbbing pain with some difficulty of breathing, both of which are relieved by the haemorrhage. She felt faint when her shoulders were raised to apply a bandage.

II p.m. Another sudden haemorrhage took place, similar in character to the previous ones. This time she lost about 4 ozs. A plug of iodoform gauze was now applied, and kept in place by an elastic bandage by which pressure was applied.

3 p.m. Another haemorrhage occurred, this time promptly checked by pressure. When the pressure was removed the blood spurted out and was bright and arterial. It required very strong pressure to control the haemorrhage. Prof. Caird was sent for and arrived about 2.30. By this time a clot had formed and the haemorrhage had ceased.
The first view which Prof. Caird held of this case was that the condition was due to an inflamed gland within the carotid sheath. It was now, however, quite clear that this view had little support, and the bleeding showed that the condition was most like a true, or false aneurism.

There was no hope of the patient living unless the slender chance of ligaturing the aneurism. The husband was informed and Mr. Alexis Thompson was sent for to assist in the operation while full preparation was made for resection of the clavicle and manubrium sterni.

3.45 a.m. A further gush of blood occurred in spite of digital pressure, but was rapidly checked. The patient appeared pale, but perfectly quiet, and appeared to be asleep. Her pulse was 130. She was given ½ gr. morphia, and gr. atropine, and about 30 minutes later she was chloroformed in the ward, and then taken to the theatre.

OPERATION.

The plugs were removed and the clots cleared out with the finger, when a powerful gush of blood occurred, at first
dark and mixed with clots, but soon bright and arterial. This was plugged by Mr. Caird by inserting his finger, which passed into a large space with an orifice leading from it. The finger was passed through this firm ring and passed into a tube, which passed downwards and was evidently the aorta.

The patient, however, was sinking rapidly; the pupils dilated widely, the swelling continued to heave, she gave three sighing respirations, her jaw dropped, her heart continued to beat for one minute and then ceased. Death 4.30 a.m.
SURGICAL TREATMENT OF ANEURISM.

The treatment of aneurism may be divided into the two main groups of medical and surgical treatment. In the present instance I only propose to discuss the latter, and, in doing so, I shall first consider the treatment by ligature.

The first method of treating aneurism by ligature was that of Antyllus, and consisted in first compressing the artery above the aneurism, and then laying over the sac, turning out the clot, and ligaturing the artery above and below the aneurism. The cavity becomes filled up with granulation tissue, and the “tumour is extinguished.”
Having now given a complete record of the history of this case, I now propose in the following pages to discuss the treatment of innominate aneurism. In a great many cases, however, the aneurism is not limited to a part of the innominate trunk, but consists of a large dilataion involving the origins of the subclavian and carotid arteries, and, therefore, I rather prefer to discuss this subject under the heading of "aneurism of the great vessels in the root of the neck" (excluding the aorta).

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The idea underlying this operation appears to have been that it was necessary to get rid of the clot which they believed to possess 'vivious principles', and to be injurious both to the
part in which it lay, and to the constitution of the patient. They, therefore, removed the clot, not merely to find the mouth of the aneurism, but also "to rid the constitution of so dangerous a secretion", (Holmes, System of Surgery, Vol. III. 1870, p. 458), and "stuffed the cavity with compounds which they believed to have the property of preventing the reproduction of coagulum". In old days the large cavity which was left behind usually suppurated or secondary haemorrhage occurred, and thus the mortality from this operation was very high. Apart from this, however, until quite recent times this operation has been rarely performed, except in cases of traumatic aneurism for which it is particularly adapted. The difficulties in regard to the operation are often of the gravest character when the aneurism is deep seated, or when the artery communicates with the deepest part of the aneurism, or when the sac contains many pouches or is closely united to the surrounding parts when there is great danger of wounding important structures. It is most suitable for axillary aneurism and also for aneurism of the gluteal artery. Nowadays there is a growing tendency to revive this old operation along with excision of the sac,—the aneurism being exposed and isolated, the arteries ligatured on each side and the sac being lifted out without opening into it.

The second method is that of Anele, and consists in ligaturing the artery close to the sac, as shown in the following figure;—
As this is an advance upon the former method, it is interesting to note the manner in which this advancement came to be made.

A man had received a wound of the brachial artery in venesection. It is said that a fortnight afterwards an aneurism formed, and the wound reopened, giving rise to haemorrhage, which was arrested by compression; and, that, after this, the tumour became very voluminous. Anel undertook the operation, which consisted in exposing the brachial artery and tying it as near the tumour as possible. The only reason that he did not open the sac and empty it of its contents was that they were fluid, and he was able to do so by pressure. He states that "instead of tying the artery above and below the tumour, I only tied it above, and besides, instead of opening the sac I did not meddle with it; not doubting that the blood which it contained would disappear, having the opportunity of passing towards the extremity of the limb, and that the sac, once emptied, would not fill again, but its tissues shrivel up and the tumour thus disappear; and all this occurred as I expected".

There would thus not appear to be much of novelty in Anel's method, as he merely did not tie the lower end of the sac because the contents were fluid; and there are only six cases on record of operations performed upon this plan (Broca) before Hunter's first operation which took place seventy-five years later.
Hunter's operation consists in distal ligature above the sac, as opposed to Anel's operation of proximal ligature above the sac.

The former operation is now most frequently adapted and is better than that of Anel in several points;—first, it is easier to cut down upon a normal artery some distance away from the aneurism, especially if it is large and there are many adhesions; and secondly;—while in Anel's operation the clot which forms is soft and loose, as it has formed rapidly, while in the Hunterian operation the clot is not formed suddenly, but is laminated because the complete circulation through the aneurism has not been altogether arrested, only diminished, the circulation being maintained through branches which pass between the point of ligature and the aneurism, ('A' in above figure). In this manner the clot is formed slowly, is laminated and more permanent.

The fourth method of ligature is that of Brasdor; and consists in tying the artery on the distal side of the sac, between the aneurism and the first large branch (See fig.).
The object underlying this plan is that the clot which forms on the proximal part of the ligature passes back into the sac.

Wardrop's operation is based upon a different principle. It consists in ligature of one of the branches distal to the aneurism. (See fig.).

and aims at diminishing, without arresting, the current of blood through the sac.
The first method in the treatment of innominate, or subclavio-innominate, aneurysm by ligature, to which I propose to discourse in detail is that of proximal ligature, i.e., ligature of the innominate artery itself.

The innominate artery is the nearest artery to the heart which it is permissible to ligature (Kocher). There are several methods employed in this operation, but before discussing their respective values, I shall first describe the anatomy of this region: (and the following account will be more easily followed if the figures which are to illustrate this portion be considered in conjunction with it.)

SURGICAL TREATMENT OF INNOMINATE ANEURISM.

I. LIGATURE OF THE INNOMINATE ARTERY.

The innominate artery arises behind the middle of the lower part of the manubrium sterni, from the convexity of the arch of the aorta near its right or anterior extremity, and terminates opposite the right sterno-clavicular articulation, where it divides into the right subclavicular and right common carotid arteries. It measures from one and a half to two inches in length, and runs upwards, backwards, and outwards in the superior mediastinum. It is in contact behind, with the trachea below and with the right pleural one above. The left innominate vein crosses in front of the lower part of the artery, and above this the sterno-thyroid muscle separates it from the sterno-hyoid and the right sterno-clavicular joint. The anterior margin of the right pleural sac overlaps the artery, and the remains of the thymus gland, which separate it from the manubrium sterni, are also to
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The right innominate vein and the upper part of the superior vena cava are on the right side of the artery. On its left side is the origin of the left common carotid artery, whilst at a higher level the trachea is in contact with it. As a rule the innominate artery does not give off any branches except its two terminals, but occasionally it furnishes an additional branch, the thyroidea ima.

The thyroidea ima is a very inconstant branch. It may arise from the innominate artery, or from the aorta directly, or it may be absent altogether. When present, it passes upwards in front of the trachea, through the anterior part of the superior mediastinum and the lower part of the neck, and gives off branches to the lateral lobes and isthmus of the thyroid gland, and to the trachea. See fig.).

In ligaturing the innominate artery there are several important structures which may be injured — the pleura, the vagus nerve which descends in front of the subclavian, the recurrent laryngeal nerve which winds round it, and the phrenic nerve; but with due care these may be avoided.

When the innominate artery divides at a moderately high level, or when the patient has a long and thin neck, it will be found that the ligature of the vessel may be effected by an incision through the soft parts above the sternum, without actually removing the manubrium sterni or the inner end of the clavicle.

Under such conditions the best method of operation appears to be that described by Sheen in 1904.
A median incision is made from the cricoid cartilage to an inch below the sternal notch, about 5 inches in length. The cervical fascia is then divided and the sterno-laryngeal muscles separated in the middle line, and drawn apart throughout the length of the incision. The lateral lobes and isthmus of the thyroid are exposed in the upper part of the wound. If any thymus remains are found, they may be removed. The aortic sheath should next be identified and opened, and the carotid artery followed down to its bifurcation. The innominate artery will next be found lying against the trachea and can be easily ligatured. Sheen used a MacEwan's right angled hernia needle and stout floss silk passed twice round the artery; the two ligatures were tied in Ballance's "stay-knot". The parts fell easily together, the sterno-laryngeal muscles and cervical fascia were brought together by interrupted sutures and the skin wound closed by continuous silk sutures. No drainage tube should be inserted.

Sheen states that the central incision is best and that removal of bone is rarely necessary.

The innominate artery was first ligatured by Valentine Mott in the year 1818. He used an incision which is usually spoken of as "Mott's incision" and has also been frequently employed. He makes a transverse incision above the inner part of the clavicle terminating over the trachea, joined to a second incision along the inner edge of the right sterno-mastoid muscle; partial division of the sterno-mastoid in the line of the
transverse incision with transverse division of the right sternohyoid and sternothyroid muscles.

In some cases, however, it is not possible to reach the innominate artery without opening into the superior mediastinum, and if this should be necessary the most satisfactory way to do so is that described by Curtis in the Annals of Surgery, 1899. The steps in this operation are as follows:

1. A median incision is made from the larynx to the middle of the sternum or lower, dividing skin and deep fascia above and periosteum also below.

2. The sternohyoid and sternothyroid muscles are followed down to their sternal insertion, retractors being placed so as to draw the soft parts at the base of the neck widely apart.

3. A transverse incision is made through the periosteum along the upper border of the manubrium, and the periosteum and muscles detached from the posterior surface of the bone by blunt elevators and the finger as far as can be reached.

4. Ordinary amputation saw is then applied to the bone in the line of the vertical incision in the periosteum, the soft parts in the neck and behind the sternum being protected by flat metal strips. The saw is held so as to entirely divide the manubrium at its upper border, the cut being more shallow below, and only grooving the bone at its lower end (see fig.)

5. A stout chisel is then applied in the saw-cut at the superior
border of the manubrium, and the thin layer of undivided bone on the posterior surface is made to give way as the wedge action of the chisel forces the two halves apart.

6. The skin being well retracted, a transverse incision is made in the periosteum across the face of the bone at the level of the 1st and 2nd intercostal space, and the chisel is applied in this line and directed obliquely outwards from the middle line on each side so as to divide each half of the bone from the body of the sternum. The instrument must not be allowed to cut entirely through the bone at the outer border for fear of injury to the pleura or internal mammary artery. Both lie a little distance from the bone, so that the danger of wounding them is not great.

7. Strong retractors are inserted in the median artery, and with a little force the two halves can be sufficiently separated to allow access to the periosteum, which should be carefully incised or scratched through with the point of the knife, beginning above, where the danger of damage to the subjacent parts is least. As the periosteum is divided, the halves of the bone can be more widely separated, and this interval gradually extends from an inch to nearly twice that distance as the steady strong traction is maintained. Three cm. can easily be obtained, and this is enough.

8. The parts are then exposed and the muscles and fascia
divided by blunt dissection or with forceps and scissors in the median line, care being taken not to injure the recurrent laryngeal nerve, and also a small vessel arising from the posterior surface of

The patient was a man aged 57, who was admitted into the

When we now come to consider the results of ligature of the innominate artery, it will be found that the results are not very satisfactory.

There have been recorded 43 attempts to reach the innominate artery with a view to its obliteration. The operation was unsuccessful in 7 cases, thus leaving 36 in which it was accomplished. Of these 28 died immediately or soon after operation, and 8 recovered, thus leaving a mortality of 73%. Subtracting the cases in which the patients were moribund at the time of operation, or died a few minutes after it, 32 cases are left, with 24 deaths, a mortality of 75%. And omitting all cases prior to 1871, i.e. prior to the antiseptic period, a total of 16 cases is left with 9 deaths, a mortality of 56%. Of the last 6 cases operated upon and published, 5 have recovered.

The causes of death have been recorded in 32 of the 28 unsuccessful cases, and they are as follows :

1. Sepsis and haemorrhage 13
2. Sepsis 3
3. Cerebral lesions 3
4. Other causes 3.
As the 3 successful cases are of great interest, I shall next give a synopsis of them. (Before doing so, however, I shall just mention the first case of ligature of the innominate artery by Valentine Mott in 1818 on account of its historical interest.)

The patient was a man aged 57, who was admitted into the New York Hospital on May 11th, 1818, suffering from the effects of a traumatic subclavian aneurism of 2½ months' duration. Mott ligatured the innominate artery in the way just described, but the patient died on the 26th day from sepsis and haemorrhage.

**Successful Cases**

**SMYTH** (1864)

W. M., mulatto; 33; steamboat stewart; admitted to New Orleans Hospital on May 9, 1864. Aneurism of right subclavian dated from a collision of patient's ship in February, 1864, when he hung from an anchor with another man clinging to him. Small throbbing tumour noticed a month later, which gradually enlarged. Operation May 13. Mott's incision. Ligature of the innominate artery a quarter of an inch from the bifurcation and of the carotid. Ligature came away from the carotid on May 28, and from the innominate on June 2. Haemorrhages on May 29, 30 and 31; lint packing. Wound filled with small shot on June 1. Some shot removed June 17, return of haemorrhage. Further haemorrhage and on July 5; 'terrific haemorrhage' which ceased spontaneously. July 9, ligature of vertebral artery; all shot removed following day; complete recovery.

May 1869, no vestige of aneurism. June 1874 aneurism recurred and became larger than at first. October 5, internal...
mammary tied; some improvement (?). Abscess above clavicle opened March 29, 1875. Two days later aneurism ruptured into cavity of abscess; sac laid open and stuffed with lint; mouth of supplying vessel not found. Death April 6, 1875.

Necropsy:

(Arteries injected). Innominate had been tied less than an inch from its origin; fibrous tissue beyond. Carotid occluded to its bifurcation and subclavian to within a quarter of an inch of thyroid axis which, with its branches, was pervious. Vertebral occluded to fourth cervical vertebra.

BANKS (1883)

J. B., aged 50, male; admitted to Liverpool Royal Infirmary Feb. 10, 1883. Aneurism of third part of subclavian. Rest, etc. tried without good effect, and on Feb. 26, innominate and carotid tied through Hott's incision. Kangaroo tendon ligatures used, and tied with a force thought sufficient to occlude artery without damaging coats. Pulsation in aneurism returned same evening and remained. Wound healed and patient went out on twentieth day. Readmitted, and 67 days after first operation first part of subclavian tied with great difficulty, a double catgut ligature being used. Sepsis; broncho-pneumonia; haemorrhage from wound on 31st and following days; patient died on 37th day. On fourth day aneurism small, hard and free from pulsation.

Necropsy: Innominate patent.
BURPELL (1895)

Male, 54; a clerk; patient in Boston City Hospital:
"Lump in throat" for 18 months. Pulsation in vessels of right side of neck with expansive thrill and bruit; undue pulsation in various other arteries; systolic and diastolic murmurs heard. Operation Jan. 15, 1895. Ether, Mott's incision, with removal of sterno-clavicular articulation and adjacent portion of sternum. Innominate found much dilated (estimated breadth 1 1/2 inches) Knot tied slowly; coats of the vessel felt to give way; second similar ligature placed 1/2 inch distally to the first (1st ligature to act as breakwater); wound closed without drainage.
Primary wound healing; pulsation ceased in aneurism; pulse returned in radial but not in carotid. Patient got up on the 59th and left Hospital on the 73rd day. Subsequently oedema of feet and heart trouble. Died suddenly from heart failure on the 104th day after operation.

Necropsy: circumscribed fusiform dilatation (fusiform aneurism) of right subclavian, of innominate and of right iliac. Innominate has been occluded by distal and severed by proximal ligature, the latter ligature being found inside the artery, the lumen of which had been restored. Chronic interstitial orchitis (indicating syphilis).

SYMONDS

Man, 53, admitted to Guy's Hospital, London, Oct. 1894, with subclavio-axillary aneurism. Operation, Nov. 5, 1894. Attempt first made to ligature first part of the subclavian through a vertical incision over the sterno-mastoid, but sharp
haemorrhage occurred on trying to pass the needle round the artery; thought that some branch of the thyroid axis was injured. Mesial vertical incision made and the two vertical incisions joined by a transverse one above the clavicle, the sternal head of the sterno-carotid being divided. Innominate and carotid tied with silk. Two sinuses formed after operation through which catgut and one piece of silk came away.

Patient seen in June, 1895; aneurism hard; usefulness of limb returning; no pulse in radial; pulse in carotid above ligature. In response to an enquiry, Mr Symonds kindly writes on Oct. 1, 1904: "The man died some time ago of a general malady". (Jacobson).

LEWTAS (1889).

Patient a soldier, 20, in Kurnan Hospital, Punjaub, India. A month before operation his gun burst, and he thought that a piece of the breech lodged above the right collar-bone; bleeding from the wound there for 3 days before admission. Hard, non-pulsating swelling above clavicle, with brownish blood oozing from partly healed wound in the centre; thought to be an abscess. Operation May 13. Wound enlarged and fragment of steel removed; profuse haemorrhage, stopped by pressure; incision along inner margin of sterno-mastoid; innominate and carotid tied with catgut. Recovery. The operator remarks that, had he known how unfavourable the results of operation were, he would have contented himself with plugging the wound.
COPPINGER (1893)

Man, 53, admitted to Mater Misericordiae Hospital, Dublin, Dec. 5, 1892, with aneurism of the 2nd and 3rd parts of the sub¬
clavian, and aneurismal dilatation of the axillary artery.
Operation, Jan. 9, 1893. Ligature of innominate and carotid
through Mott's incision; silk used; carotid tied in two
placed and divided; strict antiseptic precautions. On third
day, when dressings were removed, no pulsation in aneurism.
Patient showed at meeting of the Brit. Med. Association at New¬
castle-on-Tyne in August, 1893; good health; strong and use¬
ful right arm; no pulse at right wrist; small, hard swelling
above clavicle. On July 4, 1895, patient was seen at St Barthol¬
omew's Hospital, London, and was then quite free from any trace
of his aneurism.

FARQUHAR CURTIS

Male, 53; carpenter; admitted to St. Luke's Hospital,
New York, Nov. 1899, with subclavio-axillary aneurism. Symptoms
of some months' duration. Rest, limited diet, and KI improved
the condition of the arteries and modified the heart's action.
Ligature of innominate, Dec. 2, 1899. Median incision; separ¬
atation of sterno-laryngeal muscles; splitting of manubrium
sterni in middle line; transverse division of sternum above
2nd rib. Innominate much dilated, but with apparently healthy
walls; ligatured with a double heavy chromicized catgut ligature
the two threads being tied simultaneously; internal coats not
divided; single similar ligature put round vessel a quarter inch
distally to the first; wound closed with gauze drainage. Some
sepsis and slow wound healing. No haemorrhage. Pulsation return-
ed in the aneurism four days after operation.

March 13, 1900. Second operation. Carotid and first part
of subclavian tied; clavian being divided and wired. Innominate
impervious. Pulsation in sac came from some branches of first
part of subclavian. Some sepsis followed, attributed to diffi-
culty in sterilizing rough and wrinkled skin of patient. On
Oct. 24, 1900, patient in good health, with no trace of aneurism.
Dr Curtis says: "Patient was kept under observation for eleven
months, when he was well and apparently cured of his aneurism.

WILLIAM SHEEN

Cardiff Infirmary, Wales, March 31, 1904.

Male, 46; subclavian aneurism; six months. Median in-
cision; innominate and carotid tied. Recovery; Pulsation re-
turned; ligature of subclavian, June 2, 1904; Recovery.

Labourer, been in army; admits alcoholism; no venereal
history. "The patient, a man aged 46 years, a labourer, for-
merly a soldier, was admitted to the Cardiff Infirmary on Feb. 2,
1904. He had an aneurism of the 2nd and 3rd parts of the right
subclavian artery, the symptoms of which commenced six months
previous to admission. On March 31, 1904, the innominate and
the right common carotid arteries were tied. Pulsation ceased
in the aneurism, but was found to have returned to some extent
on the following day. On May 19, an unsuccessful attempt was
made to again tie the innominate. On June 2, the 2nd part of
the subclavian was tied close up to the aneurism. Recovery took
place with consolidation of the aneurism, and the man remained
well when last seen, eight and a half months after the first oper-
ation".

Of these eight successful cases, one was in the pre-antiseptic
period. The first case, Smyth, died eleven years later from con-
ditions connected with the aneurism. The second, Banks, died
104 days later, also from conditions connected with the aneurism.
The third case, Burrell, died 104 days later, never having com-
pletely recovered since the operation. The fourth, Symonds, died
later from causes unconnected with the aneurism, and the remaining
three were alive and well when last heard of.

When we come to consider the above list, we are at once
struck by the fact that it cannot be said that the results are
very good. Sheen (Annals of Surgery, July, 1905) states :
(1) "That in properly selected cases, ligature of the innominate
is a reasonably safe and undoubtedly useful operation ;
(2) That suitable cases are those in which the aneurism is of a
circumscribed globular character, and the general condition
of the patient is otherwise good. That unsuitable cases
are those in which the aneurism is what is commonly called
fusiform, but is really often nothing more than part of
a general arterial dilatation, and in which there are
marked signs of general arterio-sclerosis with accompanying
visceral disease;

(3) That maintenance of sepsis is the main factor in obtaining a successful result;

(4) That as a study of the recorded cases shows that, next to sepsis, some cerebral lesion has been the most frequent cause of death after operation, it would be well for future operators to consider the advisability of tying the carotid about a fortnight before the innominate."

But I can scarcely agree with his conclusions. It seems to me that ligature of the innominate artery for innominate or subclavian aneurism is not an operation which is to be undertaken if it can possibly be avoided. Before discussing this subject further, however, I wish now to consider other methods which are used in such aneurismal conditions.
DISTAL LIGATURE.
Distal Ligature.

I had at first intended to discuss the results of distal ligature for innominate aneurism as fully as I have done in the case of proximal ligature, but I very soon found that this would not only be unprofitable but also impossible, since the number of cases in which distal ligature has been attempted is so large, and as the early attempts in this direction were made before the antiseptic era, the results are not of any great value for comparison with those attained at present.

Malgaigne and others tried the effect of ligaturing the carotid and axillary vessels, but with no success.

Wardrop first ligatured the subclavian artery in 1837 for innominate aneurism, and Broca and Bryant repeated the operation. In all three cases the immediate result was good, but in none was cure effected.

It was then proposed to ligature the axillary and the carotid arteries, but this gave very little benefit. The six cases in which the aorta was involved all terminated fatally: those in which the innominate was alone involved, showed 2 improved out of 13, and of the remaining 6, in which the bifurcation of the innominate was the seat of the aneurism, 4 died and 2 were cured for 9 and 20 years respectively.

Plam in 1836 tried ligature of the carotid, followed subsequently by ligature of the subclavian. There are eight cases in the literature of this condition of which 3 were cured and 5 died.

Diday, in 1842, proposed to ligature the common carotid and subclavian arteries simultaneously, and this was carried out in
1844 by Rossi. This operation has been very frequently performed ever since then, and met with more and more success. In 1869, Le Fort could only find 3 cases on record; in 1882 Poinset was able to collect 23 cases; in 1887 the number of 32 was reached in Wharton's collection; in 1890, there were 56 cases on record; in 1900, 83; and up to the end of 1905, 89 cases are found in the literature.

Of Poinset's 23, 8 were cured (i.e., 35 per cent). In Wharton's 32 cases, between 1880 and 1890, 25 (i.e., 64 per cent) were cured, or improved for longer than one year. In the 27 cases between 1890 and 1900 the cures, or long improvements, also exceeded 60 per cent.; and in the 6 cases, since 1901, 4 were cured and 2 died (i.e., 66 per cent of cures). The mortality from the operation, though very high in the earlier cases, was reduced in those between 1890 and 1890 to 17 per cent, and in those between 1891 and 1900 to 11 per cent.

Considering the gravity of the disease and the technical difficulties of the operation, the results of simultaneous ligation of the carotid and subclavian may be considered very good and encouraging. This must be regarded as the operation of election in innominate aneurism.

Macdonald (Practitioner, Vol.76, 1906, p. 631) states that the past incision for exposure of the arteries for ligature is that of Mott for ligation of the innominate artery, i.e., an acute angled flap with resection of the sterno-mastoid, sterno-hyoid and sterno-thyroid muscles.

There are on record such a large number of cases of double
ligature of the common carotid and subclavian for innominate aneurism that there is nothing to be gained by making a complete list of them. The following is a list of some of the cases which have been recorded during the last few years.

The left side was closed, so that all the circumstance blood passed through the one, and ligature in every case would have been disastrous.

The improvement in innominate aneurism as the result of medical treatment and other surgical methods is not very great, but still this ought always to be tried first.

Absolute physical complete rest, aided by frequent insomnias and bleedings in order to reduce to a minimum the force of the heart has succeeded in some cases in effecting a cure.

Bed has solved a case by Russell's diet (8 oz. of liquids and 10 oz. of solids per day) combined with absolute rest.

And to penicillin has had good results with rest and large doses of potassium iodide without any extreme restriction in dietary. This is now the favorite medical treatment adopted, but only patients with enormous self-denial are capable of subjecting themselves to such stringent measures, and the reduction is only slowly accomplished.

Injections of subcutaneo into the carotid should never be attempted.
Before considering operation it must be remembered that if the common carotid be ligatured, the greater part of the collateral circulation comes from the carotid of the opposite side, and it has happened (e.g. in a case of Hughes) that the carotid on the left side was closed, so that all the circulating blood passed through the sac, and ligature in such a case would have been disastrous.

The improvement in innominate aneurisms as the result of medicinal treatment and milder surgical methods is not very great, but still this ought always to be tried first.

Absolute physical and mental rest, aided by frequent purgings and bleedings in order to reduce to a minimum the force of the heart has succeeded in some cases in effecting a cure.

Head has cured a case by Tufnell’s diet (8 ozs of liquid and 10 ozs of solids per day) combined with absolute rest.

And de Penzi has had good results with rest and large doses of potassium iodide without such an extreme restriction in dietary. This is now the favourite medical treatment adopted, but only patients with enormous self-denial are capable of subjecting themselves to such stringent measures, and the reduction is only slowly accomplished.

Injections of coagulants into the sac should never be attempted.
Galvanising. Poinset gives the results of 12 cases collected by him from the literature. 2 showed considerable improvement, in 4 the improvement was only temporary, in 3 there was no benefit, and 3 were worse than previously. Stewart and Galinger succeeded, however, in obliterating the sac almost completely in a man of 40 years of age, and the patient was alive after three years.

The application of the galvanic current to the surface has only had indifferent success. Galozzi found a remarkable improvement in one case after a few months' treatment.

Introduction of foreign bodies (horse hair, piano wire, etc) into the sac has been largely rejected by most English and Continental surgeons, although several cases in America have recently been put on record, in which benefit has resulted.

MacEwan's method has given several favourable results, conspicuously in a case of Bömker's. The patient had an aneurism of the innominate and adjacent part of the aorta. Both carotids were obliterated, and the right subclavian had been ligatured without success. After 13 introductions of the needle, which was left in place for 6 to 8 hours, the swelling, originally the size of a hen's egg, became flatter and disappeared within a year.

Indirect pressure on the carotid has been tried in two cases; in one there was fair improvement, but the sac ruptured within a year; the other died of hemiplegia on the fifth day after commencing pressure.

Injection of gelatine (Lancereaux), though not necessarily associated with untoward results, has not given very favourable results in innominate aneurism, except that it greatly relieves
the pain and improves the well-being of the patient. 200 grammes of gelatine (2.5 per cent) is injected subcutaneously every 4 or 5 days.

Galvano-puncture, Macewen's method, and the injection of gelatine are procedures adopted in cases quite unsuitable for ligature, or as methods promoting coagulation in the sac after ligature.

This operation must be delayed until no more gelatine is injected every 4 or 5 days. If no improvement results from medical treatment, then delay is dangerous, as more bacteria may become established and the greater the fracture, the greater is the chance of rupture either externally or internally.

Operation is contraindicated if there is obliteration or the ligature or dilatation of the neck.

If the operation fails, or the aneurysm be too large for a successful ligature of these arteries than waiting or the possible injection of gelatin should be attempted.

Ligation of the innominate artery should never be attempted except as a last resource.
CONCLUSIONS

1. If no threatening signs of pressure are present, one should always begin with medical treatment, i.e., complete rest, restricted diet and large doses of potassium iodide.

2. If the above medical treatment does not benefit the condition, and pressure signs, etc., become more marked, then simultaneous ligature of the subclavian and right common carotid artery should be attempted.

3. This operation must be carried out at as early a date as possible. If no improvement results from medical treatment, delay is dangerous, as more arteries may become occluded and the older the aneurism the greater is the chance of a rupture either externally or internally.

4. Operation is contraindicated if there is obliteration of the left carotid or dilatation of the aorta.

5. If the operation fails, or the aneurism be too large for ligature of these arteries, then needling or the subcutaneous injection of gelatin should be attempted.

6. Ligature of the innominate artery should never be attempted except as a last resource.
7. If all these methods fail, then there only remains medical
treatment, and protection of the eye from injury.
POST-MORTEM REPORT.

Body in that of a poorly developed young female. Kiloy morte in general. Pupil semi-dilated for part of this is covered by numerous striae. Over centre of right tibia there are two thin white healed olecraniac beneath which there are well marked periostoe thickening.

At root of neck in middle line above episternal notch there is a rounded opening about 1" in diameter into which the finger can be passed into the upper part of the chest.

Subcutaneous fat is scanty.

Cervical glands—some enlargement especially on right side.

On pressing chest practically pure blood could be seen of opening.

On removing structures of neck and mediastinal there are no adhesions to, or erosion of vertebrae.

On passing probe into opening it passes right away into chest.

The structures behind carotid sterni are small and show increase of cicatricial tissue above.
Annie Weir.

Age 35.  Ward 8.


Abstract of Record:–

Gumma(?) of superior mediastinal gland opening into innominate artery and externally. Syphilis.

Report:–

Body is that of a poorly developed young female. Rigor mortis is general. Post mortem lividity present. Pupils equal and semi-dilated. Lower part of abdomen and upper part of thighs covered by numerous striae. Over centre of right tibia there are two thin white healed cicatrices beneath which there are well marked periostitic thickenings.

At root of neck in middle line above episternal notch there is a rounded opening about 1" in diameter into which the finger can be passed into the upper part of the chest.

Subcutaneous fat is scanty.

Cervical glands:– some enlargement especially on right side.

Wound:– On pressing chest practically pure blood wells out of opening.

On removing structures of neck and mediastinum there are no adhesions to, or erosion of vertebrae.

On passing probe into opening it passes right down into aorta.

The structures behind manubrium sterni are oedematous and show increase of cicatricial tissue amongst which
there are numerous enlarged glands.

The remains of the thymus, which does not appear to be affected, atrophied.

On passing finger into the orifice it passes into a cavity about the size of a walnut. Clot is felt to the left side, and there is an opening which easily admits the finger into the aorta itself.

The aneurism and upper part of arch of aorta are closely surrounded by dense connective tissue.

Heart small and atrophied. The aneurism and cicatricial tissue are not adherent to lungs.

Left lung; slight old tuberculous scarring at apex. Partial collapse at base. No pleurisy. On section marked acute congestion.
Diagram of Early Stage of Development.

The portions of the Parietal Peritoneum not drawn away from the body walls to form mesenteries, ligaments, etc., are indicated by cross hatchings.

Fig. 1.
Diagram representing Early Stage of Rotation of Abdominal Viscera.
Diagram representing Later Stage of Rotation of Abdominal Viscera.
Fig. 3

G. Ninian Bruce.
Probe in the Foramen of Winslow.

Liver drawn up to expose the gastro-hepatic omentum.
Structures in lesser peritoneal cavity, exposed by dividing the gastro-hepatic omentum.