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## CLASSIC PAPER

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### **Observations On Casualties From The Western Desert And Libya Arriving At A Base Hospital Commentary**

JC Clasper

This is another paper that confirms the old adage that those that those who forget the lessons of the past are condemned to repeat its mistakes. Despite the fact that the paper is over 60 years old, many of their findings and recommendations are valid today; it is also interesting to note that the authors, at that time, felt that old lessons (probably from the First World War) had to be relearned.

A lot of the paper is devoted to the use of sulphonamides; although penicillin had been discovered over a decade before it was not commercially available at the time of this paper. The authors certainly recommend its use but do point out that chemotherapy is not a substitute for adequate surgery. This lesson unfortunately had to be relearned in the recent Gulf Conflict. Similarly the error of packing and/or suturing military wounds primarily discussed by the authors, has been revisited on a regular basis.

The authors specifically comment on the excellent general condition of patients with fractures who had been treated by what we would consider old-fashioned methods of stabilisation. Once again during the recent

Gulf Conflict traction, plaster and the Thomas' Splint proved their worth, while more modern methods were associated with a higher complication rate.

Amputation is still a commonly required operation following ballistic trauma, and the findings and recommendations from 60 years ago are also valid today.

One other point that the authors make must be considered. In their experience penetrating abdominal and chest wounds travelled badly, and the authors felt that these cases should be held as long as possible at the first point where a surgical team is located. Modern concepts of forward and damage control surgery will not allow for this and despite the facts that there are far better intensive care and specific evacuation teams today, might this be yet another lesson we have to relearn from the past?

Everyone involved in any stage of the management of these wounds should read this, and other papers from the past. It is interesting to note that the tactics and conduct of battles from antiquity are studied by officers in training, and we should adopt the same policy in the medical services.

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Original Communications

### **Observations On Casualties From The Western Desert And Libya Arriving At A Base Hospital**

By Major GA Mitchell ChM, Major NJ Logie FRCS and Maj RS Handley FRCS

This article was inspired by a remark made by a medical officer that R.A.M.C personnel working in forward and line of communication areas were anxious to know the results of their treatment. between us we have seen almost seven hundred British and Italian casualties, men wounded in every region of the body, including many injured five to nine days before admission, and we have attempted to assess the value of varying types of treatment. Working under conditions of extreme difficulty and faced with problems of transport, supply, terrain and climate uncommon in other theatres of war, the medical officers in forward areas have achieved results which were admirable for the most part, as judged by the condition of the wounded on arrival at the Base. In certain cases, however, the measures adopted were less successful and it is from such that

valuable lessons may be learned, lessons which emphasize that the canons of surgery can seldom be flouted with impunity. By selecting these cases we may apparently present a distorted review, but we have concentrated on the less successful results, not because we are actuated by the desire to criticize but because error rather than success is the great teacher. Incidentally medical officers would gain much useful information about the results of their treatment if they made more use of the official follow-up cards which are available.

#### **Flesh wounds**

Every case admitted had wounds of the soft tissues of varying severity, and many also suffered from damage to other structures. The less serious cases had no treatment except one or more dressings, the favourite

local applications being sulphanilamide and acriflavine, while all except a small minority had received prophylactic doses of anti-tetanic serum. Anti-gas gangrene serum was seldom employed.

The majority of the more serious wounds had been subjected to debridement or complete excision and the resulting cavities had been treated with sulphanilamide. Thereafter the procedure varied. Most of the wounds were left open but sometimes suture was attempted, sometimes the cavity was packed with plain gauze, and a few had been packed and partially sutured, an attempted compromise between open and closed treatments which usually failed. Undoubtedly those wounds which were left open did best. Examples of successful primary sutures were rarities, nearly all having become septic, so that the stitches had to be removed after arrival at the Base. The failures were due to incomplete or too late excision of damaged tissues, the presence of foreign bodies, tight suturing, insufficient drainage or lack of rest; the liberal use of sulphanilamide did not neutralize the neglect of these cardinal points. Loose packs produced no ill-results and may have helped to keep the sulphanilamide in contact with the wound surfaces. Tight packing was encountered several times, mainly in wounds of the extremities, and usually with deplorable results. Pain was excessive, the wounds were septic, the general condition was often poor, and there was the added disadvantage that removal was often impossible without an anaesthetic.

The question of drainage is a difficult one and is closely related to the procedure adopted after cleansing the wound but we believe that certain primary sutures would have succeeded had a separate drainage incision been made in the most dependent position, through which a jaconette or rubber drain could have been inserted. Drainage tubes were seldom employed and counter-incisions were conspicuous by their absence - not a surprising fact, for an infected area requiring such incisions on reaching the Base may well have had adequate drainage through the original wound when last treated. It was found that gauze packing was worse than useless as a method of draining sutured wounds on account of coagulation of the enmeshed exudate; well-vaselined gauze strips are more effective as drains than dry gauze, provided the suturing is not too tight.

A number of attempts had been made in forward areas to remove foreign bodies before radiography was possible and a high proportion of these operations were failures. Therefore unless a foreign body can be seen or felt, or is producing severe symptoms, it is unwise to attempt its removal until accurate localization has been effected and foolish to do a primary suture after such an operation unless all corners of the wound have been inspected.

This is especially true in areas where the presence of important structures or large muscular masses renders exploration difficult or dangerous.

When there are extensive or multiple wounds the advantages of splinting might be considered more frequently, and if tendons or nerves are severed the limb should be maintained by splints in the position most favourable for repair. This important principle of surgery was neglected in several cases and employed with excellent results in others.

### **Haemorrhage**

We have mentioned that tight packing of wounds produced deplorable results. Such packs were doubtless inserted to procure haemostasis and, were the journey between the various medical stations of short duration, no harm might result but, when days may elapse between their insertion and removal, this method should be avoided.

Realizing the difficulties of searching for a divided vessel when working in unfavourable surroundings, perhaps with inadequate instruments and defective lighting, we suggest that if a bleeding point cannot be secured and tight packing is used as a last resort, then the fact should be prominently noted in the Field Medical Card so that the packing can be removed at the first place where reasonable surgical facilities exist. In palmar wounds, where prolonged packing is particularly undesirable, the relative safety of arresting haemorrhage by a palmar pad and a firm bandage over the clenched fist is worth remembering. The bandage can be slackened and readjusted by an orderly whenever necessary, whereas the pressure of a pack cannot be eased so simply. Incidentally, the search for bleeding points would be greatly facilitated if small self-retaining retractors were included in surgical haversacks and operating sets.

No cases were admitted wearing tourniquets but a few arrived in whom layer after layer of bandages had been firmly applied to a limb to control haemorrhage. These had become saturated with dried blood and formed a rigid case constricting the limb, producing severe pain locally and oedema of the parts distally. If exploration and direct control of bleeding is impossible, then the lesser of two evils is the use of a pack rather than of layers of bandages.

Severe grades of anaemia were uncommon but several patients would have benefited from blood or plasma transfusions before being sent down the line.

### **Chemotherapy**

Chemotherapy was used frequently, sulphanilamide or sulphapyridine being given orally, applied locally to the wound, or the two methods were combined.

The dosage given by mouth varied considerably and the regularity of

administration fluctuated as the patient passed from stage to stage of the journey. Calculation made from Field Medical Cards and other documents showed that the amounts given were usually between 1 and 4 grammes daily - seldom more and often less. From a study of the condition of the cases on arrival at the Base we are convinced that those who received the larger doses of the drug showed less local sepsis and had fewer complications and we therefore believe that larger doses should be given orally as a routine and that local applications of sulphanilamide are also advisable because they provide a greater concentration of the drug in the vicinity of the infecting organisms. Oral administration should never be omitted, because local applications may be washed out of the wound if the discharge is profuse or the drug may all be absorbed and excreted within sixty hours. We are fortunate in having Major G. A. H. Buttle as a colleague, and after careful consideration of many cases we are in agreement that the present dosage recommended in official memoranda for the prophylaxis of wound infection is inadequate and we suggest that all wounds should be dusted with finely powdered sulphanilamide as soon as possible after wounding. The amount to be used must obviously depend on the size or number of the wounds, but the total

applied should not exceed 15 grammes at one time. A further local application of a similar amount should be made in all severe injuries when surgical cleansing of the wound(s) is undertaken. Such applications would be greatly facilitated if medical officers and units were provided with cellophane packets or tubes each containing 5 grammes of finely powdered sterile sulphanilamide. Such packets might actually be enclosed in the first field dressing. Oral administration consisting of 3 tablets (1.5 grammes) thrice daily should commence as soon as possible, and certainly within twenty-four hours of the occurrence of the casualty, and should be continued for six days. The dates, times and the dosages given should be carefully recorded in the Field Medical Cards. In practice, as we have said, the doses were given sporadically and, in order to ensure regularity, a characteristic label might be provided which could be attached in a conspicuous position to men selected by medical officers for chemotherapy. Thereafter, wherever the man might go and by whatever method of transport the fact would be patent that he was receiving sulphanilamide and an orderly could go round at stated times with a supply of the drug, give 3 tablets to each man wearing the label, and at the same time record the fact by marking the card with an X in the appropriate place. It is simple to devise a

**SULPHANILAMIDE**

NUMBER	NAME	UNIT	DATE WOUNDED

**INSTRUCTIONS FOR THE PROPHYLAXIS OF WOUND INFECTION.**  
 Apply 5 - 15 gms. of powdered sulphanilamide locally as soon as possible and a further 5 - 15 gms after surgical treatment.  
 Commence oral administration of 3 tablets thrice daily within 24 hours of wounding and continue for 6 days.  
 Eggs, Epsom Salts, etc., should not be given during treatment.  
**RECORD ALL DOSES ON THE REVERSE SIDE OF THIS LABEL.**

**SULPHANILAMIDE**

Fig. 1 Front of label.

**SULPHANILAMIDE**

DATE	TIME		No. OF TABLETS
	HOURS		
	06.00		
	12.00		
	18.00		
	06.00		
	12.00		
	18.00		
	06.00		
	12.00		
	18.00		

**RECORD OF ORAL DOSES.**

5/10/15 gms. APPLIED \_\_\_\_\_  
 DATE \_\_\_\_\_

**RECORD OF LOCAL APPLICATIONS.**

5/10/15 gms. APPLIED \_\_\_\_\_  
 DATE \_\_\_\_\_

**SULPHANILAMIDE**

Fig. 2 Obverse of label.  
 In practice the label could be white with red border

printed label which reduces writing to an absolute minimum (figs. 1 and 2).

If serious infection supervenes, or if the wound is already infected when the man is first seen, then larger doses are required, for example 5 to 6 tablets every six hours (10 to 12 grammes daily) for the first two days, the dose being gradually reduced as the condition improves. Such doses were never given before admission even in severe cases. Should gas-gangrene develop or be suspected, sulphapyridine should be given instead of sulphanilamide because, although both act against *Cl. welchii*, the former is slightly more active against the *Cl. septique*. These larger doses are potentially dangerous if continued for more than seven to ten days, but by that time the patient would have reached a unit where a blood examination could be performed. Apart from minor degrees of cyanosis no soldier was admitted who suffered from chemotherapy; a number may have suffered from the lack of it. It is interesting to record that we have twice found that complications due to haemolytic streptococcal infection can develop in patients receiving 8 grammes sulphanilamide daily.

As regards local applications sulphanilamide apparently produced better results than such antiseptics as eusol, acriflavine or hydrogen peroxide, and this was particularly noticeable in cases where the dressings had not been changed for three days or more. Under such conditions those treated with the usual antiseptics were often heavily infected, whereas those dressed with sulphanilamide were often surprisingly clean. Those wounds which had not responded so well to sulphanilamide were found to be infected with staphylococci - usually *S aureus*.

Whether or not the best method of applying the drug locally has yet been found is questionable. Application to deep or complicated cavities is always difficult, for example to the knee-joint or to large wounds made by modern missiles where the underlying damage is often so much more extensive than the size of the superficial wound would lead one to expect. In cases arriving at the Base it was found that in superficial wounds the powder was more adherent to the dressings than to the raw surface and was removed with the soiled dressings while, in many cases, it was apparent that incompletely crushed tablets had been used both for surface application and for insertion into cavities. Thus in cases with deep wounds irregular masses were found to be extruding from the cavities and sulphanilamide in this lumpy state can scarcely be expected to exert its maximum effect.

In co-operation with Major G.A.H. Buttle we have been experimenting with various methods which could be employed in forward and line of communication areas. For example in surface wounds sulphanilamide may be used as a fine powder applied evenly under a

vaseline spread (in our opinion the best method); as an ointment (5 grammes sulphanilamide to one ounce vaseline) applied directly to the wound or spread on gauze or lint; in the form of a solution containing 5 per cent sulphanilamide, 20 per cent dextrose and 4 per cent sodium bicarbonate, in which the dressings may be soaked or which may be sprayed on the wound, left for ten to fifteen minutes and then covered by a vaseline spread. This last method produces a third adherent film of the drug over the entire wound area. For deep cavities and complicated spaces a solution containing 5 to 8 per cent sulphanilamide in 80 to 100 per cent glycerine provides an easy method of introducing the drug to every recess and it also makes an almost non-adherent dressing for more superficial wounds.

### Fractures

Very few fractures had been missed. All others had been treated in orthodox ways, and the great majority arrived in excellent general condition. Most of the fractures were compound and comminuted and many were complicated by involvement of joints, vessels or nerves. Nearly all those had been operated upon and fixed in wooden, wire, or improvised splint in plaster or, in the case of fractured femora, in Thomas' splints. The few who arrived in poor condition had other injuries, usually visceral, or their wounds had become heavily infected.

The results being generally so effective, we have little to offer in the way of constructive criticism. Plaster of Paris, the best form of support for most limb fractures, might have been used more often and, when it was employed, the casings were sometimes too short or too thin for adequate support although this may have been due to a scarcity of plaster in the forward areas. The use of plaster slabs was not sufficiently appreciated. These can be held in position by a few circular turns of a plaster bandage, the result being a case very thick and strong in one sector to give adequate support, and so thin elsewhere that it may be cut with ordinary scissors should the need arise (actually we saw no instance of damage from too tight a plaster). Plaster splints composed entirely of circular turns are less strong, weight for weight, than those employing the girder principle, and their uniform thickness precludes their easy removal without special instruments. The slab method, therefore, not only saves plaster but also possesses definite advantages over the circular method of application. When removal of the case is likely to be required within two or three weeks, vaseline smeared over the skin prevents adhesion of the plaster to the hairs, thus avoiding what we found to be a common cause of pain and inconvenience. In addition if an open infected fracture exists vaseline helps to protect the skin from secondary infection.

Men with fractured femora had their injured

limbs fixed in Thomas' splints but extension was usually omitted. No spring boot clips were in evidence and we concluded they are not available. The alternative clovehitch and windlass method was only seen once. The limbs well fixed, so no great shock had resulted but, nevertheless, extension is desirable though heavy traction is not required to enhance the efficiency of the fixation. Cases have been reported where a tightly applied clove-hitch had caused sloughing and, during the long journey from the desert front, this would have been very liable to occur. Some such thoughts may have been in the minds of the medical officers who neglected this method of extension. The rings of the splints often bore relationship to the size of the thigh, and the provision of splints with adjustable rings or detachable rings of varying sizes would be a useful addition to the medical equipment. Colonel Monro, Consulting Surgeon, M.E.F., has suggested that in fractures of the lower limb the use of plaster slabs, with plaster bandage ties incorporating the side arms of a Thomas' splint, would give better fixation than the splint used alone. In two cases where we saw this method employed - one an officer with a compound fracture of the femoral condyles and the other a serjeant-pilot suffering from a fracture-dislocation of a knee - the results were excellent and the method deserves wide adoption.

Those with fractures in the region of the knee joint or of the leg bones were more comfortable in plaster cases than in Thomas's splints alone. Tightly laced boots were a source of discomfort in several cases and if the boots are not removed the laces should be cut. Of course with fractured humeri some had splints and some had none but all wore wide or narrow fold slings and a few had the arm bound to the side by a binder, an arrangement which proved most comfortable.

The battle casualties with fractured ribs or pelvis and penetrating or perforating injuries of the chest or abdomen and those with fractures of the skull or vertebral arches had evidence of damage to the brain or spinal cord. The visceral lesions overshadowed the symptoms and signs of the fractures and no treatment of the bony injuries had been attempted. Three cases with fractures of vertebral bodies without evidence of cord lesions, having been handled and transported correctly.

Only two men with severe cervico-facial injuries were admitted. One, who had had one side of his face and neck blown away nine days before, with great maxillary and mandibular destruction, could swallow nothing except small amounts of fluids and was slowly starving. A gastrostomy led to temporary improvement until a fatal bronchopneumonia supervened. He might have survived had a gastrostomy been done at an earlier stage. The other case was less severe, deglutition was scarcely affected, and he did remarkably well

after wiring of the mandible and secondary suture.

### **Amputations**

No amputation case arrived in good condition, this being due to various factors but particularly to insufficient general and local rest following operation. Some evacuated soon after operation died before they reached the Base and the others exhibited various degrees of surgical shock. When rapid evacuation of amputation cases is imperative, the journey may be made more tolerable if a plaster cap is applied which can be removed and replaced like a finger cot. Such caps keep dressings in position, minimise swelling, give support to the stump, and protect it from the minor traumata incidental to transport. The removal of the cap is facilitated if in the first place the skin is smeared with vaseline or covered with thin vaseline gauze spreads.

Owing to skin destruction and other causes amputations in war casualties cannot always be performed at the sites of election and unorthodox skin flaps or shortish stumps may be unavoidable, but too long stumps and too tight suturing of skin flaps are avoidable. We saw one case of Syme's amputation where sepsis had supervened with partial sloughing of the heel flap. Secondary haemorrhage occurred ten days after the initial operation necessitating re-amputation through the leg. As it is more difficult to fashion a prosthesis for a Syme's amputation than for one at the site of election, should not the former method be discarded?

Men with guillotine amputations were all dangerously ill on arrival. They all had severe pain, their wounds were heavily infected, the stumps were acutely tender, and loss of serum was a pronounced feature. A guillotine amputation is necessary only in the gravest cases; in the others the few extra minutes required to fashion and loosely suture short skin flaps may increase the operative risk slightly but this is more than counter-balanced by the greater safety and comfort of the subsequent journey. This lesson was clearly impressed upon us by a comparison of the various types of amputation. The increasing availability and use of blood and plasma will greatly reduce the necessity for extreme haste.

The mention of haste raises another problem. Two men were admitted with guillotine amputations performed through the head of the tibia, about two inches below the joint, almost the thickest part of the bone. As re-amputation would clearly be required, disarticulation through the knee would have been easier and would have meant less haemorrhage, less shock, less subsequent loss of serum, less pain and less septic absorption from the largely cartilaginous and tendinous raw areas left, while short skin flaps might have been fashioned from the skin which in both cases was intact at the level of tibial section. The moral is this: disarticulation should be

performed in every case where a guillotine amputation would otherwise be necessary immediately below the elbow or the knee.

Skin retraction in guillotine always occurs and some form of skin extension is essential; otherwise the surgeon who reamputates may have to sacrifice more bone than is desirable. This extension should be applied at the time of operation and U-shaped elastoplast straps fixed over the stump dressing do much to counteract shrinking; thereafter a plaster cap can be applied. A more elaborate method is to fix elastoplast extensions to the skin, apply the appropriate Thomas' splint and tie the strapping under tension to the side bars or end-piece.

One last point, interesting though not strictly apposite, may be interpolated here. Four men with amputations had a notch in their Field Medical Cards to the effect that the ablations had been performed for "gangrene" and anti-gas-gangrene serum and sulphanilamide had also been given. Anaerobic infection, therefore, was either diagnosed or suspected. If they were suffering from gas-gangrene the recovery rate contrasts forcibly with our experience of similar cases treated days later at the Base where only one of six proved cases survived - sad confirmation of the dangers of delayed treatment in these infections.

#### **Wounds Involving the Body Cavities.**

Cases with spinal and cranial injuries withstood the ordeal of the journey better than those suffering from wounds of the other body cavities. One case with a hernia cerebri had signs of a meningo-encephalitis, but whether he contracted the infection at the time of injury or later it is impossible to tell; three other similar cases arrived in good condition. A soldier, paraplegic from the sixth thoracic segment downwards, had required frequent catheterization and had developed a severe cystitis and urethritis. Quite apart from the danger of infection, instrumentation is a difficult matter during transport, and an early suprapubic cystostomy helps to circumvent both these problems. Instructions could be given to an orderly re regular emptying and absorbent dressing would minimize the risk of bed soiling and consequent skin irritation. Protection or anaesthetic skin over pressure points such as the sacrum and heels is imperative, a pad of wool retained in position by bandages or adhesive plaster being efficient; strapping alone does much to prevent direct friction but may itself produce skin irritation, two paraplegic cases had sacral pressure sores and one a heel sore which had not been treated before admission.

Men with penetrating and perforating abdominal and chest wounds should not be sent further than is absolutely necessary as, in our experience they travel badly. Twenty chest and eleven abdominal cases which were admitted were all seriously or dangerously ill.

The most careful selection should be made before men with such injuries are subjected to a prolonged and at the best of times trying journey. A true assessment of the progress of such cases, favourable or unfavourable can only be made by constant observation, preferably by the same person, and this is a sound reason for retaining these cases as long as possible at the first point where a surgical team is located. It is courting disaster to send soldiers with abdominal wounds straight to the Base, even those which are apparently simple, for it is axiomatic that any wound of the abdominal parietes should be treated as a wound involving the peritoneal cavity until this can be definitely disproved. The following two cases illustrate this point: one man had an intestinal obstruction as a result of a small perforating abdominal wound five days before and another with a similar injury had developed a general peritonitis and ileus. We have been able to verify the already well-established facts that the size of an entry wound may bear no relationship to the amount of internal damage and that wounds of the buttock, groin or perineum are often complicated by injuries to abdominal or pelvic viscera or to the urethra. The danger of overlooking a ruptured urethra was well exemplified in a man who was found on arrival to have widespread extravasation of urine from such a lesion with gangrene of all the superficial tissues of the perineum and genitalia; he died a few days later from secondary haemorrhage. Recovery might have occurred had an early suprapubic cystostomy been performed and free drainage provided at the site of extravasation.

The remarks about abdominal cases apply with almost equal force to chest injuries and the fact that wounds of the root of the neck or shoulder regions are liable to be accompanied by intrathoracic lesions was sometimes forgotten. Several men who arrived with large accumulations of blood or sanguino-pus in a pleural cavity would have suffered less cardiac and respiratory embarrassment had a paracentesis been performed before evacuation. This procedure may tend to restart haemorrhage but this danger can be averted by air replacement and by retaining cases for twenty-four to forty-eight hours after paracentesis. It would then be easy to determine whether fresh bleeding had occurred and if not the subsequent journey could be made in relative comfort and safety. One man with a sucking pneumothorax came under observation with such overwhelming infection of the pleura and parietes that he was beyond surgical aid.

This article was written before we knew that an Official Memorandum (M.E, Technical Instructions, 1941, No. 3 0 War surgery) was in the course of production and it is significant that, broadly speaking, the conclusions are similar, although the memorandum deals chiefly with experiences in other theatres of

war.

We wish to express our thanks to Colonel H.J.A Longmore for permission to forward this article for publication and to our medical and nursing colleagues on the staff of the

hospital who have helped us in innumerable ways in the treatment of our cases. We are especially indebted to Colonel Monro, Consultant in surgery G.H.Q., M.E. for much helpful criticism and advice.