which in this animal closely resemble those observed in man. The experiments were commenced in the spring of 1898, and the small-pox material has been obtained from cases coming under observation during outbreaks of this disease at Middlesbrough, London, and Glasgow. In each of the three separate series of experiments the human small-pox lymph or pulp was first inoculated directly on calves, and in every instance, so far as could be observed, with altogether negative results. But with monkeys success was as invariably obtained, and when, after one or more passages through this animal, the contents of the local inoculation vesicles were employed for insertion on the calf, an effect was now produced which, after one or more removes in that animal, was indistinguishable from typical vaccinia. Moreover, from the contents of vesicles raised in this manner on the calf, a considerable number of children have, in turn, been vaccinated, and afterwards kept under observation for about a couple of months. Every such vaccination "took" normally, and in no case was any bad result subsequently observed by myself or the parents of the children, no "generalisation" of the eruption occurring in any instance. I obtained a series of photographs of monkeys, calves, and children, which I hope, together with full details of the experiments, to have the opportunity of publishing shortly.

The point of interest in these experiments is found in the fact that whereas the human small-pox material employed could not be got to "take" directly on the calf, nevertheless results typical of ordinary vaccinia were obtained when the strain of lymph, after inoculation with it of a series of monkeys, was again transferred from the inoculation vesicles on this animal to the epidermis of the calf.

NOTE ON A CASE OF ENORMOUS DILATATION OF THE FIRST PART OF THE DUODENUM,

CAUSING GREAT DILATATION AND PROPTOSIS OF THE STOMACH:
GASTRO-JEJUNOSTOMY: NECROPSY.

By GILBERT BARLING, M.B., F.R.C.S.,

Surgeon to the General Hospital, Professor of Surgery in the University of Birmingham.

P. W., male, aged 31, was admitted to the General Hospital, March 15th, 1900, complaining of pain and sickness after taking food of about four years' duration, though he had suffered from indigestion since boyhood.

I first saw the patient in consultation with his medical adviser about three and a-half years before his admission to hospital, when his symptoms were the same as those mentioned above, and looking to the dilatation of the stomach with much loss of weight, I then advised an exploratory operation with gastro-jejunostomy if it seemed advisable. The patient was admitted to a hospital soon after this, and the abdomen was opened through the right rectus near the semilunar line, but the operation was merely exploratory, and nothing further was done, and I am unable to obtain any report of the condition found at that time. No benefit followed exploration—indeed, the patient thought he was distinctly worse, and took morphine to relieve his pain, subsequently developing the morphine habit badly.

During the time intervening between this operation and his admission to hospital the patient was extremely careful in his diet, but with all his care he suffered much pain with frequent vomiting, and often brought back food he had taken twenty-four or thirty-six hours previously, whilst eructations of offensive gases caused the patient a good deal of annoyance, and on two occasions these eructations ignited when he was lighting a cigarette. The bowels during this time were very constipated.

Condition on Admission.—The patient was painfully thin; he suffered from epigastric pain every few hours, followed by vomiting, which relieved him, and he was constantly craving for morphine; there was a scar near the right semilunar line, the result of the previous operation, and tenderness existed in this region. It appeared as though an ill-defined thickening could be palpated here, marked by the shading in the diagram, but the muscular rigidity was too great to allow of any positive expression of opinion on this point. When the stomach was distended by an effervescent powder it appeared to be dilated and displaced downwards, its lower margin being nearer the pubes than the umbilicus, as shown in the diagram. The dilatation and displacement of the stomach, and the vomiting of large quantities of material retained in the stomach for twenty-four hours or more pointed to a mechanical obstacle to the

emptying of the stomach; the long history pointed decidedly to this obstacle being of an innocent nature, and the starved condition of the patient clearly showed that if operation were to be attempted it must be without delay.

Operation.—On March 19th the abdomen was opened in the middle line above the umbilicus, and the stomach examined. Marked dilatation was verified, but there was no definite obstacle such as growth or cicatrix at the pylorus to explain the dilatation, nor was there any hour-glass constriction of the body of the organ. Dense adhesions were found, however, uniting the pylorus and the parts beyond to the anterior parietal peritoneum to the liver, etc., and the patient's feeble condition forbade any attempt at unravelling these because of the time it would have occupied. Gastro-jejunostomy was then performed, the jejunum, about 14 inches from its commencement, being united to the anterior wall of the stomach in front of the colon by Halsted's method, reinforced by a continuous suture through all the coats at the edge of the anastomotic opening, partly to stop bleeding, partly for extra security.

Diagram outline of stomach when artificially distended. The shading marks thickening felt on palpation and lay over dense adhesions.

After-History.—The operation was fairly well borne, and progress for the first four days was satisfactory, though vomiting occurred from time to time. On the fifth day the patient became suddenly worse, with diffuse pain in the abdomen, which became generally tender, whilst vomiting was persistent, and it was evident that widespread peritonitis existed. Death occurred on the evening of the fifth day.

Necropsy.

There was early suppurative peritonitis, with a thin, brown, slightly bile-stained fluid in the belly, which was escaping from a tear in the extremely dilated duodenum, the walls of which were in places as thin as tissue paper. The anastomosis was firmly united, and without any suspicion of leaking, and on opening the stomach two fingers could be introduced through the new orifice into the jejunum.

The parts concerned skin, liver, spleen, stomach, etc., were removed *en masse*, and showed the following conditions: Somewhat to the right of the present incision was a linear cicatrix in the skin several inches in length, beneath which were dense adhesions, uniting the anterior aspect of the pylorus to the under surface of the liver and the anterior abdominal walls, whilst other adhesions tied the anterior surface of the liver to the abdominal wall.

The walls of the stomach were thin, the muscles considerably atrophied with a certain amount of fibrous degeneration, whilst the mucous membrane was smooth and its rugæ well marked and apparently healthy. On pushing the finger through the pylorus it presented itself into the base of a large cavity which represented the hugely dilated first part of the duodenum, in size equal to about half-a-pint cavity. This was bounded above by the under surface of the liver, below by the hepatic flexure of the colon, in front by the anterior abdominal wall; it was limited to the left by the dense adhesions beneath the linear scar already alluded to, and to the right by the adhesions between the hepatic flexure and the anterior abdominal wall. In the posterior wall of this cavity remains of a first part of the duodenum could be traced, and this cavity communicated with the stomach on the one hand by the pyloric opening, and with the second part of the duodenum on the other by a second opening, the two orifices being distant from each other only by $\frac{1}{2}$ inch.

The lining membrane of this cavity in the neighbourhood of the pylorus was smooth, and consisted of mucous membrane, and muscular tissue could also be distinguished here. The anterior, inferior and right lateral aspects of the sac were rough and ragged, the mucous and muscular coats

having entirely disappeared, so that the wall of the cavity consisted entirely of fibrous tissue, which in certain areas was thin and almost transparent; it looked as though the first part of the duodenum had been gradually dilated to such an extent that its walls, thinning and fraying out, had by degrees given way until in some parts only peritoneum remained. The opening from this cavity into the second part of the duodenum was situated on the posterior wall of the cavity, and admitted two fingers, and the orifice was guarded by three large flap-like projections about an inch in length and a quarter of an inch in thickness. These were soft and elastic to touch, more or less united by their bases, and covered by healthy mucous membrane. The valve-like arrangement was distant from the pyloric orifice of the stomach about an inch and a-half, and it was the intermediate part of the duodenum that had given way. Although the opening into the second part of the duodenum was sufficient to admit two fingers, the progress of food from the dilated cavity into the second part must have been greatly obstructed by these flap-like projections acting as a valve. The remaining part of the duodenum was healthy.

It is evident that the patient died from rupture of the dilated duodenum, induced no doubt by the over-distension of the thin-walled cavity by the extra obstacle to its emptying which the anastomosis between the duodenum and stomach set up. I do not think the method of anastomosis is to blame for the accident, but believe that however the union had been carried out the result would have been the same. It is of course unfortunate that the anastomosis was not performed at the time of the exploratory operation, and there is every reason to believe that this operation did really exaggerate the patient's sufferings by setting up adhesions between the scar and the pyloric end of the stomach, which still further embarrassed the already dilated organ. The initial cause which produced the duodenal dilatation is not clear. It is, however, most probable that a congenital defect in the shape of valve-like projections of the mucous membrane was the starting-point of the mischief. Other possible causes are duodenal ulcer, or an acute duodenitis, but there is no evidence in favour of either of these.

A CASE OF GASTRO-JEJUNOSTOMY FOR COMPLETE RUPTURE OF THE INTESTINE AT THE DUODENO-JEJUNAL FLEXURE.

By B. G. A. MOYNIHAN, M.S.LOND., F.R.C.S.ENG.,
Assistant Surgeon, Leeds General Infirmary; Consulting Surgeon,
Skipton and District Hospital.

THE case now recorded is of value in that it shows that the functions of the stomach can be carried on without disturbance when bile and pancreatic juice pass freely into the organ.

E. H. L., a boy aged 6, was admitted to the Leeds General Infirmary on September 6th, 1899, under the care of Mr. W. H. Brown, for whom I acted. The patient had sustained an abdominal injury which caused collapse and gave rise to the signs of increasing fluid in the peritoneal cavity. Without entering into details, it may be said that the case clearly demanded surgical intervention. The following operation was performed.

Operation.—An incision 5 ins. in length was made to the right of the middle line, extending from about 1 in. below the ensiform cartilage downwards. On opening the abdomen there was an escape of blood, and blood was seen lying everywhere among the intestinal coils. A rapid search soon revealed the fact that there was a complete rupture of the intestine at the duodeno-jejunal flexure. The jejunum appeared to have been torn out from the duodenum in such manner that the divided end of the duodenum was beneath the peritoneal level, and was ragged and irregular. The jejunum in its upper 4½ ins. was torn away from its mesentery; this portion was removed. An end-to-end approximation was clearly impossible, as the cut duodenum was inaccessible. The duodenum was therefore closed as securely as possible with a continuous catgut stitch, and the peritoneum around it sutured over this stitch. In order to ensure a complete closure, the upper part of the mesentery which had been torn away from the jejunum was stitched as a sort of lid over the obliterated end of the duodenum. The jejunum was implanted in the anterior wall of the stomach with the aid of a Murphy button. After doing this it was my intention to make an anastomosis between the lower portion of the duodenal loop and the jejunum so as efficiently to drain the former, but the child seemed on the verge of death, and I had to complete the operation as speedily as possible. Stimulants, in the form of saline infusion, strychnine, and a hot-water enema were given during the operation, and one minim of strychnine was given every hour for the first twelve hours. The patient gradually rallied and made a good recovery.

After-History.—After the first ten days we had a skiagraph taken, and three were subsequently taken. On each occasion the button showed in a different position, and we were inclined to accept this as an indication that it was passing along the intestinal canal. The patient gained weight, ate ordinary diet, and was quite well, and his condition was in every respect satisfactory. One untoward incident alone was observed, and that was a copious attack of vomiting, which we ascribed to a pork pie injudiciously given by a friend on the visiting day. The question of a second operation, the performance of an anastomosis between the duodenal loop and the jejunum, was frequently discussed, but the condition

of the child was so satisfactory that we were unwilling to interfere. The stools were examined and pronounced in appearance and constitution normal.

Perforation.—On the 10th day after operation the patient was suddenly seized with acute and overwhelming abdominal pain, and I was urgently summoned. I found him pale, pulseless, and utterly collapsed. He died an hour subsequently.

Post-mortem Examination.—A perforation of the duodenum at the lowest point of the loop was found, the perforation being due to the Murphy button, which lay in the ulcer its pressure had produced.

a, Mesenteric flap covering sutured end of duodenum; b, point of perforation of Murphy's button.

This case is especially interesting in that it shows that the passage of all the bile and all the pancreatic juice secreted into the stomach does not interfere in any degree with the functions of that viscus. Riegel, Malbranc, and Weil have related cases where a reflux of bile into the stomach resulted in grave symptoms. Billroth remarked upon the serious import of bile regurgitation after gastro-enterostomy. Claude Bernard and others, founding their opinion upon laboratory work, considered that bile inhibited gastric digestion. Dastre, in dogs with gastric fistulae, introduced bile at all stages of digestion, and concluded that the alkalising effect of the bile was swiftly negated by a copious outflow of gastric juice. No ill-effects were noticed either in the digestive powers or in the general health. Oddi, experimenting upon dogs, obliterated the common bile duct and united the gall bladder to the stomach; all the bile consequently flowed at once into the stomach with the result that the animals gained in weight and suffered not at all. Max Wickhoff, Angelberger, and Terrier have performed cholecyst-gastrostomy for obstruction in the common bile duct.

These observations all show that the mere presence of aseptic bile alone is insufficient to induce vomiting. Chlumschij has suggested that the "regurgitant vomiting" after gastro-enterostomy is due to the presence of pancreatic juice in the stomach. This theory is negated by the case now related, and also by Steudel's experiments. Steudel performed upon dogs the same operation as was done by me. He divided the intestine completely across at the duodeno-jejunal junction, closed the duodenal end, and implanted the jejunal into the anterior wall of the stomach. The dogs lived and thrived for a time, but died from perforation of the duodenal loop by fragments of bone which had been eaten, and had passed from the stomach through the pylorus. The conditions and the results of Steudel's experiments and my case tally precisely. Had I known of the experiments when watching the case, my desire for a second operation would have been strengthened.

DR. ELLA E. SUMMERS, a young lady of 26, and a graduate of Omaha Medical College, was recently appointed coroner of Franklin County, Nebraska.