He also wished to avoid any sudden straining or movement of the infant causing him to puncture the bowel. Still keeping up gentle traction, the tissues surrounding the bowel were carefully dissected away until about an inch of it had been isolated. The bowel could now be pulled down to the edges of the wound. This was done and a suture inserted on each side, fixing it in position. An incision was now made in the bowel corresponding in extent to its antero-posterior diameter. A considerable volume of flatus escaped, followed by meconium. This completely relaxed the bowel, preventing the sutures from exercising tension. The edges of the bowel incision were scraped firmly with the edge of a scalpel in order to enhance the security of subsequent adhesions. Four fine sutures were inserted, fixing the bowel to the edges of the wound; these sutures included the skin, superficial and deep fasciae. The operation wound was sutured anteriorly and posteriorly with deep sutures. Five inches of No. 22 drainage tubing was then inserted for 2 in. into the rectum. The protruding 3 in. was split, everted, and kept in that position by overlapping the two halves with dressings. The operation occupied 1 hour 5 min., during 50 min. of which the child was well "under."

Its immediate recovery was good. It was not sick on the table. An hour afterwards it vomited about 2 oz. dark yellow fluid. Subsequently it was fed from the bottle, taking its nourishment greedily. For a few days the contents of the bowel flowed out unrestrained. In six days cicatrization had advanced far enough to allow of some degree of control of the artificial anus, its circumference being considerably less than that of the bowel immediately above. The edges had gained firm adhesions to the lips of the wound and the underlying tissues. The tube was taken out morning and evening for 8 days; at the same time the bowel was irrigated gently. On removing the tube on the morning of the eighth day the anus could be seen firmly contracting. The tip of the little finger was prevented entrance by the very effective sphincter action which was present. The perineal, levatores ani, and circular muscle fibres of the bowel had apparently compensated for the absent sphincters. From this time until the infant died, which was thirty-seven days after the operation, the bowels were evacuated twice a day. On this point the following occurs in Holmes's *System of Surgery*, vol. iii, 1906:

Even where the gut has not been drawn down to the skin the power of controlling the faeces may be hoped for. A sphincter muscle has been proved to exist in a case of this kind, but if the gut have been attached to skin its circular fibres will assume the office of a sphincter even when no external sphincter exists.

Three weeks after the operation the infant became jaundiced; this passed off to a great extent in a few days, but the sclerotics remained tinted until death. As an autopsy was not permitted, to certify the exact cause of death was difficult. The infant lived over five weeks, during which time no complication as the result of operation presented itself. Its systems were normal. The anaesthesia for operation was deep and protracted for a child of tender age, 4.4 drachms being the amount of chloroform necessary to maintain the depth of anaesthesia required. From this point of view, delayed or chronic chloroform poisoning may have been a factor in bringing about the death. Drs. McDonald and Stiles (*S. M. and S. J.*, August, 1904) have shown the toxic effect of repeated or protracted chloroform inhalation. The infant in consideration apparently lived too long to have died from this cause, but the injury to the vital tissues of the body at time of inhalation may have paved the way for organic disease.

I have to thank Dr. Johns, Honorary Surgeon to the Horton Infirmary, for permission to publish the report of this case.

BIBLIOGRAPHY.

Esmarch, *Die Krankheiten des Mastdarmes und des Afters*. Le Dentu, *Traité de Chirurgie*, vol. viii. Holmes, *System of Surgery*, Edition 3, vol. iii. Holmes, *Diseases of the Rectum*, 1876. *Treatise on the Pathology and Treatment of Congenital Malformations of the Rectum and Anus*, by Bodenbauer, of New York, 1860. Cripps's *Diseases of the Rectum and Anus*, and a similar work by Goodsall and Miles.

THE Sanitary Inspectors' Association, which was in conference at Liverpool last week, adopted unanimously a resolution declaring that meat inspection in this country could never be carried out efficiently until all private slaughterhouses had been abolished.

PERFORATED GASTRIC ULCER: OPERATION 44 HOURS AFTER PERFORATION: RECOVERY.

By ARTHUR C. ROPER, F.R.C.S.ED.,
SURGEON TO THE ROYAL DEVON AND EXETER HOSPITAL.

For the notes of the following case I am entirely indebted to our House-Surgeon, Mr. Harmer, to whose constant and assiduous care, together with the excellent nursing she received, the patient chiefly owes her recovery.

History.

Alice B., aged 21, a kitchen maid, married, had suffered from pain in the stomach after food for many months, and during that time had lived almost entirely on a liquid diet. There was no history of haematemesis.

On November 6th, 1907, she took a light supper at 8.30 p.m., consisting of chicken, bread, etc., and soon after went to bed, and to sleep. She awoke at about 10 p.m. with violent pain in the abdomen, not localized, but most acute round the umbilicus, shooting through to the back. Brandy was given and caused immediate vomiting. Pain continued throughout the night, and she vomited again after more brandy during the night. At about 7 a.m. she was seen by a medical man, who found her suffering from violent abdominal pain, quite unable to give any account of herself, and in such a state of collapse that he did not venture to remove her to hospital at that time. He diagnosed perforated appendix, ordered a sedative mixture of bismuth, etc., and a milk diet. Towards the afternoon the pain abated, and she had a fairly comfortable night with no further sickness. On the afternoon of November 8th her doctor sent her to the hospital.

Condition on Admission.

The face was pale and pinched, but the lips were of a good red colour. The eyes had the typical restless appearance of general peritonitis. She appeared to be suffering no pain, and only complained of great thirst. She was apathetic and did not realize that she was seriously ill. The tongue was covered with thick creamy fur. The pulse was 130, regular, dicrotic, temperature 101.8°.

There was general distension of the abdomen, which did not move in respiration; there was resistance to palpation all over, and the recti were firmly contracted but not board-like. Tenderness was present all over the abdomen, but was most marked in the epigastric and right iliac regions, but even here only subacute. There were patches of dullness in places, chiefly between the umbilicus and the epigastric notch. There was no dullness in the flanks, and the liver dullness was normal. Mr. Roper saw the case 43 hours after the onset of the attack, diagnosed perforation of the stomach, and decided to operate.

Operation.

At 6 p.m. an incision was made slightly to the left of the middle line. The peritoneum was like raw ham, $\frac{1}{2}$ inch thick and fleshy. On opening it about a pint of curdled milk was scooped away; it was contained in a cavity surrounded by dense adhesions below and at the sides, but running up to the left under the liver and towards oesophageal end of stomach. Milky contents of the stomach were wiped away until it was possible, by lifting the left lower ribs, to see the perforation high up on the lesser curvature and near the cardiac end of the stomach. The opening was circular and about $\frac{1}{2}$ in. in diameter; the stomach was oedematous and tense from surrounding adhesions. An attempt was made to close the aperture with silk sutures, but the site being almost inaccessible, great difficulty was experienced in inserting the sutures, and, when tied, they cut through the friable stomach wall, so that the aperture was not in any way closed.

A second incision was made in the right iliac region, and the adhesions which shut off the flanks were broken down by hand. The pelvis was found to be full of milky fluid. All the bowels exposed were coated with yellow "wash leather" lymph adherent to each other. The adhesions over the front of the bladder were also broken down, so that it was possible to pass a rubber tube across and flush out the left iliac fossa. The abdomen was then flushed with hot normal saline from each kidney pouch until it ran clear from the lower opening. A rubber tube was put through the lower opening into Douglas's pouch, and a wick drain down to the perforation in the stomach and the upper part of the incision closed by suture. The operation lasted 55 minutes and the patient suffered comparatively little shock. The pulse at the end was 140, regular, less forcible and more dicrotic.

After-History.

A suppository of opium gr. j was introduced and a hypodermic injection of strychnine gr. $\frac{1}{2}$ and digitalin gr. $\frac{1}{15}$ given every four hours, a nutrient suppository every six hours, and an enema of normal saline $\frac{3}{4}$ x every six hours.

At 10 p.m. it was noted that she had twice vomited small quantities of green clear fluid, the apathetic condition continued, she had no pain, no discomfort, and only complained of intense thirst. The pulse was 136, and the temperature 99°. She began to have abdominal pain in the early morning, but when examined the pulse was found to be much better, 110, full, regular and forcible, and her expression was more normal and

almost cheerful. Respirations 30. The dressing was soaked with black "coffee grounds" material mixed with gastric secretion and mucus. Both tubes were flushed out with saline. The abdomen was exquisitely tender all over; a stitch removed near upper tube to facilitate drainage. There was slight hiccough, the thirst was intense, and the tongue dry.

On November 10th the wound was dressed twice, there being some mucous discharge from the fistula. She had slept well, thirst was less, and the tongue more moist; slight bronchitis and congestion were present at the right base. Temperature, morning, 97.8°, evening, 99.2°; pulse 100; respirations 24. The tube was removed from the pelvis on the following day, and from the upper wound on November 12th there was considerable discharge of saliva, mucus, and gastric juice. The bronchitis was better; several liquid faecal motions had been passed during the previous afternoon and night. Thirst less, tongue moist, and there had been no return of abdominal pain since an opium suppository on November 11th; methylene blue solution $\frac{3}{4}$ j, was given by the mouth, and dressing was stained when changed in the evening.

On November 13th she was improving; much less thirst, but had parotitis on the left side. Pulse 110, temperature 98° at 6 a.m., 100.4° at 10 a.m. She had several loose faecal motions, and during night and on November 14th the parotid was more swollen and acutely tender.

On November 15th the fistula, which was still discharging, was plugged and mouth feeding commenced. There was very little discharge on removing the plug in the evening. Digitalin was stopped; strychnine reduced to $\frac{1}{8}$ gr., six-hourly. The rectal saline injections were stopped; she had had six fluid motions in 24 hours.

On November 16th the right parotid was swollen and tender. Fistula dressed. One ounce clear mucus and curd escaped when the plug was removed. She had had five small fluid motions in the past twenty-four hours.

On November 18th a left parotid abscess was incised, and on the following evening a right parotid abscess, and a quantity of thick pus evacuated. The fistula still discharged when the plug was removed. The general condition was improved. Urine showed traces of albumen.

On November 23rd the purulent discharge from both parotids was profuse. The abdominal wounds were healing and looking cleaner. The fistula still discharged when the plug was removed.

November 28th. The temperature rose yesterday to 103°, and she had pain over the back and postural oedema of the back and lower part of the right side of the chest. About midnight she began to expectorate purulent, fetid, watery material constantly without any effort, to the amount altogether of about $\frac{1}{2}$ pint. When the chest was examined on November 29th it was found dull over the right side posteriorly and breath sounds were absent. Pus having been found on exploration with a syringe, the chest was opened, 2 in. of rib excised in the posterior axillary line, and about 2 pints of foul pus evacuated. A tube left in. She experienced very little shock from the operation, and had a very comfortable night; the quantity of expectoration was small, but the discharge from the chest wound was copious. Temperature 98°; pulse 120, strong and regular.

On December 10th it was noted that she had had some oedema of the left foot and leg for three weeks; it began in the foot and spread up to the thigh. During the past week this had become worse and had extended to the lower part of the back and the left labium majus, causing some difficulty in micturition. The general condition was better to-day; she slept better and the cough, which had been severe, was less troublesome.

On December 11th, after methylene blue solution $\frac{3}{4}$ j, given by mouth, there was no stain on either dressing, but the urine blue. On December 23rd it was noted that no food had come through the gastric fistula for a week, and on January 8th, 1908, the oedema of left thigh had entirely gone. When the chest was examined on January 19th some crepitation was still present over the base of the right lung, with impaired resonance, and there was still slight discharge from the empyema wound. The gastric fistula was practically healed. She was getting up in the afternoon, but complained of pain in the epigastrium on slight exertion; it had apparently no relation to food.

On January 23rd she was sent to a convalescent home at Torquay.

REMARKS.

When I first saw this case I regarded it as quite hopeless and was disinclined to operate. She was well advanced in the final stage of perforative peritonitis, that of septic intoxication. Free from pain and almost void of tenderness on pressure of her meteorized abdomen, apathetic and complaining only of thirst, and with a pulse of 140, it did not seem possible that even a successful operation could lead to recovery, while there was every probability that an operation upon an abdomen so far advanced in a septic adhesive peritonitis would cause her much pain and hasten her death by shock. Supported, however, by the opinions of my colleagues, Dr. Davy and Mr. Harmer, and requested by the patient, I decided to give her what chance there was. Published statistics show that it is of little or no use to operate when 36 hours have elapsed after perforation of the stomach or duodenum, if the perforation is an acute one, and one naturally seeks for the explanation of her recovery after a period of such

unusual length. That she was profoundly toxic is shown by the complications which she suffered; while, although I have not seen her since she went to Torquay, I cannot doubt that her abdominal pains are due to adhesions, which were universal at the operation and which are exceedingly likely to call for surgical treatment in the future.

I am inclined to think that she owes her recovery to the dilution of the toxins by, and the envelopment of the pathogenic bacteria in, the large quantity of milk which was free in the peritoneal cavity. I am not a bacteriologist, and do not even know whether milk is a good culture medium for the various bacteria which one finds in the stomach, but I can quite imagine that bacteria, or rather their toxins, enveloped in what we in Devon call "junket," would be not readily absorbed by the peritoneum, and that the delayed absorption of toxins thus caused just saved this patient's life. I cut down upon a typical "junket" in the epigastrium, and found another, in a more advanced stage, in the pelvis; and, from the absence of any further post-operative discharge of a similar nature, suppose that my copious irrigation of the kidney pouches and pelvis fortunately removed most, if not all, of this material which was fouling the lower abdomen. Lest I should be misconstrued to advise feeding a perforated stomach, I must state my conviction that the case most likely to do well is one which perforates while the stomach is empty; and further, that, had this patient drunk water or beef tea instead of milk, she would, owing to the greater diffusibility and absorbability of those fluids, have been moribund or dead from septic absorption before 44 hours had elapsed. There was no difficulty in tracing the perforation in this case, inaccessible as it was; because, owing to the presence of the mass of curdled milk which prevented the formation of adhesions, elsewhere universal, a track to the ulcer was retained.

THE SCIENCE COMMITTEE OF THE British Medical Association.

REPORT CVIII.

SOME POINTS ON THE EXPERIMENTAL PRODUCTION AND CONTROL OF THE VASCULAR ATONY OF SURGICAL SHOCK.*

BY

P. LOCKHART MUMMERY, M.R.C.S.,

AND

W. LEGGE SYMES, M.R.C.S.

(From the Physiological Laboratory of the University of London.)

INTRODUCTION.

THE term "shock" is unfortunately employed to cover conditions due to many causes. For the purposes of this work it is applied to a state characterized, *inter alia*, by low vascular tone, evidenced by sustained fall of blood pressure, and produced by prolonged excitation of various peripheral nerve areas by manipulation or electrical stimulation.

This definition was, in substance, adopted by one of us (P. L. M.) in the Hunterian Lectures¹ at the Royal College of Surgeons in 1905.

The main object of the work was to test the action of some of the drugs which raise blood pressure, with the view of gauging their value for the treatment of shock, and of determining the best mode of administering them. This led secondarily to observations on the comparative effects of certain manipulations in producing shock and on the blood in that condition. The present paper deals with these originally secondary issues, with the mode of administering drugs in shock, with the use of adrenin

* Towards the expenses of this work a grant was made by the Science Committee of the British Medical Association.