Gunterian Lecture

[IN ABRIDGED FORM]

ON

THE EARLY TREATMENT OF COMPOUND FRACTURES AND OTHER SEVERE INJURIES OF THE UPPER LIMB.

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IN introductory remarks the lecturer said: I shall attempt to deal with general principles rather than with detailed technique. The subject is considered under (1) methods suitable in the early hours of the injury and whose object is the conversion of a compound into a simple fracture by excision and suture, and (2) methods used if sepsis has set in. The treatment of the first of these groups has usually been undertaken at the casualty clearing stations, and that of the second group at the base hospitals, so that in splinting early cases a period of transport has to be considered. In the base hospitals the most suitable splint can be used, regardless of transport. The superiority of the worst natural arm over the best artificial one should make the most conservative surgeon more conservative still.

PRIMARY SUTURE.

The primary excision and suture of wounds, which has been so successful during the last two years, has improved results enormously.

INJURIES WITHOUT FRACTURES.

In injuries without fracture the whole track can usually be excised *en bloc* and the question of immediate or delayed suture will depend upon whether the case can be retained for at least 7 to 10 days, or must be evacuated forthwith. When suture is performed an attempt should be made to restore the functional anatomy of the limb, torn muscles being united or grafted into others of the same group, inter-muscular compartments and tendon sheaths restored where possible, and particular attention given to repair of the deep fascia. Where careful previous examination is possible, it will usually be evident which nerves are out of action, and these should be traced and united wherever the injury permits. Even should the wound pursue a septic course union of divided nerves will prevent retraction, greatly facilitating later reparative operations.

In many injuries by either shell or bullet, entrance and exit wounds are small in comparison with the extensive muscular damage, calling for very careful and extensive excision. Extensive muscular hæmatomata, or even a diffuse infiltration of the whole limb with blood may be found. All such blood-clot should be carefully turned out, and if the actual bleeding point cannot be tied, as, for example, occasionally in the upper forearm, the main vessel should be ligatured above, sufficiently high to control the bleeding. Both artery and vein should be tied, since, as Sir George Makins has pointed out, gangrene is more likely to follow ligature of the artery alone than ligature of both vessels. In such cases closure of the wound should be delayed for at least 48 hours, or until the danger of a sudden acute infection is past, and the limb must be kept thoroughly warm, particularly if immobilised in a Thomas splint. If the wounds are at all extensive the limb should be splinted as carefully as if a fracture were present.

There is the vexed question as to whether any antiseptic substance should or should not be left in the wound after excision. In these early excisions there seems little doubt that an almost similar percentage of successes can be claimed by surgeons using different antiseptics or none at all. Where primary suture is practised, heat, either in the form of fomentations or as electric or hot-air baths, is of value. The process of repair tends to be somewhat sluggish, and sutures should be left in place at least 12 to 14 days, as otherwise troublesome gaping is likely to occur on their removal. Temperatures of 101°, or even 102° or 103° F., are not at all uncommon after successful excisions, and the pulse-rate and the local symptoms of the wound form the only reliable guide to interference.

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WOUNDS COMPLICATED BY FRACTURES.

If these cases can be operated on sufficiently early as great a proportion of success can be hoped for from excision and suture as in wounds of the soft parts alone. The same general principles apply, though it is usually impossible in cases of fracture to excise the whole wound *en bloc*.

In the upper limb a more radical removal of bone fragments is justifiable than in the case of the lower limb. The French surgeons practise a most extensive removal of all loose or even partially loose fragments in their "débridement" operations, while the tendency of English surgery is to leave any fragment which may possibly live *in situ*. In most fractures of the upper limb a middle course is perhaps best, but all completely loose fragments should usually be removed, since not only are the chances of primary union improved thereby, but the formation of an involucrum is avoided, which in the forearm or hand is often very disabling. An exception should be made in the case of fragments bearing a portion of an articular surface, since the disability attending their removal usually justifies the risk of their retention except in certain places to be mentioned later. The cleansing of the ends of the main fragments can generally be satisfactorily performed with a sharp spoon, though if there is no great loss of substance the removal of a thin layer from each end is perhaps safer.

Fracture of the Humerus.

This bone is particularly favourable for treatment on account of the comparative ease with which it can be reached and dealt with and the wide muscular excisions that can be performed, and partly on account of the rapidity with which it throws out callus even after very extensive loss of substance.

In fracture of the shaft, after excision has been performed, the limb has usually been put up in extension in a straight Thomas splint with swivel ring or in the suspension extension splint described later. If the straight splint is used the limb should be kept quiet in this for at least a fortnight, when gradual movement may be begun. In the upper third of the humerus, if excision has proved possible, position during transport has usually been best maintained in a Thomas splint without a swivel ring, and with the arm at right angles to the body.

Fractures of the lower end of the shaft are often very difficult to deal with, and in the later infected stages a good many cases are seen with very considerable disability from malposition. The almost invariable trouble is the forward tilting of the upper end of the lower fragment, which is accentuated by the straight Thomas splint in which they are often put up. Where excision and closure can be performed the most satisfactory result in such cases seems to be obtained by putting them up in extreme flexion, as for a separated epiphysis, and steadying the line of the bone by an acutely flexed internal or external angular splint with a long upper limb.

In all compound fractures of this bone the musculo-spiral group of muscles should be examined before operation if possible, and if apparent paralysis is present the nerve should be examined and repaired if necessary and feasible. Dorsi-flexion of the wrist must be maintained in any after-fixation, and if the nerve is found to be anatomically injured it is sometimes a good plan to maintain such dorsi-flexion during repair by excision of an elliptical portion of skin on the back of the hand followed by linear suture, as described by Sir Robert Jones in the treatment of infantile paralysis affecting the elbow flexors.

Fractures of the Forearm.

Where only one bone of the forearm is fractured free excision of the infected ends can usually be practised, and especial care should be taken to reconstitute as far as possible the contour of the bone to obviate troublesome adhesions of tendons. The middle third of the radius presents special difficulties, and unless the pronator radii teres can be made to act as a splint the attainment of anything like perfect position is often difficult or impossible.

In injuries to the upper end of the radius where the fracture involves the articular surface, as it so frequently does, it is often best to excise the head of the bone at the primary operation. If movement is begun early very good results can be obtained; a more conservative practice is often followed by considerable disability.

With fractures of both bones, particularly if loss of substance is at all extensive, there are often considerable

difficulties. In the first place, the numerous tendons prevent a satisfactory excision of the soft parts, while, as regards the bones, the maintenance of good position and the prevention of cross union; particularly where the fracture includes the radius in its middle third, is extremely difficult. Care should be taken to reconstitute as far as possible the mesial surfaces of the bones, and fragments projecting in this plane should be removed if they cannot be readjusted.

In forearm fractures that have been excised and where speedy transport is necessary a swivel-ring Thomas arm splint has been used with extension obtained by a glove glued to the hand, though where transport is not a necessity better position and earlier movement can be obtained by using the so-called suspension extension splint. Extreme supination must be kept up, and with a Thomas splint a convenient method is by a tennis ball placed in the palm and secured to the bars of the splint in the required position by threads sewn into its outer coat.

A tennis ball, or some form of wooden ball splint is also best used in fractured metacarpal bones, provided the palmar wound, if one exists, has proved capable of being closed.

Fractures of Phalanges.

The transverse and longitudinal arches of the hand—the former bony and ligamentous and the latter bony alone—have received far less attention than their importance deserves; in many cases of inefficient splinting of the hand, either for injuries elsewhere in the limb, or more particularly for fractured metacarpals, the condition of “flat hand” which results is very crippling. In such a hand not only is the opposing power diminished or absent through the loss of tension in the transverse arch, but where the metacarpals have been improperly aligned the absent longitudinal bony arch throws the metacarpo-phalangeal line of joints backwards and puts the interossei at a great disadvantage in their action.

When phalanges are fractured even very extensive damage can be dealt with without amputation by careful surgery of the wound followed by adequate splinting, and fingers that before the lessons of the war had been learnt would have been lost, can be saved by careful conservative methods. It must not be forgotten that perfect resumption of all normal functions is the essential object, and that it is not sufficient to heal the wound or repair the bone unless the movements can be restored. Extension is readily maintained in the early stages by Sinclair's ball splint, with extension by means of a glued glove finger. In cases where this is impossible Sinclair's ingenious suggestion may be followed and traction obtained by boring a hole through the free end of the nail and using the nail for the transmission of the necessary pull.

WOUNDS OF JOINTS.

It is open to argument in many cases of compound fracture whether primary suture following excision is the best treatment, considering the grave results which may follow an imperfect toilet of the wound; but there can be little doubt that where joints are involved the chances of a perfect result which immediate cleansing and closure gives very greatly outweigh the risks. In these cases the temperature chart is often extremely misleading. A rise to 102° or 103° without any great increase in the pulse is common, and can be disregarded if the other signs and symptoms are satisfactory. Where the case is doing well the temperature will usually settle to within normal limits in two, three, or four days.

Shoulder-joint.

Injuries of the shoulder-joint, if uncomplicated by fracture, may usually be dealt with conservatively by washing out the joint and closing the capsule. As to the injection of such substances as ether, formalin, glycerine, &c. into the joint cavity, no very definite evidence exists that they are of any value provided the mechanical cleansing of the joint has been complete.

Where a fracture of the head of the humerus coexists with the joint injury sepsis is so liable to lurk behind in the cancellous tissue of the bone, and future painful adhesions are so likely to follow such an injury of the large articular surface of the head, that more radical treatment is often advisable. In practically all other joints in both the upper and the lower limb—except the radio-humeral joint—opinion has been gradually hardening against the performance of excision as a primary operation. In the case of the shoulder-joint the results of excision, on the whole, are extremely

good. Where excision is performed a straight Thomas's splint without a swivel-ring, and with the arm abducted at right angles to the body, is probably the best for transport, while where the patient can be retained the system of slings mentioned later is satisfactory and allows of early movement.

Elbow-joint.

Open injuries to this joint are not common without concomitant fractures of the bones entering into its formation; but where they do occur they should be treated by thorough cleansing of the joint followed by suture. It is often not possible to reach the joint cavity satisfactorily through the original traumatic opening, and if such is the case the original track having been excised, the joint may be opened by a longitudinal excision over the head of the radius with the forearm prone, through which satisfactory lavage can be carried out. This method exposes the radio-ulnar joint, or can do, and damage to this important joint can be inspected and dealt with. Unless the injury has destroyed the greater part of the articular surfaces of the elbow-joint, it would seem best to limit interference as far as possible.

A set excision at this stage has practically nothing to recommend it. Every possible use should be made of the tendinous expansion of the triceps to reconstitute a shattered olecranon, and the continuity or otherwise of the ulnar nerve must be verified and dealt with. Where the injury to the articular surfaces renders it useless to hope for a movable joint, great care must be taken in putting up these cases. The forearm should always be supinated, and the angle at which the elbow is kept must depend largely on the patient's usual occupation. It is quite remarkable, however, how grave an injury is compatible with a subsequently movable joint, provided infection does not occur and the injury allows of early active movement vigorously maintained. In some cases where the olecranon is already separated and considerable articular damage exists it is possible to separate the injured surfaces with a flap of fat and fascia, and so secure a movable joint by means of a modified arthroplasty, particularly with injuries in the region of the capitellum. It would seem best where the head of the radius is badly damaged to excise it completely, and in all these cases the limb should be invariably kept in full supination and movements of pronation and supination begun as early as possible.

Wrist-joint.

Wounds of this joint are usually accompanied by injury to the carpal bones, and the complexity of the synovial cavities renders thorough cleansing extremely difficult. Where the carpal injury is not too severe conservative surgery is sometimes possible, and the intercommunications of the synovial spaces are very readily shut off under the influence of injury or infection, so that if early vent is given to any remaining sepsis it is usually fairly easy to keep the process under control. Limited excisions of the carpal bones in response to the nature of the damage present give usually quite good results, provided attention is given to the position of the wrist afterwards. Dorsi-flexion must be maintained and ulnar deviation prevented; early and vigorous finger movement must be insisted on.

Where a thorough excision is not possible, and particularly when many of the tendons are divided, it is usually wiser not to aim at primary closure of the wound. In such cases a careful anatomical reconstruction of the divided structures, and as complete as possible a removal of dead tissue, followed by the application of such a tissue solvent as Dakin's fluid, will usually allow of early secondary closure. If such a case has to be left open, every effort should be made to avoid leaving a tendon or tendons running uncovered through the wound, as these will certainly die. When they cannot be incorporated in the walls of the wound, it is usually better to realise at once their inevitable death and to make as good a provision as is possible for the resumption of the function they subtend by such grafting or cross-unions as are necessary.

Metacarpo-phalangeal and Phalangeal Joints.

Injuries to these joints should be treated as conservatively as possible, and every attempt should be made to secure primary union; secondary sterilisation is a long and tedious process. Sinclair's ball splint is perhaps the best in the after-treatment of these cases, and the good splinting attachment permits of graduated and increasing movements.

Perhaps the most difficult problem for the surgeon in the early treatment of all these severe injuries is the decision as to when excision and suture should *not* be performed. He must be guided partly by the length of time since the infliction of the injury, partly by the anatomical possibilities of the wound, and partly by the nature of the infection present, if known. Gas-bacillus infection is not greatly to be feared where the main vessels are intact, since a wide excision of all dead or damaged tissues will prevent its development. Further, its presence is readily recognised by the indications present in the wound and by the character of the pulse and the temperament of the patient. The most dangerous infection possible in these cases is that caused by the hæmolytic streptococcus. Even with the most radical surgery the chances of success are extremely slender.

THE TREATMENT OF INFECTED WOUNDS.

Having now briefly reviewed some of the principles which underlie the early treatment of these severe injuries to the upper limb, it remains to consider the methods to be adopted when the case is seen too late for primary excision and suture or when this method has been tried but infection has developed. This second line of treatment represents mainly the work as performed in the base hospitals in France. Consequently, where we attempt to apply the lessons of the war to civil surgery it will usually be advisable to adopt, in conjunction with "first line" surgery, the splinting of the "second line."

Two sides of the subject have to be considered—namely, (1) the treatment of the wound itself; (2) the treatment of the part wounded; but each is the necessary corollary of the other. It is chiefly in the field of pure wound treatment during this infected stage that the great controversy of opinion and practice has been waged during the war.

There can be little doubt that the treatment most likely to provide practical success is that which most closely imitates Nature's own treatment or which exaggerates it to meet the aggravated conditions present, and it is in the interpretation of these processes that the experimental work of Sir Almroth Wright and his co-workers has been so valuable. Approximately, it may be said that when dealing with an infected wound the natural reaction of the body is to limit as rapidly as possible the depredations of the invading organisms by destroying the food on which they live, and at the same time to guard against their further invasion by setting up a strong zone of defence around the wound. The first purpose is accomplished by the liberation in the wound, from dead pus cells, of trypsin, which splits up the protein of the dead tissues and deprives the organisms of their necessary pabulum, since most organisms need, at any rate, polypeptides for their growth. The second is secured by the speedy construction of a band of leucocytic infiltration and, as a guard against the activity of the body's own agents, by an increase in the normal antitryptic activity of the serum.

It is thus seen that both in the pre-infected and in the infected stage of a wound the same general principles underlie its treatment—namely, the thorough removal of all dead or dying tissues—and that the sole difference consists in the fact that before bacterial spread has occurred the process can be carried out quickly by means of the knife, while at a later stage where the line between living and dying tissues is no longer distinct, the slower process of hydrolysis must be resorted to.

We have here, then, a natural line of wound treatment along which success is to be expected. In the neutral hypochlorite solution of Dakin and Daufresne we have a substance of very great proteolytic value. Experiments on the action of a 0.5 per cent. hypochlorite solution on coagulated albumin, gelatin, albumin in solution, and dead tissue showed that the solids were dissolved and the dissolved protein hydrolysed, the various stages of the formation of alkali, albumin, proteoses, peptones, and lower products being readily followed. The rapidity of the action is well seen by two experiments.

In the first, if a solution containing 5 per cent. egg-white and 0.5 per cent. hypochlorite is incubated for eight hours at body temperature, no protein, proteose, or peptones can be detected although all these substances are readily demonstrated during the course of the experiment.

In the second an artificial wound was constructed by placing a weighed piece of meat on a tray in a Petri dish under sterile conditions, the whole being kept moist and at

body temperature. In one case two-hourly irrigation with two ounces of Dakin's solution was carried out and in another a similar procedure with normal saline. In each case a piece of meat weighing 1½ oz. was used, and the one irrigated with Dakin's solution was completely dissolved in 72 hours, while the one where saline was used was practically unaffected.

This all-important action of the hypochlorite solution is, of course, a purely chemical bulk action, and the amount to be used must be proportionate to the tissue to be dissolved, a fact which accounts for the apparent failure of Dakin's solution in Sir Almroth Wright's "artificial slough" experiment.

It would seem probable that along this line, the hydrolysis of dead tissues and the consequent secondary sterilisation of the wound, lies the most probable avenue for advance in the treatment of all infections. A great deal of work remains to be done, and whether further research shows ferment action or some form of chemical or bacterial hydrolysis to be the most successful, sufficient is already evident to establish the principle that the speediest way of dealing with an infection is to remove those substances in the medium which are essential for bacterial growth.

In the treatment of infected wounds, therefore, as regards the wound itself, Nature's tryptic digestion has been replaced by hypochlorite hydrolysis, the hypochlorite being introduced into the wound in the form of intermittent irrigation with Carrel's tubes. Dakin's fluid so employed is used *solely* for its hydrolytic power, and it is a coincidence, and perhaps an unfortunate one, that in a test-tube this fluid possessed a high so-called "bactericidal power."

The fact that a few seconds after its introduction into an actual septic wound suffices to destroy the hypochlorite as such, and the additional fact that organisms can be found growing on any isolated portions of dead tissue remaining in a wound which has been bathed in the solution, should be sufficient to vindicate it from any charge of antiseptic action *in vivo*, and prove, if proof is required, that its hydrolytic power is responsible for its undoubted success.

Nature's second method of dealing with an infected wound—namely, the establishment of a zone of leucocytic defence round the wound—is best aided by the maintenance of absolute rest and as perfect an alignment of parts as is possible, and further by a minimum of operative interference on the part of the surgeon while infection is active.

TREATMENT OF THE PART WOUNDED.

When splinting an injury of the upper limb at this stage, the question of transport need no longer limit the choice. The counterbalanced suspension method was used, and the fracture wards were fitted with permanent superstructure carrying adjustable cross-bars from which any splint can be suspended in counterbalance by means of cord, pulleys, and sand-bags. If the arm is extended by a running weight no movements of the patient can disturb the relative as opposed to the absolute position of the limb in its splint.

In deciding on the position of the limb two factors must be borne in mind: (1) the fractured bones must be brought into and maintained in as perfect a position as possible, and (2) the musculature of the limb must be held in the position which will best favour resumption of functional activity. Now the mechanics of the upper limb are rather altered by the fact that the human body is usually active in an upright position. With the body erect certain groups of muscles have, in addition to the act they are helping to perform, to overcome the weight due to gravity. There seems little doubt that this gravity effect is largely responsible for the so-called preponderance of certain groups of muscles, and its results are well seen in cases of infantile paralysis, where recovery is much more common in the gravity-aided muscles. Consequently, when putting the upper limb into its optimum repair position the gravity opposing muscles should be as far as possible kept shortened. The best position and a convenient one for wound treatment is as follows. The shoulder is abducted and flexed at right angles to the body, the arm is externally rotated, the forearm is flexed at right angles, and is kept in extreme supination, while the wrist-joint is extended and the fingers are held abducted and extended. This position has been used in most fractures of the humerus and bones of the forearm, except where unfavourable to correct bony alignment.

The Suspension Extension Splint.

The method employed is applied as follows. For example, in fracture of the shaft of the humerus Sinclair's glue is applied to the front and back of the forearm and gauze strips are fixed to it; a glove is glued to the hand, leaving thumb and fingers free. Further, gauze strips are glued to as great a surface of skin over the lower fragment as possible. A mackintosh sling is applied over the dressings round the fracture and is suspended by a cord which, running over two pulleys, has its other end attached to a hook. To this hook are fixed the

Suspension extension splint for treatment of upper-limb injuries in the optimum position for repair.

gauze strips from the forearm, also the strings from each glove finger, permitting suspension by either or both. The counterbalancing weight is fixed to the cord between the pulleys, and the gauze from over the lower fragment is fixed to a cord running over a pulley at the end of the bed, to which extension weight is attached. Supination is obtained by a torsion sling applied round the hand and running to the top or bottom of the bed.

In upper-arm wounds where the extent of skin involved proves too great for this method we have used an arm Thomas's splint, bent to a right angle, and with the angles of attachment of the ring altered to fit over point of shoulder. Extension is obtained by using the forearm as a lever. Gauze glued to the lower third of the forearm and fixed to the internal bar forms the fulcrum; gauze glued to upper third of forearm and pulled to the external bar forms the force, and so exerts traction in the line of the humerus. The optimum repair position is maintained, except for the absence of external rotation at the shoulder-joint.

Fractures of the forearm have usually been treated by the suspension extension method described for the humerus, with a sling from the seat of fracture to top of bed, which counteracts any tendency of the fracture to sag. Very extensive or very septic wounds have been treated for a time on a form of suspension extension tray, consisting of a metal tray with a drainage-pipe. A wooden upright, against which the upper arm rests, serves as a counter-extension. The wooden attachment runs forward under the tray and has at its end a pulley over which runs a cord, taking extension from lower forearm or fingers, according to situation of wound. In fractures of both bones a wooden side-piece with straps is added, so that the forearm can be treated in supination. The whole apparatus is counterbalanced in suspension. The drainage-tube is connected to a bottle at the side of the bed, avoiding any wetting.

In wounds of the carpus and lower third of the forearm this splint has also been used, usually with a wedge attachment to secure adequate dorsi-flexion of the wrist. Extension is obtained by glove fingers glued to the skin and run by a kind of wood gearing to one central pull, thus maintaining good position of the fingers and an equal distribution of strain.

INFECTED WOUNDS OF JOINTS.

In dealing with infected wounds of joints, whether or not complicated by fractures, a movable joint has been aimed at, and it is surprising in what severe injuries a certain amount of movement can be obtained. In the shoulder-joint, as mentioned before, excision is probably best if the head of the humerus is gravely injured, and if this operation is

performed, the arm is put up abducted and flexed. In general, in infected joints in the upper limb, once drainage has been established and hypochlorite introduced the condition seems improved by movement. As a rule the limb has been so arranged that if ankylosis should occur, it should occur in the most desirable position, while movement round this optimum position as a mean has been encouraged.

In the *shoulder-joint* the arm and forearm have been suspended in mackintosh slings, counterbalanced by weights and pulleys, and if the balance is accurate, the patient is able to move his arm with the minimum of muscular effort.

In the *elbow-joint*, where arthrotomy has had to be performed, the vertical incision over the head of the radius has been used, which by a downward and inward extension will also serve to expose the radio-ulnar joint. These cases have been treated on a modification of the suspension extension tray, the tray being so slung that its position of rest is that in which ankylosis, if it should follow, is desired to occur. If this splint is carefully counterbalanced, or if the patient assists himself with his other hand, all the movements of the elbow can be carried out, without in any way interfering with the treatment of the wound.

In regard to the *wrist-joint*, cases of infection of this joint have been treated in dorsi-flexion and have been kept strictly immobilised, since the advantages of early movement do not compensate for the risks of spread of infection along tendon sheaths and communicating synovial spaces. In the *meta-carpo-phalangeal* regions the same methods have been used as described in the early first line treatment.

SURGICAL TREATMENT.

As to the surgical treatment of these infected wounds the essential condition is that all pockets and portions of the wound must be made freely accessible to the irrigating fluid. The scissors should be freely used to remove any exposed tendinous expansion or intersections, as tendon tissue is very slowly hydrolysed and is very apt to keep up a slow and prolonged suppuration. In the early stages of acute sepsis the least possible manipulation of the limb in search of hidden or pocketed pus would seem best, as in the majority of cases, where immobilisation is good, a barrier will be created against any general spread of infection, and pus, if it is formed, will be local in site, and readily dealt with when the moment arrives.

Some form of bacteriological control should be instituted in these cases, and when what has been termed surgical sterility is reached, secondary suture may be carried out, with a large percentage of successful unions. All through the treatment of these cases attention to the wound must be paralleled by care that the restoration of function is encouraged by every possible means, and of such means early active movements are the most important. Fortunately there is a satisfactory guide to the extent to which movement can be carried out, in the pain which follows any excessive motion. If the limb has been arranged so that movement does not disturb its correct alignment, active movement can be safely encouraged in all cases within the limits to which pain forms a safe and certain guide.

I would like to express my great indebtedness to my colleagues Captain F. D. Saner and Captain O. G. Morgan for the readiness with which they have allowed me to use work which was jointly carried out.

Guy's Hospital.

THE War Emergency Fund has recently received donations of 50 guineas each from the Royal College of Physicians, London, and the Royal College of Surgeons, England.

THE LATE MR. G. B. MCCAUL, L.R.C.P. & S. EDIN.—The death is announced on Feb. 12th of Mr. G. B. McCaul, who for a considerable time was senior medical practitioner and senior justice of the city of Londonderry. He was in his eightieth year. A native of Newry, co. Down, Mr. McCaul went early in life to Londonderry. In 1869 he became L.R.C.P. & S. Edin., and settled down in practice in his adopted city, where he rapidly became one of the leading medical practitioners. He also took a prominent part in the civic life of Londonderry, entering the corporation in 1884, and he was specially interested in guiding the public health. He was most popular in every way and much esteemed as a medical doctor. One of his sons, Captain G. B. McCaul, M.D., R.A.M.C., has been awarded recently the Military Cross.