Of the 38 cases dead, 27 were relieved of all symptoms, 3 abandoned treatment, 8 were unrelieved, 5 of whom were recurrences following operation, and 3 were so extensive that only one exposure was given owing to the risk of fistula formation.

Of those with complete relief of symptoms, 9 lived between one and one and three-quarter years; 8 between six and twelve months; and 10 between two and six months.

Symptoms.

Haemorrhage, which varied from slight irregular losses to severe flooding, ceased within a few days of the first exposure. In two cases the haemorrhage returned after several exposures and was so free that ligature of the internal iliacs was undertaken in order to control it. These two cases were probably examples of irradiation of a tumour which had become radio-resistant. I had also to ligature these vessels in a third case, but here the haemorrhage was a true secondary haemorrhage occurring in an extensive and virulently infected growth, and, following the exposure, a massive necrosis of tissues took place.

Bloody Discharge.—This undergoes rapid improvement, the blood ceasing within a few days, the discharge becoming thinner and losing its offensive character in three weeks, concurrently with the cleansing and healing of the ulcer. At the end of a month it is watery and small in quantity with a musty odour, and at the end of six weeks has ceased.

Pain.—In some form or other pain is usually present, but is either of the nature of a long-standing backache, which remains uninfluenced, or a dull ache in the pelvis due to infection and oedema of the cellular tissues. This type of pain is commonly relieved, and patients who have been taking phenacetin and bromides at night are able to do without after the first exposure. The late pains due to involvement of nerve roots or secondary deposits in the spine are not influenced in any way.

Local Ulcer.—The ulcer which at the first exposure admitted the tips of two fingers will, at the end of a month, barely admit one tube of radium in its metal and rubber screens, which is equivalent in thickness to the ordinary lead pencil, and at the end of six weeks the cervix, though red, is covered with epithelium and has a normal appearance. The general condition improves with the disappearance of the infected focus; the colour, appetite, and general well-being undergo a great change for the better.

A serious limitation to treatment by radium in early cases is that short of opening the abdomen it is not possible to say whether the glands are involved or not, and, if they are, the irradiation of the primary growth is merely palliative. The glands are found to be infected with growth in 30 per cent. of cases that come to operation, which should exclude the advocates of radium for early cases until they are able to show how they deal with these deposits effectively. Daels has introduced an ingenious operation for dealing with pelvic deposits by passing radium from the iliac fossa to the perineum on a chain. In this way he irradiates a variable area of the pelvic cavity. This operation does not meet the fundamental rule that the radium must be placed in contact with the growth, for its power diminishes in accordance with the law of inverse squares, and while the tube may be placed opposite the sacro-iliac synchondrosis the infected gland may be some distance away from it.

Opening the abdomen and implanting the radium in the growth is the only way of being certain that it is placed where it should be, and this, while very satisfactory up to a point, is limited by the fact that it may have to be repeated several times. The Erlangen method of deep x-ray therapy was originally proclaimed as a cure for cancer of the cervix, but its value was soon assessed, and it is now reserved for the palliation of symptoms in inoperable cases, prophylactic irradiation after operation, and the irradiation of pelvic tissues in conjunction with radium to the cervix.

CONCLUSIONS.

1. That for cases of carcinoma clinically limited to the cervix the only treatment is operative.
2. That for cases which have clinically invaded the pericervical tissues the treatment is by radium to the cervix and x rays to the pelvic tissues.
3. That salts of copper play an important though subsidiary part in treatment by radium.
4. That pre- and post-operative irradiation is of considerable value.

I am indebted to Professor Brasch for permission to use his diagrams and slides.

A CASE OF HERNIA INTO THE INFERIOR DUODENAL FOSSA.

BY

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WITH X-RAY PLATES AND REPORT

BY

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(With Special Plate.)

THERE seem to be certain minor differences in the classification of the fossae round about the duodenum. Walton refers to an inferior duodenal fossa, a superior duodenal fossa, and a paraduodenal fossa. This also appears to be Cunningham's classification. Moynihan, according to Makins, in *Burghard's System of Operative Surgery*, classifies them as right duodenal hernia and left duodenal hernia. His right duodenal hernia apparently corresponds to both the superior and inferior ones in the classification of the other writers, and his left duodenal hernia corresponds to the paraduodenal variety, although he calls it a hernia into the duodeno-jejunal fossa. Beesly and Johnston mention four fossae—namely, superior, inferior, paraduodenal, and retroduodenal.

E. H. B., born December 15th, 1914.

History.—The mother states that she had an easy labour, but was taken to the hospital immediately after the birth of the child because she had fits and because there was something wrong with her kidneys. The baby (the subject of the present paper) was left with a nurse. He vomited practically from birth and the vomiting was of a projectile character. He was fed on sherry, whey, and brandy and white of egg for the first month or so; then various patent foods were tried, but he vomited them all. When he was 5 months old the doctor advised nutrine. At first he vomited this, but after about five weeks he kept it down and did not vomit again, except when he was given anything else. Up to the age of 2 years he could keep nothing else down. He gained a little weight but lost it again. His weight went up and down, never very much up, and at 2 years of age—as far as his mother can recollect—he was 6 lb. under the weight for his age. At this age he would be lying in his mother's arms and suddenly he would go into a fit. The doctor had prescribed two powders a day for him, and the mother thinks that these powders kept his bowels moving, for when she stopped them he did not seem so well and was a little constipated. When he was 2 years old his sisters contracted measles, but he did not contract the disease. He vomited continuously, however, and was fed on brandy and egg-flip. Although he did not contract measles another doctor who saw him later said that he was getting over an attack of pneumonia. When the boy was in his third year he seemed to improve in health, and he had no other disease or illness beyond vomiting when he was given anything except bread-and-butter and a little jam, strained soup, and porridge. If the soup were not strained, he vomited it. Oranges, bananas, grapes, currants, and raisins, or cake containing currants and raisins, seemed specially to cause him to vomit. He always had a bad breath and his stomach made a rolling gurgling noise at night, more especially immediately before a vomiting bout. If he ate any of the above-mentioned things he rolled on the floor in pain until he vomited. He was active and played about like any ordinary child, and was an average child at school. His mother gave him Epsom salts every Sunday, and thought they kept him more or less in health. He was brought to me when 8½ years old (November 21st, 1923), some days after a birthday party at which he had had, amongst other things, fruit and ice-cream in large quantities.

Family History.—The families of the father and mother are healthy. This boy was the fifth of five children; the eldest was a full-time child, but died two hours after birth, cause unknown; the second is a girl 15 years old and healthy; the third is a girl 12 years old and healthy; the fourth was a girl who died at the age of 11 days, because she could not feed properly owing to some deformity.

He was a small, "pot-bellied" boy, who seemed wasted but whose abdominal muscles seemed to be over-developed. He did not complain of pain anywhere in the abdomen, nor was there any tenderness in the abdomen. The stomach was obviously enlarged on percussion, but no tumour could be felt over the pyloric region. There was a good deal of gurgling in what I took to be the caecum. He was admitted to the Memorial Hospital for Children, put on ordinary diet, and kept under observation from November 22nd to 30th, 1923, and during that time he did not vomit. He did not even vomit the aperient which was given him twenty-four hours before x-ray examination. On the majority of days definite full peristaltic waves were observed, commencing in the left hypochondrium and passing over the epigastric region into the right hypochondrium.

X-RAY REPORT.

Dr. Erasmus Ellis reported as follows:

A series of seven skiagrams was taken, the first eight hours, and the last seventy-four hours, after ingestion of the opaque meal. (See plate.)

The stomach is hugely dilated, extending practically across the whole abdominal cavity in its upper portion. The duodenum is also immensely dilated. Vigorous peristaltic movements are seen, but the stomach fails to empty for many hours.

Nine hours after ingestion about one-tenth of the opaque meal is seen in the colon; none in the small bowel. This suggests that some food escapes and then the stomach fails to empty further for a considerable time. Twenty-six hours after ingestion about one-third of the food has escaped from the stomach, and is seen partly in the small and partly in the large bowel. Thirty-three hours after ingestion (Fig. 1) about two-thirds of the opaque meal have escaped from the stomach, and four-fifths after fifty hours (Fig. 2), this latter being partly in the colon distal to the splenic flexure and partly in a viscus overlying the descending colon (probably, in the light of the subsequent operative findings, the herniated portion of the early jejunum). Seventy-four hours after ingestion a trace of the opaque meal is still in the stomach and a little in the colon, but most has been evacuated.

It was obvious that the boy could not go on as he was and that a laparotomy was strongly indicated. From the history, signs, and symptoms, and the appearance of the skiagrams, a tentative diagnosis of persistent congenital hypertrophic pyloric stenosis was made, and on November 30th I operated, assisted by Dr. D. J. Dauth (Honorary Surgical Registrar, Johannesburg Hospital); Dr. B.

Diagrammatic Representation of Hernia (adapted from Cunningham).

Weinbren (anaesthetist to the Johannesburg Hospital) gave the anaesthetic.

Operation.

A right pararectal incision was made extending from just below the costal margin to about an inch below the umbilicus, and on looking into the abdomen after the peritoneum had been opened the stomach and duodenum round about the pylorus seemed to be inflamed, but as things lay without being disturbed the stomach did not seem to be much enlarged. When, however, one put in one's hand to pull down the stomach one found that it was enormously dilated and that the greater part of it was pushed well up under the left costal margin. The duodenum when traced round was found to be dilated to about five times its normal size, this dilatation extending right up to the duodeno-jejunal flexure. Here one got lost and could not at first find the commencement of the jejunum. On handling the small intestine and its mesentery, however, one saw a tumour in the mesentery to the right of the vertebral column, which turned out to be bowel shining through the mesentery. It was decided to incise the peritoneum over this bowel. When this had been done there lay what subsequently turned out to be the first fifteen or eighteen inches of the jejunum. By tracing this bowel up to a point where one expects to find the duodeno-jejunal flexure, one came to a constricting ring composed of peritoneum. When this ring had been cut through, the loop of small intestine which had been imprisoned in the mesentery, and which was the first fifteen to eighteen inches of jejunum, was free, and the jejunum could be traced up to the duodeno-jejunal flexure in the one direction, and down on to the jejunum and so on in the other direction. This loop of small intestine was dilated slightly—not nearly as much as the duodenum, but from a point where the distal end of the loop emerged through the constricting ring the small intestine was collapsed, as also was the large intestine. The inferior mesenteric vein was seen in its normal situation and was not associated with the neck of the sac anywhere, but was well to the left of the constricting ring (see diagram). After the loop of bowel had been released from its "sac," the continuity of the peritoneum of the mesentery was restored by means of a purse-string suture. As the margin of the inferior duodenal fossa which formed the restricting ring had been cut through, there seemed no further danger of another hernia. The boy in addition to this condition had a general visceroptosis. His caecum

was completely surrounded by peritoneum and had a long mesentery, and the caecum could be placed anywhere in the abdomen. The pancreas was also completely surrounded by peritoneum and had a mesentery. It was not considered wise, however, to do anything further, as the boy's condition was not too good. The abdomen was closed in three layers and subcutaneous salines were continued for two days. Except for the vomit subsequent to anaesthesia, he has not vomited. Stitches were removed on the ninth day; the boy was allowed up on a couch on the tenth day. From the third day onwards he was given solid food, including fruit, baked apples, peaches, etc., and liquid paraffin three times a day. His bowels have moved well without the assistance of enemas, his "pot-belly" is gradually disappearing, and he says that he feels entirely different from what he felt before the operation.

He was x-rayed again on December 11th by Dr. Erasmus Ellis, who reported as follows:

"A series of x-ray plates taken with opaque food in the gastro-intestinal tract, eleven days after operation, shows practically a normally functioning alimentary canal." (Figs. 3 and 4.)

The child was kept in hospital over Christmas, and apart from restricting fluids no other restrictions were made in his diet. He ate what all the other children ate, in large quantities, yet did not vomit, nor did he even feel sick. He was discharged from hospital on January 1st, 1924, looking well, feeling well, and eating everything without any discomfort or subsequent vomiting.

In thinking over this case I have unconsciously borne in mind Walton and Cunningham's classification, and in my opinion the case was one of a hernia into the inferior duodenal fossa—that is, a right duodenal hernia according to Moynihan. I think so because the neck of the so-called "sac" looked upwards and to the left. In this Dr. D. J. Dauth agrees with me. In any case I do not see how the incarcerated bowel could have got into the position in the mesentery in which we found it if it had not got there through the inferior of the two right fossae. Makins states, in his discussion of the operation for the relief of strangulation of a right duodenal hernia, that the neck of the sac is situated to the right of the vertebral column at the left end of the sac, and that the superior mesenteric artery occupies a similar position in the anterior boundary of the neck of the sac that the inferior mesenteric artery occupies in a paraduodenal or left duodenal hernia, but goes on to say that the wandering of the neck of these herniae appears to be responsible for some of the rare varieties of retromesenteric herniae which have been observed. In this particular case I am quite certain that there was no vessel in the anterior boundary of the neck, for after I had made my incision over the "tumour" I slipped my finger into the constricting ring and cut through it there was no bleeding. Therefore there could not have been a vessel of any size in the neck. Possibly the superior mesenteric artery was behind the incarcerated bowel in this case; certainly it did not get in my way at all in relieving the strangulation. Dr. R. A. Ross (Honorary Surgeon to the Transvaal Memorial Hospital for Children), who was present at the operation, is doubtful about this from an anatomical point of view. At the time of the operation he suggested a search for the superior mesenteric artery, but I was naturally a little excited in dealing with such an unusual case and did not pay sufficient attention to his suggestion, and therefore I am unable to clear up this point. It is certain, however, that the incarcerated bowel was in the mesentery and that the opening of the sac was in the situation of the inferior duodenal fossa and that it looked upwards and to the left. It was, however, not to the right of the vertebral column. It was a little to the left, if anything. I am unfortunately unable to lay my hands upon Sir Berkeley Moynihan's writings on the subject of internal herniae, and therefore am handicapped in the discussion of this case. I learn, however, from Makins that Moynihan collected seventeen cases of right duodenal hernia as against fifty-seven of left. This case should, I think, be classified among the rarer right variety.

In conclusion I should like to express my thanks to Miss D. M. Gordon for the excellent diagram which she has made for me, and also to Drs. Dauth and Weinbren for their assistance.

Note.—Since writing these notes the December issue of *Surgery, Gynecology, and Obstetrics* has come to hand containing an article entitled "Duodenal hernia—a misnomer," by Dr. Edmund

Andrews of Chicago, which rather emphasizes the handicap of not having access to Sir Berkeley Moynihan's book on the subject of duodenal hernia. My case seems to support Dr. Andrews's theory that these cases are of congenital origin.

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THE TREATMENT OF HAEMORRHOIDS BY SUBMUCOUS INJECTIONS OF CHEMICALS.

BY

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WITH A DESCRIPTION OF THE PATHOLOGICAL CHANGE PRODUCED,

BY

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I.—By H. GRAEME ANDERSON.

THE method of treating piles by the injection of chemicals into their substance was first brought to my notice in 1907 by my teacher and friend Mr. Swinford Edwards.

Since that time I have treated by this method quite a large number of haemorrhoid cases, experimenting with various types of chemicals of varying strength, and endeavouring in many ways to improve the technique. During the same time I have collected and studied almost all the contributions published on the subject. Further, during 1923, to settle the question of the pathological changes involved, I injected a series of haemorrhoid cases and then excised the piles—with uninjected control piles from each case—at daily intervals. These specimens were submitted to Dr. Dukes for microscopical examination, and the results of his investigation are recorded below.

History of the Injection Method.

This method did not originate in America as is generally recorded, but was first carried out by Mr. Morgan in Dublin in 1869. He used a solution of iron persulphate, and so applied a method to haemorrhoids that had been used in the treatment of naevi since 1836.

William Colles, another Dublin surgeon, in 1874 injected a case of piles, using iron perchloride. He had seen Mr. Cussack treat piles by the introduction of a needle coated with silver nitrate into the centre of each. Colles thought that a better result could be obtained by hypodermic injection. In 1871 carbolic acid was first used as the injecting agent by Mitchell of Clinton, Illinois. At first his method was kept a secret, but knowledge of it soon spread. The secret was sold to various unqualified people who were known as travelling pile doctors. These itinerants began to sell the secret remedy to others, who traversed the country in all directions "till their handbills fluttered on the shores of the Pacific Ocean." Professor E. Andrews of Chicago in 1876 discovered the secret from one of the "quacks" and carried out an exhaustive investigation of the whole subject. He collected the results of 3,300 cases. Mitchell used one part of carbolic acid to two parts of olive oil. Most of the "irregulars" used strong solutions of carbolic, ranging from 27 to 95 per cent.

Once the secret was laid bare many qualified medical men—eminent and otherwise—gave the method a trial, and it took some twenty years before three definite schools of opinion on the subject were established. The first school, headed by such authorities as Allingham senior, Mathews, and the Andrews, considered the method unsafe and dangerous. The second school, the chief exponents of which were Agnew, Shuford, Adler, and the Martins, believed in injecting strong solutions of carbolic acid—that is, over 20 per cent. and ranging to 95 per cent. They aimed at

removing the piles by sloughing them off. The third school believed in using weak solutions of carbolic acid—that is, from 5 to 20 per cent., injecting small quantities, and aiming at producing mild irritative changes with ultimate fibrosis and shrinking of the tumours. This school had as its advocates Hoyt, Yount, Wright, and others. For the past thirty years the "strong" school has been dying out, and it has few advocates at the present day. On the other hand, the "weak" school with succeeding years has become more firmly established, and is the one most generally followed by those who use this method at the present time. Personally, I use very rarely any carbolic solution over 10 per cent.

Selection of Cases.

The injection method, in my opinion, is a very useful one indeed, and in quite a large proportion of cases excellent results can be obtained. External piles should on no account be injected. Internal piles, complicated by fissure, fistula, or large external skin tags, and those that are inflamed, ulcerated, or gangrenous should not be injected, but submitted to ligature or clamp and cautery operation. Similarly, where the piles are very large and numerous, of old standing, and with much fibrotic change, these cases are unsuitable for injection and speedier and better results are obtained by operation. Patients with haemorrhoids who have long anal canals, hypertrophy or spasm of the sphincters are not suitable for injection.

Uncomplicated internal piles are the only ones that should be treated by injection, and I agree with Albright, who says that "the idea of universal applicability should never have been advanced for this treatment." Pennington, in the latest edition of his book, states that "it is estimated by advocates of the injection method that not over 50 per cent. of cases in America are suitable."

Technique.

The rectum, of course, should be empty, and this is usually so in the majority of patients if the bowels have acted in the morning. If constipation is a symptom, then it is better to order a purgative to be taken two nights before the visit. Confection of senna or castor oil will be found the most suitable. Enemata are better avoided as they increase the congestion of the haemorrhoids. Glycerin suppositories act just as quickly and the local effects are less drastic.

The patient should be placed on his side lying partly over on the abdomen with the lower leg only slightly flexed and the upper leg fully flexed at hip and knee. I use a strong projection lamp, as good illumination is most essential. There is no objection to injecting the piles while they are prolapsed, but on the completion of the injection the piles must be instantly reduced and returned above the sphincters.

In the majority of cases a speculum has to be used. I use one of two types, either the ordinary 3 in. Kelly's protoscope with a smooth metal collar, or one which I have devised—a modification of the Hirschman speculum, a little longer and with a smooth metal collar (Fig. 1). A speculum with a slide is one to be avoided, especially if it has a closed end. The piles will be found to prolapse into the lumen of the speculum and by gently and slowly withdrawing the latter for about half an inch and then pushing it gently inwards again a good idea will be obtained of the size of the piles.

The pile to be injected is then gently caught at its upper end by a long pair of angled forceps which I have devised for the purpose (Fig. 2). The instrument is allowed to hang on to the pile, and by its own weight it steadies the latter by gentle traction and renders easy the insertion of the needle. I use a special syringe with a glass barrel of fine calibre which can only hold 10 minims of the solution. The syringe is metal bound, and has thumb and finger rings. The needle is two inches long, of not too fine a calibre, and has a bulbous shoulder half an inch from the tip. This syringe is a safe one for beginners to use, as even if the total contents are injected into one pile no harm can accrue; and again, the shoulder on the needle prevents the latter from being inserted more than half an inch into the substance of the pile (Fig. 3).

J. J. LEVIN AND L. E. ELLIS: HERNIA INTO THE INFERIOR DUODENAL FOSSA.

DESCRIPTION OF FIGURES BY L. ERASMUS ELLIS.

Figs. 1 and 2 were taken before operation; Figs. 3 and 4 after operation. All skiagrams are antero-posterior, with the patient lying on his back.

FIG. 1, taken thirty-three hours after ingestion of the opaque meal, shows about one-third of the meal still in the stomach, and this organ as being hugely dilated and extending across the whole upper abdomen. Its lower border is within one inch of a transverse line across the iliac crests.

FIG. 2, taken fifty hours after ingestion of the meal (before operation), shows the cardiac end of the stomach outlined by opaque food and the pyloric end visualized by its contained gas. Its huge dimensions are evident. On the left of the pyloric end of the stomach the greatly dilated descending portion of the duodenum is shown.

FIG. 3 (double meal), taken immediately after ingestion of the second meal, shows the stomach (after operation) of normal size, being about one-third of the size of the stomach before operation, as shown in Fig. 1. It does not extend beyond the middle line, the pylorus being over the vertebral column. The lower border of the stomach is three inches above the transverse iliac crest line. The gastric "tone" is good, the stomach being well contracted down upon its contents. The first meal, taken seven and a half hours before the x-ray examination, is shown to be in the colon.

FIG. 4 shows a normal condition seven hours after ingestion of an opaque meal. The stomach and practically the whole of the small bowel are empty, while the meal is in the colon.