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A Plea in Favor of Early Lapa-
rotomy for Catarrhal and Ul-
cerative Appendicitis,

WITH THE REPORT OF TWO CASES.

BY
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CHICAGO, ILL.

Reprinted from "The Journal of the American Medical
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A PLEA IN FAVOR OF EARLY LAPA-
ROTOMY FOR CATARRHAL AND UL-
CERATIVE APPENDICITIS, WITH
THE REPORT OF TWO
CASES.

The literature of the surgical treatment of affections in the ileo-cæcal region has been increasing very rapidly during the last few years. A great deal has been said and written concerning the propriety of surgical interference in cases of perforative appendicitis, typhlitis, paratyphlitis and perityphlitis. Post-mortem examination and clinical experience have demonstrated that with few exceptions localized and diffuse peritonitis as well as suppurative inflammation of the connective tissue originating in the ileo-cæcal region, are caused by an antecedent affection of the appendix vermiformis, which has resulted in perforation or gangrene of that structure. While it cannot be said that unanimity of opinion exists among surgeons in reference to the exact indications for operative treatment in cases of appendicitis and suppurative perityphlitis, it is safe to assert that the majority of them would not hesitate to resort to the knife in every instance where it would be possible to ascertain beyond a doubt that perforation had taken place. Numerous cases have been reported during the last three years where prompt action on part of the surgeon has been the means of saving life in cases of phlegmonous inflammation and circumscribed peritonitis caused by perforation of the appendix vermiformis; but,

thoroughly cleansed with warm water and potash soap, after which a compress wrung out of a sublimate solution 1:2000 was applied.

Operation May 1: Chloroform anæsthesia. After removal of the compress the surface was washed with undiluted alcohol. An incision about four inches in length was made directly over the center of the cæcum and parallel to the ascending colon, the lower angle of which reached to within an inch of Poupart's ligament. All hæmorrhage was carefully arrested before the abdominal cavity was opened. The peritoneum was divided between two anatomical forceps, when two fingers of the left hand were introduced and between them the opening was enlarged. Through this incision the cæcum came directly in view and presented a normal appearance both as to size and structure. No evidences of peritonitis or perityphlitis. On making pressure over the lower portion of the cæcum an elongated body about the thickness of an ordinary lead pencil could be distinctly felt rolling under the tip of the finger. The lower margin of the cæcum was grasped with the fingers, elevated, and brought into the wound. This manipulation brought into view the appendix which was directed upwards and inwards from its point of attachment, along the posterior wall of the cæcum. No adhesions between the appendix and the cæcum, but the mesentery of the appendix appeared to be shortened and exceedingly vascular. The peritoneal covering of the appendix appeared healthy, having retained its normal smoothness and lustre. The appendix was uniformly enlarged from its junction with the cæcum to its distal extremity, and imparted a sensation of unusual hardness when grasped between the thumb and index finger. The mes-

entery of the appendix was ligated in several sections with fine silk and cut close to the appendix. The appendix was ligated near the cæcum with a silk ligature and amputated about a quarter of an inch below the point of ligation. The lumen of the appendix at the point of section was quite small, but as it was more than probable that it communicated with the cæcum, I deemed it necessary to prevent the possibility of a subsequent perforation from cutting through of the ligature by covering the stump with peritoneum. The stump was disinfected, dusted with iodoform, and buried by stitching the peritoneum from each side over it by a number of stitches of the continued suture. The cæcum was now returned and the wound closed by suturing the peritoneum with catgut, while the external sutures of silk were passed down to, but not through, the peritoneum. A compress of iodoform gauze and a thick layer of salicylated cotton retained by a number of strips of adhesive plaster encircling two-thirds of the body constituted the dressing. The subsequent history of the case was one of uninterrupted recovery. The pain disappeared as if by magic. The patient took no opiates after the operation. Temperature never above normal. On the third day the bowels were moved by a saline cathartic after which no further medication was necessary. At the end of a week the dressing was removed when the wound was found united throughout and the sutures were removed. At the end of the second week the patient left the hospital, and in the course of another week resumed his occupation. He is now in perfect health, has gained in flesh, and has been perfectly free from pain. The amputated appendix proved to be a very interesting pathological specimen. The part re-

moved measured two inches in length, and in thickness corresponded in size to the last joint of the little finger. The lumen was uniform in size throughout and was large enough to admit a small-sized lead pencil. The appendix was slit open its whole length at a point opposite to the mesenteric attachment. On inspection of the mucous membrane lining it an oblong ulcer was discovered near the middle and opposite the mesenteric attachment. The ulcer measured about half an inch in length, and a quarter of an inch in width, its greater diameter corresponding to the long axis of the appendix. The margins of the ulcer were regular in outline and not undermined. It presented no evidences of repair. Its greatest depth corresponded to its centre. The whole mucous membrane was exceedingly vascular and much thickened, the submucous infiltration being uniform over its entire area. A transverse section of the appendix through the centre of the ulcer, examined under the microscope, showed that the entire thickness of the mucous membrane and part of the muscular coat were destroyed by the ulcerative process, and that the remaining thickness of the wall as far as the peritoneum was infiltrated with embryonal cells and leucocytes which were closely grouped together in the connective tissue reticulum. The submucous tissue and part of the muscular coat were similarly infiltrated throughout. No faecal matter and no foreign body could be found in the lumen of the appendix, the whole contents consisted of a few drops of a highly viscid odorless secretion. The absence of any macroscopical cause of the inflammation, the condition of the mucous membrane, and the appearance of the ulcer substantiate the diagnosis of catarrhal appendicitis, which in this case had resulted in the

formation of a catarrhal ulcer of considerable size and depth. There can be but little doubt that repeated acute exacerbations of the chronic inflammation would have finally resulted in perforation, and as the ulcer was located on the free side of the appendix there would have been great danger in such an event of invasion of the peritoneal cavity, and death from diffuse septic peritonitis. The second case came under the observation of Dr. Knut Hoegh, of Minneapolis, Minn., and through his courtesy I am permitted to incorporate it in this paper. It furnishes an illustration of another form of appendicitis (suppurative) amenable to early successful surgical treatment.

Case 2.—H. M., 37 years of age, merchant by occupation. For the last six or seven years he has suffered at intervals from attacks of pain in the abdomen. At first these attacks were not very severe, and of short duration, the general health remaining unimpaired. Questioned as to the condition of the bowels the patient stated that the attacks were usually attended by diarrhoea. The onset of pain was always sudden and apparently without any appreciable cause, as they often occurred during the night after the patient had retired the evening before in perfect health. In the beginning the attacks occurred about every six months, but later they came on more frequently, more severe, and of longer duration, and at the same time the general health became impaired. The later attacks he describes as commencing with a severe pain in the ileo-cæcal region which at times became excruciating, accompanied by sensations of chilliness. No vomiting, but more or less retching; bowels constipated; abdomen often distended and always tender on pressure over a limited space, at a

point from which the pain always seemed to start.

Patient is not aware that he ever passed blood, mucus or pus with the stools. During the last fifteen months he has passed through five attacks, the last one two months before the operation was performed. Since the last attack he has been unable to resume his business as he has suffered constantly from pain and tenderness in the ileo-cæcal region, loss of appetite, and an increasing debility. The patient looks prematurely old, showing evidences of senile marasmus seldom found in persons of his age. He is of medium height, somewhat emaciated, having lost twenty-five pounds of his customary weight. Examination of the abdomen revealed no tympanites and no swelling, but midway between umbilicus and the right anterior superior spine of the ilium a space about two inches square was found tender on pressure. Rectal exploration yielded a negative result. The usual internal treatment in such cases consisting of the administration of belladonna, nux vomica, and alkaline cathartics was not followed by any material improvement, so that the patient readily consented to an operation which had for its object the removal of the appendix vermiformis which it was believed was in a condition of catarrhal inflammation. The absence of swelling and fever seemed to render it improbable that the symptoms were due to circumscribed peritonitis, or inflammation in the cæcal mesentery or para-cæcal connective tissue. The repeated attacks of pain, the localized tenderness, and the digestive disturbances pointed to a localized inflammation depending upon some chronic pathological change within or near the appendix vermiformis. Dr. Foster, of Minneapolis, saw the case in consultation with Dr.

Hoegh, and concurred in the opinion that an operation should be performed. The writer was consulted by letter, and strongly urged the propriety of a speedy resort to surgical treatment. The operation was performed by Dr. Hoegh in the St. Barnabas Hospital, August 19, 1889, assisted by Drs. Foster and Wood. Chloroform was used as an anæsthetic. Operation performed under strict antiseptic precautions. Incision through right linea semilunaris. On opening the peritoneal cavity the appendix came at once in sight lying free in the peritoneal cavity, pointing towards the pelvis. It was about two inches in length, remarkably firm to the touch, and its serous surface quite vascular. At some points it had formed adhesions with the surrounding structures. The adhesions were separated and a ligature applied near its junction with the cæcum. The stump was buried in the same manner as in case 1. The cæcum showed nothing abnormal. It was noticed that the point of communication between the appendix and cæcum was very narrow, the lumen not exceeding the size of a knitting needle. The abdominal incision was closed in the usual manner. Soon after the operation the patient suffered considerably from nausea and retching which gave rise to considerable pain in the wound. A slight elevation in the temperature a few days after the operation announced a slight suppuration in the superficial portion of the wound, which, however, soon subsided, and the healing by granulation proceeded in a satisfactory manner. Aside from this disturbance the patient went on to an uninterrupted and permanent recovery. Examination of the appendix after its removal showed that it was somewhat distended in its central part by a few drops of a thick, very offensive, purulent fluid of the consis-

tency of cream, of a brownish color ; the odor was not feculent, but rather fœtid. No concretion or foreign body was found. The mucous lining of the appendix showed two distinct but not very deep ulcers, both involved the entire thickness of the mucous membrane. The ulcer nearest the cæcum was the largest occupying the whole circumference of the lumen about one-quarter of an inch wide. The second ulcer nearer the apex was not larger in circumference than the size of a split pea. The serous coat near the junction of the cæcum was considerably thickened. Microscopical examination of the fluid showed broken down tissue, pus corpuscles, and pigment granules.

GENERAL REMARKS ON EARLY RADICAL OPERATION FOR APPENDICITIS.

Excision of the appendix in cases as reported above must be considered in the light of a curative and prophylactic operation. It is curative, as by it the cause of the disease with the diseased tissues is completely removed, and it is prophylactic, as by it the disastrous consequences of a probable later perforation are positively prevented. Extirpation of the appendix at a time before the inflammatory process has reached the serous coat is one of the easiest and safest of all intra-abdominal operations. The operation is performed in a healthy aseptic peritoneal cavity, and if the customary antiseptic precautions are carried out healing of the visceral and abdominal wounds by primary intention may be confidently expected. The operation eliminates a structure which if not entirely useless has at most only an unimportant physiological importance.

INDICATIONS FOR OPERATION.

It may be stated as a general rule, to which there can be but few exceptions, that the appendix should be extirpated in all cases where from the symptoms and history of the case the existence of a localized destructive inflammatory process can be surmised. From a diagnostic and practical standpoint all cases of appendicitis can be divided into two classes: 1. Acute, 2. Chronic. There can be but little doubt that most, if not all, acute cases are preceded by a chronic lesion. The history of many cases, and the pathological conditions of numerous specimens corroborate this statement. A foreign body, for instance, may be present for a long time without giving rise to serious symptoms, but it cannot remain for any length of time without causing a catarrhal inflammation and superficial ulceration. An ulcerative catarrhal inflammation may exist for a long time before it gives rise to acute symptoms, and when the acute attack makes its appearance the inflammation has reached the peritoneal surface and the connective tissue underlying the appendix and cæcum; it is then no longer an uncomplicated case of appendicitis as the primary inflammation has extended beyond the structures of the appendix, and has given rise to perityphlitis, with or without perforation. Chronic appendicitis is characterized by acute exacerbations of short duration, the attacks of greater or less severity occurring at intervals of a few months or weeks. Between the attacks the patient may be in perfect health, unless the attacks recur with great frequency, when impairment of the digestive functions produces general ill health. The most important symptoms which point to the existence of chronic

appendicitis are localized pain and a circumscribed area of tenderness at a place corresponding to the location of the appendix. Simple appendicitis does not give rise to any appreciable swelling as long as the lumen of the appendix remains in communication with the cæcum, as the resistance of the indurated walls is sufficient to force the contents of the appendix into the cæcum. In persons with thin abdominal walls it is possible to feel the hardened and thickened appendix by making deep pressure while the patient is placed in a position that favors relaxation of the abdominal muscles. Tympanites is usually absent unless the appendicitis is complicated by circumscribed peritonitis. Rigidity of the abdominal muscles is absent as long as the inflammation is limited to the deeper structures of the appendix. During the acute exacerbations of the chronic form of the disease aside of the pain the general symptoms are not severe. The temperature is either normal or there is only a slight rise seldom above 100° F. The pulse is only slightly increased in frequency, and shows none of the characteristic features which it presents in peritonitis.

Vomiting is occasionally present, but is not a constant nor even a frequent symptom. Constipation which is usually present is probably more the result of a change in diet, rest, and the medicines taken for the relief of pain than the disease. The frequency of catarrhal and ulcerative inflammation in the interior of the appendix as compared with the remaining portion of the intestinal tract is probably owing to the anatomical location of this structure. The lumen of the appendix constitutes a cul-de-sac which is in communication with the intestinal canal, but which is virtually excluded from the fæcal circu-

lation, hence it serves an admirable purpose as a reservoir for the collection, localization and retention of pathogenic microbes. That the anatomical location of the appendix acts as a predisposing cause in the etiology of localized forms of infection is evident from the course of the disease.

The inflammatory process remains limited and does not extend by continuity to the cæcum, the extension of the disease being only in a peripheral direction from the mucous membrane to the deeper structures. In conclusion it may be said that recurring attacks of pain in the region of the appendix with a circumscribed area of tenderness over the same point are presumptive evidences of the existence of appendicitis, and if the other symptoms and signs point in the same direction treatment by abdominal section is indicated.

TECHNIQUE OF OPERATION.

As an operation for simple appendicitis always presupposes an aseptic condition of the peritoneal cavity, it is of the utmost importance to secure by thorough antiseptic precautions an aseptic condition of everything that has to be brought in contact with the wound. The field of operation should be disinfected by shaving and thorough washing with warm water and potash soap, after which a moist compress saturated either with a 1-2000 solution of sublimate or a $2\frac{1}{2}$ per cent. solution of carbolic acid is applied and allowed to remain from the time the disinfection is made the evening before the operation until the patient is ready for the operation the next day. Immediately before the incision is made, I am in the habit of washing the surface once more with one of the disinfectant solutions, and lastly with absolute alcohol. The instruments should be

sterilized by boiling for ten or fifteen minutes immediately before the operation. The operator and assistants should disinfect their hands by washing thoroughly with warm water and potash soap, and subsequently a 1-1000 solution of sublimate. If everything has been rendered thoroughly aseptic, that is to be brought in contact with the wound, no antiseptic solutions will be necessary during the operation, unless perhaps for the disinfection of the stump after amputation of the appendix. Sterilized water is used for the sponges.

Incision.—The incision that renders the cæcum and appendix most accessible to inspection, examination and operative manipulation is one made parallel to the long axis of the ascending colon and cæcum. It should be about four inches in length and directly over the centre of the cæcum, and extend to within an inch of Poupart's ligament. With a sharp scalpel the skin, fascia and successive muscular layers are rapidly divided without the use of any director until the peritoneum is reached. At this stage a pause is made in the operation in order to arrest hæmorrhage by applying hæmostatic forceps to every bleeding point, the forceps remain until the surgeon is ready to close the wound, when it will generally be found that ligatures are superfluous, as the compression and crushing of the tissues caused by the forceps have been sufficient to arrest the bleeding. By following this plan unnecessary ligation of small vessels is avoided. The peritoneum is picked up by two catch-toothed forceps, and between them the abdominal cavity is opened, and the incision subsequently enlarged to the desired extent between the index and middle finger of the left hand. As soon as the peritoneal cavity is opened the further steps

of the operation will be greatly facilitated by packing around the cæcum a small compress of aseptic gauze wrung out of sterilized water for the purpose of preventing prolapse of the small intestines. If the appendix is below the cæcum it will come into sight at once, when it can be examined and directly dealt with. If, as is more frequently the case, it is behind and towards the inner side of the cæcum its size and direction can be readily ascertained by palpation through the cæcum, but to make it accessible to direct examination and operative treatment it is necessary to raise the lower margin of the cæcum.

Excision of the Appendix.—If the serous coat has not been implicated by the inflammation the only attachment to be separated is the mesentery of the appendix. This is always present, but varies greatly in length and width. If it is attached to the whole length of the appendix it should be ligated in several sections with fine silk ligatures as far as the cæcum. If inflammatory adhesions are present they are separated, and all bleeding points carefully tied. When the appendix has been thus completely isolated a ligature of fine silk is tied around its base close to the cæcum, and about a quarter of an inch below it the section is made with scissors.

Treatment of Stump.—As the interior of the appendix under such circumstances necessarily must always contain pathogenic microorganisms it is necessary to disinfect the cut surface of the stump thoroughly. This can be done with one of the disinfectant solutions, after which the stump should be dusted with iodoform. After amputating the appendix it has been heretofore customary to drop the stump without making any provision against the possibility of perforation, subsequently taking place at the point of

ligation. This I consider a great mistake. The ligature approximates a diseased mucous membrane, and if after the operation the entire stump is not speedily surrounded by a wall of impermeable granulation tissue which is later transformed into a connective tissue capsule, there is great danger that perforation will take place after cutting through of the ligature, thus exposing the patient to the same danger he was in before the operation. To obviate the possibility of such an occurrence the stump, after thorough disinfection and iodoformization should be covered with peritoneum by stitching the serous surfaces of the cæcum from both sides over it by a number of Lembert sutures. The serous surfaces will become agglutinated in a few hours, and in a few days the adhesions will have become sufficiently firm to protect the surrounding tissues and the peritoneal cavity against extravasation should leakage take place at the point of ligation. By resorting to this precaution we protect the patient against all possibility of the occurrence of perforative peritonitis subsequently, as the perforation, should it occur, of necessity would take place into the cæcum.

Closure of Abdominal Incision.—More care is required in closing an incision made through the several muscular layers of the abdominal wall than by going through the median line, as the ordinary way of closing a median incision would be very likely to be followed by a ventral hernia. The peritoneum must be sutured separately with fine catgut or silk sutures, while the remaining sutures are passed down to, but not through, the peritoneum. No provision for drainage is necessary in these cases.

Dressing of Wound.—After dusting the wound with iodoform a narrow strip of protective silk is

applied over it, when it is covered with a compress of iodoform gauze and a larger compress of salicylated cotton which are retained with a few broad strips of rubber adhesive plaster encircling two-thirds of the body. After this the whole abdomen is enveloped with a thick layer of common cotton over which a well-fitting binder is snugly pinned; this not only gives additional support to the wound, but furnishes likewise an agreeable and efficient support to the abdominal wall.

After Treatment.—As it is advisable to move the bowels the day before the operation by a saline cathartic, and to empty the colon by enema the following morning, the bowels should not be disturbed again for several days after the operation. This can be accomplished by administering several ten-drop doses of deodorized tincture of opium, and placing the patient on absolute diet for at least two or three days. On the third day a saline cathartic is administered, and, if necessary, this is followed by an enema. The sutures are removed at the end of the first week, but the patient is not allowed to leave the bed for another week for fear that the adhesions might yield and a hernia might follow. For several weeks after this he should wear some kind of an efficient abdominal support to guard still longer against the same accidents.

CONCLUSIONS.

1. All cases of catarrhal and ulcerative appendicitis should be treated by laparotomy and excision of the appendix as soon as the lesion can be recognized.
2. Excision of the appendix in cases of simple uncomplicated appendicitis is one of the easiest and safest of all intra-abdominal operations.

3. Excision of the appendix in cases of appendicitis before perforation has occurred is both a curative and prophylactic measure.

4. The most constant and reliable symptom indicating the existence of appendicitis are recurring pains and circumscribed tenderness in the region of the appendix.

5. All operations on the appendix should be done through a straight incision parallel to and directly over the cæcum.

6. The stump after excision of the appendix should be carefully disinfected, iodoformized, and covered with peritoneum by suturing the serous surface of the cæcum on each side over it with a number of Lembert stitches.

7. The abdominal incision should be closed by two rows of sutures, the first embracing the peritoneum, and the second the remaining structures of the margins of the wound.

8. Drainage in such cases is unnecessary and should be dispensed with.

