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IMPRESSIONS OF ANAESTHESIA IN A MILITARY BASE HOSPITAL

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THIS paper is based upon experience in an Australian General Hospital in the past eight months. It describes the conditions of anaesthetic practice in a large, military Base Hospital in the Middle East. The conditions in field units are naturally somewhat different, and are not within the personal experience of the writer. The present paper has been compiled from personal records rather than departmental, for the former are more uniform in arrangement and in criteria. The paper may be regarded as a plea for simplicity in anaesthetic methods in military hospitals.

1. THE BACKGROUND

(*a*) *The Australian Army Medical Corps.*—The Australian expeditionary force, known as the Second Australian Imperial Force, derives its title and its tradition from the Australian Imperial Force which participated in the war of 1914–18. Like its predecessor, the force was raised by voluntary enlistment. Its medical units contained originally a majority of officers with previous military experience, but have approached more and more to a cross-section of the civilian medical profession of Australia, newly organized for the purposes of war.

Throughout 1940, medical activity in the Australian Imperial Force in the Middle East was limited to "maintenance" duties, by which is meant the medical and surgical work encountered in any large community, whether of civilians or of soldiers. During 1941, however, the Australian troops have been actively engaged in Libya, Greece, Crete and Syria, and the problem of battle casualties has been added to that of "maintenance" medicine and surgery.

The Australian forces in the Middle East form a self-contained unit of the Middle East Forces, a very widespread command. It is desirable

that the Australians should be, so far as possible, self-contained, for the British authorities have a sufficient task in supplying their own large forces in the Middle East, and the sea route from Britain is more difficult than that from Australia. The industrial expansion of Australia since 1918 renders it possible for her now to supply most of the needs of her army in the field. A line of sea-borne communication, eight thousand miles in length, has not proved to be the disability which might be anticipated, although it sets a certain premium upon economy in material.

The system employed in the British Army for the evacuation of sick and wounded was evolved, in its "classical" form, during the First German War. The wounded are collected at Regimental Aid Posts, whence they are evacuated by Field Ambulances, of which three form a component part of each Division. At the Advanced and Main Dressing Stations of the Field Ambulances, a minimum of essential surgical treatment is given. Major casualties are then evacuated by motor ambulance convoys to Casualty Clearing Stations, situated some twenty miles behind the front and equipped to perform all the surgery of necessity. The patients are evacuated thence, as soon as their condition permits, by rail or road to General Hospitals, situated up to one hundred miles behind the front. These units are relatively immobile; they are equipped to provide all forms of medical and surgical treatment, and to carry out the surgery of reconstruction as well as that of necessity. The wounded leave the General Hospitals for Convalescent Depôts, and return thence by way of the General Base Depot to their units in the field. Should their injuries, however, be such as to involve a long convalescence, they are evacuated from the General Hospitals to Australia by means of hospital trains and ships.

This "classical" system has been modified in the present war by reason of the terrain, the great distances and the mobility of modern warfare, which together form a sharp contrast to the static trench-warfare of 1914–18. More of the primary operative work has now to be performed in the Main Dressing Stations of Field Ambulances, which are therefore reinforced as necessary by advanced detachments from the Casualty Clearing Stations and by mobile surgical teams sent up from General Hospitals. The front being fluid, and no longer an affair of trench-lines, safety has at times decreed that the Casualty Clearing Stations be kept many miles behind it. General Hospitals may be situated perhaps four hundred miles from the front, but the latter has been known to fluctuate so rapidly that one General Hospital was overtaken by the fighting, and is now subserving the functions of an advanced Casualty Clearing Station in a combat area!

Modern warfare has proved thus far to be war of manoeuvre, hostile formations being isolated by mechanized columns and compelled to surrender. Enemy strongpoints are no longer bombarded for days by massed artillery, and then carried by infantry assault in the face of

counter-barrage and machine-gun fire. The fighting seems therefore to have been, with local exceptions, less sanguinary than in the last war. The actual distribution of wounds amongst the various weapons of destruction cannot be determined at this date, or until the records have been searched upon a large scale; it will vary, moreover, with the conditions of each local action. Many of the wounds are caused by "shrapnel," a term used loosely and inaccurately by the troops to designate the splinters of any high-explosive shell or aerial bomb. True shrapnel, so widely used in the last war, seems to be uncommon in the present one. The injuries inflicted by high-explosive shells or bombs can be of a very frightful character, and similar wounds result from the use of the trench mortar at points where the front has become relatively stable. Fortunately, the incidence of injuries resulting from high-explosives seems to be less than in the last war, probably because massed artillery has been less often employed. Machine-gun wounds are unusual, probably because infantry are no longer thrown against strongly fortified positions without mechanized support. There is a high incidence of every destructive injuries caused by land-mines and booby-traps, and there are the accidental gunshot wounds inevitable where thousands of men are engaged in the daily handling of firearms.

In the mobile warfare of today, the evacuation of the serious casualty is always difficult, especially during a retirement. The great distances between hospital units and the front is doubtless reflected in a high mortality amongst patients with abdominal, thoracic or cerebral injuries. For this reason, such patients tend to be kept at Casualty Clearing Stations until their recovery is well advanced, and so they do not figure largely in the operation-lists of General Hospitals. The great majority of patients upon such lists suffer from wounds of the limbs. In view of the length of the line of evacuation, sepsis is likely to be well-developed before the patient reaches the hospital. For this reason, the primary suture of wounds, so popular in the last war, has been abandoned; wounds are now excised, packed with petroleum jelly and left open. Immobilization by means of plaster of Paris has proved of the highest value, both in transportation and in the subsequent treatment.

(*b*) *The Australian General Hospitals.*—The various Australian General Hospitals are distributed throughout the Middle Eastern Command. Two of them shared in the expedition to Greece, returning after adventures which demonstrated how readily even a Base Hospital may become involved in the mobile warfare of today.

Our own General Hospital accommodates fifteen hundred patients, and has a staff of approximately thirty medical officers, one hundred and forty nurses and two hundred and sixty men. It is the policy of the authorities to concentrate certain types of wounds or disabilities in special therapeutic centres, and three such centres (for orthopaedics,

plastic and facio-maxillary surgery and neuro-surgery) are incorporated in our Hospital.

The Hospital is situated in a featureless expanse of desert, thirty miles from any town, but in strategic proximity to important lines of communication. The accommodation consists of huts, dispersed over an area of some eighty acres within a perimeter fence of barbed wire. The surrounding desert is flat and almost treeless, shimmering with mirage and heat-haze in the summer, when the shade temperature may exceed 120 Fahrenheit. The short winter is characterized by cold winds, chilly nights and the prevalence of dust-storms, which reduce visability to a hundred yards and render conditions very disagreeable. The living conditions are generally comfortable; tennis courts and an outdoor cinema are available, and recreational activities, from cricket to gramophone recitals, have been organized. The supply of water, a major difficulty, has been satisfactorily arranged. Provisions, which are varied and abundant, are in great part brought from Australia. Technical equipment and supply are on a generous scale, so that the conditions of work are much the same as would be encountered in a civil hospital. Few technical supplies can be procured locally, for the secondary industries of Egypt are poorly developed. The frequent arrival of convoys from Australia serves, however, to maintain supply. Enemy aerial activity is frequent, but the Red Cross has been respected.

2. ORGANIZATION WITHIN THE HOSPITAL

The anaesthesia department of an Australian General Hospital is linked with the Surgical Division. There is but one full-time anaesthetist, usually a major and desirably a professional anaesthetist in civil life, although neither of these qualifications is absolute. Since no one anaesthetist could handle the work of a large hospital, assistance is given from the list of officers available for general duties. The use of such "occasional" anaesthetists does not make for punctual or efficient service, so that a full-time deputy anaesthetist has been appointed in our Hospital. Professional anaesthetists being too few in Australia for duplication to be permissible in any one unit, the deputy is drawn from the general-duties list, but is an officer possessing special interest and aptitude for anaesthesia. Such an officer is most likely to be found amongst the more recent graduates, who have graduated since anaesthesia has been deemed worthy of a place in the curriculum of Australian universities.

The unit's anaesthetist enjoys permanency of appointment, so far as is possible in an army on active service. His deputy does not. Young men are much in demand for field units, so that the deputy is apt to be transferred away from the hospital just when he is beginning to be really useful to it. The gap must then be filled from the general-duties list. It is fortunate that Australian medical graduates are generally

versatile, and that most of them can apply the simpler anaesthetic methods very capably. In the absence of a deputy, however, the senior anaesthetist is obliged personally to carry out most of the gas or endotracheal administrations, and he has a strenuous time in consequence.

The operation list is promulgated each afternoon, in advance, by the lieutenant-colonel in charge of the Surgical Division. The senior anaesthetist allocates duties from his list, selecting cases for himself and his deputy, and distributing the remainder amongst as many "occasional" anaesthetists as may be necessary. The morning's work extends from 8 a.m. until noon or later, and involves the use of either two or three operating-theatres and of a room for the application of plaster-of-Paris splints. There is then a lull until 3 p.m., consequent on the great heat of the Egyptian summer. Operating is usually resumed between 3 p.m. and 6 p.m., one theatre and the plaster room being in use. It sometimes happens in the winter or spring that an operation-list has to be cancelled because of a sand-storm, which jeopardizes asepsis and renders injudicious all but the most urgent operations.

The preoperative and postoperative visitation of the patients is performed by the anaesthetist and his deputy. It is a laborious task in view of the widespread area of the camp, and a bicycle is an asset in accomplishing it. "Occasional" anaesthetists have too many other duties to perform to be meticulous in the visitation of patients, but the surgeons usually report any undesirable sequelae (such as postanaesthetic pulmonary infection) to the senior anaesthetist, who then visits the patients concerned. It is usual for the surgeon to suggest, upon the operation list, an appropriate choice of anaesthetic agent and technique, but the anaesthetist has full discretion to modify this after visiting the patient.

Military anaesthetic practice consists of periods of relative quiescence alternating with periods of intense activity. It is in the latter periods that the demand for "occasional" anaesthetists is most marked. On the average, three-quarters of the total work is done by the anaesthetist and his deputy. The remainder is divided between "occasional" anaesthetists and (in the case of local or spinal analgesia) the surgeons. The senior anaesthetist is responsible for the keeping of departmental records, for the maintenance of anaesthetic apparatus and supplies, and for such training in anaesthesia as can be given under the hurried conditions of wartime. This amount is but small, for the senior anaesthetist has his own quota of administrations to perform, and finds little time or energy to assist his juniors in improving their technique. The senior anaesthetist is available as a consultant in medical gas therapy. He is also, in our Hospital, in charge of the workshop. This is a small machine-shop, staffed by one corporal, and engaged in the repair of medical, surgical and anaesthetic apparatus, and in the experimental production of new appliances.

There are many duties in a hospital unit which are military rather than medical. They include, inter alia, the functions of the Convoy Officer, who detrains convoys of wounded; of the Orderly Medical Officer, who is the general-duty medical officer of the day; of the Orderly Officer, who sees to the welfare of the unit's own personnel, and of the Passive Air Defence Officer. These functions are seldom interesting in themselves, but are a necessary burden to be shared by all. Neither the anaesthetist nor his deputy can, from the nature of their employment, carry a fair share of this burden.

3. Conditions of Anaesthetic Practice

Soldiers are usually young men in hard physical condition. They are therefore resistant subjects for anaesthesia, absorbing anaesthetics in large amounts, eliminating them rapidly and shewing fewer after-effects than civilian experience might suggest. Further, soldiers have often undergone the intense emotional experience of battle and of being wounded, so that their psychical state is one of repressed tension. With the removal of voluntary inhibitions during anaesthetic induction, the latent psychical stress is often manifested in shouting, struggling and re-enactment of the battle in which the wound was sustained. The seriously wounded man, in whom psychical tension is combined with physical debility, is often a very difficult subject for anaesthesia.

Although basal narcosis to the point of oblivion might have much to commend it on psychological grounds, its practical application is limited by the extra pre- and postoperative supervision which would be involved. No ward has a sufficiency of nurses or trained orderlies for this purpose, so basal narcosis has been reserved for selected patients only. Sedation, however, is employed as a routine, the available drugs being atropine, morphine, hyoscine, sodium amytal and pentothal sodium. The basal narcotics available are avertin, paraldehyde and oil-ether. The choice of premedicant is made by the individual anaesthetist in collaboration with the surgeon.

Extra carbohydrate, in the form of boiled sweets or glucose powder, is given to all patients in the evening prior to anaesthesia. Postoperatively, sweetened citrus drinks, containing salt, are supplied ad lib. as soon as the patient is able to consume them. The replacement of fluid lost by sweating is very necessary in the Egyptian summer heat, but this fluid is less likely to be vomited by the patient if it contains sodium chloride. Serious losses of fluid or blood are combated by intravenous saline infusion or blood transfusion, the administration of which is the province of a special service within the hospital.

The transportation of the sedatized patient to the theatre and the removal of the anaesthetized patient from it form a major problem. The wards are widely separated; ambulances are few, and their personnel only partially trained. Every attempt is made to ensure that the pa-

tient, before leaving the theatre, shall have partially awakened from the anaesthetic and shall have finished his primary vomiting. He is provided with a pharyngeal airway, unless so far recovered as to be unable to retain one. He is, where possible, placed in the ambulance in the lateral posture, with his head low. Despite these precautions, the transportation of patients is felt to be a weak link in the chain of service. The only apparent remedy would seem to be greater centralization, which is clearly impossible in any hospital situated within range of hostile aircraft.

Postanaesthetic expansion of the lungs by means of carbon dioxide is performed before the patient leaves the theatre. Subsequent inhalations at two- or four-hourly intervals, where necessary, are carried out by the ward sisters. For this purpose, pure carbon dioxide, directed in a gentle stream toward the face, is preferred to carbon dioxide-oxygen mixtures. It is a simple, effective and economical means of administration: further, it dispenses with the need for valves, gauges and masks, which seem to be an embarrassment to the average nursing sister.

The general conditions of practice would be unfamiliar to the anaesthetist transplanted from a university teaching hospital. No longer would he find himself engaged upon a limited number of elective operations, in selected surroundings, and with chosen apparatus. He would find himself expected to do good work with simple appliances, and with no more assistance than can be provided by a nurse or orderly with several other duties to perform. Military operating-theatres are understaffed and, at times, inevitably overworked; they are faced by the imperative necessity of completing their list of operations, however long it may be. These conditions put a premium upon speedy and safe induction, uneventful maintenance and prompt recovery. Finally, the anaesthetist must thoroughly understand the structure of his appliances, so as to be able to maintain and repair them, and to improvise technique to meet unusual requirements.

The official requirements of the Army in respect of records are limited to a mere statement of the name of the anaesthetic employed, its amount, the duration of anaesthesia and the anaesthetist's signature. The present writer and his deputy use a slightly more detailed system. Each patient receives a line in a loose-leaf ledger. Vertical rulings provide columns for serial number, date, age and sex of the patient, the surgeon's name, the anaesthetic agent and technique, the anaesthetic "risk," the duration of anaesthesia, the incidence of vomiting or other undesirable sequelae, and general remarks. The conditions of hurry and improvision, and sometimes of physical fatigue, do not encourage formal blood-pressure charting. Readings are taken in all but minor administrations, but are only recorded upon standard International Anaesthesia Research Society charts in special instances, such as abdominal sections, thoracotomies or major amputations.

4. METHODS OF ANAESTHESIA

Simple methods of anaesthesia are preferred, employing agents which are readily obtainable and which have a wide margin of safety in non-specialist hands. Simplicity becomes an added safeguard at times of stress, with its concomitant hurry and fatigue. Specialized methods, if over-emphasized, may prove an embarrassment to the "occasional" anaesthetist, whilst the limited number of trained anaesthetists can usually achieve their object with relatively simple equipment. The anaesthetics supplied by the Army are as follows:

(*a*) *Ether.*—Ether is probably the best "standard" anaesthetic for military use. It is cheap, readily obtainable and capable of providing adequate muscular relaxation in the majority of soldier patients. It is ideally suited to the "occasional" anaesthetist, since with no other drug is there so wide a margin between the effective and the toxic dosages. The use of ether in field units has been criticized on the grounds of bulkiness and inflammability. The former objection should not be overemphasized. The latter may be material, and caution had to be exercised in the early days of our Hospital, when we also were dependent upon naked lights and kerosene sterilizers. With the provision of an electrical supply, our concern has been correspondingly reduced.

The drawbacks to ether lie in its relatively disagreeable after-effects and its irritant effect upon the lungs. Nausea and vomiting may be materially reduced by skillful administration, and by the preanaesthetic administration of carbohydrate. The irritant effect can be obviated only by appropriate selection of patients. Signs indicative of subclinical bronchitis are to be observed in a proportion (possibly seven per cent) of soldiers living under army conditions in the desert, especially in the sand-storm season. If ether be given to such patients, exacerbation of the bronchitis is likely to occur, especially if the operation be one of coeliotomy, herniotomy or other procedure leading to reduced diaphragmatic excursion. For such patients, therefore, a non-irritant anaesthetic must be preferred to ether.

In our Hospital, ether is employed for the majority of "maintenance" operations, such as herniotomy, tonsillectomy or appendicectomy. The patients are usually healthy and are suitable subjects for this form of anaesthesia. Amongst battle casualties, there is a high percentage of debility produced by wounds, sepsis and anaemia; the incidence of ether cases is correspondingly much reduced in this group.

The "semi-open," perhalational method of administration is employed, because of its simplicity and generally good results. Induction is made more agreeable by the initial administration of ethyl chloride in dosage sufficient to produce amnesia. Should ethyl chloride be not available, resort is made to the carbon dioxide-ether induction or to the chloroform-ether "sequence." It has not been thought worth while to give ether in a closed system with carbon dioxide absorption; the result-

ing economy in ether would have to be set against increased consumption of our limited stocks of oxygen and soda lime. Further, the simplicity of the "semi-open" method commends it to the non-specialist anaesthetists who are the main users of ether. Resort is made freely, in appropriate cases, to endopharyngeal or endotracheal administration of ether vapour. The Magill inhalational technique is ordinarily used for endotracheal anaesthesia, although facilities for the older, insufflational method exist for those who require them.

Despite a contrary opinion frequently expressed, ether has proved quite capable of providing adequate muscular relaxation even in the heat of the Egyptian summer. This need not surprise the Australian anaesthetist, for Egyptian temperatures do not exceed those of many parts of Australia; they are merely unremitting throughout the hot months. Only exceptionally, and in the most resistant subjects, does the effect of ether require to be supplemented by that of chloroform in the induction stage. Even here, a few drops of chloroform or a few drachms of Silk's mixture (chloroform, 1 part; ether, 31 parts) will suffice to overcome the patient's resistance.

(*b*) *Chloroform.*—The portability of chloroform might be expected to recommend it to field units, but its disadvantages are well understood in the Army. In our Hospital, it is very seldom used as an anaesthetic per se, and then usually on account of respiratory disease, by an anaesthetist unfamiliar with gas technique. It is otherwise employed only as an adjuvant to ether anaesthesia.

(*c*) *Gaseous Anaesthetics.*—Nitrous oxide was selected by the Army as its only gaseous anaesthetic. Being manufactured in Australia, its supply was assured. It is the gas most familiar to the largest number of potential users, and it is not inflammable. Ethylene was thought to have few, if any, advantages over nitrous oxide to justify its importation. Cyclopropane, effective and admirably portable as it is, would have required importation; further, only the few professional anaesthetists with the expeditionary force would have been familiar with its administration. For these reasons, the choice was restricted to nitrous oxide, and a gas decanting station was opened in the Middle East for the distribution of Australian-made nitrous oxide to both British and Australian medical units. Oxygen is obtainable commercially in the Middle East.

On the whole, the restriction of gaseous anaesthetics to nitrous oxide has not proved a hardship. In skilled and careful hands, this gas meets practically all requirements. Cyclopropane, although advantageous in individual cases, is not essential. The writer carries a small, private stock of it, upon which he has only once had occasion to draw. He is husbanding the remainder because, in the event of rapid movement, the requirements for several hours' anaesthesia could be carried in a haversack. For general purposes, however, nitrous oxide has served extremely well.

Problems of transportation have so far denied the use of gas anaesthesia to units operating nearer to the front than Casualty Clearing Stations. The value of gas in advanced surgical units was established in the war of 1914–18, so that the present position appears to be retrogressive. On the other hand, it is contended that methods of resuscitation have so advanced since 1918 that the recent casualty can be converted into a reasonable anaesthetic "risk"; a better risk, it is said, than the same patient presents by the time he reaches a Base Hospital, with sepsis well established. The writer, not having served in field units, can offer no opinion on this question. In his experience at the Base, he has found gas anaesthesia desirable in from 20 to 40 per cent of battle casualties, the percentage varying with the tactical situation and the possibility of evacuating the more seriously wounded men to the Base. In using gas on this scale, he has been guided rather by recognition of its benefits than by imperative indications for its use. Although the supply of gases in the Middle East is necessarily limited, it has been possible to use them generously for battle casualties. Economy can be effected in the "maintenance" group of patients, who do not really require this form of anaesthesia, unless it be indicated by the presence of respiratory disease.

Economy in anaesthetic gases has been achieved by resort to carbon dioxide absorption by the canister method. The standard army gas cylinder contains two hundred imperial gallons of nitrous oxide. With continuous-flow administration at the rate of six litres per minute without rebreathing, such a cylinder would have a maximum longevity of two and one-half hours. With the absorption technique, the average longevity has been seven hours; individual cylinders, under favourable conditions in regard to freedom from leakage and rapid stabilization of anaesthesia, have lasted for nearly ten hours. Further, military operations are usually brief and do not allow time for the fullest advantages of absorption to be manifested. Each cylinder serves, on the average, for ten and one-half administrations, the number ranging in individual cases from eight to fourteen. The consumption of nitrous oxide may be thus regarded as fairly low. It could be further reduced only by the employment of a circle absorber with the ether vaporizer in series, a complication of apparatus which would not be worth the while. The soda lime supplied by the Army is American, and approximates to the standard "4–8 mesh."

Facilities are available for endotracheal gas anaesthesia, preferably by the absorption method. There is no provision for anaesthesia under positive pressure, which would make heavy inroads upon the stock of gases. Patients for whom positive pressure might be considered are usually capable of being handled by means of tracheal intubation, followed by absorption anaesthesia at low pressure. A small degree of positive pressure may be secured, in such cases, by manual compression of the gas bag.

The use of ether supplement is often desirable in soldier patients, and is seldom contraindicated. The use of unlimited or almost continuous supplement admittedly sacrifices most of the advantages of gas anaesthesia, and is undesirable. The seeking of muscular relaxation in a resistant subject, at the price of carrying unsupplemented gas anaesthesia to the verge of anoxaemia, is of no less questionable benefit to the patient. The writer's practice has been to allow a reasonable period in which to attain the required plane of anaesthesia without ether supplement. Failing this, and in the absence of any contraindication to ether, he has had no hesitation is employing minimal ether supplement. Once the desired plane of anaesthesia is attained, the ether is discontinued; absorption anaesthesia is initiated, and no further resort to ether may be required for the remainder of the administration. This limited employment of ether has not affected the essential characteristics of gas anaesthesia, as manifested in prompt recovery, absence of after-sickness and freedom from respiratory sequelae. It has, however, shortened the time of induction and reduced the amount of gas-mixture necessary for the stabilization of anaesthesia. These are factors of some importance in military practice, in which reasonably prompt induction and economy of material are desirable, and are more likely to be appreciated than a demonstration of unsupplemented gas anaesthesia, carried out regardless of other considerations. At the same time, cases in this series in which the smallest supplement of ether was employed are separated in the records from those not requiring supplement.

(*d*) *Intravenous Anaesthesia.*—The intravenous anaesthetic supplied by the Army is pentothal sodium. Encouraging reports of its utility are received from field units, in which portability, speedy induction and recovery, and non-inflammability are assets in any anaesthetic. Withal, the place of pentothal in military surgery still remains to be evaluated, and the present war may supply the data necessary to this end.

In our Hospital, pentothal is employed only for minor operations upon relatively good-risk patients. It is used for minor operations and painful dressings in the wards, and to a limited extent in the operating theatres. There has been little inclination to use it for prolonged operations or in debilitated subjects; one patient, suffering from gross sepsis, succumbed in our Hospital from central respiratory failure during anaesthesia with pentothal. In the writer's present opinion, other anaesthetic agents are preferable in states of haemorrhage or sepsis, in suppurative conditions of the neck, and in lesions of the face or jaws which affect the patency of the air passages.

Pentothal has served as a means of speedy premedication in patients who are subsequently to receive gas anaesthesia. As a prelude to ether, it is less satisfactory; the transition is frequently uneven. The administration of pentothal to patients receiving sulphonamide therapy has not been attended, in our Hospital, by untoward results.

(*e*) *Spinal Analgesia.*—There would seem to be little scope for spinal analgesia in field units. In hospitals, its use will be governed largely by personal preference. In our Hospital, it is not employed as a routine. It finds application in such operations as haemorrhoidectomy, herniotomy and cystoscopy, but the total of administrations is small. There is little inclination to employ spinal analgesia for abdominal operations.

The "standard" spinal analgesic supplied by the Army is percaine in 1:1500 "light" solution, and good results have been obtained with it. To meet individual preferences, a 1:200 "heavy" solution of percaine and an eight per cent solution of procain are supplied for "low" spinal analgesia. Most of the administrations have been effected by the surgeons, who prefer to perform the spinal puncture for themselves. This course is unexceptionable, provided that the patient be adequately tended after the intrathecal injection. Arrangements have been made for the retention of the appropriate posture, with head low, in the operating-theatre, in the ambulance and after the return of the patient to bed.

(*f*) *Local Analgesia.*—The scope of local analgesia is restricted by the fact that the average British patient, whether soldier or civilian, prefers general anaesthesia for a major operation, and that surgeons have consequently become accustomed to general anaesthesia for the latter type of case. In our Hospital, local analgesia tends to be reserved for two very different classes of patients, viz. "desperate risks" for whom any form of general anaesthesia would be hazardous, and trivial operations not justifying the induction of general anaesthesia. Further, the induction of local analgesia is time-consuming and hence unsuited to the conditions of a military hospital in a period of activity.

With these provisos, local analgesia finds ample employment in our Hospital. "Contact" analgesia is used for ophthalmic operations, laryngoscopy and bronchoscopy; the drug supplied by the Army is cocaine. Local or regional analgesia is used in minor oto-laryngological, rectal and genito-urinary operations, and in the removal of superficially-situated gunshot fragments. The drug provided is procain. The technique is usually that of infiltration; true nerve block is less often practised.

Local analgesia is usually carried out, in British communities, by the surgeon. This practice has advantages in a military hospital, for it releases busy anaesthetists for duty in other operating-theatres. Only occasionally, and at quiet periods, do the anaesthetists have opportunities to practise local analgesic technique.

(To be concluded in the July issue)