solubilities of acetyl sulphapyridine and acetyl sulphathiazole are 32.6 and 5.8 at pH 5.5, and 36.5 and 25.1 at pH 7.5.

Dosage.—In these two cases both the daily dose of 4 g. and the total amounts administered—9 and 13 g. respectively—are low to have brought about anuria, and suggest a personal idiosyncrasy to the drug. The case reported by Laird had 1 g. four-hourly, with a total of 11 g.; the fatal case reported by Carson and Smith received 1 g. four-hourly, with a total of 22 g.; and the successful case reported by Benson and Percival received 21 g. in 3 days. These and other cases make it clear that without an adequate fluid intake anuria may occur with any therapeutically efficient dosage of sulphapyridine and sulphathiazole.

Diagnosis and Treatment.—The diagnosis is obvious, the early symptoms being haematuria, diminished secretion of urine, and pain in the loin which may radiate down to the groin, associated with persistent vomiting. If conservative treatment such as intravenous salines and large quantities of fluid by mouth does not relieve the symptoms quickly—say within six hours—it would seem wise to catheterize the ureters without delay. Such early treatment would appear to give the best chance of recovery and prevent permanent renal damage.

The cystoscopic appearances in Case II are similar to the necropsy findings reported by Carson and Smith, who also found the ureters blocked by crystalline debris. It seems probable in this case that when renal secretion was re-established secondary ureteric obstruction was avoided by the presence of ureteric catheters *in situ*. Having regard to the general condition of the patient, we have little doubt that in the absence of ureteric catheterization this case would have ended fatally.

Attention is drawn to two causes which may make the passage of ureteric catheters difficult or impossible—namely, crystals of the drug in the ureter, and the presence of a ureterocele. Case I demonstrated how rapidly ureteroceles may progress, and it seems likely that had the operation been delayed longer the passage of a ureteric catheter on either side would have been impossible.

Addendum

Since writing this paper one of us (A. G. J.) has had another case which supports the contention that early catheterization is the proper treatment of this condition—to secure drainage from and to provide a method of washing out the renal pelvis, also to prevent subsequent ureteric obstruction from blood and debris.

Briefly, the case history is that of a man aged 26 admitted to hospital with an acute epididymo-orchitis. A centrifuge deposit of urine showed pus cells in moderate number and a few organisms. Culture gave a growth of *B. coli*. He was nursed in bed, fluid intake was approximately six pints daily, and sulphapyridine 5 g. daily was given. On the third day, when a total of 15 g. of sulphapyridine had been taken, he passed deeply blood-stained urine, and complained of severe loin and abdominal pain, with vomiting. Six hours later, as no urine had been passed, he was cystoscoped under a general anaesthetic, and intravenous fluids were started. The bladder was empty but otherwise normal, and catheters were passed easily up both ureters. Almost at once heavily blood-stained urine, containing crystals of sulphapyridine, was recovered from the left side. As there was no secretion from the right side 5 c.cm. of normal saline was injected into the renal pelvis, and secretion from this side was established some two hours later. Urine was passed round the catheters the next morning and they were removed. Subsequent progress was satisfactory, the urine being clear of blood on the fourth day.

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IMMOBILIZATION AND TRANSPORTATION OF THE FRACTURED FEMUR IN WAR

BY

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The ideal method of transporting compound fractures of the femur from forward areas in warfare is undoubtedly the spica plaster. Trueta, following his experiences in the Spanish Civil War, has strongly advocated it. He and Böhler have pointed out the great importance of rest, not only for fractured bone but even more so for the lacerated muscles. They both agree that the most efficient splintage is the unpadded plaster spica. Trueta's method is undoubtedly ideal where distances are short, roads good, train transport luxurious and rapid, and the number of casualties small. In North Africa, however, where work at the field ambulances and C.C.S. has been heavy and quick evacuation imperative, where the roads are bad, and where single-track railways make evacuation slow, the spica plaster has not been found satisfactory. Here there are no ambulance trains de luxe, and patients evacuated to the base travel a distance of 400 miles or more on stretchers, on which the spica does not lie snugly. Bad roads or badly sprung railway trucks cause considerable shaking, resulting in friction sores on the buttocks, chest, or back. Similar conditions occur in sea transport; for the spica does not fit the cot, and the roll of the ship makes retention difficult and friction sores develop.

From the field ambulance or C.C.S. the wounded man is sent back to a forward hospital. Should complications arise or other wounds require treatment, he is retained there until fit to travel to the base hospital. This may be a period of many weeks, so the importance of correct fixation and alignment of the fracture is obvious.

Fractures of the femur have been evacuated to the base hospitals in North Africa by what is known as the "Tobruk" method, a description of which is as follows: When the toilet of the wound is completed a strapping extension is applied to each side of the limb, but circular strapping is not used for fear of subsequent swelling. A long plaster slab extending from the top of the thigh to the extremity of the toes is retained in position with circular plaster bandages. The tapes of the strapping emerge from the plaster above the ankle on either side, the plaster being cut around the points of exit. The plaster is split down the anterior aspect over a piece of rubber tubing which has previously been placed on the limb. A Thomas splint is fitted and the tapes protruding from the plaster are fastened to the end. Further circular plaster bandages from the thigh to the lower third of the leg keep the limb steady on the splint.

The "Tobruk" method is good for a short period, inasmuch as the patient travels in comparative comfort. Shortening, however, invariably occurs. This method is permissible for

the journey from a C.C.S. to a forward hospital, but if retained after a period of four or five days muscle spasm must be overcome by some means or other before full length can be obtained. The "Tobruk" method is mechanically unsound, for the plaster around the knee will counteract the pull of the strapping extension. Another cause of shortening is the failure to apply a perfectly fitting Thomas splint. The art of doing so appears to be dying out, especially among the younger generation of surgeons.

The ideal method of fixing these fractures (a) must ensure adequate fixation over a period of some weeks, (b) must entail the minimum of attention, and (c) must be easily transportable.

Method of Fixation

I have tried out a method in a forward hospital in North Africa which would appear to fulfil these requirements. It is

essentially the principle devised by Thomas and still practised by the Liverpool school. I have simply substituted an all-metal line of extension for the strapping. The latter requires constant daily attention, which it is impossible to give during transportation. Should the case be complicated by flesh wounds of the lower leg, strapping extension is altogether impossible.

The diagram of this method is self-explanatory. The pin and stirrup should be fitted under aseptic precautions before the surgeon deals with the wound. On completion of the operation, a thick posterior plaster slab is applied from below the knee to the extremity of the toes and retained in place with cotton bandage. The Thomas splint is applied, the surgeon seeing that it fits snugly round the thigh. While an assistant exerts traction on the stirrup the surgeon fastens it to the end of the splint by means of a piece of box wire, the ends of which should be left long.

The success of the method depends on the accurate fitting of the Thomas splint. If the ring is too small pressure will be borne on the upper thigh, leading to interference with the venous return. If the ring is too large pressure will occur on the anterior superior iliac spine, leading to an early pressure-sore, or else the ring will pass up into the folds of the buttock, interfering with defaecation or micturition. If the ring is too large it can be made to fit by padding the outer third with felt. If it is too small it can be divided on the posterior and inner aspect. It is important to bend the splint to an angle of 165 degrees at the knee-joint. If a straight splint is used the knee remains in full extension, which is uncomfortable and predisposes to backward bowing of the femur. Should full length of the limb not be obtained at the first fixation a lapse of four or five days will result in loss of muscle spasm, when the shortening can be overcome by application of a fresh wire. The ideal time for the application of this form of fixation is at the primary operation before muscle spasm has appeared. If extension is applied early there is no difficulty in procuring full length of the limb; the tendency would rather be to over-distract the fragments. This can be rectified later by slackening off the wire.

This mode of traction is ideal for fractures of the lower three-fourths of the femur and should produce perfect alignment. It is of course not suitable for fractures of the upper fourth where abduction of the proximal fragment occurs. It will, however, retain full length of the limb until the patient reaches the base hospital, where abduction treatment is facilitated.

Shortening of the limb must never be permitted in compound fractures, for it may lead to dire consequences. The first is mobility of the bone fragments. If this is allowed, muscle cells are repeatedly torn and die, thereby affording nourishment to the ever-lurking organism, which not only delays union and healing of the wound but may upset the delicate balance existing between the invading microbe and the natural resistances of the body. The second is the mobility allowed to the muscles. Lacerated muscles which are not kept at rest weep profusely, thereby causing loss of fluid from the body. The intermuscular septa open up when muscles are lax and form pockets in which pus will readily collect and track up the thigh. If the muscles are taut the intermuscular septa are closed and form a barrier to the extension of infection. The criterion of good surgery is the amount of discharge from the wound. If the wound has been well and properly saucerized, if bone fragments are in good position, and if muscles are taut and motionless, discharge will be at a minimum. If, on the other hand, the discharge is profuse we know that either the surgery or the fixation is at fault.

Advantages of the Method

The advantages of this form of immobilization over the "Tobruk" method are: (1) The whole limb is on view, so that gas gangrene or other infections can be detected early. (2) Re-dressing of the wound, if necessary, is simple. (3) Re-operation, if required, can be done with the splint *in situ*. (4) It is pre-eminently suitable if there are soft-tissue wounds of the leg. (5) Further manipulation and fixations are unnecessary, as shortening of the limb cannot occur. (6) There is no possibility of plaster sores or interference with the circulation. (7) Patients can be transported any distance, even by sea, with strict immobilization and the minimum of attention.

LOCAL CHEMOTHERAPY IN CHRONIC (NON-RHEUMATOID) RHEUMATISM

BY

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Local chemotherapy denotes the therapeutic action of chemical substances so applied that immediate effect is confined to the area treated. It also suggests, if not implies, local bacteriostatic or bactericidal influence, which raises the objection that the existence of organisms in the rheumatic lesion is far from being proved. This is indeed a link missing in the chain of argument, but facts accumulate which seem to demand that hypothesis to explain them. At any rate, this sort of rationale is proposed for the present treatment.

Preliminary Diagnostic Investigation

It will be seen that a system founded upon the vital importance of the local rheumatic lesion requires the lesion to be defined with the greatest exactitude. Considerations of space prevent more than one example of how this need is met. In rheumatic sciatica diagnosis only begins with the discovery of signs, with errors of posture, and with the elimination of possibly non-rheumatic causes. It is when such matters have been finished with that location starts. The patient's pain may give direction if it is increased by coughing, sneezing, walking, sitting, bending the neck, or inclining the trunk towards or away from the affected side. Rectal examination will reveal tenderness of sacral roots or spasm of pyriformis; while the whole area must be searched for altered skin sensation. Guttman's (1940) colorimetric investigation of sweat secretion gives useful aid; but most important is the exploratory massage of lumbar, sacral, and gluteal regions, which discloses the various muscular lesions which may play their part in the syndrome. There is nothing new in such mapping of rheumatic geography except its thoroughness; and, indeed, ordinary physical treatment does not demand the same meticulous definition.

Composition of Injection and Method of Use

The trial of numerous essential oils over many years has not revealed the special power of any unusual medicament. The use of oil of niouli in osteo-arthritis was described (Scott, 1938), and an oily suspension of streptococcal substance won success (Scott, 1936a, 1936b); but no advance has been made upon a 10% solution of benzyl salicylate in oil. This is the mixture administered in the series described below.

Points of attack determined, the operator plans his dosage. Idiosyncrasy to the oil-soluble salicylate does not occur, though tolerance will vary. It will soon be seen that previous workers have failed of significant success because in fibrositis their dose was far too small, but in the treatment of joints much too large. In the former 20 c.cm., rising to 50 or 60 c.cm., is usually well tolerated; whereas with joints 0.1 c.cm. to 0.2 c.cm. must not be exceeded. Large injections are followed by malaise and pyrexia, but the effects soon pass. It is curious how closely the rules for vaccine administration govern the treatment—weekly spacing, rising doses, negative phase, and improving tolerance.

Results

Since 1932 about 1,500 patients have been dealt with, but some of earlier date are not now traceable, and, indeed, belong to a period when many problems of technique were fluid. A series of 96 recent and consecutive cases is therefore presented. All were treated over the past three years in a provincial town and have the corroboration of their doctor. A rigid standard of success has been applied, for "good result" is not claimed unless function, recovered on discharge, remains complete to date. Milder cases were rejected, as also all new cases of the rheumatoid type and osteo-arthritis of the hip, which do not benefit. Out of the 96 cases, 76 results are returned as good, 14 as fair, and 6 as failures. Twelve cases, the most severe, are described below in some detail; with these contact has been maintained so that points of interest may be verified.