February 8, temperature 103 F.; slight swelling of the parotid; refuses food.

February 9, temperature 103.2 F.; decided enlargement of the parotid; chews with difficulty, but does not appear sick.

February 10, temperature 101.8 F.; parotid about as it was yesterday; less difficulty in chewing; appetite good.

February 11, temperature 101.2 F.; parotid smaller than yesterday.

February 12, temperature 100.8 F.; swelling of parotid gradually disappearing.

February 13, temperature 100.2 F.; swelling of parotid gradually disappearing.

February 14, temperature 100.2 F.; parotid appears of normal size.

Most of my experiments have been on dogs. These animals seem to react in a characteristic manner to the introduction of the coccus into the parotid gland, while subcutaneous and intraperitoneal inoculations produce no results. Direct inoculation into the parotid gland of dogs causes a swelling of the gland, lasting for 7 to 10 days. The injection of suspensions into Steno's duct produces in dogs a uniform swelling of the parotid gland which begins in from 48 to 72 hours, the gland continuing to enlarge for a few days, when it gradually returns to the normal size. In these animals the temperature during the period of the swelling of the gland ranges from 1 to 1.5 F. above normal; in no case did suppuration develop, and with the exception of difficulty in chewing for a day or two the animals appear to suffer no special inconvenience.

Injections into the duct of mixed cultures of the organism and staphylococcus causes edema of that side of the face and the parotid gland in 3 or 4 hours and abscesses form in 3 or 4 days. In two dogs that survived these injections after drainage of the abscesses the parotid gland was completely destroyed. One dog died on the fifth day of bacteremia, another developed lung abscesses and died on the twenty-third day.

The following record of a single experimental inoculation of the diplococcus into Steno's duct in the dog illustrates well the changes thus produced in this animal:

February 24.—Small, young, black and white dog. Temperature, 102.5 F. Inoculated into the left Steno's duct with the bacteria from two 48 hours saliva agar slants suspended in 3 c.c. broth.

February 25.—Temperature, 102.5 F. No visible enlargement.

February 26.—Temperature, 103 F. Parotid enlarged. Dog whines when firm pressure is made over the gland.

February 27.—Temperature, 103.5 F. Parotid evenly enlarged and hard. Dog does not act ill, is playful and hungry, but experiences difficulty in chewing.

February 28.—Temperature 102.8 F. Gland about as it was yesterday. Pure cultures of the organism injected developed from aspirated fluid.

March 2.—Temperature 102.5 F. Swelling gradually disappearing.

March 5.—Temperature 102.5 F. Almost no enlargement of the gland.

March 6.—Temperature 102.5 F. Gland appears normal.

Macroscopically, the enlarged parotid gland of inoculated dogs is of uniform firm consistence, the enlargement often reaching many times the size of the normal gland, and the cut surface is pinkish, exuding a slight amount of pinkish, rather turbid fluid. The neighbor-

ing lymph nodes are moderately swollen, but there are no gross changes in other parts of the body.

Microscopic examination of the parotid gland at the height of the enlargement shows a uniform infiltration of the tissue with plasma cells, small and large mononuclear cells, and polymorphonuclear leucocytes, the ducts being packed with cells. This infiltration begins in the interacinous tissue.

Examinations of the blood of the inoculated dogs shows a distinct leucocytosis, the increase being largely in the mononuclears.

Shortly after injection of the diplococcus into the parotid gland, the opsonic index of the serum of the injected animal begins to rise, reaching the highest point, about three, on about the fourth day, returning to normal gradually. So far as my observations go, a similar rise in the opsonic index with respect to the diplococcus occurs in human mumps, but many further observations are necessary before final statements may be permitted. Work along these and other lines, including the anatomic changes in the inoculated dog, is now in progress.

CONCLUSIONS.

From a case of mumps a diplococcus was isolated which corresponds in its essential characteristics to the organism obtained from mumps by Laveran and Catrin, McCray and Walch, and the other investigators cited. Inoculations of suspensions of the diplococcus into Steno's duct in the monkey and in the dog produce an acute, uniform enlargement of the parotid gland accompanied with some slight fever. In the dog this enlargement is the result of an infiltration that consists largely of mononuclear cells, and is accompanied with a general increase in the mononuclear cells in the blood as well as a distinct rise in the opsonic index with respect to the diplococcus. Further studies, especially of the changes and reactions in human mumps, are necessary before it can be said whether or not this diplococcus is the specific cause of mumps.

Clinical Notes

THREE CASES OF IMPERFORATE ANUS WITH RECTOVAGINAL FISTULA.

H. J. WHITACRE, B.S., M.D.

CINCINNATI.

It has been my good fortune to see during the past five years three very unusual congenital defects of the rectum the reports of which cases are appended. The defect in these cases consists in a partial failure of development in the fetal septum which divides the cloaca into a posterior rectal portion and an anterior genito-urinary portion. The defect is well illustrated in Figures 1 and 2.

CASE 1.—*History*.—C. K., aged 8 months, well-developed female child was sent to me by Dr. Allyn C. Poole of Cincinnati for the operative treatment of a defect of the rectum which had existed since birth. This little patient suffered great inconvenience from this defect. The bowels could be moved only with great difficulty and she often suffered much abdominal pain. Furthermore, there was a constant irritation about the genitalia because of the discharge of stool through the vagina. This irritation had been kept under fairly good control by the mother. The bowels had at all times moved voluntarily, however, and there had been no incontinence.

Examination.—The patient is well developed and well nour-

ished, having the usual amount of adipose tissue for a child of this age. The head, chest and abdomen present no evident abnormalities. On examination of the perineum there is no depression or other evidence of an anus. On separating the labia and opening the vagina an opening into the rectum is found just within the fourchette. This opening is about one-fourth inch in diameter, is pliable and can be dilated. The mucous membrane of the rectum unites and becomes continuous with that of the vagina, with no pouting of the rectal mucosa. While the opening does not seize the finger as does the normal anal sphincter, a sensation of a definite tone is communicated to the examining finger. A curved sound introduced into the rectal opening demonstrates a pouching of the rectum backward, so that there does not seem to be much tissue between the skin at the normal site of the anus and the interior of the bowel. The vagina and the urethra are normal in their anatomic structure and arrangement.

First Operation.—This was performed under ether anesthesia. In view of the fact that the rectum seemed so near to the skin at the usual site of the anus, it was deemed feasible to make an opening here and close the vaginal fistula by suture. Accordingly, a three-fourths inch incision was made through the skin into the rectum and the mucosa sutured to the skin by interrupted catgut sutures. A circular incision

Fig. 1.—Imperforate anus with rectovaginal fistula. Sagittal view of the condition.

was then made around the fistulous opening into the vagina, and the edges were turned into the rectum by interrupted suture tied in the rectum. After a few days, and in spite of irrigation of the rectum to prevent accumulation, the fistulous opening into the vagina reopened. The tube was now removed from the rectum. Within a surprisingly short time the incision in the perineum closed completely and all stool was again discharged through the vagina. Three weeks later a second operation based on a more rational and correct technic was performed.

Second Operation.—This also was done under ether anesthesia. An incision was made in the median line from the lower border of the fistulous opening almost to the coccyx. This incision extended down to the rectal wall throughout its extent. A circular incision was now made around the fistula and the rectum was dissected free from the vagina in front and from the tissues laterally until it presented the appearance shown in Figure 3. Previous experience had demonstrated the fact that the fistulous opening in the vagina was in reality the lower end of the rectal tube, and that there was a certain amount of sphincteric action present, so it seemed rational

to suppose that a functional result could be obtained by displacing this opening backward to the normal site of the anus. When the dissection had been carried backward sufficiently to allow this opening to be placed in the desired position at the posterior extremity of the median incision, the mucosa of the bowel was sutured to the skin by interrupted chromic gut sutures. The space between the vagina and this new location of the anus was now closed by suture in a manner entirely analogous to that used in perineorrhaphy and shown in Figures 4 and 5. Figure 4 is not entirely correct. It should show the sutures passing through the loose peri-rectal tissues in the bottom of the wound—just enough to prevent dead space. The closure of the wound in this way gives a perineal body of considerable size and solidity. The bowels were moved on the fourth day and all stitches held. The result was complete at the end of two weeks' time, the bowels were moving daily, without incontinence, and have continued to act in a perfectly normal manner for the past five years. The perineum of this child is somewhat more depressed than is normal, yet it has a normal appearance on inspection. The anal opening is of sufficient diameter, the vagina is normal in

Fig. 2.—Imperforate anus with rectovaginal fistula. The vulva is distended and the vaginal anus is seen just within the fourchette.

its appearance and capacity and the perineal body has remained fairly satisfactory in size. The child is now a fine looking girl 6 years of age.

CASE 2.—History.—A. K., aged 5, was admitted to Christ Hospital, Nov. 27, 1906, and discharged Dec. 18, 1906. This patient was referred to me in consultation and for operation by Dr. F. C. Theiss of Cincinnati. She was a healthy, well-developed child, who gave no history of serious illness.

Examination.—Nothing abnormal is to be seen except the congenital defect in the rectum and vagina. On inspection of the perineal region there is absolutely no marking at the usual site of the anus. The vulva is apparently normal in appearance on the outside. The vagina shows an opening on its posterior wall about one-fourth inch in diameter and one-fourth inch back of the fourchette. This opening seems to correspond to the termination of the rectum. There does not seem to be the same considerable pouching of the rectum posteriorly that was found in Case 1. This abnormal opening shows evidence of some sphincteric action, and there is no pouting of the mucous membrane in the rectum.

Operation.—On Nov. 28, 1906, under nitrous-oxid, ether anesthesia, an operation, precisely similar in every detail to that done in Case 1, was performed. The primary result was again very satisfactory, the patient endured the operation well and recovery was prompt. She suffered some difficulty in movement of the bowels for a period of three or four days, about ten days after operation, but this was temporary and did not recur.

Postoperative History.—During the past thirteen months the patient has been perfectly well, has suffered no incontinence, even when the bowels were loose, and has been attending school since Sept. 1, 1907. She was recently presented to the Cincinnati Obstetric Society, and it was agreed by the members present that the anus was in a satisfactory position, that the mucocutaneous junction was satisfactory, that the perineal body was of sufficient size and solidity, and that the vagina presented a fairly normal appearance. I believe that both patients will be able to satisfactorily perform the functions of wife and mother.

CASE 3.—History.—This patient a new-born baby, was seen eight months ago with Dr. Neufarth of Mt. Healthy, Ohio. The child presented precisely the same lesion that has been described in the other two cases. Inasmuch as the stool was discharged satisfactorily and the irritation was kept fairly under control, it was deemed wise to postpone operation until

Figure 3.

Figure 4.

Fig. 3.—An incision has been made in the median line extending down to the rectal wall; a circular incision has been made around the fistula and the rectum has been dissected free from the vagina in front and from the tissues laterally.

Fig. 4.—Showing the mucosa of the bowel sutured to the skin and the space between the vagina and the new location of the anus closed as in a perineorrhaphy.

the child was older. When the proper time has arrived I shall perform the operation that has been described.

RARITY OF THE CONDITION.

I am prompted to report these cases by the rarity of the condition and by the seemingly insufficient presentation of this subject by the text-books. That the condition is a rare one is shown by the fact that in 1894 not more than sixty cases were found on record by Buckmaster.¹ The rarity is further shown by the fact that in 16,000 cases of obstetrics occurring under Collins at the Rotunda Hospital one case of vaginal anus is noted. Bednar saw but one case in 7,154 girls in his foundling asylum, while Winckel does not recall a single case

among 12,000 children who were under his care while director of the Dresden Hospital (Buckmaster). Furthermore, my own experience corresponds with that of Buckmaster, who states that inquiry made among a large number of physicians having extensive practices reveals no cases of this sort. My experience of encountering three cases of this variety within a period of five years is unusual.

A noteworthy fact brought out by a study of collected case reports is that very few successful cases are reported later than a few weeks or months after the operation. A large number of the cases reported are of patients who were not operated on. The failures after operation are to be explained by the fact that all of the earlier operations consisted in simply making an incision down to the rectum at the normal site of the anus and suturing the mucosa to the skin. If the rectum could not be

Fig. 5.—Completed operation showing new anus.

brought down to the skin the wound was packed and this channel was kept open by persistent dilatation. The vaginal opening was either closed by suture or left to close spontaneously.

M. Vicq d'Azyr suggested the division of all tissue posterior to the vaginal opening as far as the normal site of the anus. This suggestion was put into practice by Rhea Barton of Philadelphia. Professor Dieffenbach (1826) made an important step in the evolution of the operation when he made a dissection of the rectum and drew it down to the skin and then repaired the perineum by a later operation. He did not dissect out the vaginal opening, however.

Rizzoli performed and described an operation in 1871 which is practically the same that the author has used. Buckmaster¹ has described an operation which is somewhat more complicated and is adapted to cases in which the opening is higher up and incontinence of feces is present. He provides sphincteric action by drawing the bowel through the separated fibers of the levator ani.

1. N. Y. Med Jour., Aug. 11, 1894.

Dr. Paul Puech (Paris, 1890) has collected all reported cases of this type of imperforate anus, has discussed the subject at length in a monograph and has given a complete bibliographic reference list.

SUMMARY OF THE TECHNIC.

The lesion has been so uniform in the three cases that have been reported that in each case a typical operation was applicable. I consider that the important points in the technic are:

1. An appreciation of the fact that in my cases the vaginal opening was apparently the termination of the bowel.
2. That this fistulous opening into the intestine was supplied with the usual or a sort of sphincteric muscle which was entirely efficient in the new location.
3. The vaginal opening should be carefully preserved by a circular incision made around it.
4. A dissection of the rectum should be made sufficient to permit the bowel opening to be displaced to about the normal position of the anus, and this dissection should be conducted in a manner which will not too seriously interfere with the nutrition of the rectum.
5. The perineum and vagina are to be closed in front by sutures in a manner exactly similar to that followed in an ordinary perineorrhaphy.
6. The bowels should be managed as in an ordinary case of perineorrhaphy.

22 West Seventh Street.

A DEVICE FOR FACILITATING TEST-MEAL REMOVAL AND GASTRIC LAVAGE.*

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Some years ago Professor Judson Daland adopted, for the purpose of facilitating gastric lavage and test-meal removal, two large open-mouth bottles of more than a liter capacity, a plain gastric tube and a double action Davidson bulb. With this arrangement, aided by an assistant, it was possible to obtain a sample of gastric contents in considerably less than a minute and to immediately follow this procedure with lavage and inflation if desired. This arrangement while marking a distinct advance over other methods in common use, has the decided drawback that its employment required the attendance of an assistant; the complicated nature of the apparatus requiring a second pair of hands to manage bottles and change tube connections during the passage of the tube.

To overcome this difficulty and to render this method more universal in its employment we have devised the reversing valve about to be described. This device is simple in its manipulation, easy to keep clean and in repair, and in practice does away entirely with the necessity for assistance.

Besides the reversing valve (F,F) the following components are required: 1, A plain gastric tube (C) without bulb or funnel; 2, a double-action Davidson hand bulb (E); 3, a large rubber stopper having two perfora-

tions; 4, two wide-mouth bottles (A and B) of more than a liter capacity each and graduated in fractions of a liter; 5, a short length of glass tubing (D) and some quarter-inch tubing. The stomach tube should be of relatively large diameter ($\frac{1}{2}$ to $\frac{5}{8}$ inch) and should be provided with both a terminal and lateral openings in the gastric end. Such a tube is easier of insertion, less annoying to the patient, and greatly increases the chances of obtaining a sufficient sample without difficulty.

TECHNIC.

Fill one graduated bottle (A) to the 500 c.c. mark with warm sterile water. Fit the double-perforated stopper with the reversing valve and with the glass tube. Place the stopper firmly in the empty bottle (B) and attach the gastric tube (C) to the glass tube (D) and the two ends of the double-action bulb (E) to the horizontal tubes of the reversing valve (F,F). Finally, ascertain the direction of the air current

Apparatus for facilitating test-meal removal and gastric lavage. A, bottle of at least 1 liter capacity graduated in c. c. to hold sterile water; B, bottle similar to A, to which aspirating apparatus is attached; C, plain gastric tube without bulb or funnel; D, glass tubing to which is attached the gastric tube and which goes well down into bottle B; E, Davidson hand bulb for producing either negative or positive pressure in bottle B; F, F, reversing valve by which the direction of the air current is changed so as to produce either negative or positive pressure within bottle B and therefore (when in use) within the stomach.

through the valve by making a few pressures on the bulb. Set the valve to make negative pressure within the bottle.

These preliminaries completed, the tube should be passed with the patient preferably in the sitting posture. As soon as the tube enters the cardiac extremity a few quick pressures are made on the bulb, this will develop a slight degree of negative pressure within the bottle

1. These special bottles are not necessary for practical results, as any large open-mouth bottle of sufficient capacity, such as a quart milk bottle, may be substituted. In this event a line around the bottle must be made at the measured 500 c. c. mark.

* Demonstrated before the Philadelphia County Medical Society, June 10, 1908. From the Laboratory of the Department of Clinical Medicine, Medico-Chirurgical College, Philadelphia.