

men by fixation sutures or by gauze. In the event of gangrene, the fecal extravasation would course toward the external wound.

When in 1880 Czerny reported his first case of primary excision for gangrene, he believed that the operation would not displace the older operation of enterostomy. Although the last four years have brought forward success after success from primary resection, the dictum of Czerny still holds good. Each operation has its proper field. The boundary lines are becoming more clearly defined. Nevertheless, it must always remain for the judgment and tact of the surgeon, as individual cases arise, to determine the proper procedure to be adopted. In operative surgery, as elsewhere, the ideal should be sought. This would make primary excision the normal procedure in gangrenous hernia, and only cogent reasons should cause the operator to refrain from striving for the ideal.

#### CASES OF GANGRENOUS HERNIA.

*Case 1.*—Male, aged 60 years; Germantown, Ohio; left inguinal hernia; reduction by taxis; obstruction unrelieved. Two days later, laparotomy by lamplight. Bowel apparently viable. Perforation peritonitis on fifth day. Death.

*Case 2.*—W. P., male, aged 29 years; Carlisle, Ky. Rupture of several years standing. Taxis attempted on second day. Operation in the night of the fifth; one-half pint of foul smelling bloody serum in the sac. Omental mass large as a fist, gangrenous; no intestine in sac. Death in twenty-four hours from peritonitis.

*Case 3.*—Miss D., aged 30 years; seen with Dr. Jenkins, of Newport. Recent rupture of four days; strangulation. Sac contained several ounces of bloody serum; coil of small intestine four inches long; in its center, opposite mesenteric pudic, gangrenous patch large as a silver quarter. Constriction divided; intestine anchored by catgut suture through mesentery; gauze packing; perforation on the fourth day; profuse discharge during two weeks. Gradual contraction of fistula and permanent closure in one month.

*Case 4.*—Mrs. K., age 56 years, seen with Dr. Rariff. Large intestinal inguino-labial hernia. Strangulation by band; operation twenty-four hours after inception; gangrene of intestine; excision of fourteen inches and end-to-end suture by Czerny-Lembert method. Recovery.

*Case 5.*—Mrs. P., age 58 years; seen with Dr. Potter, Carthage, Ohio. Small femoral hernia right side; strangulated six days; refused earlier operation. Great abdominal distension; vomiting fecal. Pulse 110, temperature 101. Fetid and bloody fluid in sac; loop of small intestine six inches long, gangrenous, afferent gut normal. Relief of constriction, excision of gut several inches. End-to-end suture by Czerny-Lembert method. Fixation of gut near wound, gauze drainage, death in twenty-four hours from peritonitis.

*Case 6.*—I. F., male, age 54 years; Good Samaritan Hospital. Irreducible femoral hernia; right side; strangulated four days; fecal regurgitation; general condition good. Few ounces of purplish fluid in sac. Knuckle of intestine and adherent omentum in sac. Constriction at Gimbernaut's ligament divided. Intestine gives. When brought into wound there is a perforation in the constriction groove one-third inch wide and one-half inch long. Edges normal. Inversion and closure by suture as in gun-shot wound. Slight anchoring of intestine; gauze packing; uneventful recovery.

*Case 7.*—Mrs. H., age 35 years; seen with Dr. Hoppe; four months pregnant. Right irreducible femoral hernia of many years standing. Absolute constipation, five days; vomiting twenty-four hours; sac contained several ounces of bloody fluid and adherent omentum and a knuckle of small intestine, eight inches long. Gangrenous in constriction groove but not perforated. Anchored to wound. Fistula established on fourth day; closed permanently in a month. Recovery.

**HOSPITAL CAR.**—A hospital car, recently adopted by the Central of New Jersey, is the latest departure in railroad-ing. It is supplied with every known medical and surgical device for prompt aid in case of wrecks or other accidents. While on the line it is given the right of way.

## THE SURGICAL TREATMENT OF HERNIA.

Read in the Section on Surgery and Anatomy, at the Forty-fifth Annual Meeting of the American Medical Association, held at San Francisco, June 5-8, 1894.

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One of the most brilliant triumphs of modern aseptic surgery is the undoubted demonstration that hernia, in all its common varieties, may be permanently cured. This occasion offers little more than the possibility of somewhat dogmatically emphasizing certain fundamental factors and conditions which enter into the problem, and which must be understood in order to make possible the permanent cure of hernia.

Since inguinal hernia in the male is by far the most common of all varieties, and much the more difficult of cure, it is proper that the limited time at our disposal should be devoted to the consideration of this variety. The normal anatomic relationships of the important structures which form the anterior lower portion of the abdominal wall are invested with an entirely new interest when considered from the standpoint of their physiologic function in connection with the reproductive organs.

For many reasons it would have been of great advantage to the male, if the testicle had been held in suspension within the abdominal cavity, somewhat after the general disposition of the ovary in woman. The dislocation of the testicle into an external pouch necessitates long and tortuous blood vessels, with a corresponding increase in length of the spermatic tube, and these component parts of the cord must traverse an opening in the muscular abdominal wall, which is ever varying in functional activity and motion. We can but admire the adjustment of these entirely diverse relationships, so as to render possible the functional equilibrium of such diverse structures.

In a large degree this is rendered possible only by the obliquity of the inguinal canal, which traverses the abdominal wall in a direction that is normally maintained at or near to a right angle with the intra-abdominal pressure—a condition analogous to the penetration of the ureter through the urinary bladder, which is the only other important illustration of this principle of mechanics found in the human body. It is not a valve which acts only at the exit of the canal to prevent the reflow from backward pressure, but it is exerted upon the whole length of the canal equally, so that, when the normal conditions are maintained, the greater the intra-abdominal pressure, the more firmly in juxtaposition are the walls of the inguinal canal, effecting its complete closure.

Whatever may be the causes which produce a departure from this normal anatomic relationship and result in hernia, certain conditions invariably pertain. The first of these is an enlargement, almost always from above downward, of the internal inguinal ring. When this has taken place, the thin elastic peritoneum easily yields to the intra-abdominal pressure, and the fluid contents of the intestinal canal soon form a hydrostatic wedge, operating more or less constantly in its further enlargement, until at last the obliquity of the inguinal canal is lost and only a large direct opening through the abdominal wall exists. Although these conditions were more or less recognized and described by the earlier mas-

ters of surgery, as well as their functional importance hinted at, the reconstruction of the deformed structures, so as to restore the parts to their normal condition, was not made possible until surgical methods were perfected, based upon the knowledge of the rôle of the bacterial ferments in wounds, and the adoption of methods which should render their exclusion a practical certainty. This having been demonstrated as possible, free dissections, involving structures hitherto considered beyond the domain of surgery, were ventured upon, and thus it became possible to open with safety the peritoneal cavity, dissect away and remove its redundant pocket which served as a receptacle for the hernial contents. The technique of the wound treatment became the next important factor for consideration. Had the testicle been dissected away and removed as was advocated in the sixteenth and seventeenth centuries, the problem would have been simple, not unlike any abdominal wound, to be closed by a considerable variety of methods. On the contrary, however, the maintenance of the cord gave a wound which presented troublesome conditions, and the closure of the abdominal incision in the usual way left the internal ring open, and the canal no longer oblique, but more or less in direct line with the intra-abdominal pressure. It is owing to this faulty technique that hernia after operation, as still too commonly performed for cure, is so likely to be recurrent, and it has caused such severe criticisms, indiscriminately applied to all operative measures for the cure of hernia.

In order to obviate these difficulties and reconstruct the inguinal canal after its normal oblique pattern, it became necessary to employ some method of closure which should permit the permanent retention of the suture material in the *posterior* wall of the reconstructed canal. To fulfill this demand, it occurred to me that the structures could be coaptated and permanently held in place by the use of buried catgut sutures, a deduction derived from the well-known but then recent experiments of Mr. Lister upon the ligation of arteries in continuity by catgut, and the permanent retention of the ligature.

Important and interesting experimental studies now destined to bear fruit, were carefully made and published by Dr. Jamieson, of Baltimore, in the early part of the present century. This valuable contribution should have given great honor to American surgery, but unfortunately it was prematurely advanced and forgotten.

In order to close the internal ring from below upward, quite upon the exit of the cord from the abdominal cavity, it is necessary to lift the cord, holding it toward the median line. If, as is too often the case, the abdominal wall has been thinned from the long wearing of a truss, the muscular aponeurosis of Poupart's ligament and the conjoined tendon should be incorporated with the transversalis fascia in order to reinforce the posterior wall of the internal inguinal canal. This having been effected, the cord is replaced and the tissues which enter into the formation of the external wall of the canal are sutured. It is important to remember that in doing this, the usually thinned abdominal wall on a level with the internal ring should be reinforced by a stitch or two, carried above the line of the incision through the muscular aponeurosis. Otherwise, a bulging of the weakened abdominal wall may occur, giving discomfort, though not causing a return of the hernia.

The soft parts above the muscular structures are closed with light running buried sutures, the skin is easily coaptated in the same way, and the wound is sealed with collodion *without drainage*. If the wound has been maintained and closed in an aseptic condition it will so remain and primary union will supervene, without suppuration. The patient is rarely a sufferer from pain, is of necessity confined absolutely to the bed only a day or two, any posture of the body being assumed which will give surgical rest to the parts involved. The danger attendant upon the operation for the cure of hernia is so slight that it is scarcely worthy of consideration. In my entire experience I do not recall a case where the life issues seemed to be involved. I have elsewhere<sup>1</sup> collated and reported over three thousand cases, in which the death rate was only the fraction of 1 per cent., and this attributed by the surgeon to some other cause than the operative measures.

Rather more care is requisite with children, but the little invalids are not sufferers and may be made happy with their toys and playthings. After six weeks, light occupation can be resumed and I can not help feeling that it is a serious mistake to apply a support of any character. I believe a truss to be positively injurious and abdominal supporters, rubber bandages, etc., are as a rule harmful. At the best they fail to support the part upon the integrity of which the permanency of the cure largely depends, to-wit: The reconstruction of the posterior wall of the inguinal canal, and undue pressure upon wounds of every description interferes with their circulation and nutrition.

The experience of the year only emphasizes the conclusions which I had the honor of presenting to this Section at its last meeting. From the very large number of hernial operations which I have performed during the last twenty years, I then tabulated 135 cases in which I had followed up the conditions to date. During the year I have re-operated upon two cases where I thought further surgical procedure advisable. In both, there was no return of the hernia, the cord lay obliquely in its reformed canal, surrounded by a dense loose-meshed connective-tissue stroma. In both cases, by ill-judged advice a strong truss had been adjusted soon after operation, and the thinned abdominal wall above the line of the internal inguinal ring was weak and bulging. In one case, over thirteen months after the primal operation, I dissected out well-defined sutures, and I take pleasure in presenting sections of the unmistakable, vitalized connective tissue of the tendon suture, incorporated with the surrounding parts.

I have been recently criticised by a writer upon hernia who evidently fails to appreciate the value and force of the anatomic considerations which, elsewhere as in this paper, I have emphasized as fundamental and primal. He writes:<sup>2</sup> "In the infantile type of inguinal hernia, as there is practically but one ring, and hence no canal, other tissues must be utilized as a tampon." . . . "When the radical operation is essayed in this considerable class, we are not concerned with the physiologic inguinal canal for there is none."

There is little doubt but that the common cause of hernia, although it may appear after adult life,

<sup>1</sup> The Anatomy and Surgical Treatment of Hernia, H. O. Marcy. D. Appleton & Co.  
<sup>2</sup> Manley, Hernia, p. 154.

originates in an improper development of the inguinal canal, pertaining of necessity to the infantile period. From my standpoint of observation, the "infantile type of inguinal hernia" is by no means an "undesirable class" for operation, since here we are primarily concerned in constructing a physiologic inguinal canal, and not in looking about for material which we may utilize as a tampon. Again my critic, when discussing the chronic or senile hernia, dismisses the possibility of the reconstruction of the obliquity of the inguinal canal as follows: "It is obvious that with these chronic or senile herniæ, pathologic changes have wrought such a radical alteration in the position, consistence, and the relation of the gross structures, and the minute histologic elements, that we need hold out no hope for a cure by radical operation; as the most which we may expect to accomplish is the comfortable reposition of the parts, in such a manner, that they may be painlessly and securely retained by a prothetic support after operation." Quite the contrary, these large old direct herniæ are the cases of the greatest interest and are as susceptible of cure as the smaller or less developed ones. They are the very class of herniæ which I select by preference, when operating in public, for the purpose of teaching the method above outlined. Interesting as is the subject, time forbids a review and analysis of a very considerable number of modifications in the surgical procedures which have within a very recent period been advocated.

There is a general consensus of opinion that the operative field should be sufficiently ample to permit a full inspection of the structures involved; that the hernial sac should be opened in order to ascertain its exact condition, contents and relationship. As a rule this should be sutured, or ligatured to its very base, and the redundant peritoneum resected and removed. A considerable number of very distinguished surgeons in Europe and America advocate the closure of the wound by buried animal sutures, varying, however, in their method of application, without a clear definition of their purpose or manner of reconstruction of the parts. Doubtless such excellent anatomists as Championniere, of Paris, and Park, of Buffalo, have restored the cord to its normal oblique position without making special emphasis upon the importance of this procedure. Certainly their results are in the highest degree satisfactory.

Bassini, of Padua, has somewhat recently published his method, which, in its essentials, incorporates the principles I have so long advocated as fundamental and basic. He emphasizes the necessity of producing a buttress or reinforcement of structures posterior to the cord. Moreover, he describes the closure of the tissues in a way which must certainly narrow the internal ring and increase the obliquity of the reconstructed canal, the importance of which I believe can not be over-estimated. More recently Potempshi, of Europe, Halstead and Fowler, of America, have gone one step farther by firmly closing the muscular aponeurosis of the abdominal wall beneath the cord, protecting it only by the fatty structures, superficial to the muscular layer. Time alone will determine if the nutrition and function of the testicle are impaired by this external implantation of the cord. Most surgeons agree that the wound must be made and maintained aseptic with the most scrupulous care, and closed without drainage.

#### RECAPITULATION.

The operation for the cure of hernia must be performed with the most careful aseptic detail. The wound must be sufficiently large for free inspection, the cord is lifted from its position, slight tension being made upon it upward and inward, in order to expose its entrance into the abdominal cavity. If the hernial tumor is large, the sac is opened and its contents replaced. The peritoneal sac is then dissected to its base, held tense, sutured at its neck, resected and excised. The posterior wall of the inguinal canal is intra-folded and reinforced by a line of double continuous tendon sutures, until the internal ring is reconstructed closely about the cord. The cord is replaced, the external structures are sutured in like manner, commencing at the upper portion of the incision, closing the structures closely upon the cord quite to the reconstruction of the external ring. The superficial tissues are brought into coaptation also, by buried tendon sutures, and the wound sealed with collodion *without drainage*.

The essential factors of this method are the obliteration of the peritoneal pouch, the reconstruction of the internal inguinal ring, the reinforcement of the posterior wall of the canal which restores its obliquity, and the closure of the wound with buried animal sutures, aseptically applied without drainage. Personalities count for little, but this method for the cure of hernia and the general introduction of the buried animal suture which made it possible, are the result of more than twenty years of original study and investigation, and I claim the privilege of presenting them as my contribution to American surgery.

#### OBSERVATIONS ON THE RADICAL CURE OF HERNIA.

Read in the Section on Surgery and Anatomy, at the Forty-fifth Annual Meeting of the American Medical Association, held at San Francisco, June 5-8, 1894.

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The individual opportunity of a surgeon practicing in the larger cities to recommend and perform operations for the radical cure of hernia, is certainly greater than that of a surgeon in general practice in the smaller cities and towns. It is consequently to the former class that we owe the evolution of the present operations, but as a whole by far the larger number of cases come under the observation of the latter class, and until recently and at the present time too frequently relegated by them to an indifferent palliative treatment, or worse, advised against operation and turned adrift, only to fall into the hands of some charlatan who "cures without detention from business."

As a representative of surgeons in general practice, I desire to speak in favor of reform. Instead of regarding only cases of strangulated hernia or those of exceedingly difficult retention as proper ones for operation, I unhesitatingly recommend it in all cases except retainable hernia in the aged, or inguinal hernia in young children where the prospect of truss cure is fair. This opinion is based on results of about forty operations without a death and with a few relapses. The experience is a moderate one, but if I had made use of the opportunities I have lost, between the failure of my first Wood's silver wire invagination operation fifteen years ago, and the final adoption of a