very occasionally, owing to the light respiration, the patient may become a trifle bluish under chloroform.

Since 1901, when I first used it by the closed method, I gave ethyl chloride as a preliminary to etherization, but since administering "mitigated ether" it occurred to me that a better preliminary would be a few drops of a mixture of two parts of ether and one part of chloroform dropped into the bag of the inhaler, just as is ethyl chloride. At first I used to drop the mixture on to a little wad of wool fixed in the angle piece to which the bag is attached, but I soon found it better to spray directly into the bag 15 to 20 drops (not minims— $2\frac{1}{2}$ drops are about equal to 1 minim) of E_2C_1 . This quantity seems to be equivalent to the usual dose of 3 c.cm. of ethyl chloride. The few drops of this mixture do not volatilize so quickly as does ethyl chloride, the vapour does not surge into the head so rapidly, and the transition from the one mixture of chloroform and ether to another mixture of the same components seems somewhat easier, quicker, and smoother than from ethyl chloride to ether or to "mitigated ether." The small quantity of mixture so administered is far less costly and more convenient than ethyl chloride, and I now use it before giving ether in private work.

With regard to the course of anaesthesia during the administration of $E_{16}C_1$ I have had two cases in which respiration ceased, in one of which the fault was due to inadvertence. In both cases the pulse and colour remained excellent, and respiration quickly restarted after a few compressions of the chest. Otherwise I have had no danger or trouble.

With regard to lung troubles I have had four cases of pneumonia and two or three of bronchitis.

Pneumonia.

Case 1.—Patient aged 25; stone in ureter. No cough before operation. Anaesthetic, E_2C_1 , $E_{16}C_1$. Anaesthesia lasted about fifty minutes. Three days afterwards the patient developed a high temperature and cough. The officer in charge said the patient had a bronchopneumonic patch lasting three days.

Case 2.—Patient aged 22; double hernia. Had cough for years and been subject to attacks of bronchitis since childhood. Anaesthetic, E_2C_1 , $E_{16}C_1$, followed by chloroform as soon as under. Developed pneumonic signs at right base, later on had signs at both bases. The patient was very ill, but recovered.

Case 3.—Patient aged 26; appendicectomy. Anaesthetic, $E_{16}C_1$, chloroform for a few minutes, $E_{16}C_1$. Administration lasted half an hour. Had general bronchitis and right apical pneumonia. Denies previous cough.

Case 4.—Patient aged 23; nephrolithotomy. Rather pink and flabby-looking; chest normal, no cough. Anaesthetic, E_2C_1 , $E_{16}C_1$. Perfect anaesthesia for three-quarters of an hour. Next day developed bronchitis and high temperature, then bronchopneumonia; very ill for three days. The ward was a very cold and draughty one.

Bronchitis.

Case 5.—Patient aged 24; hernia. Anaesthetic, E_2C_1 , $E_{16}C_1$. Anaesthesia lasted thirty-five minutes. Bronchitis for two or three days afterwards.

All these patients had morphine $\frac{1}{2}$ gr. and atropine $\frac{1}{100}$ gr. before anaesthesia, and had no mucous secretion; therefore there was no question of inhalation of septic material from the mouth.

Two other patients, in addition to Case 5, had a good deal of bronchitis afterwards. There was no prolonged sickness after any administration. It is very probable that in no case was the lung trouble wholly, or even partly, due to the anaesthetic, because the patients had to be transferred after operation along draughty corridors to wards which were also sometimes draughty and cold, and were never intended for hospital use.

In the pressure of present-day hospital work rapid induction of anaesthesia is necessary. The method described is all round the quickest and least unpleasant one I know, and is practically as safe as the more usual sequences of gas and ether or ethyl chloride and ether. Refinements and time-spending methods of administration, such as gas and oxygen, intratracheal anaesthesia, open ether *ab initio*, percentage inhalers, have little scope and less efficiency, when applied to tough fighting men, in the routine of a big and busy hospital. Safe, simple, and speedy methods are the most valuable.

CONCLUSIONS.

1. The irritation caused by ether vapour administered by the "closed" method is much mitigated by the addition of a very small quantity of chloroform.

2. The addition of this small amount of chloroform to ether distinctly saves the work of the lungs and heart, which during a long or severe operation may be a very important factor.

3. The mixture is practically as safe as the administration of ether alone, because the ether greatly predominates.

4. It is valuable as a routine method of producing anaesthesia in soldiers, being reasonably safe and rapid.

5. A few drops of E_2C_1 are preferable to ethyl chloride as a preliminary to the administration of ether, or $E_{16}C_1$.

6. For maintenance of anaesthesia E_2C_1 or chloroform are preferable to even "mitigated ether," owing to the prevalence of respiratory irritability among soldiers.

MULTIPLE SEVERE INJURIES FROM A BOMB EXPLOSION: OPERATION: RECOVERY.

BY

CAPTAIN NORMAN DAVIDSON, F.R.C.S.E., R.A.M.C.

THE following case deserves attention on account of the multiplicity of the wounds, their seriousness, and the good recovery following operation.

Pte. J. W. P., aged 25, while practising bombing on December 17th, 1916, threw a bomb which burst prematurely at about a distance of a little over a yard from his head. This occurred about 11.30 a.m. He was dressed by the medical officer of his battalion, and was brought at 12.45 p.m. by ambulance to this military hospital, where he was examined immediately on admission.

He was quite conscious, and complained much of abdominal pain; he said he was quite blind. Pulse 120, temperature $97.4^{\circ}F.$, respirations 20. He showed a considerable amount of blanching, and was suffering from great shock. The wounds were as follows:

1. Wound of the scalp, 2 in. long, on the vertex down to the bone.
2. Perforating wound entering the abdominal cavity at the junction of the ninth costal cartilage with its rib on the right side.
3. Wound of left thigh entering the left groin 1 in. below Poupart's ligament, in a line with the vessels, and with its exit below the left knee, apparently smashing the head of the tibia and tearing the patellar ligament.
4. Wound in the right groin 1 in. below Poupart's ligament.
5. Small superficial wounds of right and left arms, abdominal wall, etc.

Operation: The patient was brought to the theatre at 3 o'clock the same day, and anaesthetized by ether. He had already had $\frac{1}{2}$ grain of morphine hydrochloride and 500 units of antitetanic serum. With the assistance of Lieutenant J. F. Gill, R.A.M.C., the skin around the wound over the ninth costal cartilage was excised, and it was seen that the cartilage had been half torn through and a fragment had perforated the peritoneum. This wound was then sewn up.

The abdomen was immediately opened in the hypogastrium by splitting the right rectus sheath and pulling the rectus towards the middle line, the nerves to that muscle being preserved by pulling downwards. The abdomen was found to contain about a pint of blood and blood-stained serum. This was mopped out, and an examination was made of the abdominal contents. The liver was found to be intact, as was the stomach. The duodenum was found to have a perforating wound at the middle of the second part, practically in the centre of its anterior surface; this was closed with a Lambert stitch of linen thread. The jejunum was next followed, and there was found, about 12 in. down, a perforation at the free edge and another on the mesenteric edge, with a small chunk of bomb-case lying in the mesentery. The missile was removed and the three holes closed by Lambert sutures of linen thread. No further abdominal lesion was found, though it was noticed that gauze which had been placed near the duodenal lesion had a little bile on it, but search failed to reveal any injury. As the patient was in a very exhausted condition the search was not prolonged; a rubber tube rolled up in gauze was inserted down to the duodenum and another at the lower angle of the wound down to the recto-vesical pouch, and the abdominal wall closed in layers. Attention was then turned to the left groin, the skin wound was excised, and there was found to be considerable arterial oozing from the depth of the wound. This was opened up freely, the sartorius muscle retracted inwards, and the track of the foreign body was followed. This caused more bleeding. Digital pressure was put on the femoral artery, and by following the track of the haemorrhage one quickly came on the femoral artery and vein at the upper end of Hunter's canal. The artery was isolated and ligatured above and below with stout catgut. On removal of digital pressure there was only a little venous oozing, but on lifting up the artery there was quite a rush of venous blood. Pressure was applied above and below, the artery lifted up again, when it was seen that there was a small longitudinal tear in the vein. This was stitched up with a fine linen stitch for want of better material, as it was considered that ligation of both artery

and vein would be sure to invite the risk of gangrene. The sides of the wound were then drawn together at each end and the centre packed with gauze soaked in eusol.

The wound in the knee was excised and opened up freely, when it was seen that the joint had not been entered, but that the patellar ligament with the tuberosity of the tibia had been torn away. Loose bone was scraped out and the wound packed with gauze and eusol. The wound in the right groin was excised, the track followed down about eight inches to the adductor muscles. A counter opening was made, the track well scraped out, and a rubber tube placed along it. The scalp wound, through an oversight, was not excised, and the patient was returned to bed with the right leg enveloped in cotton-wool and placed in an elevated position. On recovering from the anaesthetic he was placed in the Fowler position. The next day the patient was very ill indeed. Pulse 130, respirations 30, temperature 99° F. He was given morphine freely. He had one and a half grains of morphine hypodermically in the twenty-four hours and salines per rectum, which he retained, also a turpentine enema to relieve some distension.

December 19th. He was better and had had a good night. Dressings were soaked through, so he was dressed. There was no discharge from the lower abdominal tube, but a free discharge of bile from the upper one, free oozing from the left knee wound, and no signs of gangrene in the foot.

December 20th. To-day the foot showed dry gangrene of all the toes. Circulation was apparently good up to the knee. The abdominal tubes and gauze were removed and the tubes only replaced. General condition satisfactory. Had bowels opened, but abdomen seemed distended. Good night. Pulse 96; less bile escaping; tube shortened. Line of demarcation now begun to form at the middle of the calf.

December 25th. Patient doing well, but there was pain in the left leg and oedema above the line of demarcation.

January 1st, 1917. Complained of a great deal of pain during the night. Amputation was decided on, and morphine hydrochloride $\frac{1}{2}$ gr. and atropine sulphate $\frac{1}{32}$ gr. given. The operation was performed with anterior and posterior flaps. The bone was sawn through 2 in. above the knee. At the same time an opportunity was taken to draw together the edges of the wound in the left groin which had become a large granulating area, and the head wound scraped of redundant granulations.

January 2nd. Patient says that he feels better than he has done since he came into hospital. No bile escaped to-day. Tube removed.

January 7th. All wounds healing well.

January 17th. Patient was quite convalescent and went to a concert on a wheeled chair.

To sum up, the patient was injured at 11.30 a.m. and was operated on three and a half hours later. The interval between the accident and the operation was to the patient's advantage as he was in better condition at 3 p.m. than on admission. Morphine, salines, and warmth, were all that was used to combat the shock.

I have to thank Lieutenant Gill, R.A.M.C., for his able assistance and advice, and Sisters Geeve and Frewin, Q.A.I.M.N.S.R., for their care of the patient.

THE VALUE OF FEEDING DURING OPERATION AS A PREVENTIVE OF SURGICAL SHOCK.

WITH SPECIAL REFERENCE TO OPERATIONS ON THE
STOMACH.

By HERBERT H. BROWN, M.D.LOND., F.R.C.S.,
SURGEON TO THE EAST SUFFOLK AND IPSWICH HOSPITAL.

In 1911 I published an article on surgical shock,¹ in which I attributed the phenomena to exhaustion of the food material—the Nissl granules—stored in the nerve cells, more particularly those of the vasomotor centres. Severe haemorrhage and starvation prior to operation were mentioned as important factors predisposing to shock, owing to their leading to a "depleted larder" in the nerve cells.

Whatever theory of the causation of shock is accepted, it is quite certain that loss of blood and insufficient feeding are of great importance as predisposing agents. Operations on the stomach, such as gastro-enterostomy and partial gastrectomy, are often accompanied by severe, and sometimes fatal, shock.

The operation is usually performed either for stricture of the pylorus and consequent gastric dilatation resulting from cicatrization of an ulcer in the pyloric region, or for malignant disease; in another class of case it is performed for severe haemorrhage from a gastric or duodenal ulcer. In the first class the patient's nutrition is low. Owing to the difficulty in the passage of food through the pylorus and the vomiting of a large part of the food ingested, a condition of starvation is induced, and when malignant

disease is present, haemorrhages and cachexia add to the debility. In the second class the patient is usually profoundly anaemic, and may have undergone a preliminary course of starvation only very partially alleviated by rectal feeding. It is not surprising that in such cases operations on the stomach produce an extreme degree of shock.

To combat this, it has been my practice during the past ten years to feed the patient during the operation. The operation is proceeded with in the usual way until the suturing with catgut of the mucous membrane and muscular wall of the stomach and jejunum is nearly completed—that is, to within the last $\frac{1}{4}$ in. A soft catheter with rubber tube and funnel attached is then introduced into the jejunum and passed on until the end of the catheter is in a coil of intestine well within the abdomen, the opening through which it has passed being held firmly with the finger and thumb to prevent any leakage of fluid. The intestinal and stomach clamps have been removed. A pint of peptonized milk, to which a beaten-up egg and an ounce of brandy have been added, is poured slowly through the funnel into the intestine; the funnel is held at a distance of 8 to 10 inches above the abdomen so that no undue distension of the intestine can take place. The catheter is then withdrawn and the operation completed in the usual manner.

Since adopting this procedure I have never seen serious shock follow an operation of this character, and the patient usually leaves the table with a better pulse than he had at the commencement of the operation.

A few weeks ago I operated upon a man of 57 who was wasted and anaemic. He had malignant disease involving the circumference of the stomach about 5 in. from the pylorus. I removed about two-thirds of the stomach, uniting the cardiac end to the jejunum. The operation was long, lasting for two hours, or a little more.

The blood pressure, which was 140 mm. before the operation, fell to 90 mm. soon after its commencement, and was below 90 mm. when feeding was commenced. It had risen to 120 mm. half an hour later, when the operation was completed. He had no symptoms of shock afterwards, and made an uninterrupted recovery.

Shortly afterwards I operated upon a similar case, in which the carcinoma involved a still larger area of the stomach, and the resection was very extensive. The patient suffered somewhat severely from shock at the time of operation, but was sitting up in bed taking food well in the course of a few days. After an operation I generally start regular feeding within twelve hours, giving two ounces of peptonized milk hourly to commence with.

In performing gastrostomy for stricture of the oesophagus or the cardiac end of the stomach upon a patient who is in a cachectic and semi-starved condition, I always feed during the operation, passing a catheter through the gastrostomy opening into the duodenum, and inject a pint of prepared food, and continue feeding regularly at four-hourly intervals after the operation.

In addition to its value in preventing the development of shock, this procedure tends to promote the healing of the stomach and abdominal wounds. It is obvious that tissue cells cannot divide and repair take place unless the cells are provided with food, and speedy union is of great importance in the success of these operations.

REFERENCE.

¹ *Practitioner*, August, 1911.

A CASE OF CEREBRAL ABSCESS OF OTIC ORIGIN.

By H. BODKIN, D.O.Oxon., M.R.C.S., L.R.C.P.

THE following case may be of interest from the symptoms that led up to the diagnosis:

A boy, aged 15 years, was admitted at night to the Bristol Royal Infirmary with pain in the right ear and a temperature of 103°. The history was that he had suffered from chronic suppurative otitis media on both sides from infancy, but had had no pain before.

When seen next day the temperature was 99°, the pulse 72, and he was free from pain, but he had facial paresis on the right side. No other nerves were affected.

The boy's mother, being questioned as to how long his face had been in this condition, declared that it had always been the same and that all her children were born like that.