action in France. Later it was proved conclusively that not only had he not been in action but he had not even left the country.

The cases in which memory failed to be restored fell into three groups.

1. *Malingers.*—We found that these cases behaved differently from others. Whereas most patients became communicative under barbiturate narcosis, the malingerer usually became more quiet and guarded. When he was questioned about the amnesic period he would often tend to yawn and go to sleep. Failure to recover memory may suggest malingering in some cases; but of course it cannot be used as proof, as the failure may be due to other causes, such as:

2. *Fugues*, occurring in depressive setting;

3. *Faulty technique*, such as allowing narcosis to become too deep: this probably explains why some physicians succeed after others have failed.

Discussion

Analysis of the results of treating 247 Service cases of hysteria shows that intravenous barbiturate narcosis is no better than ordinary persuasion and re-education. The usefulness of including intravenous barbiturate narcosis in a scheme of treatment varies with the type of hysterical symptom—e.g., it proved to be by far the easiest and quickest method of recovering memory in hysterical amnesia. On the other hand, it was of little value in treating somatic pains. The main advantage appears to be the saving of time; equally good or even better results can be obtained by other methods if one is prepared to devote a longer time to treatment. Thus intravenous barbiturate narcosis is particularly popular in wartime, when usually the time available for the treatment of each patient is strictly limited. The greater rapidity of psychotherapy when intravenous barbiturate is used is probably due to its pharmacological effects of diminishing inhibitions and also, probably, of increasing suggestibility in most cases. The increased suggestibility cannot wholly be attributed to the pharmacological effects of the barbiturate; in fact, Lewis (1941) considers the pharmacological effect to be trifling compared with the suggestive value of the procedure in the achievement of therapeutic success. Our findings confirm this view, and we regard the "psychological preparation" of the patient as of equal importance to the injection, and in some cases as of even greater importance. A number of patients recovered from their symptoms spontaneously during the preparatory phase before the injection had been given. However, each step of the general technique is of value in the achievement of therapeutic success.

Another important aspect of this method of treatment not often realized, but pointed out by Lewis (1941), is the increased confidence of the physician. Compared with verbal hypnosis there is usually less embarrassment to both physician and patient, and as risk of failure is negligible the former's confidence is increased. This increased confidence probably plays a large part in the achievement of successful therapeutic results.

Some specific disadvantages of using intravenous barbiturates were that in some cases great motor restlessness was precipitated, and the patients could only with difficulty be restrained from hurting themselves; also in some cases the physical procedure may tend to confirm the patient's cherished belief that he is suffering from some physical illness. This disadvantage, however, is probably outweighed by the suggestive value of the physical procedure. The results achieved cannot wholly be attributed to the intravenous barbiturate treatment, as essentially it fitted into a general scheme of treatment at the hospital, all aspects of which contributed to the successful outcome. Also it should be realized that barbiturate narcosis is merely an aid to psychotherapy and probably plays only a small part in producing therapeutic success. The success achieved depends mainly on the ability of the physician, his confidence in the method, and the general plan of treatment.

Summary

The results of treatment of 247 Service cases of hysteria are described with particular reference to 126 patients to whom intravenous barbiturates were given.

Various barbiturates were tried, but there was no important difference in the effects produced or in the results obtained.

The pre-anaesthetic phase of light narcosis was found to be most suitable for psychotherapy.

Compared with other psychotherapeutic methods, the main advantage obtained by using intravenous barbiturates was economy of time. This was particularly so with cases of hysterical amnesia, for which it was regarded as the method of choice. Mathematical evaluation of the results shows that, statistically, barbiturate narcosis produces no significantly better results than other psychotherapeutic methods.

The general technique is described, and the importance of the various steps of the technique in ensuring success is stressed.

The suggestive value of the treatment and the increased confidence of the physician are considered to play an important part in the success obtained.

Intravenous barbiturate narcosis may be described as a tactical aid in the general strategy of treatment of patients suffering from neurosis.

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TWO CASES OF GUNSHOT WOUND RESULTING FROM UNUSUALLY LARGE MISSILES: RECOVERY

BY

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I have removed many large missiles from the human body in treating war wounds, but the history of the following cases is of interest because they involved two of the largest foreign bodies that I have ever taken from the chest or abdomen. In both instances the patients recovered.

Case I: Chest Wound

Flight Sergeant B. was hit by "flak" at approximately 18.45 hours on May 7, 1942. He lost consciousness for a few minutes, and on recovering found himself leaning over his gun-hatch. His under-gunner helped him to undo his harness and placed him on the floor of the aircraft. Towards the end of the journey home to his base he apparently became delirious, and his under-gunner had difficulty in restraining him from firing off Vêry lights. About 35 minutes later they landed at an aerodrome.

On admission to S.S.Q., he was greatly shocked, restless, in great pain, cyanosed, and suffering from severe dyspnoea. His blood pressure was 90/50; pulse 140 and very thready. He had a large penetrating sucking wound of the left side of the chest, approximately $3\frac{1}{2}$ by 2 in., situated about 2 in. from the midline at the back, at the level of the sixth and seventh ribs, and running in a forward and lateral direction. A shell fragment which measured $3\frac{1}{2}$ by $5/8$ in. (Fig. 1) was found lying beneath the skin over the eighth rib in

FIG. 1.—Shell fragment ($3\frac{1}{2}$ by $5/8$ in.) removed from Case I.

the mid-clavicular line, at a distance of $12\frac{1}{2}$ in. from the wound of entrance. During its passage into the chest wall the sixth rib was fractured, and the seventh was shattered for several inches, though the overlying skin had not been damaged. Squadron Leader Anderson controlled the parietal haemorrhage, and covered the wound with a large wet dressing and overlapping layers of adhesive strapping. Morphine $1/4$ gr. was given, intravenous serum begun, and 90% oxygen administered by the B.L.B. mask intermittently, and for a short time moderate warmth was applied by a radiant-

heat cradle. A little later the shell fragment was removed under local anaesthesia and occlusive dressing applied.

I saw the patient at the Rest Station at 22.45 hours. His dyspnoea and cyanosis were then less marked; pulse 110 and very thready. There was no apparent intrathoracic bleeding or any sign of tension pneumothorax—the latter not likely to develop in this particular type of wound. He was not, however, in a fit state to be transferred to hospital—a distance of about five miles. During the night two more pints of serum were given, and two further doses of morphine. By 08.00 hours his general condition had slowly but steadily improved, and he was fit to be transferred.

On admission to hospital his blood pressure was 110/70; pulse 116 and of fair volume. Full clinical and x-ray examinations were carried out, and during these procedures he was given a transfusion of one pint of blood; he was then transferred to the operating theatre and received a further pint during the course of the operation, which was carried out under gas and oxygen supplemented by local anaesthesia, using 0.5% novocain (anaesthetist, Dr. Pretty). The skin was washed thoroughly with soap and water, dried, and painted with warm tincture of merthiolate. An elliptical incision was made round the wound of entrance, extending forward to the incision previously made for the removal of the missile; the skin was undermined and widely retracted, and the entire tract of the missile, with all layers, including several inches of the comminuted rib, periosteum, and pleura, was excised *en masse* without permitting the knife or other instruments to touch the tract or the infected surface wound. All used instruments and gloves were then discarded. Blood was evacuated from the pleural cavity by suction apparatus, and a hole in the costal portion of the diaphragm was sutured. Attention was then directed to the lung itself and a careful search was made for bone splinters, pieces of clothing, etc. A portion of the lung was found bruised but not lacerated. The operation was completed by intercostal drainage carried out through a Malecot tube, introduced by trocar and cannula, into the ninth intercostal space posteriorly. The wound was freely dusted with sulphanilamide powder. The skin only was sutured as far as the wound of entrance, which was packed with vaselined gauze. By this time the patient's condition was very grave; he was pulseless and cyanosed. A pint of serum was quickly given, and on his return to the ward he had another pint, followed by the usual 5% glucose and saline. Oxygen 90% was administered at intervals, and at 18.30 hours his blood pressure was 120/80, pulse 130 and of fair volume, haemoglobin 50%. Two days later sulphapyridine was begun, and subsequently two further transfusions of blood were given. After this his convalescence was practically uneventful.

On May 18 the sutures were removed and the wound had healed by first intention. On May 20 the Malecot tube was withdrawn from the thorax as there had been no sign of intrapleural infection and only a slight serous blood-stained discharge for the first ten days. The wound of entrance was dressed from time to time, and he was finally discharged on June 1.

In Aug., 1943, a letter was received from the patient informing me that he was fit and well, and that he was back on operational flying in the R.A.F., but was not allowed to fly above 5,000 ft. for the present.

Case II: Wound of Abdomen

Flying Officer K. was admitted to hospital on June 5, 1943, with a gunshot wound of the abdomen. About 05.00 hours, while returning from an operational flight over the North Sea, he was hit by a large fragment of cannon-shell. He stuffed a handkerchief in the large abdominal wound of entrance and gave himself an injection of one tubulin ampoule of morphine. His pilot crash-landed at 06.10 hours; shortly afterwards Dr. Garnett saw the wounded airman and gave him a dose of alupon. At 07.30 hours he was transferred to hospital under my care, arriving at 10.00 hours.

On examination he was pale, sweating, restless, cold, and shocked; pulse 128 and of poor volume, blood pressure 90/70. A preliminary examination revealed a penetrating wound of the lower abdomen, a laceration of the penis, and a superficial wound of the left leg. Prophylactic doses of anti-gas-gangrene and antitetanic serum were administered, and serum drip was begun. Radiographs of the abdomen showed a large foreign body in the pelvis, and there was a smaller one in the mid-third of the left leg. X-ray examination of the chest was negative. At 11.30 hours one pint of blood was given, and by 13.30 hours he was fit to be taken to the theatre. A second pint of blood, followed by saline and glucose, was administered during the course of the operation, which was carried out under gas-oxygen and ether (anaesthetist, Dr. Pretty). The parietal abdominal wound measured 3 by 2½ in., and there was gross loss of substance; it was situated just lateral to the outer border of the right rectus and its lower end was about 2½ in. above Poupart's ligament. The hole in the peritoneum was about half the size of the missile. The whole abdomen was thoroughly washed with green soap and water, dried, and shaved. The penis wound was then prepared in the same way, and finally the whole area was painted with warm tincture of merthiolate. Laparotomy was performed through the standard midline incision and a fair quantity of blood

in the abdomen was removed by suction. Several small areas of the small bowel were seen to be damaged but not perforated. Two large perforations were found in the pelvic colon running in a longitudinal direction; these were closed in two layers, using fine silk sutures. The damaged areas of the small bowel were then invaginated by pursestring sutures. The foreign body (Fig. 2) was found lying

FIG. 2.—Portion of cannon-shell (1 by 1½ in.) removed from Case II.

loose in the pouch of Douglas. The peritoneal cavity was sprinkled with sulphathiazole powder and the wound temporarily covered with hot abdominal packs.

Next, after a complete change of gloves and gowns, using a closing-tray of clean instruments prepared beforehand, a double-barrelled colostomy was performed in the left iliac fossa, and a Rankin's clamp applied. Sulphathiazole cream was then applied to the abdominal incision, which was completely closed. The penis wound, which consisted of a severe laceration involving the right side of that organ, dividing one half of the corpus cavernosum, was dealt with again, using fresh instruments and gloves. All devitalized infected tissue was removed, including a portion from each end of the corpus cavernosum, and the latter were brought together by an end-to-end suture, using fine silkworm-gut. The wound was left open, and was dressed with sulphathiazole cream and vaselined gauze. Finally, the parietal wound in the abdominal wall was similarly treated. By 17.30 hours his blood pressure was 120/80, and five hours later 130/86.

During the next three days the patient made fairly steady progress. Nothing was given by the mouth during that time; fluids were administered intravenously, but subsequently he began to take sips of glucose, barley-water, and fruit juice.

On June 10 he complained of a pain in the right chest. Temperature 100-103°. X-ray report: "Collapse of the right middle and lower lobes of the lung." A full course of sulphathiazole was begun, and this was continued for seven days. Haemoglobin 69%, W.B.C. 13,000 per c.mm.

June 14.—Respirations 32; pulse 118; swinging temperature 102-102.8°. Still complaining of pain in the right chest, though not so severe. His abdominal condition was satisfactory and the colostomy working well. Radiographs of the chest at this time showed loss of radio-translucency over the whole of the right side, most marked in the middle and lower zones. Haemoglobin, 62%; W.B.C., 28,000 per c.mm.

June 18.—The incisional wound had healed by first intention without the slightest sign of infection. The other wounds had a very mild suppuration, which required occasional dressings.

June 21.—Swinging temperature continued. Night sweats; slight breathlessness but no cough. X-ray report: "Several opacities seen in the right side of the chest. These are greater in the middle and lower zones. ? pleural effusion." In consultation, Dr. Ronald Jones confirmed the previous clinical findings. The following is his report: "There were marked dullness, diminished breath sounds, and impaired fremitus over the whole of the right chest, without any obvious displacement of the mediastinum. The fingers were not clubbed."

July 2.—Chest signs seemed to be diminishing, but fever and sweats still continued and lung abscess was suspected.

July 14.—After a few days' dry cough the patient began to cough up purulent sputum, and 10 oz. was produced. This contained pus cells; the predominant micro-organism was the pneumococcus. No tubercle bacilli were seen. Postural drainage was begun.

July 24.—Some 40 to 60 oz. of pus had been coughed up. General condition much better.

July 29.—Temperature normal, sputum very scanty.

Aug. 3.—Temperature and pulse normal for past five days. No sputum. Chest signs: slight diminution of movement of the right thorax with slight impairment of percussion note and air entry. No clubbing of fingers.

The patient was transferred to a Royal Air Force hospital on Aug. 3; thereafter his convalescence was uneventful. A letter was received from Wing Commander G. H. Morley on Nov. 1, informing me that he had successfully closed the colostomy wound and the patient had made a good recovery.

Comments on Case II

This was a case of pulmonary suppuration probably resulting from atelectasis and infection. Alternatively it may have been metastatic, but if so one would not expect the predominant organism to be the pneumococcus. As there were neither clinical nor radiological signs of cavitation, pulmonary suppuration is a more descriptive diagnosis than lung abscess.

The result of postural treatment was very good, and, owing to this and the absence of cavitation, the question of surgical treatment fortunately did not arise.

By using the midline incision in war wounds the abdomen can be opened quickly, and, what is equally important, it can be closed quickly. It is comparatively bloodless, and can be extended upwards and downwards according to the needs of the case.

In colon injuries, perforated or bruised, exteriorization of the damaged loop as a colostomy is the safest procedure; when this is impossible the wound of the intestine should be sutured and a proximal double-barrelled colostomy of the Devone type performed. In cases of injury to the fixed parts of the colon a separate incision in the flank has many advantages.

The suction apparatus is invaluable in abdominal wounds as, in addition to its many other advantages, it reduces the number of swabs used to an absolute minimum, thereby contributing towards a fool-proof organization in the counting of swabs and packs.

It is interesting to record that the pilot officer, who escaped without a scratch, found 120 cannon-shell bases in the cockpit!

[Figs. 1 and 2 are reproduced from drawings by Leonard Squinell.]

A MODIFICATION OF THE INVAGINATION METHOD OF INTESTINAL ANASTOMOSIS

BY

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In this communication a modified method of performing intestinal anastomosis is described which, it is hoped, will be of use in carrying out this operation quickly and efficiently. The operative technique was devised by me many years ago, and has only recently been employed on the living subject. In view of the measure of success achieved in the cases noted below, which were not ideally suitable for a trial application, I have been encouraged to bring the method to the notice of the profession, before having been able to practise it extensively, in the hope that surgeons in our field hospitals may find it useful.

During the last war Fraser and Dott used the invagination method with satisfactory results in abdominal emergency work in France necessitated through injuries caused by projectiles. They employed the method of temporary occlusion, and although the end-results of their operation and the one to be described are somewhat similar, there are important differences in: (i) the degree of invagination achieved at the site of anastomosis by means of a special instrument devised for this purpose; and (ii) the means of recanalization. Other "aseptic" methods have no doubt been adopted, both in this country and abroad, and any claim to originality on behalf of this method must depend upon the specific use of the two instruments undermentioned—viz., a screw and a pair of sharp-pointed angled forceps. It is hoped that these improvements will lead to the more widespread practice of this type of operation in suitable cases. It effects the union of two temporarily occluded ends of severed bowel and therefore leads to little soiling of the operative field. Preliminary technical investigations were carried out on fresh pig's bowel, and the union obtained was found to be sound and capable of withstanding high water pressure and considerable distension before any sign of leakage occurred round the site of anastomosis.

The special instruments required in addition to those normally available are: (a) an instrument of modified corkscrew pattern (Fig. 3); (b) a modified StClair Thomson angled

forceps; (c) a powerful broad-bladed enterotribe, of the Doyen pattern, and means of heating its blades (the means adopted was a small electric heater).

In describing this operation it is assumed that the part to be removed has been isolated, together with sufficient lengths of healthy bowel on both sides of the lesion to enable the union to be effected. From this point the technique employed is as follows:

Technique of Operation

The mesenteric attachments are ligated and divided close to the bowel. This operation is continued on each side of the diseased portion for a distance of one and a half to two inches. Two portions of healthy bowel, adjacent to the diseased part, are now crushed with the enterotribe. Sufficiently wide areas should be crushed to enable the next stage to be carried out. This consists in removing the lesion between ligatures. A "double overhand knot" (Fig. 1) should be used to occlude the healthy bowel-ends,

FIG. 1

as these ligatures have to be unloosed by mechanical means at a later stage in the operation. Silk is best for this purpose, as it is much less liable to slip than catgut. For temporary occlusion the pursestring, instead of the stump method, may be adopted so long as the same type of knot is employed. If a heated enterotribe is used for crushing the type of knot is immaterial, as an opening may easily be secured through the "roasted" bowel owing to its friability.

The occluded ends are now approximated, and before invagination are held together by half a dozen interrupted sutures round the circumference of the bowel (Fig. 2). The special "corkscrew" is

FIG. 2

then inserted into the lumen of the bowel with a screwing movement, in the approximate position as shown in Fig. 3, and partly screwed through the double diaphragm formed by the approximated occluded ends (Figs. 3 and 4).

FIG. 3

Invagination is produced by holding the distal part of the bowel in the left hand and pushing the diaphragm, by means of the