On hernia of the vermiform appendix : with a series of cases / by W. McAdam Eccles.

[Reprinted from St. Bartholomew's Hospital Reports, Vol. XXXII.]

ON HERNIA OF THE VERMIFORM APPENDIX

WITH A SERIES OF CASES.

BY

W. McADAM ECCLES.

The vermiform appendix may be found in the sac of an external hernia, or it may occur as the contents of a retro-peritoneal hernia within the abdomen. Both of these mal-positions of the appendix cæci are comparatively rare, though, with the increasing number of operations performed, there are now a considerable number of cases recorded and of specimens preserved—such a number, in fact, as may warrant certain deductions being made from them.

I. The appearance of the appendix in a hernial sac may be the sole contents of such a sac, or it may be accompanied by other parts of the viscera.

A. The appendix as the sole contents of a hernial sac.

The question which first arises is as to how the appendix has come to enter a peritoneal pouch protruded beyond the abdominal wall. The normal appendix, some four to five inches in length, with a complete meso-appendix, is free to move about within the abdomen within a certain range around its attachment to the cæcum; but it cannot be brought down to, and much less dragged through, either the right inguinal or femoral ring.

One of two conditions then is necessary for its descent. In the first place, it may itself be considerably in excess of its usual length. This can be either the outcome of congenital elongation, or of a stretching the result of adhesion. In the second place, the cæcum may be abnormally free from the presence of a long meso-cæcum, with the result that the appendix may thus approach dangerously near to a hernial ring. A further point comes up for investigation in the query whether the appendix alone can be the primary and final contents of a hernial sac? It is undoubtedly possible for it to be extended

into the sac of a congenital right inguinal hernia, for in such a case there is a naturally patent processus vaginalis into which any viscus lying near may be forced.

It is certainly somewhat difficult to understand how such a small part of the alimentary tract, having so little of surface area, would be able of itself to form a sac by pressure ; but, on the other hand, is it actually necessary that there should be this special and active distending force of a particular viscus in order that an acquired pouch of peritoneum may be produced? It does not require any very resistent organ to share in the formation of a pouch ; in fact, it may be true that no pressure of any viscus is absolutely needful. Some sacs with very narrow necks and of an acquired origin have but an extremely thin process of elongated omentum lying within them, and surely this would seem of itself less able to aid by pressure the protrusion of the serous membrane than even the appendix.

If, however, it is necessary to suppose that other of the abdominal contents besides the appendix have been the cause of the hernial sac, it is difficult to account for the very small pouches, and these, moreover, with narrow necks, which appear not infrequently as the coverings of prolapsed appendices.

Doubtless this argument is open to the rejoinder that it is quite possible for the original multiform contents of the sac to be reduced all but the appendix (which might alone have become adherent), and then for the mouth and neck to contract around the small structure passing through them; and beyond this it is perhaps feasible that strangulation, or at least some constriction of the appendix, may occur. Or, again, the appendix might slip into a sac which had not previously contained it, but had been occupied by some other viscera.

There is an instructive preparation in the Museum of the Royal College of Surgeons of London[1] which bears out the theory that other viscera may form a sac, but that sooner or later the appendix may remain as the sole contents, and that more particularly if it become adherent. In this specimen a somewhat large sac of a right inguinal hernia has at the upper part a portion of the cæcum, and it is not difficult to believe that the whole of that organ was at one time within the peritoneal pouch. Further, this would doubtless have been completely reduced were it not for the fact that the tip of the appendix cæci is adherent to the bottom of the sac, and thus effectually preventing the total return of the cæcum.

It may further be conjectured that if the appendix were to

[1] No. 2635.

become stretched in such a case, the rest of the cæcum might disappear from the sac and its appendix alone remain, held fast within it. In spite of these latter considerations, however, I am inclined to believe that the appendix itself may be the producer and the entire contents of a right inguinal or a right femoral sac, and in a few very rare cases of a left inguinal.[1] I do not know of any instance in which it has been discovered in a left femoral, umbilical hernia, or ventral hernia.

The appendix when herniated is liable to a number of changes, some of which are peculiarly interesting, and others of the gravest import.

(1.) Elongation is almost invariably present. The normal or average length is given as four inches, but the appendix may vary from one to nine inches. This lengthening may be the outcome of traction upon the tube, either by its being repeatedly nipped in the hernial ring, or by its being adherent within the sac.

Moreover, the appendix may be congenitally longer than usual, and this fact itself may predispose to its protrusion.

With this elongation there is sometimes an accompanying diminution in the calibre of the tube in its whole length, or only in that part which still lies within the abdomen.

(2.) Adhesions may form, and seem to be of comparatively common occurrence. Indeed, the appendix would appear to be more frequently adherent than other viscera found in hernial sacs. This adhesion is probably always the result of local inflammation, and it is a well known fact that an abnormally placed appendix is very liable to attacks of inflammation.

In these cases of adhesion the appendix may be found attached to the margins of the mouth of the sac, with the extremity free in the body of the sac, or the tip alone may be the part adherent, or its whole length may be attached.

This adherence, moreover, will bring about irreducibility, and may further lead, as above stated, to elongation and thinning of the appendix. Possibly also it sometimes has to do with the onset of inflammation by producing kinking of the organ. Lastly, the blocking of the mouth of the sac by the adherent appendix may be complete, and bring about the formation of a hydrocele of the body of the hernial sac.

(3.) A cystic dilatation of the protruded portion has been found in several cases. Within the abdomen such a condition may also be found, and would appear to be due to blockage of the

[1] An instance of this is found in the record by Geissler in which the appendix alone was within a left inguinal sac, the cæcum lying in the middle of the abdomen (Geissler in Virchow's "Jahresbericht," vol. ii. 1867, p. 475). See also Case 26.

lumen of the tube, either by contraction (or constriction) or kinking.

Precisely the same may occur in a hernial sac. The mucous membrane of the tube contains glands which are habitually secreting, and if obstruction to the outflow of this secretion occurs, a cystic distension will result.

(4.) Inflammation of the appendix in a hernial sac is decidedly common, just as it is when the appendix retains its normal position. The causes of these inflammatory attacks are probably exactly similar to those of inflammation occurring in the appendix when within the peritoneal cavity. It has been suggested that a truss worn over an adherent appendix is very likely to produce injury, and thus cause inflammation, and possibly this may account for a small proportion of the cases.

As in the abdomen, so in the sac of a hernia, perforation of the appendix may be a termination of the inflammation, and this may lead to symptoms which are very like, if not identical with. those which are ordinarily said to be the outcome of strangulation of the appendix. In many of the cases recorded below it was stated that there was a sudden onset to the symptoms, and that there was local pain, vomiting, and in some constipation. These, of course, are symptoms which might well be put down to strangulation, and therefore intestinal obstruction; not so complete, certainly, as in cases where strangulation of a loop of intestine occurs, but similar in every detail to those which are in evidence when appendicitis is present within the abdomen. In this latter condition there is wanting any cause of strangulation of the appendix, though there is very clear inflammation of the tube.

(5.) Strangulation of a true nature no doubt does occur sometimes when an appendix is protruded, though I venture to assert that it is much less frequent than is usually thought. It may be brought about in at least two different ways. In some cases the contraction of inflammatory tissue outside the sac has seemed to be the real cause, but more frequently it appears the appendix has been forced into a sac with a very narrow mouth, particularly that of a congenital inguinal hernia. Here the strangulation is the result of direct pressure of the tissues around the neck of the sac.

In whatever way produced, the symptoms which follow are, as has been stated, hardly those of true intestinal obstruction, but similar to those resulting from a partial enterocele, also from strangulation of Meckel's diverticulum, and occasionally from a strangulated ovary. The vermiform appendix, though somewhat poorly supplied with blood, seems to be well inner-

vated, and it is probably as the outcome of reflex irritation that the symptoms which do arise are present. Though there may be vomiting, it is not so urgent or persistent, nor does it become stercoraceous, as in acute obstruction, and the constipation present is rarely if ever absolute. Still, these cases are open to a considerable amount of uncertainty, and by far the wiser course is to explore the swelling.

Usually on opening the sac the appendix is readily recognised, but at times, owing to the presence of many adhesions, with, in fact, a matting together of the tissues, it is difficult to be certain as to the structure which is being dealt with. The appendix has been mistaken for the sac itself, for a second sac within an outer one, for the Fallopian tube, and even for the urinary bladder. The elongated form, the presence of its extremity, and the smaller size as compared with other hollow viscera, all serve to differentiate the appendix.

The methods of treating the organ vary according to the condition in which it is found. If an operation for a radical cure of a non-strangulated reducible hernia is being undertaken, and the appendix is found in the sac, it may be returned into the abdomen, or it may be amputated in the usual way, and the stump replaced within the peritoneal cavity. If, however, the tube is found adherent, and specially if not of natural size, it is well to free it from its attachments and remove it. Furthermore, if, as in some cases of inflammation, and possibly also of strangulation, it is found perforated or gangrenous, it may be either removed after having been drawn down until healthy tissue is seen, or it may be left in the wound which should remain unclosed.

Death occurs in a certain proportion of these cases from general peritonitis, as a consequence of an infection of the peritoneum from the hernial sac, and in other instances it is due to extravasation of contents of an appendix which has been reduced into the abdomen. Recovery may be complete after operation, or it may be complicated with the presence of an intestinal fistula, as the outcome of perforation. Such a fistula, moreover, may occur spontaneously, as the result of an abscess caused by inflammation and perforation which has of itself opened through the skin or been incised by a surgeon. These fistulæ occasionally close without any operation, but most need to have the diseased appendix exposed and removed.

Foreign bodies are occasionally found, as when the appendix is normally situated, within the lumen of the tube. An interesting specimen illustrating this will be found in Guy's Hospital Museum, No. 1166, in which a pin was present.

See also Cases 6 and 17, in both of which a piece of bone was discovered.

To sum up, it may be said that the appendix alone in a hernial sac is not so very rare—in fact, a good deal more frequent than is generally supposed, and that when so occurring, it is almost invariably in a sac protruded on the right side.

Further, a herniated appendix is very liable to become inflamed, and thus to acquire adhesions, so as to be irreducible. The inflammation, if severe, may lead to gangrene or perforation, with the result that symptoms are produced which are not infrequently attributed to a strangulation of the tube.

Lastly, that a true strangulation may occur, but that the signs and symptoms of acute intestinal obstruction in their characteristic form but rarely present themselves, the case being like that of a Richter's or Littre's hernia, where in the former only a part of the circumference of the bowel is nipped, and in the latter Meckel's diverticulum is strangulated.

B. The appendix appearing within a hernial sac accompanied by other viscera.

This class of cases may conveniently be divided into two distinct sections, one where the appendix merely passes with the cæcum into a rupture—a condition by no means uncommon, and the second in which the appendix is protruded and often adherent, and therefore irreducible, but is associated as the contents of the sac with small intestine or omentum.

It is these latter cases which lend so much interest to and bring so much light upon the question of local appendicitis within a sac; for, as in Case 12, acute inflammation of the appendix may be in progress with the signs and symptoms so often produced under such conditions, and these may be taken as evidence of strangulation; but on herniotomy it will be found that a portion of unconstricted intestine or omentum lies by the side of an inflamed appendix.

There are a few rare cases on record where the appendix accompanied by the cæcum has been found in a femoral sac on the right side. I have recorded one which was under the care of Mr. Langton in a previous volume of these Reports.[1]

Moreover, some true congenital umbilical herniæ most commonly contain the cæcum and appendix.

II. Retro-peritoneal hernia of the appendix cæci has been met with in not a few instances.

About the cæcum are several well-marked peritoneal fossæ, and others which are not so well defined; in fact, about these latter there is some dispute as to their actual existence.

[1] St. Bartholomew's Hospital Reports, vol. xxvii. p. 180.

The recess which can be seen lying below the cæcum when that viscus is drawn upwards and forwards is the one which is most constant in appearance and development. It is usually termed the sub-cæcal, and is undoubtedly formed as the cæcum gradually descends in the right iliac region. In addition an ileo-cæcal fossa may often be made out lying parallel and posterior to the lowest portion of the ileum.

It has been averred that the appendix can become strangulated in one of these peritoneal pouches; but here again it is easy to conceive that the symptoms which occur may equally well be due to inflammation rather than strangulation.

In some cases where the opening of the retro-peritoneal sac is considerably constricted—for it may even become entirely occluded—strangulation may possibly occur.

The appendix has been found wholly or only partially enclosed within the pouch, and when so displaced is usually much coiled. Occasionally it is firmly adherent; at other times there are only very slight adhesions, easily broken through.

As to the production of this condition, it may be that during the descent of the cæcum the appendix has been as it were left behind and become caught in the sub-cæcal fossa.

Mr. Lockwood has suggested another mode of formation of such herniæ by supposing that while an ordinary scrotal hernia is being formed, the displacement of the parietal peritoneum causes the appendix to remain behind and become imprisoned in a retro-peritoneal fossa in a manner similar to that just alluded to. There is, moreover, certainly no reason why, during the movements of the abdominal viscera in health and disease, the appendix should not pass or be forced into one of the cæcal pouches, and sometimes become fixed there. Such displacement has led in some instances to the belief that the appendix is absent altogether.

In conclusion, I have to thank all those gentlemen who have kindly allowed me to record cases under their care, particularly Dr. Gee and Mr. Butlin.

Series of Cases to Illustrate the Various Points alluded to in the Paper.

First Series.—*Appendix alone in the Hernial Sac, and with no symptoms of acute inflammation or strangulation.*

Case 1.—Female, aged 48. Appendix in right femoral sac. Patient had had hernia for eleven years. She had never had any vomiting, but suffered from constipation. On admission, a con-

siderable swelling in the right groin. No impulse on cough, but there was fluctuation. The skin was somewhat inflamed and tender. The swelling was irreducible.

Herniotomy was performed. The sac was much thickened, and one inch of the appendix was found adherent in the mouth, and somewhat dark in colour and swollen. The sac contained much clear fluid. The appendix was ligatured and removed, as also was the sac wall. The patient made a good recovery.

The case was under the care of Mr. Butlin, and the full notes will be found in the St. Bartholomew's Hospital Female Surgical Register, 1896, vol. v. No. 1804.

Case 2.—Male, aged 41. Appendix in right femoral sac. The patient died from carcinoma of the stomach, and *post-mortem* the appendix was found to be five inches long, of which four inches were within the abdomen, and the last inch in the sac, adherent at its mouth, and the free extremity somewhat dilated. There was no previous history of the case. The patient was under the care of Dr. Gee. See St. Barth. Hosp. Med. *Post-Mortem* Reg., 1895, p. 193; also Trans. Path. Soc. Lond., 1896–97.

Case 3.—There is a specimen in St. Bartholomew's Hospital Museum, No. 2111A, of an appendix within a right inguinal funicular sac. The upper two-thirds of the appendix is devoid of mesentery; the lower third lies free in the sac.

Case 4.—Appendix adherent in right inguinal sac; found during operation for radical cure. Recorded by the late Mr. John Wood (Trans. Path. Soc. Lond., vol. x. p. 190).

SECOND SERIES.—*Appendix alone in the Hernial Sac, with the record that it was acutely inflamed.*

Case 5.—Female, aged 50. Appendix in right femoral sac. Recorded by Cruveilhier. Inflammation occurred with a fatal result. See Anat. Path., tom. ii. liv. 37.

Case 6.—Male, aged 56. Appendix in right inguinal sac. The patient had worn a truss, but inflammation was produced by the presence of a piece of bone within the lumen of the appendix, and this led to perforation and the formation of an abscess. From this a fistula resulted, which in the end, however, healed. Two months later the patient died from other causes, and the appendix was found to be the sole contents of the hernial sac. The case is reported by Thurnam (Trans. Path. Soc. Lond., 1846–48, vol. i. p. 269).

Case 7.—Male, aged 16. Appendix in right inguinal sac. The testes were undescended. Inflammation occurred; an

operation was performed; the appendix found inflamed and adherent. A fatal result followed. The case is reported by the late Dr. Habershon (Diseases of the Abdomen, 4th edit., p. 445).

Case 8.—Male, aged 17. Appendix in right inguinal scrotal sac. It was said to be completely reducible. Inflammation came on, and was thought to be of a tubercular nature. Perforation occurred, and operation was performed and the appendix removed. Subsequently laparotomy was undertaken for consequent suppurative peritonitis. Ultimately the patient recovered. The case is recorded by R. J. Hall (New York Med. Jour., 1886, vol. i. p. 662).

Case 9.—Female, aged 60. Appendix in right femoral sac. No truss had been worn. Inflammation supervened (it is expressly said there was no strangulation). Herniotomy performed, and $3\frac{1}{2}$ inches of appendix removed. The case is recorded by Annandale (Lancet, 1889, vol. i. p. 627).

Case 10.—Male, aged 13 months. Appendix in right inguinal scrotal sac. Acute inflammation was in progress. Suppuration resulted. An incision was made. Healing followed. An operation was subsequently performed, and a very adherent appendix was removed. There was no evidence of any symptoms of intestinal obstruction in this case. Recorded by G. H. Monks (Boston Med. and Surg. Jour., 1890, vol. i. p. 543).

Case 11.—In the Museum of the London Hospital there is a specimen (No. 1300) from a case of Mr. Jonathan Hutchinson's. It is from an old man who had the appendix alone in the sac of a right inguinal hernia, which had apparently been in existence for some time. Inflammation came on and an abscess formed. The appendix is adherent to the sac wall, except the lowest inch, which is free. About two inches from its extremity there is a small perforation.

Third Series.—*Appendix with other Viscera in Hernial Sac, but acute inflammation of Appendix present.*

Case 12.—Male, aged 24. Appendix with a knuckle of small intestine in right inguinal sac. The patient rather suddenly was seized with vomiting, but beyond this there was no evidence whatever of any intestinal obstruction. A portion of the contents of the sac had been reduced by taxis prior to the operation. Herniotomy performed, and the sac found to contain an inflamed adherent appendix, together with a knuckle of small intestine. The latter presented no sign of having been strangulated. The appendix was removed by ligature. During con-

valescence the patient had an attack of parotitis, but in the end completely recovered. The case was under the care of Mr. Butlin. See St. Barth. Hosp. Male Surg. Reg., 1894, vol. v. No. 203.

Case 13.—Male. Appendix with omentum in right inguinal sac. Inflammation and perforation of appendix. An abscess formed, followed by a fistula, from which came a very profuse discharge. It never healed, and the patient died twelve months after. It was thought to be a case of orchitis, until *post-mortem* examination revealed appendix. Recorded by Shaw (Trans. Path. Soc. Lond., 1846–48, vol. i. p. 270).

FOURTH SERIES.—*Appendix alone in the Hernial Sac, with the record that it was acutely strangulated.*

Case 14.—Female, aged 50. Appendix in (? right) inguinal sac. Strangulation was said to have occurred four days before operation. There was vomiting and complete constipation. The appendix was in a fit condition to be returned, and speedy recovery followed. Recorded by Court (Lancet, 1870, vol. ii. p. 401).

Case 15.—Male, aged 19. Appendix in right femoral sac. As a result of strangulation, nausea, vomiting, and constipation ensued. The appendix, on herniotomy, was left adherent in the sac, and recovery succeeded. Recorded by Wölfer (Archiv für klin. Chir., vol. xxi. p. 432).

Case 16.—Male, aged 66. Appendix in (? right) inguinal sac. It was said to be strangulated, but although there was local pain, there was neither vomiting nor constipation. Recorded by De Morgan (Trans. Path. Soc. Lond., vol. xxv. 1873–74, p. 107).

Case 17.—Male, aged 57. Appendix in right inguinal sac. Said to have been strangulated. There was no impulse of cough in the swelling; the pain was severe, but there was no vomiting, and the bowels were open freely. At the herniotomy, $2\frac{1}{2}$ inches of the appendix were cut away. Within the tube was found a small piece of bone. Recorded by C. R. Thompson. (Brit. Med. Jour., 1882, vol. ii. p. 599).

Case 18.—Female, aged 38. Appendix in right femoral sac. Strangulation was said to be present. Pain was great, and there was some vomiting, but the bowels acted well. Recovery occurred after operation. Recorded by Davies-Colley (Guy's Hospital Reports, 1884, vol. xxvii. p. 430).

Case 19.—Male, aged 5 months. Appendix in right inguinal sac, of congenital origin. It was said to have been strangulated.

The infant was very sick, but passed flatus. The skin over the scrotum was much reddened. On herniotomy, the appendix was found sloughing and perforated. A fistula remained, but ultimately there was complete recovery. Recorded by Durham (Guy's Hospital Reports, 1884, vol. xxvii. p. 435).

Case 20.—Female, aged 47. Appendix in right femoral sac. Said to have been strangulated. Vomiting was in evidence, but there was no constipation. On herniotomy, the appendix was found gangrenous. It was ligatured and removed with perfectly satisfactory results. Recorded by Clement Lucas (Guy's Hospital Reports, 1884, vol. xxvii. p. 436).

Case 21.—Male, aged 54. Appendix in right inguinal sac. In this case pain was marked; there was offensive vomiting, and the bowels did not act. Recorded by Pick (Lancet, 1880, vol. i. p. 801).

Case 22.—Female, aged 53. Appendix in right femoral sac. Said to have been strangulated. The patient vomited thrice. Herniotomy four days later. No definite peritoneal sac found. The appendix was found white, but thickened, and contained much mucus. It was ligatured and removed, and the patient made an excellent recovery. Recorded by Keetley (Med. Press and Circ., 1890, vol. i. p. 85).

Case 23.—Female, aged 67. Appendix in right femoral sac. Said to have been strangulated. There was nausea, but no vomiting. The sac was not opened, but the appendix felt and reduced. Recorded by Swasey (New York Med. Rec., 1881, xix. p. 706).

Case 24.—Female, aged 46. Appendix in right femoral sac. A sudden onset of symptoms was said to have occurred twelve hours before operation. Vomiting, but loose motions. Much flatus by mouth. The appendix was found ulcerated and perforated, and the sac much thickened. The appendix was removed. Recovery followed. Case under the care of Mr. Langton. (See St. Barth. Hosp. Female Surg. Reg., 1891, vol. iv., No. 92; also St. Barth. Hosp. Reports, 1891, p. 179).

Case 25.—Male, aged 6 weeks. Appendix in right inguinal sac, of congenital origin. Strangulation was said to have occurred. The appendix was removed on herniotomy, and the infant recovered well. Recorded by Bilton Pollard (Lancet, 1895, vol. i. p. 1114).

Case 26.—Male, aged 58. Appendix in *left* inguinal sac. Patient had noticed a hernia for eight months, which had always been reducible up to three days before he came under observation. At that time, after a rather violent movement, he was seized with intense local pain, and in addition vomited, and

had no action of the bowels. Herniotomy was performed and the sac opened. Fluid with fæcal odour was evacuated. After section of the constricting neck, the appendix was drawn down, and found to be eight inches in length. It had been tightly nipped at the junction of the middle with the lower third, and was gangrenous below the constriction, and perforated at the extremity. A ligature was applied near the cæcum and the appendix cut away. The patient made a good recovery. Recorded by Thiéry (Bull. de la Soc. Anat. de Paris, July 1892).

Case 27.—Female, aged 45. Appendix in (? right) femoral sac. Had been irreducible five days. Operation revealed appendix, which was said to be strangulated. It was removed, and the patient recovered. Recorded by Guinard (Med. Press and Circ., 1896, vol. ii. p. 604).

Case 28.—Appendix in right femoral sac. Said to have been strangulated; there was local pain and swelling. Recorded by Bayer (Centralb. für Chir., 1876, xxxi. p. 689).

Case 29.—Male, aged 63. Appendix in right femoral sac. Was said to be strangulated. There was vomiting, but the bowels acted. The appendix was returned to the abdomen, and death resulted. Recorded by Diffenbach.

List of Authors and References Consulted.

External Hernia of Appendix.

Annandale, Lancet, 1889, vol. i. p. 627.
Bayer, Centr. f. Chir., 1876, p. 689.
Brieger, Archiv f. Klin. Chir., 1893, Band 45, p. 892.
British Medical Journal, 1882, vol. ii. p. 579.
Court, Lancet, 1870, vol. ii. p. 401.
Cruveilhier, Anat. Path., tom. ii. liv. 37.
Davies-Colley, Guy's Hospital Reports, 1884, p. 430, &c.
De Morgan, Transactions of the Pathological Society, London, vol. xxv. p. 107.
Diffenbach.
Eccles, McAdam, St. Bartholomew's Hospital Reports, 1891, vol. xxvii. pp. 179, 180.
Geissler, Virchow's Jahresbericht, vol. ii. p. 475.
Guinard, Medical Press and Circular, 1896, vol. ii. p. 604.
Guy's Hospital Museum, No. 1166.
Habershon, "Diseases of the Abdomen," 4th edition, p. 445.
Hall, New York Medical Journal, 1886, vol. i. p. 662.
Keetley, Medical Press and Circular, 1890, vol. i. p. 85.
Kelynack, "The Pathology of the Vermiform Appendix," 1894.
Lancet, 1880, vol. i. p. 801; 1889, vol. i. p. 627; 1895, vol. i. p. 1114.
London Hospital Museum, No. 1300.

Medical Press and Circular, 1890, vol. i. p. 85 ; 1896, vol. ii. p. 604.
Monks, Boston Medical and Surgical Journal, 1890, vol. i. p. 543.
Pathological Society of London, Transactions, vol. i. pp. 269, 270 ; vol. x. p. 190 ; vol. xxv. p. 107.
Pick, Lancet, 1880, vol. i. p. 801.
Pollard, Lancet, 1895, vol. i. p. 1114.
Polloson, Lyon Medical, May 21, 1893, p. 75.
Royal College of Surgeons' Museum, No. 2635.
Shaw, Transactions of the Pathological Society, London, vol. i. p. 270.
St. Bartholomew's Hospital—
Medical Post-Mortem Register, 1895, p. 193.
Museum, No. 2111A.
Surgical Registers. Female—1891, vol. iv. No. 92 ; 1896, vol. v. No. 1804. Male—1894, vol. v. No. 203.
Reports, vol. xxvii. pp. 179, 180.
Swasey, New York Medical Record, 1881, p. 706.
Thiéry, Bull. de la Soc. Anat. de Paris, July 1892.
Thompson, British Medical Journal, 1882, vol. ii. p. 579.
Thurnam, Transactions of the Pathological Society, London, vol. i. p. 269.
Wölfer, Archiv f. Klin. Chir., vol. xxi. p. 432.
Wood, Transactions of the Pathological Society, London, vol. x. p. 190.

Other cases are recorded by—

Bayer, Prager Med. Woch., 1886.
Bennet, Virginia Medical Monthly, 1883–84, vol. x. p. 91.
Brunner, Beit. zur Klin. Chir., 1886 and 1889.
Cabaret, Jour. de com. Med. Chir., 1842.
Habs, Deutsche Zeit. f. Chir., xxii. S. 323.
Haidenthaller, Archiv f. Klin. Chir., xl. 1890.
Jackle, Die Erkankung des Processus vermiformis in Bruchsack, Marburg, 1888.
Javanelli, Archiv Gen. de Med., 1836, vol. x. p. 483.
Klein, Ueber die äusseren Brücke des Processus vermiformis cæci, Geissen, 1868.
Loebker, Mittheilungen aus der Chir. Klin. zu Greifswald, 1884.
Luschka, Archiv f. Path. Anat., 1853, vol. vi. p. 409.
Paget, Stephen, Lancet, 1891, vol. i. p. 928.
Thorin, Hygiea, 1887, p. 762.
Treves, "A System of Surgery," 1896, vol. ii. p. 723.
Wette, Die Herniotomien im städtischen Hospital zu Aachen, 1889.
Zdekaur, Prager Woch., 1890, No. 27.
Zuckerhandl, Wien. Klin. Woch., 1891, vol. iv. p. 305.

References to Retro-Peritoneal Hernia of Vermiform Appendix.

Dunn, Transactions of the Pathological Society, London, 1889, vol. xl. p. 114.
Lichtenstein, Cyclopædia of Medicine, vol. vii. p. 550.
Lockwood, Transactions of the Pathological Society, London, 1889, vol. xl. p. 115 ; 1890, vol. xli. p. 118.