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.,
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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.

She produced photographs of several other sons, taken in khaki and broad smiles, which certainly bore out her statement in so far as they all had a very peculiar one-sided smile. This feature was apparently inherited from their father and grandfather. The boy himself stated that he was always laughed at by his mates for having a lopsided face. The mother, therefore, would not recognize the paralysis as such, or consent to operation on that account.

A week later there was a recurrence of the pain and temperature, and the facial paralysis became more complete. Operation was then agreed to, and a radical mastoid operation performed. The maxillary antrum being explored as a routine with Watson-Williams sinus exploring syringe, thick pus was found in the left antrum. This condition had no doubt been instrumental in keeping up the otitis media.

The temperature returned to normal next day, and the patient appeared to be progressing favourably for the next fortnight, except for attacks of headache, chiefly referred to the frontal region, coming on every two or three days but only lasting an hour or so, and a general mental depression. "No, I haven't any pain but I feel so downhearted," being the usual information vouchsafed. The boy took his food well, and there was never any vomiting.

On the sixteenth day after the mastoid operation, when the patient was up and about the ward, he was given by a friend visiting him some jam tarts and a cigarette. He contrived to smoke the cigarette unobserved in the bathroom, after which he became collapsed, and had to be carried to bed. He then lost consciousness, and developed paralysis of the left arm and leg, with conjugate deviation of eyes to the right, the right pupil being widely dilated and inactive to light; the left pupil remaining of normal size and active to light. The right fundus showed arteries very contracted and veins full, but no swelling of disc. The knee-jerk was lost on the left side. Extensor plantar reflexes on both sides.

Right temporo-sphenoidal abscess was diagnosed, and preparations made for operation.

Two hours later the paralysis had completely passed off, the eyes were normal, and the patient quite conscious, and able to relate his smoking exploit and declare himself all right again.

The operation was proceeded with, the dura being exposed in the tegmen tympani, and further uncovered by the removal of bone upwards. Pus was sought for with a slender-bladed knife, and a small collection found at a depth of rather over an inch, about an inch and a half above and a little anterior to the auditory meatus. A culture of the pus from the abscess gave a feeble growth of *Staphylococcus albus* and a few streptococci. The abscess was drained with gauze, and for some days the patient appeared to be doing well, and was particularly ravenous for food, but died on the tenth day after the abscess was opened.

On post-mortem examination it was found that the abscess cavity was well drained, but the infection had spread up the meninges, there being a thick layer of pus under the dura in the right parietal region.

I think the temporo-sphenoidal abscess must have been present when he was first admitted, but had given insufficient sign of its existence for diagnosis till the accident of the cigarette smoking in a young boy in an enfeebled condition of health led to sudden cerebral congestion which brought out pressure signs, these signs passing off again as quickly as the effects of the tobacco. Previously there was only the very transient headaches and the more marked mental depression to suggest the presence of an abscess. I have noticed before in chronic cerebral abscess a mental depression or melancholy, much greater than would be expected from any complaint of pain or other symptoms, and on meeting this again shall be inclined to try the effect of tobacco or some similar drug for its diagnostic value as shown accidentally in this case.

I am indebted to Dr. Watson-Williams for permission to record this case.

TREATMENT OF TRENCH FEET BY THE SUBCUTANEOUS INJECTION OF OXYGEN.

BY

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THERE are several stages of trench feet:

1. *Neuritic*, producing acute pain, and preventing the patient walking or sleeping. There is no swelling or discoloration of the foot.
2. *Oedematous* without discoloration, but acute pain is present, produced by the pressure of nerve endings.
3. *Oedematous* with blisters, and varying discoloration of the skin short of gangrene.
4. *Gangrenous*, partial or circumscribed, with oedema and blisters, and reddening of the skin involving the lower leg.

I have employed subcutaneous injections of oxygen in Classes 2, 3, and 4.

Technique of Treatment.

It is essential that in all cases of trench feet, whether the skin is broken or not, antitetanic serum should be given under the skin in the arm or pectoral region; the dose should be 500 U.S.A. units.

The operator requires a Woulfe bottle, with two glass tubes bent at an angle and inserted into a tightly fitting cork. To the end of one glass tube is fitted three yards of red rubber tubing connected with the usual oxygen cylinder; to the end of the other glass tube is fitted two yards of a finer rubber tube, and the distal end of the tube has a salvarsan needle fitted on. The bottle contains a saturated solution of sodium carbonate.

It is best to sterilize the needle in boiling oil, and this should be done for each individual case. The operator having sterilized his hands uses a little iodine on the proposed sites of puncture. The needle is inserted into the subcutaneous tissue at a point midway between the heel and external malleolus. The oxygen is allowed to enter slowly until the foot is filled up. The needle is then withdrawn, and inserted midway between the internal malleolus and the heel. If the toes are black and cold the needle is inserted in the mid-line at the base of the toes. It is important that the oxygen should be injected slowly. So far the process is simple, but one learns with experience that if the part is almost gangrenous injection into the deeper tissues is of advantage.

The treatment is based on the conclusion that trench foot is akin to Raynaud's disease. The oedema produces stasis in the veins of the foot, impeding or stopping circulation. The venous blood, if oxygenated, will help to keep the tissues alive until the serum can be drained away. The oxygen helps to drive out the serum slowly but steadily through the puncture holes. Mere puncturing has been found useless in relieving the oedema. Furthermore, the oxygen balloons up the subcutaneous tissue, and relieves thereby pressure on the blood vessels and lymphatics. When the oxygen is absorbed and the serum drained away circulation is quickly restored to the limb.

There is marked relief to pain at once, and under the eye of the observer certain changes can be seen taking place. The reddish-blue appearance changes to pink; the redness which often extends up the leg disappears, and where blackened areas exist a white line makes its appearance, and any living tissue is picked out in pink. The white line indicates what would ultimately be the line of demarcation of gangrene, and it is noted that healthy granulations start from this white line after injections of oxygen. The destruction of parts is greatly lessened, and is often confined to the tips of the toes. Areas of black blood on the dorsum of the foot rapidly undergo change, becoming greyish-white and pink, more resembling healthy tissue. In many of the severe cases recovery of the whole foot has taken place, and in some the loss of a single digit has been recorded. I have amputated in two only out of a large number of cases; both were suffering from severe toxæmia and dangerously ill. In each the other foot made splendid recovery, but amputation of the relapsing foot had to be undertaken to save life. These patients have been evacuated to England in a good state of health.

A minor but important point is the treatment of all blisters. They should be drained by sterilized thread