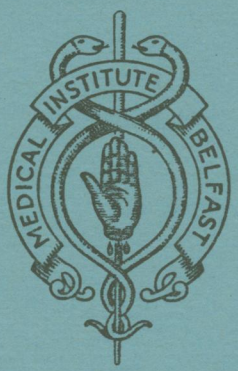
NOVEMBER, 1947

# THE ULSTER MEDICAL JOURNAL

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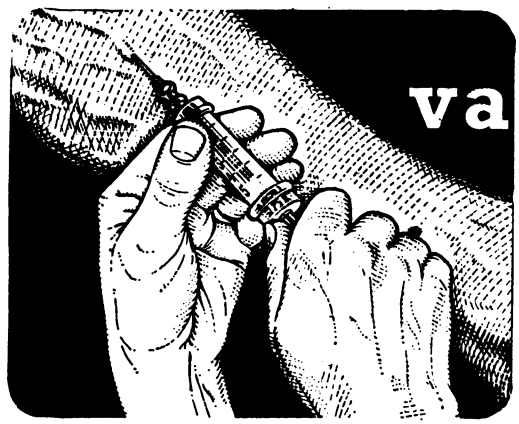

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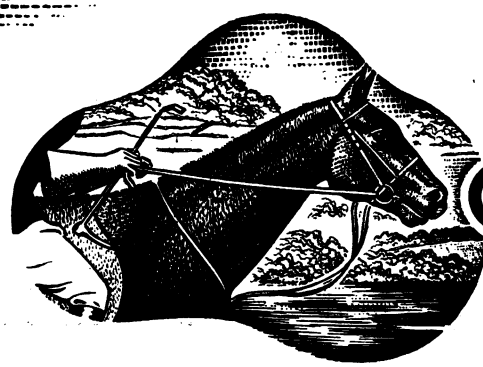

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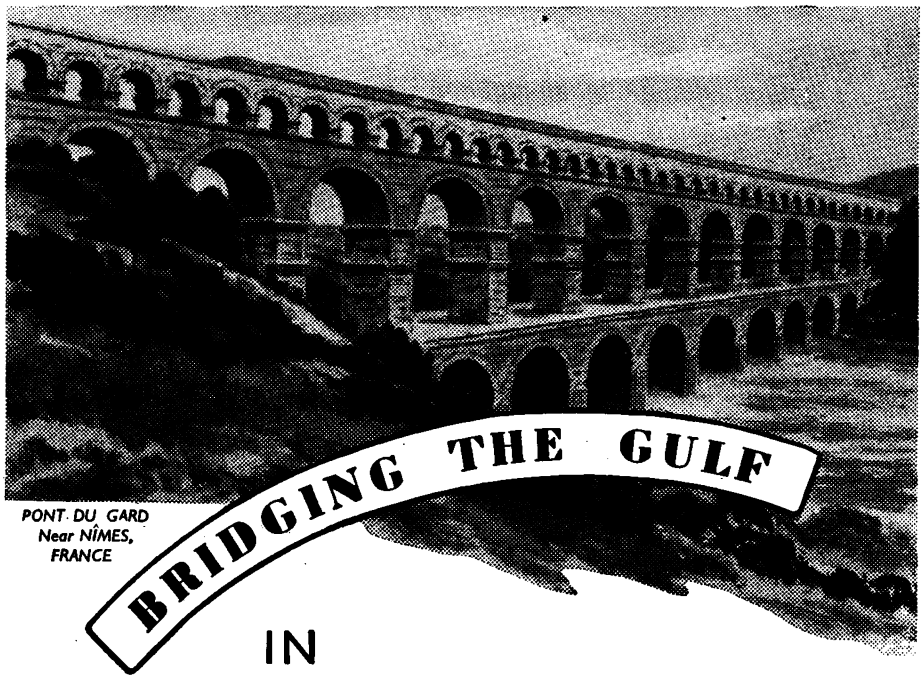


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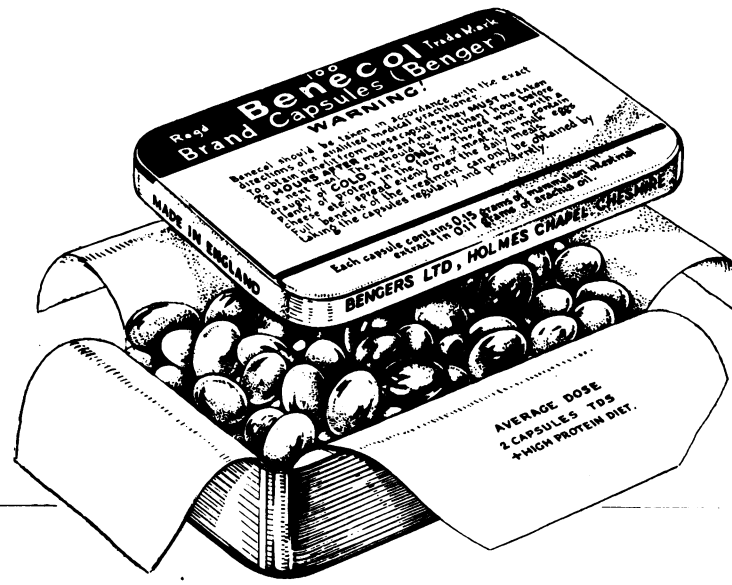


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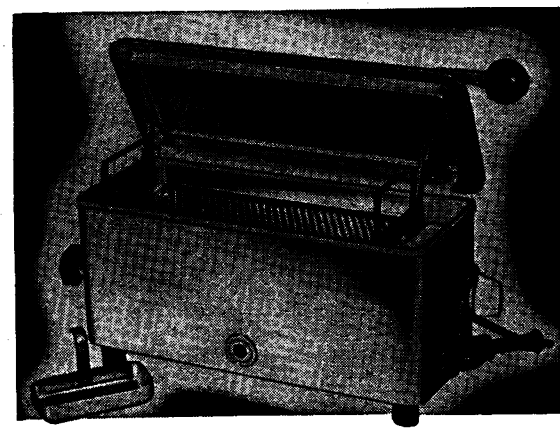

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# CONTENTS


PAGE

THE NEW HONORARY FELLOWS - - - - - - 85

SOME ASPECTS, HISTORICAL AND OTHERWISE, OF SURGERY OF THE THORAX. G. R. B. Purce, M.C., M.CH., F.R.C.S.(EDIN.) - - - - 87

SOME LANDMARKS IN SURGICAL TECHNIQUE. H. C. Lowry, M.B., F.R.C.S.ED., F.R.C.O.G. - - - - - - - - - 102

ACUTE INTESTINAL OBSTRUCTION. George D. F. McFadden, M.B., M.CH., F.R.C.S.(ENG.) - - - - - - - - 114

INTRA-THORACIC ACTINOMYCOSIS PRESENTING AS EMPYEMA. R. A. Pyper, M.D., M.R.C.P.(LOND.) - - - - - - - - 132

THE HERALDRY OF MEDICINE. R. W. M. Strain, M.D., B.SC. - - 138

JOURNALS IN THE LIBRARY OF THE ULSTER MEDICAL SOCIETY - - 142

LIST OF NEW BOOKS ADDED TO THE LIBRARY OF THE ULSTER MEDICAL SOCIETY DURING 1947 - - - - - - - 142

LIST OF ADDITIONS TO THE MEDICAL SECTION OF QUEEN'S UNIVERSITY LIBRARY, MARCH-AUGUST, 1947 - - - - - 143

BOOK REVIEWS - - - - 86, 101, 131, 137, 141, 146





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# CONTENTS


PAGE

THE NEW HONORARY FELLOWS - - - - - - 85

SOME ASPECTS, HISTORICAL AND OTHERWISE, OF SURGERY OF THE THORAX. G. R. B. Purce, M.C., M.CH., F.R.C.S.(EDIN.) - - - - 87

SOME LANDMARKS IN SURGICAL TECHNIQUE. H. C. Lowry, M.B., F.R.C.S.ED., F.R.C.O.G. - - - - - - - - - 102

ACUTE INTESTINAL OBSTRUCTION. George D. F. McFadden, M.B., M.CH., F.R.C.S.(ENG.) - - - - - - - - 114

INTRA-THORACIC ACTINOMYCOSIS PRESENTING AS EMPYEMA. R. A. Pyper, M.D., M.R.C.P.(LOND.) - - - - - - - - 132

THE HERALDRY OF MEDICINE. R. W. M. Strain, M.D., B.SC. - - 138

JOURNALS IN THE LIBRARY OF THE ULSTER MEDICAL SOCIETY - - 142

LIST OF NEW BOOKS ADDED TO THE LIBRARY OF THE ULSTER MEDICAL SOCIETY DURING 1947 - - - - - - - 142

LIST OF ADDITIONS TO THE MEDICAL SECTION OF QUEEN'S UNIVERSITY LIBRARY, MARCH-AUGUST, 1947 - - - - - 143

BOOK REVIEWS - - - - 86, 101, 131, 137, 141, 146





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British Journal of Ophthalmology, Vol. 30 (1946).
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### NEW PERIODICALS

British Journal of Social Medicine, 1, 1947.
Enzymologia, 1, 1936/37.

Helvetica Physiologica et Pharmacologica Acta, 5, 1947.
Hereditas, 13, 1929/30.
Heredity, 1, 1947.
Journal of Dental Research, 26, 1947.
Journal of General Microbiology, 1, 1947.
Ophthalmic Literature, 1, 1947.
Quarterly Review of Medicine, 4, 1947.
Quarterly Review of Ophthalmology, 3, 1947.
Quarterly Review of Pediatrics, 1, 1946.
Quarterly Review of Surgery, 4, 1947.
Thorax, 1.
University of Western Ontario Medical Journal, 16, 1946.
Year Book of Obstetrics and Gynæcology, 1946.

## BIOLOGY

ASDELL, S. A. : Patterns of Mammalian Reproduction (1946).
BARCROFT, SIR J. : Researches on Pre-Natal Life (vol. 1, 1946).
BRACHET, J. : Embryologie Chimique (1947).
COLLIER, H. : An Interpretation of Biology (1938).
CURTIS, W. C. : Science and Human Affairs from the Viewpoint of Biology (1922).
DALE, A. : An Introduction to Social Biology (1946).
DOBZHANSKY, T. : Genetics and the Origin of Species (2nd edition, 1947).
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WOLFF, E. : A Pathology of the Eye (2nd edition, 1944).

## PEDIATRICS

CAMERON, H. C. : The Nervous Child (5th edition, 1946).
CAMERON, H. C. : The Nervous Child at School (1933).
MACY, I. G. : Nutrition and Chemical Growth in Childhood (vol. 1, 2, 1942-46).

## DENTISTRY

DEWEY, M. : Practical Orthodontics (6th edition, 1942).
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THOMA, K. H. : Oral Pathology (2nd edition, 1944).

## THERAPEUTICS AND MATERIA MEDICA

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# THE ULSTER MEDICAL JOURNAL

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Vol. XVI 1st NOVEMBER, 1947 No. 2


## THE NEW HONORARY FELLOWS

*"Let us now praise famous men"*

DURING the 1947-48 Session the Honorary Fellowship of the Society will be conferred on six distinguished teachers of medicine.

Four of the new Honorary Fellows are ex-Presidents of the Society.

MAJOR-GENERAL SIR HENRY LETHEBY TIDY, a graduate of Oxford University and a Fellow of the Royal College of Physicians of London, is of world renown as a clinician, a teacher, and an author, and has been rewarded as such in many countries. Consultant Physician to the Army at home during the recent war, he also undertook tours of strenuous examination duty in overseas theatres. Among the foremost of British physicians, Queen's has been fortunate to have had his services for many years as Extern Examiner in Medicine.

FRANCIS JAMES BROWNE, an Ulsterman by birth, a Scot by graduation, and an Englishman by adoption, has an outstanding record as a teacher of Midwifery and Gynæcology in the Chair of those subjects in the Medical School of University College Hospital, London. Long an extern examiner in this school, no man has been more looked up to in this capacity. The Society will welcome this opportunity of conferring their highest honour on a son of the Province.

JAMES ANDREW CRAIG is a graduate of the Royal University of Ireland and a Fellow of the Royal College of Surgeons of England. A noted teacher for many years of Ophthalmology and ot Oto-Rhino-Laryngology, his sharpness of wit and keratome alike have been a joy to many generations of students. He was a former University Lecturer in his special subjects. Among his many distinctions is Membership of the Société Francaise d'Ophthalmologie.

SAMUEL THOMPSON IRWIN, a Commander of the Order of the British Empire, a graduate of the Royal University of Ireland, and a Fellow of the Royal College of Surgeons of Edinburgh, is deservedly held to be one of Belfast's most outstanding surgeons. His skill as an operator is equalled by his devotion to the cause of the crippled child, and by his ability in the fields of medical politics and hospital administration.

CHARLES GIBSON LOWRY, a graduate of the Royal University of Ireland, a Fellow of the Royal College of Surgeons of Ireland, and an Honorary Fellow of the Royal College of Obstetricians and Gynæcologists, has spent a lifetime in the teaching and practice of Midwifery and Gynæcology. Now Emeritus Professor, he has held the Chair of Midwifery and then the combined chairs of Midwifery and Gynæcology in Queen's University. His lucidity as a teacher has drawn many tributes from his old students and has been an important factor in the present status of this school.

HOWARD STEVENSON is a graduate of the Royal University of Ireland and a Fellow of the Royal College of Surgeons of Ireland. For many years a member of the staff of the Royal Victoria Hospital, he is a well remembered teacher, while those who have witnessed his skill as an abdominal surgeon will recall feats of swiftness seldom seen, and patients who exhibited a minimum of shock. In more recent times, as a member of the Northern Ireland Parliament for the University, his report as Chairman of the Health Services Committee has done much to clarify the present position of the Medical Services in the Province.

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# REVIEW

NUTRITIONAL DISORDERS OF THE NERVOUS SYSTEM. By John D. Spillane, B.Sc., M.D., M.R.C.P.(Lond.). Edinburgh: E. & S. Livingstone Ltd. 20s.

THIS is a well written and informative book on a very widespread and ill understood subject. It includes not only a descripton of the better known nutritional disorders met with in this country, but also of those met with during the war in the Middle and Far East and elsewhere.

After a foreword by Dr. George Riddoch, who paid tribute to the excellent records kept by the prisoner of war doctors of their patients under difficult conditions, the book opens with a chapter on the vitamin B complex. In some thirty pages this subject is discussed from every angle in view of its importance in elucidating the various syndromes described later.

Polyneuritis, Wernicke's Encephalopathy, and Subacute Combined Degeneration of the Cord, each receive chapters and should interest readers in these climates. The nutritional disorders of warm climates and in war time are dealt with and these with Dr. Spillane's own personal experiences comprise some of the most interesting sections of the book. The penultimate chapter is devoted to the rôle of the gastro-intestinal tract in the production of the nutritional neuropathies and finally the author sums up the present situation and outlines some of the lines on which research is required.

The reader is left realising the magnitude of these problems and perhaps somewhat disappointed at the lack of finality in them. It is obvious, however, that the "spade work" of clinical observations had to be made, and that in this book they have been done excellently. The illustrations enhance the text and the bibliography is very complete. H. H. S.

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# Some Aspects, Historical and Otherwise, of Surgery of the Thorax

*By* G. R. B. PURCE, M.C., M.CH., F.R.C.S.(EDIN.)

*Presidental Address, Ulster Medical Society, Session 1947-48*

THORACIC surgery, in some of its aspects, has an ancient history. It has had perforce to deal with wounds through all the ages, but we know too that the conditions of empyema, and abscess of the lung, were recognised and treated surgically by Hippocrates. Modern thoracic surgery however dates from about the end of the nineteenth century and since then its progress has been remarkable, but it has been much slower of development than the surgery of other regions, such as the abdomen, because of the difficulties of access, and the dangers associated with disturbance of the vital respiratory functions.

The dangers associated with an open pneumothorax were known to the ancient Greeks. Vesalius[1] in his Fabricia of 1552 showed how artificial respiration by bellows will keep an animal alive after its chest had been opened, and Hewson[2] the great English physiologist who worked with the Hunters, William and John, showed in 1767 that with an open chest wound blocking or closing the opening rapidly lessened the dyspnœa.

The respiratory difficulties of the open chest have been successfully overcome, and the past two decades have seen the first successful total pneumonectomy for bronchiectasis (1931) and the first total pneumonectomy for carcinoma (1933). It was only in 1941 that the first successful resection in the British Isles of the lower end of the œsophagus for carcinoma with restoration of continuity by œsophagus-gastrostomy was done. Within the past two years there has been the amazing attack on some congenital lesions of the heart—patent ductus arteriosus, co-arctation of the aorta, and pulmonic stenosis. Indeed so remarkable have been the strides lately that it is almost impossible to keep pace.

## THORACIC SURGERY AND WAR

It is perhaps appropriate on this 23rd October, the fifth anniversary of the Battle of El Alamein, that some of my remarks should have to do with war surgery. Thoracic surgery owes much to war and these two are intimately linked, for the wounds and injuries of the chest have compelled the surgeon to show his art and skill in dealing with them, however reluctant he may have been to violate the sanctity of the intact cage.

Just over two years ago the second World War ended and James Wellard, the American war correspondent, in his book "The Man in a Helmet," which is the life of that colourful person General George Patton of the U.S. Army, has said

of it that we may come to know it as the last of the "Gunpowder Wars." He may be right and there will no more be seen the wounds we have been familiar with, but rather the effects of the blast and searing heat of atomic fission. I should think, however, that the use of ordinary molecular disintegration will not wholly be discarded. It seemed to be effective enough.

If we have reached the end of an era it might be interesting to look back into it and see how some of the notable figures in surgery dealt with wounds of the chest during that period. We shall see that some of these surgeons, notably those of the Napoleonic period, had taught lessons as regards chest wounds which later had to be relearned painfully. It seems indeed that Grey Turner is right when he says "surgical memory is very short."

The gunpowder era began about six hundred and fifty years ago when primitive cannon appeared. They were used at Crecy in 1346 but gunshot wounds cannot have been common until long after, as the first detailed account of gunshot wounds was given by Brunschwig[3] in his Wund Artzney of 1497. He regarded them as being poisoned. At the very beginning of the era a Norman, Henri de Mondeville,[4A] declared that, contrary to the teachings of Galen, suppuration was not necessary in the healing of a wound but rather to be avoided, and showed that wounds when treated as we now call aseptically, heal without the formation of pus, and so anticipated Lister by six hundred years. He must be regarded as one of the great surgeons of history. His treatment for recent wounds which penetrate the chest is: "From whichever side it (the wound) may be, one treats them just in the same way as wounds penetrating the skull, i.e. removing foreign bodies, closing the edges of the wound, and giving powder with the pigment." Somewhat reminiscent of the present day, is it not? He goes on: "These wounds should be closed more quickly and sutured by stitches closer and tighter, even though they be smaller, than wounds of other parts because here greater danger follows delay if they remain open or gaping for some time. One must act so for three reasons: so that the vital heat should not be exhaled through the wounds; in order that the surrounding cold should not annihilate this heat—two things which are very harmful; and in order that the entry of circulating air should not cause suppuration in the wound because if suppuration is produced I know by experience that it is not cured without difficulty, if ever."

A little later came Guy de Chauliac,[4B] probably the most eminent authority in surgery in the fourteenth and fifteenth centuries, but a reactionary as regards the treatment of wounds, who discusses the differential diagnosis between penetrating and non-penetrating wounds and says that the evidence of penetration is that the breath comes out of the wound even when one closes the mouth and nostril of the patient, and which is demonstrated by a lighted candle or piece of wool or cotton put close to the wound. He does not recommend early closure of wounds and advises injection of medicaments. In the event of infection there should be no delay in opening and draining the wound, and if the patient is very ill he advises counter-incision with a razor in the eighth space.

In the sixteenth century Ambroise Paré[5] and his contemporary in England,

Thomas Gale,[4] were alike in closing, by plaster or suture, wounds that penetrated but did not have wound of the inward viscera, and leaving tents or drains in penetrating wounds that had inward bleeding. Paré writes about the necessity of fastening the tent to the dressing in case it should become lost in the pleural cavity. The wound was kept open until the "sanies" or bloody matter was exhausted. He goes on to say: "Notwithstanding the art and care of the physician, sometimes the wound degenerates into a fistula; then the former evil is become much worse, for fistulæ of the chest are scarce cured at any time."

In the seventeenth century Wilhelm Fabry[6] of Hilden, near Dusseldorf (Fabricius Hildanus), regarded as the father of German surgery, in his "Century of Surgical Cases" relates a case in which there was a penetrating sword wound through which a portion of lung protruded. He amputated this by a red hot knife, and the patient, whose life had been despaired of, recovered and enjoyed good health for many years. Surely one of the earliest records of a partial pneumonectomy.

In the eighteenth century there was no particular change in the treatment of chest wounds. The great John Hunter,[7] although he had much experience of wounds in the Belle Isle expedition of 1761, has little to say about thoracic wounds except that "in the cases arising from balls nothing in general is to be done but keep quiet, and dress wounds superficially; for any extravasated blood which might have got into the cavity of the thorax will generally make its escape by the external wound, as also any matter from suppuration. In the cases of wounds made by cutting instruments when there is reason to suspect a considerable quantity of blood in the cavity of the thorax—the operation for empyema should be performed."

Hunter makes a most interesting observation with regard to the limitation of thoracic movement often associated with a chest wound. "I have thought it a pity that we do not accustom ourselves to move one side of our thorax independently of the other as we from habit move one eyelid independently of the other." This is just what the patient is taught to do by the modern physiotherapist when breathing exercises are being carried out.

In the early part of the century Lorenz Heister,[8] the leading German surgeon, served with the Dutch forces in the campaigns of Marlborough in the war of the Spanish Succession and had much experience, as he was at the sieges of Lille, Tournai, and Mons and at the battle of Oudenarde. (I wonder what he thought of John Churchill, Duke of Marlborough.) He says that at the taking of Mons there were five thousand wounded on the side of the Hollanders only. In his textbook on surgery there is a good deal about wounds of the thorax, and he says that if it appears from the symptoms that there is a collection of blood in the thorax the utmost diligence must be used to get it out, lest it should be a foundation for greater mischief. He recommends enlarging the wound if necessary, using a syringe to suck out and wash out blood, and if the wound is high in the breast or between the upper ribs, a paracentesis with trocar is to be done in the lower part of the thorax towards the back.

Coming to the nineteenth century and the Napoleonic era, there were two great figures in military surgery, Guthrie[9] in the English service and Larrey in the

French. Guthrie treated thoracic wounds by removing foreign bodies, splintered bones, and the missile when accessible, and had no hesitation in enlarging the wound to allow of this. He was well aware of the relief to a distressing dyspnœa when an open chest wound was closed. This closure of course prevented the exit of fluids and led to the very curious practice of having the wounds sucked, Guthrie says, "by the mouths of irregular practitioners, generally the drum-major of the regiment, when the patient was a soldier; and the consequences, in some instances apparently miraculous, were in others quite as unfortunate." In the case of a large hæmothorax he punctured it and if necessary drained it by an empyema incision.

Larrey went further in excising the wounds as far as the fractured ribs; the jagged ends of these were cut off and loose bone fragments removed. The ball was sought for and removed if within reach. Blood and air were sucked from the pleural cavity by the application of dry cups to the edges of the wound. The wound was sealed by an agglutination plaster.

The practice of sucking was carried out in the French army, but Larrey did not like it, as he thought it might disturb a clot or transfer a virus. It was referred to by Heister in the previous century as a method of treatment for a deep wound between the muscles of the chest wall and the ribs.

No improvement took place regarding thoracic wounds in the Crimean, American Civil, or Franco-Prussian wars,[10] although in the latter some sporadic attempts were made on the German side, I think by Volkmann, to utilise Listerian methods. In the Crimean war the mortality for wounds in which the lung was involved was over 79 per cent, in the American Civil war it was 62½ per cent. for penetrating wounds, and in the Franco-Prussian war for penetrating wounds at Sedan, it was nearly 55 per cent. Experiences were very much different in the South African and Russo-Japanese wars, and a complacent attitude was engendered as regards wounds of the chest, but this was soon dispelled at the beginning of World War I, when it was seen how severe were the wounds, and how frequently there occurred septic complications; complications chiefly in the change from a simple hæmothorax into an infected empyema. Moreover, when sepsis had once developed nearly 50 per cent. of such cases died in spite of rib resection and drainage. This had not been expected, because the experience in the South African war had suggested that a conservative attitude should be adopted with regard to chest wounds, as in that war these had been relatively benign in their course. Stevenson[11] in a series of cases found a 14 per cent. mortality, and primary empyemata rarely existed. But the South African wounds were made for the most part by small cylindrical bullets at long range frequently; the percentage of shell wounds was low; the soil dry and clean and the climate good, whereas the Great War wounds were made by pointed or spitze bullets with centre of gravity far back so that they turned readily on meeting slight obstructions, thus often producing larger wounds, and by irregular often jagged portions of high explosive shell. The soil too was highly cultivated. These lacerated wounds must have been similar to the wounds produced by the large round leaden bullet of low velocity fired from the smooth bore flintlock musket of a .7 inch calibre (about the same as the twelve bore gun), which in the

seventeenth century superseded the harquebus and was the weapon of the infantryman at Blenheim and Waterloo.

Up till 1916 surgeons were reluctant to deal with chest wounds in the way other wounds were being dealt with, as it was assumed that it would be fatal to open widely the thoracic cavity without the aid of some form of differential pressure apparatus, and that handling the wounded lung would start fresh and uncontrollable bleeding. Experience proved that these assumptions were wrong when Pierre Duval[12] in the French service and several surgeons, George E. Gask in particular, in the British service, found that it was possible to open the chest freely, deal with the lesions, and close it again without special devices for maintaining respiration. The dangers associated with the wide open thorax were minimised by fixation of the collapsed lung either by the hand, the device of Muller, or by holding it in forceps, and by shutting off the opening into the thorax by thick pads in order to prevent air passing in and out—the traumatopnœa or wound breathing. The operation had also to be done quickly.

In 1916 then a radical change was made and the thoracic wound was no longer considered as a thing wholly apart, but had applied to it the surgical principles which were correct for wounds in general, namely, "surgical revision" or wound excision as regards the chest wall and lungs, the removal of foreign bodies, the removal of blood from the pleural cavity, closure of the open pneumothorax, and promotion of early expansion of the lung.

Gask[13] relates that "his first big thoracic operation was done in the latter end of 1916 on a young Australian doctor who was admitted with a large open wound of the lower part of the thorax and a retained missile. He was anæsthetised with chloroform, the wound opened up, about four inches of the broken rib excised and the pleural cavity opened widely by means of a rib spreader. In the cavity of the pleura were found a shrapnel ball, a bit of rib and a large piece of khaki tunic. These were removed, the jagged ends of rib cut cleanly off and all the pleural cavity cleared of blood; then the chest was closed in layers. The patient did well, the wound healed by first intention and remained healed, the lung rapidly expanded, and the pneumothorax disappeared. His convalescence was short, he rejoined his unit, and was later awarded the D.S.O. for gallantry in the field while serving with his field ambulance."

This was the pattern of the ideal procedure for the open penetrating wound with hæmothorax and retained missile. It was required possibly in about one quarter of the cases of gunshot wounds of the chest.

The same principles were applied to wounds of the thorax in World War II but with new and powerful adjuvants, as the sulphonamides were in use at the beginning of the war, and penicillin was available in 1943. As will be seen, the results have been so good as to be almost unbelievable.

A notable advance has been made with regard to hæmothorax, which after all is the most common complication of injury of the chest and occurs in 70 to 80 per cent. of cases. The blood remains unclotted as a rule, for reasons not yet properly understood, and so can be aspirated. Here I would like to remind you that it was

one of the Fellows of our Society, indeed a Vice-President at the moment, who showed that slow aspiration of the hæmothorax on the first or second day was not attended by fresh bleeding and that this early aspiration gave the best results. I refer to Dr. S. R. Armstrong, who was with a casualty clearing station in Bailleul. The time was 1915. It has been found, however, and various observers agree to the figures, that in roughly 10 per cent. clotting does take place and that about one-third of these clotted hæmothoraces become infected. The collapsed lung is bound down by a fibro-blastic and fibrous membrane which may be one or more centimetres thick, and which is not thickened pleura. The normal pleura is found deep to it. Organization of the clot produces the "frozen" or "fused" chest and causes much respiratory crippling, and if infection supervenes, results in a chronic empyena often of the total variety. This had been noted in World War I.

Mere evacuation of the clot by thoracotomy was not enough. The lung did not expand and it was found that the limiting membrane, "rind," or "peel" as it has been styled, had to be stripped off the visceral pleura which is left intact.[14] The lung could then be expanded fully. This was a re-introduction of an operation done many years ago, in fact in 1893 by Fowler, the Fowler of the familiar Fowler's position. It is also particularly associated with Delorme. Fowler's operation was done for a condition in which there was a mass of cicatricial tissue occupying three-fifths of the right pleural cavity in an empyema of thirty-three months' duration. The cavity was packed with gauze and the lung expanded in twenty-eight days.

Lilienthal[15] in 1915 described decortication again, as applied to acute empyema, and this was probably the first time that acute empyema had been so dealt with. The operation was used a good deal and with much success following World War I by such surgeons as Tuffier of France and Graham, Eggers, and Hedblom of United States in dealing with the very chronic empyemata. At any rate, in World War II it was first applied in the Mediterranean theatre to the clotted hæmothorax by T. H. Burford of the U.S. Army Medical Corps in May, 1943, and soon after by Nicholson of the British army.[16] Later it was found that infected clotted hæmothorax could be dealt with in the same way and also the hæmothoracic empyema. The remarkable result is that 75 per cent. have had primary healing with complete pulmonary restoration. The operation was done when there was much lateral compression of the lung and especially if the apex was collapsed, and it was found best to do it in from three to five weeks. It is a procedure of considerable magnitude associated with loss of blood and much shock, and blood transfusion is necessary. Yet it has been estimated that fifteen hundred[17] early decortications have been done with a mortality of probably less than 2 per cent.

The unbelievable outcome that I have already indicated as regards wounds of the thorax is this, that wheras in World War I, as given in the official history, the mortality was 27 per cent., in World War II it was only 5.7 per cent. This figure was given two months ago by Major-General Mitchiner.[18] Just last month D'Abreu at the Congress in London of the International Society of Surgery, in a review of two thousand gunshot wounds of the chest on the Italian front, gave the astonishing figure of 1 per cent. as the mortality in the battle for the River Po.

Surely a triumph for the linkage of proper surgical principles and chemotherapy, and it may be truly said that if thoracic surgery owes much to war it has repaid its debt, and with interest.

But lest it should be thought that a wound of the thorax is of comparatively small importance, it must not be forgotten that probably 70 per cent. of those hit in the chest die in the field, and that of those killed in battle 20 to 30 per cent. or more possibly had wounds of the thorax. The sinister reputation too of thoraco-abdominal wounds is well supported by a mortality up to 50 per cent. in World War II. It was worse in World War I.

## Empyema

What has history to say of the other ancient associate of thoracic surgery—empyema, so often a grave complication of its chest wounds. As has been said, Hippocrates[19] was familiar with it, and directs that when the collection protrudes externally an opening should be made in it: but if not, he directs that the patient should be shaken by the shoulders, when the sound of the fluid within will be heard. When the side is ascertained he recommends cutting down to the third rib from the last and making a perforation with a trocar or trepan to give vent to a small portion of the fluid; the opening is then to be filled with a tent and the remainder evacuated after twelve days. In the Aphorisms[20] he remarks that when empyema is treated either with the cautery or incision, if pure and white pus flow from the wound the patients recover; but if mixed with blood, slimy and fœtid, they die. This is probably the first recorded statement of the difference between the ordinary pyogenic empyema and the putrid anærobic variety due to rupture of a lung abscess. And again in the Aphorisms[21] he says that those cases of empyema or dropsy which are treated by incision or the cautery, if water or pus flow rapidly all at once, certainly prove fatal.

R. A. Young in his Lumleian Lectures[22] says that the Hippocratic rules were followed till the fifth or sixth centuries, and then were forgotten or discarded. At any rate they were revived in the Middle Ages, and Paré, after describing drainage of empyema by intercostal incision or by the actual cautery, goes on to say, "but if the patient shall have a large body, chest, and ribs, you may divide and perforate the ribs themselves with a trepan," thus following the Hippocratic teaching about drainage.

During the eighteenth century the practice of tapping came into vogue, and drainage with a cannula. There were apparently very few successes from incision, and operation must have had a sinister reputation, as Dupuytren refused operation when he himself had empyema. The great Sir Astley Cooper said he could never get a single cure.[22]

Syme in his textbook of surgery of the year 1832 only describes paracentesis by incision and likewise Liston in his textbook of the following year. Erichsen in his "Science and Art of Surgery" of 1853 does not mention empyema at all except as a complication of chest wound. So that at that time it would look as if empyema had been entirely in the hands of the physicians. Lister, after he had introduced his antiseptic method, carried out rib resection for drainage and it was thought

that this might be the answer to the problem, but apparently open operation had a high mortality in an influenzal pandemic between 1889-1892, but the problems peculiar to empyema in influenzal outbreaks had been appreciated and noted. They had to be relearned twenty-six years later.

There had, of course, been introduced methods of closed continuous drainage, and Potain[28] must be regarded as the pioneer in that field. He described a method of siphonage combined with lavage in 1869. Curiously enough, it was an obstetrician Playfair[29] who must be credited with water-seal intercostal drainage in this country. He introduced it in 1872 and thus antedated Bülau in Germany and Revilliod in Switzerland, who described similar methods some years later.

Open drainage with rib resection appears to have been the more frequently used form of treatment up till the Great War (World War I) and various estimates of its mortality have been made. Osler and McCrae,[30] for example, in a series of cases give the mortality as 22.2 per cent. and Graham[31] says that 25 per cent. was not unusual. A rude shock came during the worldwide influenzal or hæmolytic streptococcal epidemic when it was realised how great was the mortality with open drainage of the empyema. In military camps in the United States the average mortality was 30 per cent. and in many of the camps it was well over 50 per cent. A special Commission was set up by the Surgeon-General U.S. to investigate the causes of the high mortality, and the report of this Commission is the most notable landmark in the history of empyema. As a result of the work of that Commission the reduction in mortality was very striking; at one camp, for example, it fell from 40 per cent to 4 per cent. and it was concluded that death should not occur in cases of empyema, other than tuberculous empyema, unless complicated by such conditions as lung abscess and suppurative pericarditis. The most important one of the principles advocated by the Commission in the treatment of empyema was the avoidance of an open pneumothorax during the formative or pneumonic stage, and it was recommended that open drainage whether by rib resection or intercostal incision should not be carried out, but rather aspiration or closed drainage until the pneumonic phase had passed. It was dangerous to create an open pneumothorax when the vital capacity was low, and when there were no adhesions or no induration of the mediastinal pleura to prevent displacement of the mediastinal structures towards the opposite side. Practical experience showed that when the character of the effusion changed to definite frank pus, open drainage could be done without the deleterious effects that would have occurred earlier. Evarts Graham, who was a member of that Commission, pointed out the marked difference between streptococcal and pneumococcal infections and suggested that the high mortality in the streptococcal cases was due to the application to them of the principles commonly and correctly applied to pneumococcal cases. In streptococcal infections the effusion is synpneumonic in its appearance, copious, and rapidly formed, and there are no limiting adhesions, whereas in pneumococcal infections the empyema is generally metapneumonic, and adhesions have already fixed the lung to the chest wall.

Adherence to these principles, so well set out, has been the feature of the treat-

ment of empyema up till the present. They have not been forgotten and it has been recognised that empyema is a problem in bacteriology and physics. Fortunately too there has not been a repetition of the fearful influenzal pandemic of 1918 and 1919, when streptococcal empyema was such a common complication.

The advent of penicillin has been of considerable importance with regard to empyema, as, of course, most of the cases are caused by penicillin-sensitive organisms. The empyema can be sterilised in several days, but this does not mean that it is cured—there is still the empyema cavitv until expansion of the lung occurs, and often it is quite impossible to gain this by aspiration, as the only measure, because of the thick pus and probably masses of fibrin in the pneumococcal and staphlyococcal cases. For these open drainage is still obviously required.

An important role for penicillin is in the case diagnosed very early in which the pleural fluid is still thin and localisation has not yet occurred, as has been recommended by Fatti[32] and his colleagues. It would apply particularly to the synpneumonic empyema of streptococcal origin in children and in old people.

With regard to the chronic empyema which so often is due to inadequate drainage of the acute empyema, the recent excellent results from decortication in infected hæmothorax cases may well stimulate a return to that procedure, as an early measure, in total and subtotal empyemata with collapsed apex.

### The Control of the Open Pneumothorax and Anæsthesia

A most important thing, if not the most important, in surgery of the thorax is the control of the open pneumothorax, and this very responsible task, in addition to the maintenance of anæsthesia, devolves on the anæsthetist. I must apologise to my friends who practise that art for daring to trespass in their domain. My excuses are that the open pneumothorax is very much a mutual concern, and that I have been intensely interested in the mechanics of the various methods of maintaining lung function, since those far-off days in World War I when I was endeavouring to cope with the open chest, using a somewhat primitive and homemade Boyle-type anæsthetic machine. Another excuse for my trespass is my desire in this the centenary year, and almost to the day, of the introduction of chloroform, to pay homage to that new saint, St. Anæsthesia, whose name, among others, has been put forward as very worthy by Mr. Winston Churchill when he suggested at a dinner in the Guildhall, London, that there should be a hagiology of medical science.

The baleful effects of an open pneumothorax have long been known; the collapse of the lung on the opened side, the futile to and fro movement of air from one lung to the other across the tracheal bifurcation which Brauer styled "pendelluft," the flutter of the mediastinum and the loss of aspirating effect on the great veins. These have to be prevented and sufficient lung function maintained, as well as anæsthesia, during operations in which the pleural cavity is widely opened or when the chest wall is deprived of rigid support, as may happen in the course of a thoracoplasty. Indeed, often a completely artificial respiration has to be undertaken.

A somewhat erroneous impression of the dangers of open pneumothorax had arisen because of the experiences with chest wounds in World War I. Gask and Duval in particular had found it possible to do thoracotomies without any special anæsthetic apparatus, but these operations were of short duration and various manœuvres such as narrowing the wound with packs, fixing the lung with the hand or with holding forceps, were used as correctives.

As long ago as 1895 Tuffier had shown that a pressure of 10 cm. of water in the bronchial tree would keep the lungs expanded even if the chest were widely opened, and Quénu[33] in 1896 actually used a modified diver's helmet in which the pressure was raised when the pleura was opened, the anæsthetic being chloroform, on a sponge, in the helmet.

Then in 1904 Sauerbruch[34] began to elaborate his negative pressure chamber in which the operation was performed, and in its final stage it held not only the patient below the neck, but also the surgeon and assistants. At the same time Brauer was working on a positive pressure chamber in which the patient's head was contained, and there was much controversy as to which method was the better, but when a simple mask was introduced the positive pressure method gained the field. Meltzer and Auer[35] of the Rockefeller Institute in 1909 simplified matters somewhat by their introduction of insufflation through an intracheal catheter passed as far as the bifurcation, and this also was a constant positive pressure method. Positive differential pressure methods were those commonly used up till about 1938 in spite of the criticism by Giertz,[36] the Swedish surgeon, who as long ago as 1916 showed that with differential pressure, whether negative or positive, breathing, i.e. autorespiration, might be so inefficient as to lead to slow suffocation, and strongly maintained that rhythmical ventilation was much superior to constant positive pressure breathing in which any ventilation effect is brought about by the patient's own respiratory muscles and in which expiration, which should be free, requires some effort. Crafoord, whose chief Giertz was, and who has now succeeded him in Stockholm, confirmed all the findings of Giertz and showed too that in the dog in a period of a little more than three hours under positive pressure anæsthesia, the blood $CO_2$ may rise from the normal value of 40 per cent. to over 80 and 90 per cent. and the animal will die of $CO_2$ poisoning, even when pure oxygen is being breathed.

In conjunction with the Aga engineer Anderson, Crafoord has elaborated a ventilation anæsthesia machine using the Frenckener spiro-pulsator to produce the rhythmic action, and with this machine a fully controlled respiration is maintained.[37]

In this country and in the U.S.A. controlled respiration is achieved by manual pressure on the breathing bag, using the closed circuit and $CO_2$ absorption apparatus. Nosworthy,[38] who in this country was the pioneer of this method, credits Guedel of South California as being the first to make use of controlled respiration.

It is a curious thing that the use of rhythmic ventilation in thoracic surgery has been so late in development, although it must be said that for some time the

methods of carrying out anæsthesia with positive pressure were not far removed, e.g. the gas flow was interrupted frequently to allow the lungs to empty and if the respiration became poor and superficial, manual rhythmic compression of the breathing bag was carried out.

The physiologists have been much in advance of the surgeons in the use of rhythmic ventilation, e.g. the Palmer pump designed by Starling has been in use since 1926,[39] and this was by no means the first of the pumps. This is a single-cylinder pump with solid piston, with valves in the course of the inlet and outlet tubes, so that the lungs receive a constant adjustable volume of air at each thrust of the pump, and are then allowed to deflate by their own elasticity. Starling says that with this arrangement the lungs remain in perfect condition throughout experiments lasting four to five hours.

The tardy development may be due to the Sauerbruch advocacy of differential pressures, and indirectly may be associated with the popularising of the artificial respiration methods of Hall (1857), Howard (1868), Sylvester (1859), and Schaefer (1890), so that insufflatory rhythmic methods and the designing of the apparatus to carry these out have been neglected, although these are more ancient, and as George Edward Fell[40] showed in 1887, could rescue from death cases in which the external methods had failed.

In the Old Ashmolean at Oxford I saw recently a case containing a bellows and leather-wire-covered pipes with this astonishing legend: "For the resuscitation of the apparently drowned as recommended by the Royal Humane Society (c. 1800), contains bellows and leather pipes for rectal insufflations with tobacco-smoke," but there was no chamber that I could see in which the tobacco could be burnt such as Heister illustrates in his "System of Surgery" (1748) when describing the tobacco-smoke clyster for quite a different purpose, and I was confirmed in my idea that some mistake had been made, for close at hand was the Royal Humane Society's Pocket Companion of 1814 with the following instructions: "To restore breathing, introduce the pipe of a pair of bellows into one nostril, the other nostril and the mouth being closed, inflate the lungs till the breast be a little raised, the mouth and nose must then be let free. Repeat the process until life appears."

About this curious smoke clyster, Heister says of it: "The moderns have a new kind of clyster made of the smoke of tobacco which appears to be of considerable efficacy and was introduced first by the English, after whom it has been used by several of the other European nations. It is used chiefly when other clysters prove ineffectual and particularly in the Iliac Passion and in the Hernia Incarcerata . . . They have an iron or brass capsula large enough to hold about half an ounce of tobacco to which capsula are fastened two pipes, one to be inserted into the anus and the opposite pipe is made like the end of a trumpet which is applied to the mouth and being made of ivory the patient or an assistant may blow through it and force the smoke of the burning tobacco in the capsula into the anus. In this manner the smoke is to be blown up the anus until the patient received stimulus enough to excite him to stool; and if one pipeful of tobacco does not produce the desired effect the same may be repeated at discretion; or if the common tobacco is too weak,

recourse may be had to the strongest kind termed canaster, the usefulness of which kind of tobacco has been experienced to good purpose by myself and others in obstinate and incarcerated ruptures when the common tobacco has proved ineffectual, and when at the same time the patient's case had been judged desperate, it has succeeded so well that I have had no occasion to use the knife."

So it seems as if the rectum can be as fastidious in its choice of tobacco as the palate.

I have very recently seen another reference to tobacco smoke, this time by one of the peripatetic correspondents in the Lancet,[41] who, commenting on a work entitled "A Physical Dissertation on Drowning" by Dr. Rowland Jackson published in 1746, says that "Dr. Jackson suggests tracheotomy if others measures prove ineffectual, and if no tracheotomy tube is at hand the shank of a common pipe—presumably a churchwarden—is to be slipped into the tracheotomy opening and the operator 'blows into the bole.' He recommends another and much more extraordinary use of the pipe, this time loaded and burning. The small end is to be introduced into the anus, the bowl covered with a piece of perforated paper, and the operator is then to blow tobacco smoke into the intestines as strongly as he possibly can. On one occasion when this remedy was put to trial at the instigation of a soldier: "At the fifth blast a considerable rumbling in the woman's abdomen was heard upon which she discharged some water from her mouth and in a moment after returned to life." Dr. Jackson was so impressed by reports of this method that he invented an instrument "contrived on purpose for impelling the smoke of tobacco into the intestines." It enables the blower to operate from a distance of some feet, but has no advantage for the patient, the peripatetic gentleman says, "unless like the users of cigarette-holders he prefers his smoke cool."

There may be something in it, after all.

## The Surgery of Pulmonary Tuberculosis

What of the surgery of pulmonary tuberculosis, which bulks largely in everyday thoracic work and will do so, as far as can be judged at present, until a chemotherapeutic or an antibiotic remedy is found? This goal, I feel, is not very far distant.

The surgery of pulmonary tuberculosis is still largely collapse therapy, and comprises operations on the phrenic nerve often with pneumo-peritoneum, closed internal pneumonolysis in conjunction with artificial pneumothorax, and thoracoplasty. The results of thoracoplasty are good in spite of some pessimistic expectation. At a recent meeting of the Tuberculosis Association, Sellors reported that on reviewing just under six hundred cases, of which five hundred and fifteen were traced, he found there was a good result in 77 per cent; of four hundred and thirty-five cavities, three hundred and ninety-two or 90 per cent. were closed and that sputum conversion had occurred in 83 per cent., and again Lewis,[42] collecting the figures of seventeen American authors amounting to a total of three thousand and forty-five cases, found that the average percentage of arrested or apparently

arrested cases was practically 70 per cent. In one large series in that collection, 91 per cent. of cures was claimed.

The Monaldi intracavitary drainage, of which so much was hoped, has proved disappointing, but has a place as a preparatory measure for thoracoplasty in cases with very large excavations. Cavernostomy too, in a limited way, has proved to be a useful method in dealing with some of the so-called tension cavities.

Since 1944 a good deal of surgery of the extirpative kind, i.e. lobectomy and pneumonectomy, has been done for tuberculous lesions in which collapse measures have failed or which were not likely to benefit by thoracoplasty, such as tuberculoma, lower lobe cavity, broncho-stenosis, "destroyed lung" with multiple cavitation, some of these latter cases being described as "desperate risk" cases.[43]

The best results have been obtained by pneumonectomy in cases of broncho-stenosis and thoracoplasty failure. Extirpation has apparently failed to solve the problem of the cases with enormous cavities which are not amenable to collapse therapy.

It has been found that it is a good thing to do thoracoplasty as a supplemental measure following lobectomy and pneumonectomy to avoid over-expansion of remaining lung tissue. The results of lobectomy have been disappointing because of spreads or reactivations in roughly 50 per cent. on the side of operation or in the other lung.

As I see it, the position as regards extirpation in pulmonary tuberculosis may well be expressed in the words of one of the contributors at a recent discussion on the subject:[44] ". . . extirpation of the disease is still not the philosopher's stone in the treatment of pulmonary tuberculosis . . . the imponderables which, for want of a better term, we call the immunobiologic balance, weigh as heavily in these procedures as they ever did in a given case of pulmonary tuberculosis. If the balance can be weighted by some factor as, for example, streptomycin, the complexion of the procedures may change."

In May this year Glover, Clagett, and Hinshaw[45] reported from the Mayo Clinic five cases of resection, three of which were pneumonectomies in which streptomycin was used as a protective. No spreads took place. They think that in this prophylactic sense streptomycin may find its greatest field of service.

## The Surgery of the Oesophagus

For a good number of years I have been treating œsophageal cancers by radium intubation, and while I cannot claim any definite cures, a fair measure of palliation has been achieved. Indeed, quite often it has been seen that the cancerous manifestation in the lumen has disappeared and has been replaced by fibrous tissue, so that dilatation for the resulting stricture has been required.

The story of the surgery of œsophageal carcinoma has been a melancholy one since Billroth in 1871 showed experimentally that resection was feasible. It was not until 1913 that a successful operation for carcinoma of the thoracic œsophagus was done. That was the classical operation of Torek[46] which was done in two stages, the first stage being the establishment of a gastrostomy. In the second

stage the œsophagus was resected and its upper end exteriorised via the neck on the anterior chest wall. Continuity was established by a rubber tube. This patient of Torek's lived for eleven years and died of pneumonia at the age of eighty. Between 1913 and 1941 only fifty-eight operations of similar sort were reported and of these forty-one died—a mortality of over 70 per cent.

The first successful purely transthoracic resection for cancer of the œsophagus with immediate junction of œsophagus and stomach was done by Adams and Phemister in 1938,[47] and that seems to have determined a wave of enthusiasm for resection, especially for tumours of the lower end.

Up till 1943 the Torek operation, or a modification, was the operation of choice for cancers of the middle third, but in that year Garlock[48] showed that it was possible to anastomose the stomach to the œsophagus in front of the arch of the aorta and near the apex of the thorax. Dickson Wright told me not long ago that he had actually done this anastomosis on the surface in the lower part of the neck, thus instancing to what an extent the stomach can be mobilised without jepordising too greatly its blood supply.

The Torek operation is thus more or less completely outmoded. The mortality of these operations is still too high. At a recent meeting of The Association of Surgeons of Great Britain and Ireland, a joint presentation was made by four British surgeons of eighty-two cases of resection with immediate œsophago-gastrostomy. The mortality was 49 per cent. Garlock's (New York) mortality was 48 per cent., whereas another series from Boston (Sweet) had the low figure of 19 per cent.

But to quote Grey Turner again[49]: "In surgery, as in the affairs of life, with concerted and sustained effort insuperable difficulties seem gradually to fade away."

And now, Mr. Ex-President, Ladies and Gentlemen, I fear I have wearied you with these few facets of thoracic surgery, yet I have said nothing of the tumours of the lung, of abscess, or of bronchiectasis; nothing of the tumours of nerve tissue, the neurofibroma and ganglioneuroma; nothing of the vagi and their section for peptic ulcer; nothing of the thymus in its relationship to myasthenia gravis; nothing of the pericardium; nothing of the congenital lesions of the heart which have been very much a high light at the recent meeting of The Association of Physicians and the International Congress of Surgery.

So many worlds, so much to do, so little done.[50]

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# REVIEW

## A HANDBOOK ON DISEASES OF CHILDREN. By Bruce Williamson. Fifth Edition.

THE popularity of this handbook may be judged by the fact that the last edition was exhausted in little more than a year. The present edition shows evidence of careful revision, and adequate reference is made to the newer therapeutic resources, such as penicillin, streptomycin, and B.C.G. The style is brief but lucid; the illustrations and "get up" are excellent. This volume will, like its predecessors, prove an ever-present help to the ambitious senior student. T. H. C.

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# Some Landmarks in Surgical Technique

*By* H. C. Lowry, M.B., F.R.C.S.ED., F.R.C.O.G.

*Address to Students, opening of Winter Session 1947-48, Royal Victoria Hospital, Belfast*

In welcoming the students who are coming to hospital for the first time and those who have already attended the hospital, I am carrying on a tradition which has extended for over sixty years. It is recorded in the staff minutes of 2nd October, 1883, that Dr. Whitla moved and Dr. Byers seconded that the winter session be inaugurated with an address by a member of the staff. Some of the staff did not agree with this and an amendment was moved by Mr. Fagan, seconded by Dr. Moore, to the effect that the session be opened by an ordinary clinical lecture and that the introductory be postponed until next year, but on being put to the vote, the motion was carried and Dr. John Moore gave an address on the following 3rd November. One wonders if Dr. Moore supported the amendment because he had to give the address. He was a busy man and I can appreciate his feelings. All were famous members of the staff. Dr. Whitla, Dr. Byers, and Mr. Fagan in the course of time were knighted, and Sir Wm. Whitla's name lives in the school by the Whitla Medical Institute and the Whitla Hall at the University, and the Vice-Chancellor's residence, all three projects due to his munificent benefactions. I am therefore the sixty-fifth member of the staff to give the opening address. It is of interest that there were then one hundred and sixty-four medical students attending the hospital. To-day we have two hundred and eighty medical and twenty-seven dental students.

Before commencing my address it is my pleasant duty to give a welcome to the recently elected members of the staff. First Mr. Harold W. Rodgers, O.B.E., who joins the staff by virtue of his election as Professor of Surgery. Professor Rodgers comes to us from St. Bartholomew's Hospital, where he was Assistant Surgeon. Professor Rodgers served in the army as a surgical specialist for more than six years and was awarded the O.B.E. for his services in Italy and in North Africa. In offering him a cordial welcome may I wish him a long and happy tenure of office. He comes to a Chair with great traditions. Within living memory it has been held by Gordon, Sinclair, Fullerton, and Crymble, all names that are held in respect by Queen's men. Professor Crymble leaves us amid general regret. He has been associated with the hospital as Assistant Surgeon and Surgeon since 1919 and as Professor of Surgery since 1933. In all these offices he has served with great advantage to the school and credit to himself. Dr. M. G. Nelson is another recruit to the staff whom we welcome this morning. After serving for over five years in the R.A.F., Dr. Nelson has been appointed full-time Clinical Pathologist to the hospital, and I have much pleasure in giving him a hearty welcome to the staff.

Students coming to hospital for the first time might think the assemblage of so many sick people very depressing, but it has its cheerful side when we consider

how many of them, restored to health through the ministrations of the hospital, are enabled to resume their places in the busy world and in their homes.

For the purpose of this morning's address I propose to consider an everyday series of events in the hospital and one which any student with an enquiring mind—and I hope all of you have enquiring minds—would wonder how these were evolved. I refer to the methods of surgeons preparing to operate. Minor differences will be noticed, but in the main, one broad principle guides them all—to render themselves surgically clean, to keep their patients and the field of operation as far as possible immaculate also. It is appropriate that we should mark this, for it is just one hundred years since the first concerted effort was made to render the hands clean and to prevent infection amongst patients from unclean hands. It is strange to reflect that twenty years should have elapsed between the discovery of the virtues of hand-washing in 1847 and the introduction of antiseptics in 1867, seeing that the underlying principle is the same.

The person responsible for the systematic washing of the hands was Ignaz Phillip Semmelweiss, a Hungarian born in Budapest in the year 1818. He received part of his education in Vienna and in course of time became first assistant to the Professor of Midwifery in that city. The Obstetric Hospital in which he worked is still in use and his activities in Vienna are marked by a bronze plaque, which I have often seen and admired. This records his name, age, and fame. A statue was also erected to him in a public square in his native city of Budapest, about fifty years after his death. It was not his fortune to have his merits and work recognised in life, and his teaching as to the cause of puerperal fever and its prevention accepted. Had it been so it is possible that, as Sir Wm. J. Sinclair says, instead of giving antiseptics to midwifery twenty years later, midwifery would have been the beneficent donor to surgery in 1847.

Briefly the story is this. The Vienna school had a sinister reputation for maternal deaths due to puerperal fever, especially in the years 1822 to 1847, and it was due to the genius of Semmelweiss that the cause was discovered and measures taken to defeat it. Five to seven thousand patients per annum were delivered in the Maternity Hospital and the death rate from puerperal sepsis alone ranged from two per cent. to fifteen per cent. in its different sections. Note that the figures of maternal mortality are per hundred and not per thousand, as we are accustomed to think of it. To-day's rate is three to four per thousand from *all* causes. Anything over five per thousand, i.e. one in two hundred, would provoke anxious comment. The hospital was divided into two divisions, one for the training of medical students and the other for nurses. The death rate for the students' department always had an unenviable pre-eminence, ranging from six per cent. to fifteen per cent. The nurses' death rate ranged from two per cent. to seven per cent., and high as the figures were, they were much below the students'. The difference in the death rates in the two departments was so well known to the general public in Vienna that it was quite a common occurrence for a patient on being admitted to hospital to get down on her knees and beg to be sent to the nurses' division rather than to the students'. It is almost certain that this does not include the

deaths of women suffering from puerperal fever who were transferred to the General Hospital and died there, so that the statistics are even worse than they seem. Those who are familiar with puerperal fever, especially before the introduction of the sulphonamide drugs, will remember two classes of cases—those who died after a few days' illness and those who lingered for weeks.

Semmelweiss described the various theories which were supposed to govern the onset of puerperal sepsis, which were current at the time. None satisfied him, and then a great light was shed on the problem. His friend, Kolletschka, Professor of Jurisprudence, died from a prick received at a post-mortem. Semmelweiss was already familiar with post-mortem appearances in deaths from puerperal sepsis. Let him tell in his own words the impression that Kolletschka's death made upon him. "Day and night," he says, "a vision of Kolletschka's malady haunted me and with ever-increasing conviction I recognised the disease from which he died with the malady which I had observed had carried off so many lying-in women."

At one stroke he solved the dual problem: the comparative immunity in the nurses' department from sepsis and the occurrence in such numbers in the students' department. The students were coming direct from the dissecting room and post-mortems to the labour ward and examining patients without efficiently cleansing their hands. The nurses had no contact with such sources of infection. Once Semmelweiss had grasped this fact he instituted hand-washing and disinfection of the hands with a solution of chlorinated lime. This was in May, 1847, and during the remaining months of 1847 the maternal mortality was three per cent. compared with 11.8 per cent. in 1846. In 1848, when hand-washing was in full operation for the whole year, forty-five patients out of three thousand five hundred and fifty-six died in the students' department, that is, 1.27 per cent. For the first time in the history of the Vienna Lying-in Hospital the students' division had a lower mortality than the nurses'. In March and August of 1848 there were no deaths whatsoever from puerperal sepsis.

Semmelweiss when he made his important discovery of the cause and prevention of puerperal sepsis was only twenty-nine years of age. It would be comforting if I could tell you that his success was hailed in the world of obstetrics as a great advance, but, beyond a few schools, he made little headway, and finally, disgusted with his treatment in Vienna, he returned to Budapest, where he was appointed Professor of Midwifery with charge of the hospital. It is certain that his treatment in Vienna and the opposition of some of his senior colleagues was a great disappointment to him. He had proved beyond a doubt that the disease was conveyed from the mortuary to the patients and from patient to patient and that the vehicle for its transmission was the hand of the student. What he did not recognise was that there were many other sources of infecton equally potent and that the "cadaveric particles," as he called them, were not the whole story.

Four years previously, in 1843, Oliver Wendell Holmes had read a paper in Boston on the contagiousness of puerperal fever, in which he contended that a woman in child-birth should never be attended by a physician who had been conducting post-mortems, or who had an infected midwifery case under his care, and

that if he had such a case his clothes should be changed, the hands washed in chloride of lime solution before attending another case. He was ridiculed, especially by the two leading American obstetricians, Meigs and Hodge, but in 1853 he returned to the charge with another paper entitled "Puerperal Fever, a Private Pestilence," in which he reiterated his views and recorded that a Hungarian, Semmelweiss, had lowered the mortality in his hospital by simple washing of the hands with chloride of lime solution and a nail-brush. This shows how circumscribed the medical world was a hundred years ago, eight years elapsing between Semmelweiss's discovery and the knowledge of it by Holmes.

Semmelweiss is the true pioneer of antiseptics in midwifery; while Holmes had made his observations four years earlier, Semmelweiss, not knowing of Holmes' paper, recognised puerperal sepsis in its true colours, as a blood poisoning or septicæmia. It is said, not without truth, that there is a black chapter in the history of medicine and it is headed "Semmelweiss." We cannot imagine the acrimony that marked the controversies between medical men a century ago. Semmelweiss, towards the end of his life, wrote a series of open letters to various German professors who opposed him. In a letter assailing the teaching of one of them, Scanzoni of Wurzburg, he writes, "Your teaching, Herr Hofrat, is based on the dead bodies of lying-in women slaughtered through ignorance. I denounce you before God and the world as a murderer and the history of puerperal fever will not do you an injustice when it perpetuates your name as a medical Nero." For a fortnight before his fatal illness overtook him he had been strange in his manner, and his wife and his old friend, Professor Hebra, took Semmelweiss from Budapest to Vienna. He was admitted to the Asylum and there a little cut in his finger became infected and he died of an acute sepsis, as did his friend Kolletschka, eighteen years previously, and, strangely enough, in the same room where Kolletschka had lain they performed a post-mortem on Semmelweiss, confirming that his death was due to septic infection.

We now pass to a different man and a different scene—Joseph Lister. He was born in 1827, nine years after Semmelweiss, at Upton House in Essex, now part of London, in the Borough of East Ham. His father was a prosperous wine merchant in London, who won distinction in the study of optics and was made a Fellow of the Royal Society, in which he was joined in his lifetime by his son, Joseph, so that father and son were contemporaries in the Fellowship of the Society. The son gained his admission as a Fellow at the early age of thirty-three. Joseph Lister was a great contrast to Semmelweiss. A Quaker with a Quaker's moderation of language, gentleness, patience, and a dislike of controversy, he yet convinced his generation of the essential merits of his system. To-day it is difficult for us to visualize what surgery was before Lister.

It has been truly said that surgery may be divided into two great divisions—that before Lister and that after him. In the days before Lister's system, in the main only operations directly contrived to conserve life were undertaken. All operations of expediency were frowned on. Even those undertaken to conserve life, although they might remove the immediate risks, too often resulted in death

from another avenue—acute sepsis. I have time for one example only. In the Franco-Prussian War the mortality among the French wounded was appalling. Of every hundred soldiers who underwent amputations, even for minor wounds involving fingers and toes, ninety eventually died. The final figures of the Inspector-General, which were probably an understatement, recorded ten thousand and six deaths out of thirteen thousand one hundred and seventy-three cases of amputation.

Lister received his education at University College, becoming a Bachelor of Arts and finally taking his degree in Medicine and the Fellowship of the Royal College of Surgeons in 1852. In September, 1853, he went to Edinburgh with a letter of introduction to James Syme, who was then the leading surgeon in Great Britain, if not in the world. Syme made him a clinical assistant, then a house surgeon, assisting him in his private operations, and finally on the death of a Dr. McKenzie, he was appointed to the staff of the Edinburgh Royal Infirmary. He married Syme's daughter. Edinburgh was the home of controversy, but Lister kept as far away from this as possible and seldom or never was provoked into personal conflict with his rivals. His progress in Edinburgh was solid, if not spectacular, and in 1860 he was elected Professor of Surgery in the University of Glasgow, and in 1861 he was given charge of beds in the Royal Infirmary. Here as elsewhere the situation of surgical patients after operation was deplorable. Evil smelling wards, due to the great prevalence of sepsis—erysipelas, pyæmia, septicæmia, hospital gangrene, tetanus, all were rampant. In fact, Sir James Simpson, of anæsthetic fame, suggested burning hospitals down at periodic intervals. Of course this was impossible, and Lister set himself the more practical task of finding out how these dreadful conditions could be modified. It required a master hand to put the pieces of the jig-saw puzzle together and to evolve some order out of apparently unrelated phenomena. As long ago as the seventeenth century a Dutchman, Leeuwenhoek, the first microscopist, had already described minute bodies which are now known as bacteria. Then Lazzaro Spallanzani had discovered the presence of minute globules in the structure of yeast, and Cagniard de Latour in the year 1834 found that the fermentation, with which they were associated, was the direct product of their existence and formed a vital process. This view was discredited by the chemical explanations of Liebig. Louis Pasteur was eventually to prove that Cagniard de Latour was right.

Pasteur, who was five years older than Lister, was also able to point out that other fermentations, such as souring of milk and butter, were dependent upon and could be produced by living and multiplying organisms and that it was not the presence of air itself, but these dust-carried agents in it which contained microbes, which were responsible.

Meanwhile, it had been shown that by heat and filtration air could be deprived of its putrefactive powers and that there were certain substances that could check decomposition and suppuration in the human body.

Lister, carrying for the first time the full responsibility of his own wards, had stumbled almost by chance on Pasteur's work, and a great reformation began. This was in 1865. As Bashford put it, "Having already satisfied himself and

taught his students that pus in a wound meant decomposition of tissue, that this was somehow dependent upon, but not due to the air, and that there could be no wound infection without it, he now perceived staring him in the face, the explanation for which he had been striving. It was the micro-organisms that were in the air, that was the enemy, and, since, as he then believed, all were malign, to attack the citadel was insufficient; they must be destroyed before they entered the gates." He thought of many agents and finally settled upon carbolic acid, which was being used as a deodorant of sewage at Carlisle. It was taught that putrefaction was due to oxygen, which it was manifestly impossible to exclude, but it was shown by Pasteur that the septic property in the atmosphere depended not on the oxygen or any gaseous constituent, but on minute organisms in it. It occurred to Lister that decomposition in the injured part could be avoided by applying as a dressing some material capable of destroying the life of the floating particles, and in addition using a spray of carbolic which would purify the atmosphere. This was not, as Godlee says in his Life of Lister, an old struggle against putrefaction already established in the wound. It was an effort to prevent the occurrence of putrefaction in such wounds at all. I must quote again from Godlee, who has made it very clear. It had been shown that sterile urine could be kept from putrefying in a glass flask which had been sterilized and its neck hermetically sealed or the air admitted to it had been filtered, heated, or submitted to the action of an antiseptic substance. But if the cork be removed or the flask broken, or unfiltered, unheated, or untreated air admitted, putrefaction inevitably occurs. The skin is the flask in which our bodies are contained, a delicate covering almost as flimsy as glass. Let it be cut or lacerated and immediately a contest begins between our defensive living tissues and the deadly germs carried to the wound by the air, the surgeon's hands, or the instruments, unless the air, the surgeon's hands, and the instruments are purified by heat or an antiseptic chemical substance.

These minute organisms, of which Pasteur spoke and of which Lister was so alert to recognise the significance, are the whole family of microbes—the cocci, the bacteria, and all their numerous allies.

Of the common accidents those with compound fractures were the most difficult to treat, as they had a break of the skin, admitting air to the broken bones. At this time many compound fractures were amputated, harsh treatment as it may now seem, although many amputations ended as a compound fracture would have done—in severe sepsis. Lister himself recorded a mortality of forty-five per cent. in his own cases of amputation. The first case which Lister treated by his new methods was a compound fracture of the leg. It remained clean and healthy, and beyond some damage due to the antiseptic, gave him no anxiety. He treated eleven cases with one death and one amputation, and finally in August, 1867, read a paper in Dublin "On the Antiseptic Principle in the Practice of Surgery." Like all pioneers in medicine his views were received by those who understood with approbation, by his enemies with expressed scepticism, and by the great majority with indifference. It is interesting to note that one of the strongest of his critics was James Simpson of Edinburgh. This might have been a case of familial enmity, as

he was a great opponent of Syme, Lister's father-in-law. From 1867 Lister's wards in the Royal Infirmary in Glasgow, which were formerly the home of sepsis, became singularly free from it.

The cases of septicæmia, erysipelas, tetanus, and hospital gangrene were gone. He had visits from a few London men, while of continental visitors Lucas Championniere and Professor Saxtorph of Copenhagen were able to spread the gospel of antiseptics to the continent. Saxtorph, one year later, was able to report that he had no cases of blood poisoning in his charge and all the compound fractures with which he had to deal, some of them very severe ones, had healed without suppurating, and that all his amputations had recovered.

Thiersch of Leipzig was also in the field and his testimony came at a time when reinforcements were particularly welcome, although Lister had achieved by then the highest position in Scotland—Syme's Chair of Clinical Surgery in Edinburgh.

It is remarkable that all through the '70s the progress of antiseptic surgery had made small headway in these islands. In London only a few, notably Howse of Guys, afterwards President of the Royal College of Surgeons, and Marcus Beck of University College, were firm adherents. Sir Wm. Savory of St. Bartholomew's, one of the foremost surgeons in London and a bitter opponent of Lister's, considered that the annual average in his wards of about six cases of pyæmia, twenty of erysipelas, twenty-six of blood poisoning following injury, represented as good a result as it was possible to expect. He attributed the recent diminution in mortality to improvements in hygiene. Savory's address was described as the "Swan Song" of an already dwindling race of pre-antiseptic surgeons. It expressed, however, the views of a considerable proportion of senior members of staffs of the London and provincial hospitals at the time. As Godlee writes, "Like a poultice it warmed and comforted the soul of many middle-aged men, who had felt the discomforts of an undermined faith," although it made some of the younger men, to whom time passes but slowly, despair of the future. In the larger provincial hospitals progress was much quicker, as young men were more frequently advanced to the charge of wards.

Glasgow and Edinburgh had to wait for the advent of a new generation before reaping the fruits of antiseptic surgery. It is sad to read in the Life of Lister these words, "In Dublin and Belfast, the two principal surgical centres, leading surgeons with a few notable exceptions, either smiled at the innovation or ignored it." It is rather a reflection on British surgery that continental surgeons, notably the Germans, took up antiseptic surgery from the start; in fact von Bergmann, Thiersch, Volkmann, and others were amongst his strongest supporters.

The foreign tour which Lister took in 1876 was a triumphal procession. In 1877 Lister came to London as extra Professor of Clinical Surgery at King's College Hospital. Here his reception, to say the least of it, was cold. He had arranged to take his team from Edinburgh with him, two qualified house surgeons and two unqualified dressers, and the account of their reception at King's College is anything but flattering to King's. However, in time they wore down the opposition. It is remarkable, however, the slow progress that Lister's teaching in its early

years made in London. Even in Edinburgh he had no support from his colleagues on the senior staff, but he had many adherents amongst the juniors. After he left Edinburgh John Chiene and John Duncan did their best to follow his teaching amidst many difficulties.

In Glasgow, where the treatment had originated, one would have expected its success to be more immediate. All the surgeons, except one, affected to give the method a trial, but according to one of them "the thing was a sham." In 1874 Hector Cameron, afterwards Sir Hector Cameron, became one of the surgeons. He was thoroughly versed in Lister's methods and obtained equally good results.

Lister, it is recorded, found it hard to understand the indifference of his fellow-countrymen. Referring to the "flask experiment," he says: "I confess, Mr. President, I am ready to blush for the character of our profession for scientific accuracy when I see the loose comments sometimes made upon this experiment; and I am tempted to doubt whether some of the commentators can have enjoyed the advantages of sufficient education either in chemical physics or in logic."

Another notable contribution to surgery was made in 1869. For long the ideal ligature had been sought. Silk was almost invariably used and in pre-antiseptic days was left hanging out of the wound and finally sloughed out, not infrequently being attended by secondary hæmorrhage and quite often by suppuration.

Lister first used silk soaked in carbolic acid, which acted very well, and he even cut the silk short and left it buried in the wound, but an aneurism which he tied with silk and had an opportunity of examining ten months later, he found a few droplets of pus around the ligature, although the wound was apparently soundly healed. He thought of a more suitable animal material and tried catgut, which had been used before but had been given up as being unsatisfactory.

In December, 1868, at his father's house, with the assistance of his young nephew, Godlee, he got a calf and tied an artery in its neck in two places with catgut, which had been soaked for four hours in a watery solution of carbolic acid. A month later the calf, meantime having been in excellent health, was slaughtered. The original catgut had almost completely disappeared and its place had been taken by a new tissue formed by the invasion of its substance by cells from surrounding parts, The story of catgut is a long one and I do not propose to tell it here. Suffice it to say that Lister worked with catgut for almost the whole of his professional life. He used carbolised catgut first, but confessed in later years that he looked back with horror on some of his early procedures with it, for he did not then know how much the trustworthiness of catgut depended on the seasoning that comes with age. In the course of his endless experiments Lister tried many substances to sterilize and harden catgut—tannin, chromic acid, bichromate of potash, and others. He recommended chromic acid and carbolic acid for the preparing medium in 1881, but his final process consisted in treating the gut with chromium sulphate and corrosive sublimate.

This is of academic interest now, as there are many excellent brands of catgut on the market, but it is interesting as showing that his search after truth continued with unabated vigour in the subject of catgut ligatures from 1868 until 1908.

Lister was the first medical peer and died in 1912, aged eighty-four. His memory is enshrined by the poet, William Henley, who was his patient for two years in the Edinburgh Royal Infirmary. Henley described these two years in a series of poems entitled "In Hospital," in which he paid the highest tribute to the Chief, as Lister was always called.

The history of dress in operating is obscure. We know that the old-time surgeon had a discarded frock coat in which he used to operate, the more stained and encrusted with blood from previous operations the better, and we are familiar to-day with the surgeon in white sterile gown, but the gradations between these two states are not so easy to trace. Lister did not dress in conformity with modern ideas. He took off his coat and pinned a towel over his waistcoat for his own protection, and Lawson Tait, we read, took off his coat and put on a large mackintosh apron, which it was quite impossible to render sterile. They both followed the same rule: they never spoke during an operation.

In 1891 we read in the Manual of Operative Surgery by Frederick Treves: "In the matter of dress the operator should be in his shirt sleeves with his arms bare and clothed from his collar to his feet in a simple mackintosh apron. The practice of wearing the ancient and discarded frock coat, which repeated operations have rendered stiff with blood, is not consistent with the rudiments of antiseptic surgery. If the surgeon must wear a coat, let it be an entirely new one. Sleeves of mackintosh or any other material are objectionable, clumsy, and in the way."

There are interesting illustrations in Castiglioni's History of Medicine. Gross is depicted operating in 1870 dressed in ordinary street clothes. About 1890 Hayes Agnew of Philadelphia and his assistants are seen in gowns, but no gloves or masks. In 1904 Halstead is depicted with a cap and rubber gloves, but no mask, and there is a picture of the modern technique, dated 1940, with even the spectators in gowns and masks. It is difficult, therefore, to state who deserves the credit for the adoption of gowns. In our own school they were certainly worn in the '90s.

The introduction of gloves has a flavour of romance about it. William Stewart Halstead, born in 1852 and afterwards surgeon at Johns Hopkins Hospital in Baltimore, deserves the credit. He was a follower of Lister with rather an aseptic approach. Many will recollect the severe treatment which was formerly considered essential for the disinfection of hands. Older men have described to me their sufferings as pupils and house surgeons, for corrosive sublimate was largely used, and it was especially severe when it was combined with instruments kept in shallow trays filled with carbolic acid. Halstead had a particularly rigorous method of disinfecting his hands and arms. He and his assistants started with a nail toilet, then scrubbed the hands for ten minutes with green soap and a nail-brush, plunged them into a saturated solution of permanganate of potash and kept them in it until they were stained a dark brown. The hands were then plunged into a warm solution of oxalic acid, which decolorized them again, after which they were immersed in corrosive sublimate solution. Small wonder that many of them got dermatitis.

Halstead had a theatre nurse working in his unit, whom he afterwards married,

a Miss Caroline Hampton, whose hands suffered severely from this regime. Halstead, on a visit to New York towards the end of 1889, called on the Goodyear Rubber Co., now famous for tyres, and asked them to make two pairs of thin rubber gloves with gauntlets, for Miss Hampton. These were boiled and used by her with the happiest results. Halstead was quick to realise that in addition to protecting the hands and arms from dermatitis, gloves would also protect the patient from infection from the hands, and thus arose the almost universal use of gloves.

It was not until the beginning of the century that they were used in this school. One who is present has described to me Professor Sinclair wearing them on the occasion of the excision of an anthrax pustule, but this was undoubtedly to protect himself. This was in January, 1900.

With the discovery of micro-organisms by Pasteur and the measures to control them introduced by Lister, theories of the cause of suppurative diseases and sepsis had to yield to established facts.

The hands, instruments, outdoor clothing of the surgeon and his assistants, were rendered innocuous, but it remained for the painstaking investigations of a German called Flügge in 1895 to discover another avenue of infection, for which so far no protection had been devised. Flügge proved that the bacteria found in the mouth and nose were not only pathogenic, but to quote a later investigator, Hübener, "that when speaking, coughing, and sneezing a spreading about of the mouth and nose secretions takes place." Even at a distance of several metres he had shown that agar plates were covered with colonies after somewhat louder and livelier speaking. Hübener's investigations were carried out in the Breslau Surgical Clinic of von Mikulicz-Rodecki, generally referred to as Mikulicz, and Mikulicz bent his energies to devise a plan to counteract this newly discovered source of infection.

In July, 1897, according to Professor Miles Phillips, who has gone very thoroughly into this question, he published a paper describing a "Mundebinde" (mouth bandage), which he used for this purpose. The material used was the finest mull, "sterilized of course," he says, "and fastened to the similarly sterilized operation gown."

This was a comparatively clumsy form of mask, and after further experiments a modified Esmarch chloroform mask, with spectacle ear-pieces carrying a double layer of close-meshed mull, was used. Mikulicz and Hübener found that the efficiency of the mask was greatly increased by wearing it a few centimetres from the face. This is now provided for by giving a snout-like projection to the mask, so that one breathes as it were into a bag. The Cestra mask used in the gynæcological wards of this hospital and the Royal Maternity Hospital are good examples of this type. Masks, which fit closely and tightly over the mouth and nose, are inefficient and may be a source of danger.

About the same time as Flügge, Hübener, and Mikulicz were investigating the question of oral sepsis, Paul Berger, a famous Paris surgeon, published a paper about the use of a mask in operating. He began with the statement, "For several



I,

years I have been worried as to the part that drops of liquid projected from the mouths of the operator and his assistants may exercise on the outbreaks of infection, which one still sees from time to time under conditions of surgical asepsis, which are apparently satisfactory." Berger's suspicions had been aroused by the association of a short series of cases of suppuration in clean operations with an assistant who was suffering from an alveolar abscess. The same mishap occurred several months later when he himself was suffering from a dental periostitis. With his suspicions aroused he noticed that drops of saliva were projected from his own lips and those of his assistants when even simple monosyllabic orders were given. He was aware of Flügge's discovery and straightway set to work to shield his operation wounds from this cause of contamination, even before Mikulicz had published his paper. It would seem, therefore, that the credit for evolving the idea of the mask should be shared by these French and German surgeons. In our own school the first person to wear a mask was the late Robert Campbell. Using masks, he did a series of over one hundred cases of radical cure of inguinal hernia in infants at the turn of the century. As he expressed it, "There are so many people who cannot speak to you without spitting in your face," that it was necessary to protect open wounds during the progress of operations.

That the danger is a real one has been proved frequently in the last twenty years. In Hübener's original experiment fifty years ago an assistant whose mouth had been rinsed with a diluted culture of bacillus prodigiosus spoke and coughed at varying distances over appropriately arranged agar plates. As the prodigiosus colonies were coloured it was easy to distinguish the microbes projected from the mouth and those deposited by the air. The Doctors Colebrook, brother and sister, have proved the pathogenic nature of the flora of the respiratory passages, especially the occurrence of the hæmolytic streptococcus Type A. At Harvard University William and Mildred Wells have conducted experiments even more striking than Hübener's. In an air-conditioned room a "sneeze powder" was projected amongst a group of graduates. Bacterial samples of the air were collected by a centrifuge into blood agar tubes. In their own words this experiment showed "that under conditions of crowding in enclosed rooms we are breathing one another's naso-pharyngeal flora as we once drank each other's intestinal flora in our water supplies." Some die-hards still refuse to wear masks; let them think over these words.

It is customary in an introductory address to give some words of advice. This I hesitate to do, as when a student I was often in need of advice and exhortation myself. I remember lodging with a student who like myself came from County Derry, who always made good resolutions for the coming week on Sunday evening and advised me in the words of Milton: "To scorn delights and live laborious days." This mood usually lasted until Wednesday evening, then Thursday would find us at the Hippodrome or some such place of entertainment. Once we had slipped from grace, the rest of the week was frequently spent in a like manner. So we pursued our way until the middle of term, when we began to work in earnest and burned the midnight oil with a vengeance. I think the students of to-day work

harder than we did. Perhaps because there are so many new things to learn, but hard work pays good dividends. You will never regret it. But more than hard work is necessary. Be punctual at hospital, be tidy in your person, be kind and courteous to patients, remember that frequently the hospital will be judged by your conduct—you are its representatives. Take an interest in your patient. Remember that he or she is dear to someone and that it is only by the mercy of Providence that your positions are not reversed.

I have given you a short sketch of Semmelweiss, Lister, Halstead, and Mikulicz, and may it serve as an introduction to medical biography. There is no pleasanter method of learning medical history, and no man can consider himself educated who is ignorant of the great members of his own profession who have gone before, what they have attempted and what they have done. One of my teachers used to tell us that as an introduction to medical biography there were three books every medical student should read. They are: "The Life of Pasteur," The Memoirs and Letters of Sir James Paget," and Osler's "Aequanimitas." I followed this advice and never regretted it. There you learn of great achievements reached through earnest work. This is an age of rush and hurry when the great ideals of medicine are apt to be forgotten and it is well to look to these great men of a past age to see the difficulties they overcame when we are annoyed and exasperated by present-day conditions.

Nowadays in every sphere you all too often hear, "It will do well enough," "It's not so bad," or "I'll do it to-morrow." Never be content with anything short of the best. Sir Richard Livingstone, who was our Vice-Chancellor when I graduated, in a recent article has asked for an ideal of civilisation which in all fields of life aims at the first-rate. He says, "A man may show it in the way he grows flowers or vegetables, keeps bees, runs a factory or office, paints a picture, writes a book, or performs a surgical operation." You will agree that these are diverse occupations. Let your aim therefore be the first-rate. There are amongst you the future leaders of the profession, members no doubt of the staff of this hospital. Take yourselves seriously. According to Osler, than whom there is no better guide, the master word in medicine is "Work."

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# Acute Intestinal Obstruction

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THE problem of acute intestinal obstruction is well illustrated by the patient, some twenty years ago, who first raised my serious interest in the processes concerned. This patient, a well-nourished middle-aged man, was admitted to hospital suffering from generalised crampy abdominal pain, vomiting, and constipation.

On examination, the patient looked well; his abdomen was somewhat distended, and there was slight tenderness over the middle of the abdomen. Under spinal anæsthesia the abdomen was opened and a narrow obstructing band divided and the obstruction relieved. The patient did not seem in any way disturbed by the operation, and one looked forward to a rapid convalescence. Yet, twenty-four hours later, the patient's condition rapidly deteriorated. The colour became blae, the nostrils pinched looking, the respirations rapid and shallow, and cold sweat broke out on him. The pulse lost its volume, and he died shortly afterwards in a condition resembling surgical shock. The cause of the obstruction had been relieved, and he appeared to have recovered from the immediate effects of his operation. What factors had brought about his death and how could these be combated?

Through the kindness of the staffs I have studied the records for the ten years of the Belfast Hospitals—Royal Victoria, Belfast City, and Ulster Hospital. The results are epitomized in the following graphs (figs. I, II, III, IV) :—

FRANKAU[1] gives the following mortality figures for *strangulated hernia with intestinal obstruction* :—

| | |
|---|---|
| Inguinal hernia - - - - | 15.4 per cent. |
| Femoral hernia - - - - | 16.6 per cent. |
| Umbilical hernia - - - | 46.6 per cent. |

CHRISTOPHER AND JENNINGS[2]—*Mortality figures for intestinal obstruction* :—

| | |
|---|---|
| Adhesions - - - - | 42.0 per cent. |
| Hernia - - - - - | 50.0 per cent. |
| Intussusceptions - - - | 44.7 per cent. |

AMENDOLA[3]—

*General mortality for intestinal obstruction* :—
34.5 per cent.

*If the circulation of the gut was affected* :—
43.0 per cent.

MEYER AND SPIVACK[4]—*All-over mortality in acute intestinal obstruction* :—
48.6 per cent.

## PROGNOSIS

From the study of the figures, several factors are seen to influence the mortality.

*Time* :—

The most serious adverse factor is the length of time the obstruction has existed. If the obstruction has existed for twelve hours or less, the mortality is around 6.6 per cent. (all ages combined). Another twelve hours added to the duration of the obstruction makes the mortality up to 22 per cent. This is in itself very significant. An obstruction existing three days gives a mortality of from 30 per cent. to 70 per cent. The question of duration of obstruction applies in all types of small intestine obstruction.

*Age of Patient* :—

Age has not got such an influence on the mortality as the duration of the obstruction. It appears to be of more significance where a laparotomy is necessary, as in obstruction by adhesions and bands, than in strangulated hernia. In obstruction by bands the mortality rises from an average mortality of about 20 per cent. for patients under 50 years, but after that rises steadily according to age. As chest complications are a frequent cause of death, these old patients would be more susceptible to lung complications. Also, in cases necessitating laparotomy a general anæsthetic is usually given, unlike external herniæ, which are frequently done under local anæsthesia.

The common causes of the obstruction in the intestine can be divided in the classical manner by considering these obstructions :

*In the Lumen — In the Walls — Pressure from without.*

- **Lumen**
  - Swallowed bodies.
    - Paper, bolus of food, hair and hairpins, or worms.
  - Gall stones.
  - Intussusception.
- **In the walls**
  - Congenital atresia of gut.
  - Hypertrophic pyloric stenosis.
  - Strictures—following tuberculous ulceration. Crohn's disease (regional localised ileitis).
  - New growths.
  - Paralysis
    - Paralytic ileus.
    - Following on mesenteric thrombosis.
- **Pressure from without**
  - Bands following operation.
  - Bands associated with Meckel's diverticulæ.
  - Bands associated with adhesions to mesenteric glands, and adhesions.
  - Tuberculosis peritonei.
  - Intra-abdominal tumours.
- Caught in orifices
  - Internal hernia.
  - Interstitial hernia.
  - External hernia.

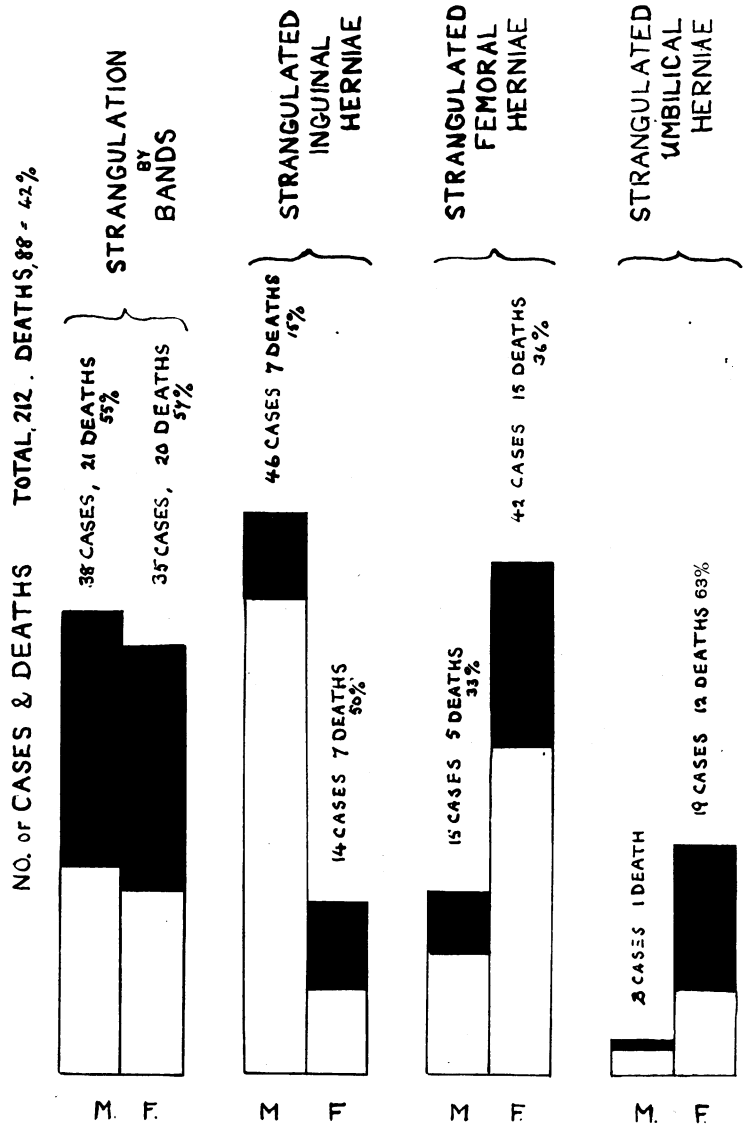



PLATE I

All-over death-rate of 41.5 per cent. This agrees with that of most general hospitals.

**MORTALITY:—**

**Bands,** 56.3 per cent.; **inguinal hernia,** 23.3 per cent.; **femoral hernia,** 35 per cent.; **umbilical hernia,** 63 per cent.

In sexes the number of cases follows the rule:

**Internal strangulation by bands** being about equal in the sexes.

**Inguinal hernia**—Males outnumber females by over 3 to 1. Mortality is greater in females in the proportion of 10 to 3.

**Femoral hernia**—Women outnumber men by about 3 to 1, but mortality is about equal in the sexes.

**Umbilical hernia**—Women outnumber men by about 6 to 1. Mortality greater in the women, but number of men too small.

Of the above, about 42 per cent. have interference with the mesenteric circulation.

### Age and Type of Restriction

Age bears its own typical types of obstruction. Obstruction from birth denotes malformations—intestinal atresia or volvulus; from ten days old, hypertrophic pyloric stenosis. At seven months of age the cases of intussusception are at their peak. Bundles of round worms obstructing the small intestine are in this country most common about eight years old. In young adult life we meet with bands and adhesions from previous operations, although these as a cause of obstructions can be found at any age as long as twenty years after an operation. Some patients seem more prone to develop bands and adhesions. Some in this series were operated on several times for acute intestinal obstruction due to post-operative adhesions. It is the chronicity of the infection that spells chronicity of adhesions. In most cases the adhesions of an acute inflammatory process in the abdomen disappear completely, as in appendical abscess or pneumococcal peritonitis, whereas bands and adhesions due to tuberculous infection recur. It seems to take a steady fifty-five to sixty years of placid indulgence to produce a gall-stone large enough to block the small intestine: the cases in this series ranged from fifty-five to sixty-three years. This agrees with Storck and Rothschild's[5] figures of an average of 62.7 years.

There were only four cases of mesenteric vascular occlusion. Three of these died. Of two personal cases, one was too ill to consider operation; the other had a localised thrombosis and survived without resection. About two feet of intestine were involved in this latter case. He was a man of middle age, apparently healthy, who got a very severe cramp in his abdomen and vomited. The pain was so intense that the patient was shocked by it; it came in spasms. The intensity of the pain distinguished this case from acute appendicitis. There was no bleeding from the bowel and only slight tumescence. There were two cases of acute regional ileitis in which there was no attempt at resection, and both made a complete recovery. There was one chronic case of regional ileitis in which a right colectomy was necessary. This patient made a complete recovery.

Lateness in diagnosis is due first to the patients themselves. Women are loath to stop their household work and attribute their symptoms of colic to many other causes and are not alarmed till vomiting becomes uncontrollable. Herniæ have been present for many years and have not caused any symptoms, so that the patients do not attribute the colic and vomiting to their long-standing lump. An historic example was Queen Caroline, who had her umbilical hernia for fifteen years, and was reticent to show her physicians her debilitating hernia even after she had vomited for two and a half days.[6]

### Diagnosis

The second difficulty is the diagnosis. So many patients have colic that, when consulted, the practitioner—once he can exclude appendicitis, feels a burden lifted off his shoulders and no longer looks upon the complaint as that of a surgical

emergency: an old scar of an appendicitis wound relieves his mind rather than alarms him. Vomiting added to colic can be explained by some dietetic indiscretion to which the patient usually attributes it. The fact that the bowels may move once or twice after a small intestinal obstruction buoys up the practitioner that he is not missing anything in the way of intestinal obstruction, and when the picture is complete with constipation and distention the patient may be too late for surgical help.

I sympathise with the practitioner called out to see a patient with the early symptoms of acute intestinal obstruction; it is, I think, almost the most difficult problem in surgery.

## Symptoms

Cramplike abdominal pains are the most constant symptom in acute mechanical intestinal obstruction, but in the late stages these may even be absent. The spasms of pain come in attacks, followed by a lull, and are, in the case of small intestine, felt in the mid-abdominal area. Where the obstruction is due to a torsion or any cause that tightens up or pulls firmly upon the root of the mesentery, the spasmodic pains may be overshadowed by a severe pain in the back. The pains of a strangulated hernia incorporating small intestine may all be referred to the mid-abdominal area, but there may be also associated pain over the hernia due to stretching of the soft parts. The cramp-like spasms may be initiated by swallowing fluid. In mesenteric thrombosis and embolism the cramp-like pain is very severe and may be enough to cause marked shock. If the root of the mesentery is involved in the thrombosis, the pain will be also felt in the back.

The higher up an obstruction is placed, vomiting is earlier and more marked. The lower down, the more marked is constipation.

## Signs

Certain obstructions are more easily diagnosed by giving definite clinical signs, such as strangulated and obstructed external hernia and intussusception. An obstructing gall-stone may be felt on vaginal examination if it is blocked in the lower ileum when it lies in the pelvis, or, on rectal examination, when it is held up in the rectum. A large hernia may have an impulse on coughing, yet be the site of a strangulated small loop among the other coils of gut in the hernia.

Some fullness and tenderness can usually be elicited over an obstructed loop of gut. If there is rebound tenderness, or pain shifting to the side to which the patient turns, pointing to peritonitis with an irritating free fluid, it suggests that there is internal strangulation with the associated obstruction, and operation cannot be delayed. In these cases the circulating plasma becomes more rapidly diminished than without strangulation. In obstruction due to volvulus, bands, and internal hernia, the obstructed area is slightly tender, and the abdomen gives a sense of a vague tumour beneath the examining hand. A rectal examination may reveal low-down obstructions such as a large gall-stone, impacted fæces, rectal carcinoma, etc. Soldiers in trench warfare in the 1914-1918 war suffered from intestinal ob-

struction due to impacted fæces in the rectum. Rarely the abdomen is retracted as in diaphragmatic herniæ.

### X-Ray

Help in the diagnosis may be had from a straight X-ray of the abdomen.[7] It should be taken in the upright position. The characteristic picture of small intestine obstruction is a staircase-step pattern of gas with a fluid level. Gas and fluid may both be present with irritating cathartics and, unfortunately, many of these patients have had cathartics. Marked gas-filled coils may be seen in renal lesions, but in these latter the fluid level is absent. A large gall-stone may be seen in an X-ray plate.

### Differential Diagnosis

Renal lesions undoubtly give rise to signs and symptoms that most closely mimic acute intestinal obstruction. A renal calculus will cause pain, vomiting, constipation, and abdominal distension. The greatest abdominal distension I have seen was in a thin woman where the abdomen was the size of a full-time pregnancy. It was due to a stone impacted in the only functioning ureter, causing calculous anuria. There was no active peristalsis to be seen in this patient. Patients with uræmia have been diagnosed wrongly as suffering from intestinal obstruction. The two conditions may be intermingled. A patient may start to vomit with intestinal obstruction, and even if the obstruction is relieved, continue to vomit on account of uræmia. Here the dehydration brought about by the vomiting of obstruction has caused interference with kidney function. If the growth is situated over the kidneys, the pain may be typically renal in position, but the pain has not the typical renal radiation, and tenderness may be elicited over the kidneys. In these cases the upright X-ray may be very helpful in making a diagnosis. In cases with uræmia the tongue is dry compared with the tongue of an uncomplicated case of intestinal obstruction.

In appendicitis with the appendix lying behind the terminal ileum there will be distension and frequent vomiting and constipation. But a careful clinical examination of areas of tenderness, psoas or obturator sign—and the temperature, tongue, and breath will all help to make the diagnosis definite.

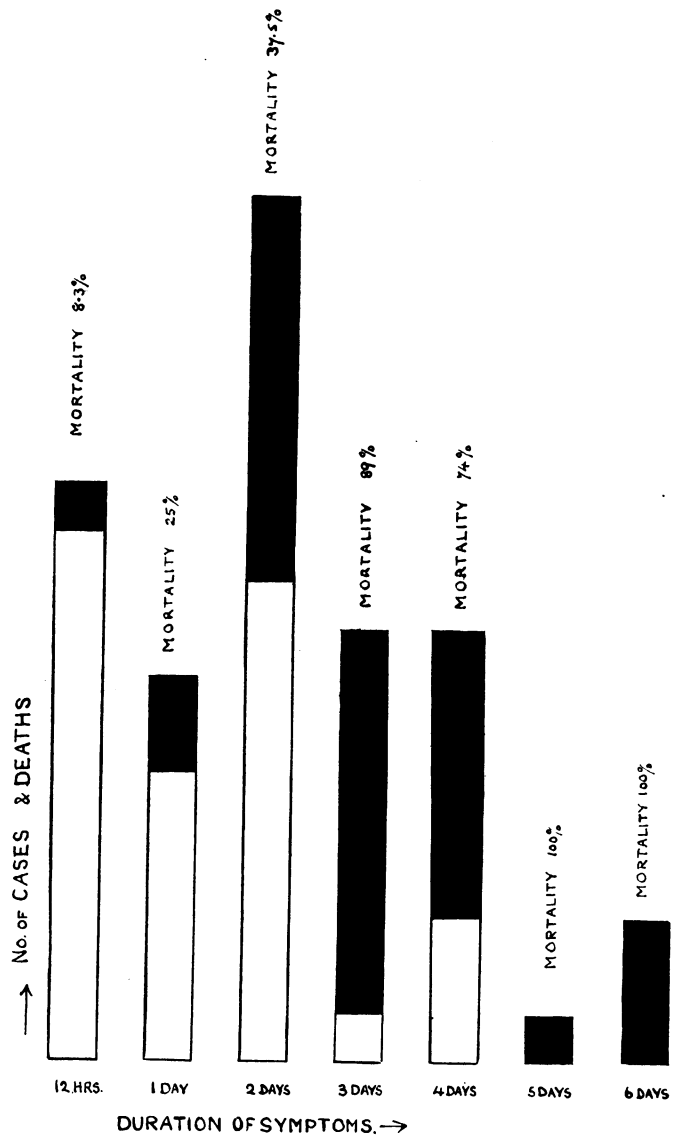
The colic of acute enteritis is quickly followed by diarrhœa, and so easily distinguished from the colic of intestinal obstruction.

### Pathology of Intestinal Obstruction

An obstructing band may be divided or an incarcerated hernia reduced, yet these figures show that a poor percentage of the patients will recover. The obstructing agent has evidently set in motion undermining changes which the operation does not correct. The patient will die in a condition resembling surgical shock or from uræmia, pulmonary thrombosis, embolism, or peritonitis.

In high obstruction of the lumen, as, for example, in pyloric stenosis, the vomiting is pronounced.

J. B. Peters has well described the changing blood conditions[8]:—"Each vomit




OBSTRUCTION BY BANDS

PLATE II

**Obstruction by Bands, Adhesions, and Internal Hernia.**

This plate shows graphically the number of cases represented by the length of the column, and the number of deaths represented by shading at the top of each column in relation to the duration of symptoms.

**Duration:**—12 hours or less the mortality is 8.3 per cent.; between 12 and 24 hours, 25 per cent.; between 1 and 2 days, 37.5 per cent.; between 2 and 3 days, 89 per cent.; between 3 and 4 days, 74 per cent.; 5 days and over, 100 per cent.

This emphasises the importance of early diagnosis and treatment.

carries off chlorides, and the sodium left behind combines with the $CO_2$ to form bicarbonate. Thus we get bicarbonate excess and alkalosis.

"In order to restore a normal serum pattern, excretion of chloride in the urine ceases, and the kidneys secrete an alkaline urine containing sodium bicarbonate. This abolishes the bicarbonate excess. Meantime, the fluid content of the body has been reduced. The net effect is the restoration of the normal composition of the body fluids at the expense of the volume.

"As the vomiting continues, water being taken throughout, a point is reached at which fluid can no longer be spared. The sodium concentration falls, since bicarbonate is still sacrificed in the urine on behalf of the acid base equilibrium, to balance chloride lost in the vomiting. If the vomiting continues, the urine becomes suddenly acid because no further loss of sodium is tolerated. In this final stage dehydration, alkalosis, salt depletion, and reduction of osmotic pressure are all combined. We can see how the giving of fluids by mouth does not cure dehydration, but exaggerates it, because it encourages vomiting and thus washes the chlorides out of the body." This fall in salt concentration causes swelling of the body-cells, which impairs functional activity, especially in the kidneys, leading to renal failure. I have seen a patient vomit from intestinal obstruction due to a hernia, and, after the hernia was reduced, continue to vomit from uræmia. It is obvious that in these high obstructions intravenous saline is indicated.

In obstructions of the small intestine, other factors besides those of dehydration and imbalance of electrolytic salts come to bear.

The small intestine contains gases from that swallowed and from the digestion of food. Its musculature is stimulated to contraction by distension of its lumen. This musculature is dependent upon oxygen carried in the blood-stream and upon vitamin "B" for its rhythmic contractions. It has probably also the peculiar ratchet mechanism described by Learmouth. This can best be illustrated by the urinary bladder. The stimulus is given for emptying the bladder. If this is unattended to, the stimulus passes, a ratchet is loosened and the bladder fills further when another stimulus is delivered. In intestinal obstruction the luminal tension causes a peristaltic wave. This passes down—as Markowitz describes—like a wave in the sea and washes against the obstruction, one wave succeeding another, followed by a backwash that gives rise to vomiting. After a time the musculature relaxes its ratchet, peristalsis ceases. These events are sometimes illustrated clinically by the baby with intussusception. A little whimper disturbs the mother at the first wave; the next wave with its greater stimulus causes a shriller cry; the cries get shriller, till they end in a shriek with a powerful peristaltic wave. Then the ratchet relaxes and the baby sleeps till the tension rises again sufficiently to produce another stimulus. These later contractions obey the laws of tired muscle : it contracts after a short rest on stimulus more readily and with greater amplitude.

### Effect of Distension

The increase in tension in the obstructed small gut is mainly due to increase in gas—chiefly nitrogen. The normal gases in the gut and the outpouring of mucus

with the increasing diameter of the gut cause a relative unsaturation of the nitrogen in the lumen compared with the nitrogen in the blood, and nitrogen passes out from the blood to the gut. Distension is greatest and most rapid in volvulus. Any absorption of gases from the gut is blocked by the obstruction of the venous return, whilst the arteries—more resistant to a twist—can still pump blood, and with it nitrogen to distend the gut. One way of preventing or removing this distension is obviously to deprive the blood of the free nitrogen by making the patient breath pure oxygen.[9] The relative pressures of gases will then be reversed, and nitrogen will pass from the intestine to the blood.

Distension by increasing the intra-luminal pressure begins to stop the circulation in the submucosal vessels. A pressure of 20 mm.Hg. in the lumen of a size of two to three inches diameter brings about complete cessation of circulation in the mucosa. In five hours the mucosa is damaged, and in fifteen hours it will be completely devitalised.[10] In this state of distension no absorption takes place from the distended area. Strychnine can be left in a distended loop with safety, but the relief of the distension will be followed by acute poisoning. In this period no toxins are absorbed from the obstructed loop. In time the walls become devitalised, and the contents pass out through the walls into the peritoneal cavity, from which it is absorbed into the circulation. In the small intestine the gut above an obstruction due to a band is rarely distended enough to obliterate the circulation in the mucosa, and will allow of absorption from the proximal intestine.

## The Blood Plasma

*Pari passu* with the onset of distension of the small intestine, the volume of plasma in the circulation drops. We have seen how the salt balance of the blood in vomiting of high obstruction is disturbed. When the obstruction is in the jejunum or ileum, these changes are proceeding and at first the circulating plasma is not disturbed, for any loss is made good by withdrawing plasma from the interstitial spaces; later no further inflow of plasma from this source is available, and the circulating plasma drops. Where the protein reserve of the patient is low, as in the undernourished, the aged poor, and the very young, intestinal obstruction will be badly borne. Here the mortality is high, up to 70 per cent.

As the distension proceeds, the fall in circulating plasma begins, and with it the deterioration in the patient's condition. A loss of 3 per cent. of plasma body weight is fatal.[11] Conversely, as the distension is removed, the amount of circulating plasma rises, but very sudden relief of a distended gut may cause a sudden temporary drop in blood pressure.

The loss of circulating plasma in obstruction may be due to the excess of mucus secreted into the lumen and lost to the circulation, and to the amount of fluid secreted into the peritoneal cavity, but this point is not yet definitely scientifically proven.[12]

In obstruction without distention the loss of plasma is about 15 per cent.; in obstruction with distention it rises to 55 per cent.—which is fatal. The loss of plasma is similar to surgical shock, and, like it, the circulating plasma shows a

decline long before the blood pressure or pulse rate gives any indication of the fatal influences at work.

### Blood Pressure and Pulse Rate are not True Criterion of the Actual Conditions

The taking of the blood pressure and the pulse rate is no indication of the state of the patient for—

$$\text{Cardiac output} = \frac{\text{blood pressure}}{\text{resistance}} \times \text{constant.}$$

$\therefore$ Cardiac output $\times$ resistance = blood pressure $\times$ K.

Resistance = Number, length, and calibre of peripheral vessels $\times$ viscosity of blood.

Now, the viscosity of the blood is increased by the loss of plasma in the circulating fluid, and thus its resistance is increased, so that the blood pressure will show a high figure giving a false idea of the patient's condition. In the shock of hæmorrhage when there is no hæmoconcentration, the blood pressure gives a truer index. It is noteworthy that transfusion will restore a patient who has had a blood pressure of 40 mm.Hg. for hours following on hæmorrhage; whereas when the blood pressure of a patient with intestinal obstruction or shock, surgical or toxic, falls below 80 mm.Hg. for over an hour, transfusion will not restore him. The condition has become irreversible.[14]

It used to be thought that the toxic substances causing the fall in the circulating plasma were in the contents of the obstructed intestine. This substance is allied to histamine and causes similar effects. If histamine is injected into healthy dogs there is little effect, but if it is injected into dogs with pyloric occlusion it produces death in the same way as intestinal obstruction. Van Beuren[16] has shown that the contents of an unobstructed loop were even more toxic than those of an obstructed loop when injected into the blood stream of healthy animals. Evidently the healthy animals' mucous membrane possesses properties which prevent this substance passing into the circulation. The distension of the gut interferes with the mucous membrane in such a way as to prevent the neutralisation of the toxin and allows it to pass freely into circulation.

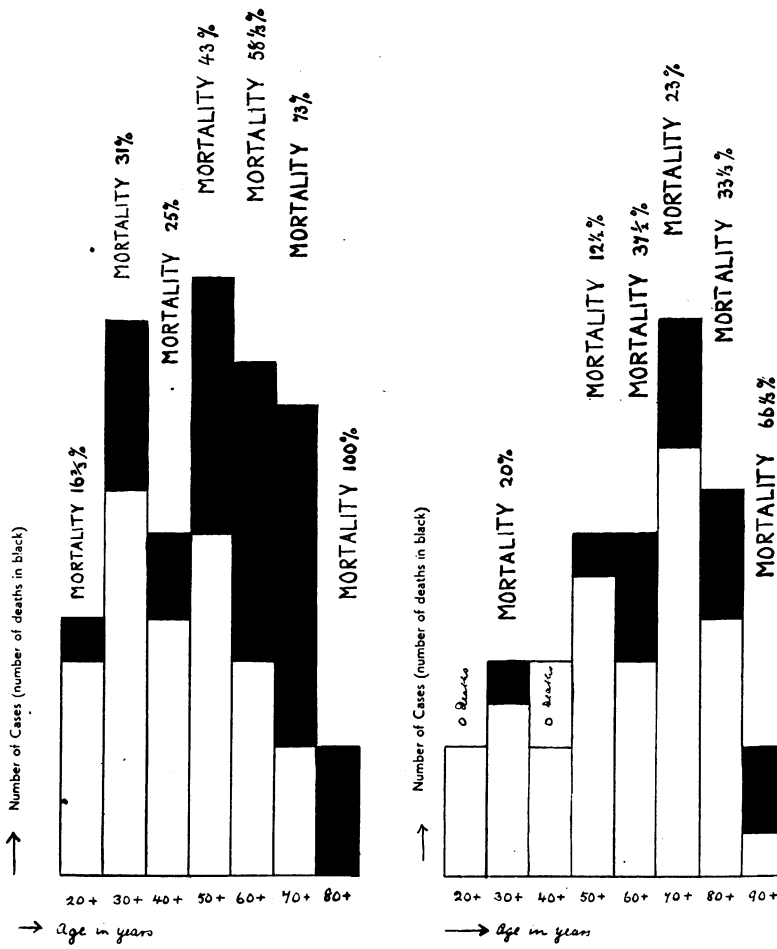
With the loss of circulating plasma the concentration of the blood cells in the capillaries rises. This can be shown by estimating the specific gravity of the blood by the Hamilton and Barbour falling drop or roughly by the hemoglobinometer. In hospital practice the average hemoglobin is between eighty and ninety per cent.

### Effects on Kidneys

With the dehydration and the loss of circulating plasma the renal cells swell with blockage of the tubules and deficiency of renal function. Hence the ultimate fate of some patients with intestinal obstruction is uræmia.

### Cause of Pulmonary Complications

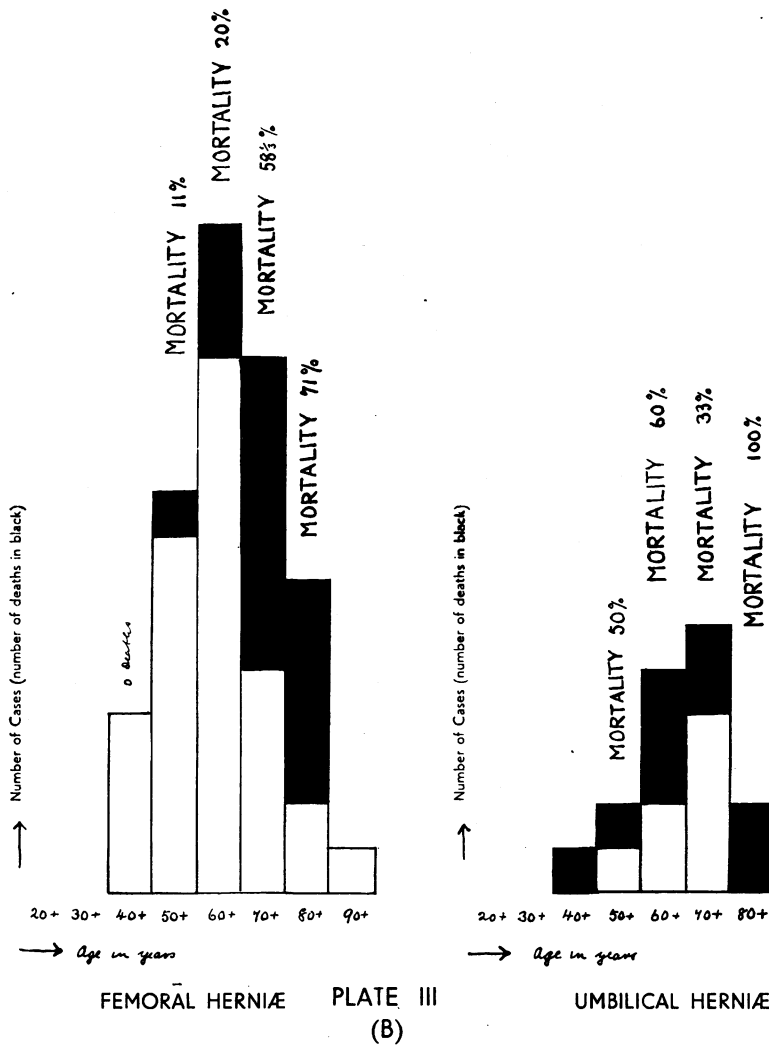
Another common cause of death is pulmonary complications.[17] Several factors




ADHESIONS & BANDS PLATE III INGUINAL HERNIÆ

(A)

These columns show graphically the age at which the obstruction occurred and the mortality for each age.




FEMORAL HERNIÆ PLATE III UMBILICAL HERNIÆ

(B)

It shows that young adults bear obstruction better than the elderly. The mortality rate rises sharply in patients over 50 years of age.

are accountable for this. A patient under gentral anæsthesia may suck some vomited matter into his bronchus, but, apart from this, the lack of circulating plasma with its attendant effects upon the pumping force of the heart impede pulmonary circulation. The lack of protein in the circulation is followed by œdema in the tissues and lungs. Also a distended abdomen impedes the full movement of the diaphragm. Hence basic pneumonia is a common cause of death. The condition of the blood and reduced cardiac output and the pressure of the distended abdomen tend to pulmonary embolism. (See later.)

*Paralytic Ileus*

Paralytic ileus is usually due to infection helped by trauma. It is contributed to by the distension and the resultant lack of oxygen to the musculature of the walls of the gut.

*Treatment*

In the obstructed gut the problem of nutrition must be considered. I have before drawn attention to the reserves of protein that are necessary. In the young adult the reserves of protein, carbohydrates, and fats are usually sufficient. There is also stored in reserve the fat-soluble vitamins "A" and "D." The water-soluble vitamins "B" and "C" must be taken daily. Vitamin "B" has a specific action on the movements of the gut as, for example, in a dilated stomach inherent peristalsis continues, but deprive it of vitamin "B" and complete atony of the stomach takes place. The vitamin "B" complex also shields the liver from the toxins. Vitamin "C" is necessary for the formation of fibroblasts, hence the disruption of wounds in the patients operated upon after periods of carbohydrate dieting or continued vomiting.

Knowing the undermining influences at work in acute intestinal obstruction, one can form some idea of the lines of treatment required. The circulating plasma must be restored, distension of the gut prevented or eliminated, the obstruction relieved, the water and salt balance restored, and the proper proportion of vitamins "B" and "C" supplied.

A patient when first seen may appear to be in good condition. The blood pressure may be normal and the pulse rate within normal limits. It is only by studying the volume of circulating plasma that one has a real picture of the patient's general condition. The hæmoglobin gives one a rough and easily acquired index, or it can be more accurately estimated by the rate of fall of a falling drop of blood by Hamilton and Barbour's apparatus. Strangulated hernia used to have a very high mortality, 20 per cent. to 70 per cent. depending on the duration of the obstruction, in patients over sixty years old, admitted to the Belfast City Hospital. Since instigating hæmoglobin estimations and the restoration of the circulating plasma to near normal limits before undertaking operation in these patients, none have died from this condition, but numbers are yet small.

The following are examples of the state of the patients on admission :—

MRS. S., 57 years. Ventral hernia strangulated for five days. Pulse rate 80.
Hæmoglobin on admission - - - - 115 per cent.
Drip transfusion given.

Hæmoglobin just before operation - - 88 per cent.
Gut found strangulated and viable.
Hæmoglobin at end of operation - - 75 per cent.
Hæmoglobin on evening of operation - - 75 per cent.

Here a patient's hæmoglobin had risen from 75 per cent. to 115 per cent. and the pulse rate was only 80. Had operation been begun without drip plasma a further 15 per cent. drop would have occurred with practical certainty of death.

In the pre-transfusion period the mortality-rate for this age and duration of obstruction was :—

According to age - - - - 60 per cent.
According to duration - - - 100 per cent.

Wm. McM.—Strangulated ing. hernia. Pulse rate 72.
Hæmoglobin on admission (5 p.m.)—120 per cent.; Drip started (6 p.m.).
8 p.m.—Hæmoglobin, 95 per cent.
9 p.m.—Local anæsthetic and operation.
12.30 a.m.—Hæmoglobin, 96 per cent.

Here also a probable death from operation was prevented by transfusion. It is noteworthy the pulse rate was no indication of his condition.

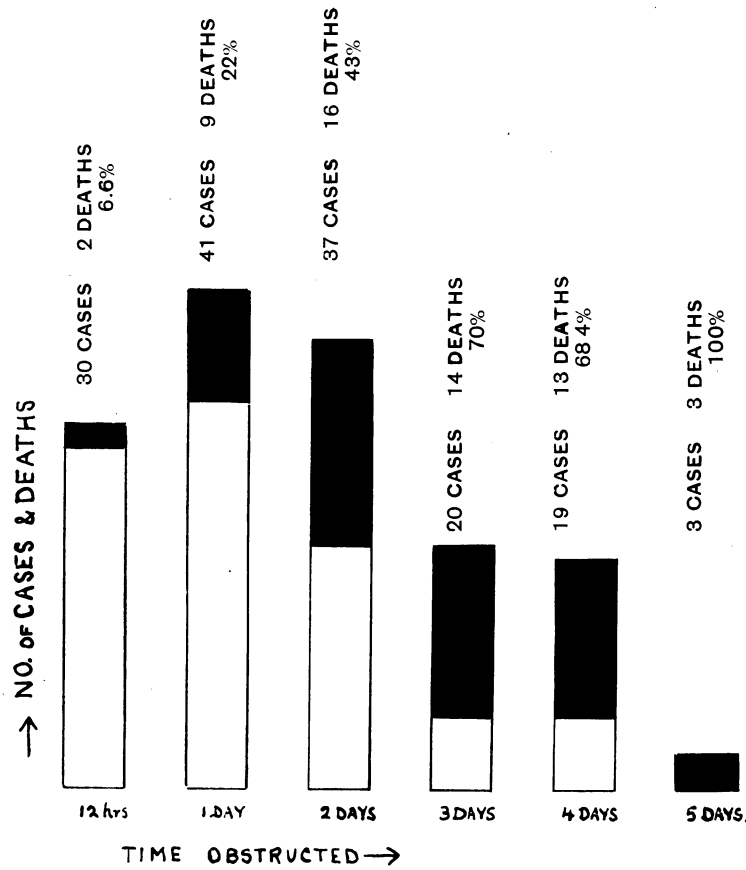
As the normal hæmoglobin of the patient when first seen is not known, it is our rule to regard any reading over 90, even in the full-blooded young adult, as suggesting a state of loss of circulating plasma or shock exists, and treatment by intravenous saline and plasma is begun before operation is undertaken.

It is interesting that the loss of circulating plasma occurs concomitantly with the onset of abdominal distension. If the distension is removed by breathing pure oxygen or by deflation by an indwelling intestinal suction tube (Miller Abbott), the circulating plasma is restored. Hence, where possible, deflation should be produced before undertaking operation.

Deflation has another indirect bearing on the mortality. A patient with a low blood pressure and concentrated red cells is well set for vascular peripheral thrombosis, and the distended abdomen with flexed lower limbs adds further resistance to the central flow of the veins from the lower limbs, with resulting thrombosis of the femoral veins and veins of the leg. Hence the prevalence of pulmonary thrombosis and embolism in intestinal obstruction. Deflation and an absence of insistence on the Fowler position after operation are thus advisable.

Pre- and post-operative deflation by the Miller Abbott tube in one American hospital has lowered the mortality in that hospital from 29.6 to 5.9 per cent.

The continuous drip saline has come to stay, but it has frequently been of no help and in not a few instances has helped to carry off the patient it was designed to save. In the high obstruction or the dehydration of hypertrophic pyloric stenosis, loss of electrolytic salts can be made good, and in the early stages of acute intestinal obstruction when the blood protein is being made good from the interstitial spaces. But later, after distension has arisen, the protein in the circulation is too low to hold the salts and water, and these later pass from the circulation into the interstitial spaces, causing œdema. Even concentrated saline cannot be held in




COMBINED TYPES OF OBSTRUCTION

## PLATE IV

Here all types of obstruction are plotted against the duration of the symptoms. The mortality rate is seen to rise rapidly with each hour obstructed.

In the first 12 hours the mortality is 6.6 per cent.; between 12 and 24 hours the mortality is 22 per cent.; between 1 and 2 days, 43 per cent.; between 2 and 3 days, 70 per cent.; between 3 and 4 days, 68.4 per cent.; between 4 and 5 days, 100 per cent.

This is in agreement with each type of obstruction.

circulation from the same cause if there is not sufficient protein in the circulating blood to hold it.

Now, a loss of 3 per cent. of plasma is fatal and cannot be recovered from. Loss of circulating plasma must be restored by plasma and must be administered before blood pressure is dropping. Blood may be used, but carries into a circulation crowded with red blood cells more red blood cells, and the quantity needed is two or three times that of the plasma. In an average man with obstruction and distension lasting four hours, one litre of plasma would be required, whilst 1,800 c.c. of blood would be necessary.

The administration of plasma may even cure an obstruction, for example one due to inflammatory adhesions from acute appendicitis. In such a case the patient will vomit, and the abdomen become distended, causing a lowered circulating plasma. The lowered plasma will in turn increase intestinal œdema—this œdematous swelling in the region of a kink will make an incomplete obstruction complete. The œdema will be removed and the obstruction relieved by restoring protein in the way of plasma to the circulation and by lessening the abdominal distension by intubation. Secondly, after a resection in a patient with lowered plasma the site of the anastomosis will become œdematous, and this œdematous tissue may cause complete obstruction. I have noted this at post-mortems. Plasma alone would save these people by removing the œdema.

Distension is prevented or reduced by intestinal intubation and suction—the best tube being the Miller Abbott type. This tube is passed through the mouth, or preferably nostrils, and is designed to travel to the seat of obstruction. Constant suction is employed. The patient is allowed to drink, but for every 100 c.c. of water given he should be given a 10 gr. capsule of common salt to maintain the chloride balance. In the absence of getting the tube passed per *via naturalis,* the tube can be passed through a high enterostomy and suction continued. Ryle's tube, although not so efficient, used with gastric suction, is also helpful. Breathing pure oxygen will also diminish distension. Intravenous oxygen is in the experimental stage.

Unless the blood supply of the obstructed loop is in danger, e.g. strangulated hernia, it is best to restore the plasma and deflate the abdomen before putting the patient to the strain of operation. Where the blood supply is in jeopardy, the transfusion is started and a pint of plasma rapidly run in; the transfusion is continued during the operation. Anæsthetics themselves lower circulating plasma by ten to fifteen per cent., and are inhibitors in muscular tone, in the case of ether lasting up to twenty-four hours. Gas and oxygen inhibits peristalsis for about eight hours, so that to subject a patient with a low plasma content to operation entails grave risks. Fifty per cent. of patients who died in this series after operation died within twenty-four hours of operation.

Paralytic ileus is treated on the same lines. The earlier treatment is begun, the better. If plasma is low, peristalsis is slowed. Deflation by suction must be maintained. If vitamin "B" is deficient, peristalsis is absent, and oxygen is necessary for peristaltic contracture. Measures must be taken to supply the body with these

necessary factors and to keep down distension. The infection must be counteracted with penicillin and sulphonamides as they are required.

Plasma is also necessary for fibroblastic formation, and if these patients had definitely low plasma, even with technical perfection in operating, healing would be unlikely to take place, hence leakage at the anastomosis and peritonitis are to be expected after resection in patients with long-standing intestinal obstruction.

I remember being struck with the post-mortem appearance of a patient who had had resection of gut for a strangulated hernia; even after twenty-four hours there was not the slightest appearance of lymph formation, and the sutures appeared to be in wet, dead tissue with resultant leakage. If resection is necessary, plasma must be administered, distension must be eliminated by intubation, and suction and other measures of nutrition mentioned carefully carried out.

In this paper I have confined myself to the small intestine obstruction. Colonic obstructions cause less general disturbance, and distension of the colon *per se* does not cause a drop in plasma circulation. This aspect of the problem was discussed at a former meeting of the Society and published in the Journal.[18]

This paper was read at the combined Ulster Medical Society and British Medical Association meeting, 19th March, 1942. Its publication has been delayed due to loss of the original typescript.

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# REVIEWS

## MODERN TREATMENT YEAR BOOK, 1947. Edited by Sir Cecil Wakeley, K.B.E., C.B., D.Sc., F.R.C.S. Pp. viii and 354, 38 figs., and 17 plates. 15s.

This volume, as indicated in its sub-title, is intended to be an aid to diagnosis and treatment for the general practitioner.

It is a collection of forty-four articles covering a wide range of subjects in general medicine and surgery and in the specialties.

In the preface Sir Cecil Wakeley writes: "With post-war fatigue and a lack of interest due to such a constant unpalatable diet, the average doctor requires something to interest him in the few moments he has for medical reading." The pabulum offered in this book, however, is not light or concentrated nourishment, nor is it suitable for a hurried meal. There is much useful and interesting information on recent advances in diagnosis and treatment, but also much that could be found more readily in standard textbooks.

There is no attempt at classification of the material. An arrangement under sections would look more orderly and would facilitate reference.

Nevertheless, the majority of the articles elucidate everyday problems met in general practice, and this book should be helpful to many doctors in keeping them abreast of the latest scientific achievements and technical advances in medicine. W. G. F.

## RETROPUBIC URINARY SURGERY. By Terence Millen, F.R.C.S., F.R.C.S.I. Pp. 208. Edinburgh: E. & S. Livingstone Ltd. 25s.

Mr. Terence Millen has been particularly fortunate in the publishers of his recently published Retropubic Urinary Surgery. Printing, paper, and illustrations are of a much higher standard than one expects in these austere times.

After a careful analysis of the different types of prostatic obstruction and a short critical review of the various operations employed for its relief he deals with the history of the retropubic approach which was used as long ago as 1908, but was not adopted as a recognised method until after August, 1945, when Mr. Millen described the technique which has been so successful in his practice.

He then deals with the anatomy of the region, the preparation of the patient, and gives an excellent description of all the details of the operation, the after-care and complications.

He concludes with a description of his own operation for stress incontinence in the female, as this is to a large extent a retropubic operation.

Whilst all urological surgeons have not had the same success as Mr. Millen with the retropubic approach, there is no doubt that it is a major contribution to prostatic surgery.

In conclusion one must say that it is not an operation to be attempted unless the surgeon has a wide experience, adequate equipment, and a competent team. C. J. A. W.

15. Moon, V. H.: "Early Recognition of Shock and Its Differentiation from Hæmorrhage," *Annals of Surgery,* Vol. 110, 260, August, 1939.
16. Van Beuren, jun., F. T.: "Acute Ileus," *Annals of Surgery,* Vol. 102, 605, Oct., 1935.
17. Douglas, D. M.: "Strangulated Hernia," *British Medical Journal,* Vol. 1, 354, March, 1942.
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# Intra-Thoracic Actinomycosis Presenting as Empyema

## REPORT OF A CASE

*By* R. A. PYPER, M.D., M.R.C.P.(LOND.)
Royal Victoria Hospital, Belfast.

THORACIC actinomycosis, a comparatively uncommon condition, may arise by direct inhalation of the infecting organism, by metastatic spread from a focus elsewhere, or by infiltration through the œsophagus. It may present as a broncho-pneumonia or as a lung abscess; it may closely simulate pulmonary tuberculosis or spreading suppurative pneumonitis; new growth or bronchiectasis may be suggested; sometimes, as in the present case, there is an empyema. Diagnosis is not usually established until the organism is found in sputum or in pus from a surgically drained abscess; sometimes not until "sulphur granules" appear in pus from one or many discharging sinuses in the chest-wall. If empyema has occurred diagnosis may be made by thoracentesis.

If the progress of the abscess-forming granulomatous lesion remains unchecked the result is disastrous, and in pre-penicillin days few patients survived more than than a year or two. The outlook is now more hopeful, but a definite line of satisfactory treatment does not as yet appear to have been finally decided, particularly with reference to the dosage of penicillin which should be employed, and the length of time for which it should be continued.

### REPORT OF CASE

The patient, a district nurse of 43 years, was admitted to the City and County Hospital, Londonderry, on 10th April, 1947, with a diagnosis of pneumonia in the left lower lobe. Intramuscular penicillin, fifty thousand units three-hourly for six days, produced no immediate response, the temperature remaining between 100 and 102°F., but three days later it dropped to normal and remained so for a further three weeks; during this period dullness at the left base, both clinically and radiologically, remained. On the 10th of May, one month after admission, the temperature rose again to 102°F., and failed to respond to a further course of penicillin (twenty thousand units three-hourly for twenty-three days) supplemented by sulphamerazine (1 gramme six-hourly for six days). The clinical signs and radiograms suggested empyema, but diagnostic needling of the chest on three occasions failed to find pus or fluid. Two examinations of sputum showed pneumococci and streptococci; no tubercle bacilli were found direct or on culture. White cell count was fourteen thousand per c.mm.; Hb. was 75 per cent. and blood film showed microcytic hypochromic anæmia.

She was transferred to the Royal Victoria Hospital, Belfast, on 16th June, with a diagnosis of probable interlobar empyema, having maintained for the previous six weeks a swinging temperature between 101 and 103°F., with a corresponding pulse rate and respirations about twenty to twenty-four per minute.

On admission to the Royal Victoria Hospital she was found to be a well-nourished woman with slight pallor of the conjunctivæ. There was no cyanosis, no palpable enlargement of superficial lymph glands, and no œdema; she showed no respiratory distress; there was slight finger-clubbing. The pulse rate was ninety-two per minute and the temperature was 100°F.

Outside the respiratory system nothing of interest was discovered on routine clinical examination.

Examination of the chest revealed diminished expansion of the left side. The trachea was in the mid-line and there was no deviation of the apex beat from its normal position. There was flat dullness to percussion over the left lower lobe and also anteriorly over a wedge-shaped area, its apex towards the sternum, in the left mid-zone extending laterally to the upper half of the left anterior axillary line. Elsewhere percussion resonance was normal. Over all of the dull areas described there was diminished vocal fremitus, increased vocal resonance, bronchial breathing and whispering pectoriloquy. Air entry was diminished at the left base. No adventitious sounds were heard.

Sputum showed nothing of interest. Blood examination gave a white cell count of fourteen thousand two hundred per c.mm., with 83 per cent. neutrophil polymorphs, and confirmed the presence of a moderate degree of microcytic hypochromic anæmia. The B.S.R. was 85 mm. in one hour (Westergren).

The chest was screened and radiograms were taken. In the postero-anterior view the appearances were consistent with a pleural effusion extending up to the mid-zone, but could have been produced by pleural thickening. The lateral picture showed a rounded pear-shaped opacity with smooth outline in the region of the sixth to eighth left ribs far back in the paravertebral gutter, with a vague, irregular, fainter shadow running upwards and forwards from its anterior end, and a third doubtful shadow, largely obscured by the heart, running downwards and forwards in the region of the interlobar fissure.

These appearances and the clinical signs were interpreted as those of an encysted empyema, and the chest was needled in the seventh left interspace between the scapula and the vertebral column. A little blood and one or two c.cm. of thick, almost solid pus were obtained. The pus was too thick for further aspiration. One quarter of a million units of penicillin in 4 c.cm. of saline was injected through the aspirating needle before withdrawl. This procedure was repeated on the following day, and the next day intramuscular injection of penicillin, two hundred thousand units three-hourly, was commenced. Laboratory examination of the pus showed abundant polymorphs and lymphocytes and a few gram-negative bacilli; no tubercle bacilli were seen; culture was sterile.

It was decided to drain the chest by rib-resection, and this was carried out by Mr. G. R. B. Purce on the following day (23rd June). A small portion of the eighth rib was resected on the left side posteriorly, after aspiration of pus through the eighth interspace, and the pleural cavity was opened. There was a good deal of loculation and it was difficult to say if all the trabeculæ were pleural; some appeared to be pulmonary; there were "tunnels" of pus tracking in several direc-

tions; the appearances were reminiscent of the "lattice lung" pictured in Sauerbruch and O'Shaughnessy's book (1937). Many ounces of pus were aspirated and a large drainage tube was inserted.

Microscopical examination of the pus showed polymorphs and lymphocytes and actinomyces. (This was cultured and shown, some two and a half weeks later, to be penicillin-sensitive.)

After operation intramuscular penicillin was continued as before, and in addition one Mega unit was instilled daily into the pleural cavity through the drainage tube. Three days later two grammes of sulphadiazine were given orally, followed by one gramme four-hourly. The day following operation the temperature fell from a previous level of 103°F. to 98.2°F., and thereafter only rose above normal on five occasions over the next eight weeks, and was never above 99°F. Four days later the white cell count fell to six thousand two hundred per c.mm., with 36 per cent. polymorphs: sulphadiazine was discontinued (total thirty-three grammes in six days) and the intra-pleural penicillin was increased to one Mega unit twice daily.

Three days later pus from the drainage tube showed no organisms and was sterile on ærobic and anærobic culture. The patient was now feeling well for the first time in three months and was allowed up out of bed for short periods (eleven days after operation). Thereafter clinical recovery was uneventful, although there was one bacteriological set-back. The dosage of penicillin was now reduced by fifty per cent. to one hundred thousand units intramuscularly three-hourly, and five hundred thousand units twice daily intra-pleurally.

On 7th July, two weeks after operation, Mr. Purce examined her again: there was now no sign of a broncho-pleural fistula, and on coughing the lung came up almost to the chest wall. The large drainage tube was removed and a smaller one substituted. Three days after this the laboratory reported that actinomyces grown in culture from the pus from the original operation was penicillin-sensitive. On 12th July the dosage of penicillin was again halved and it was discontinued on 19th July. (Total dosage: 28.5 million units intramuscularly and 27 million units intrapleurally in thirty days.)

By this time the wound was clean and the lung was expanding well. Five days later a swab from the wound showed the reappearance of actinomyces and penicillin was recommenced: one hundred thousand units three-hourly intramuscularly and five hundred thousand units intrapleurally twice daily. Two days after this (26th July) the drainage tube slipped out. As there was no visible pus and as the lung was expanding well, it was decided not to re-insert it but to allow the wound to heal under a dry dressing. Intramuscular penicillin was continued in the same dosage and five hundred thousand units were infiltrated through the wound and into its edges twice daily. A wound swab showed no organisms on 4th August, and on 8th August penicillin therapy was finally terminated, the total dosage in the second course of sixteen days being twelve million units systemically and fifteen million units locally. Thereafter repeated swabs were negative.

On 18th August there was still a small sinus in the chest-wall with a little serous

discharge. There was dullness and impaired air entry over the left lower lobe; there were no adventitious sounds. The patient looked and felt well and had no cough or other symptoms. She was discharged on this date, eight weeks after operation, having been in hospital for just over four months, and was advised to take a holiday. She had been having iron and ammonium citrate to combat the anæmia and was told to continue this.

She was seen again on 28th August, by which time the sinus had closed; and again on 11th September, 1947, when she looked and felt very fit. The wound was firmly healed. Expansion of the left hemi-thorax was now only very slightly less than the right. There was some impairment of resonance over the left lower lobe, and although air entry was good, it was still a little diminished. There were no adventitiæ. There were no symptoms. The B.S.R. was 4 mm. in one hour. Hb. was 70 per cent; red cells 4,870,000 per c.mm. X-ray of the chest now showed slight dullness only at the left base, with slight elevation of the left diaphragm, and good re-expansion of the left lower lobe. The patient was considered fit to resume work at the end of the month.

## Commentary

The dosage of penicillin used in this case was very high: it may have been wastefully so; but a brief glance at the literature on actinomycosis and penicillin reveals potent arguments in favour of intensive and prolonged therapy.

Since Waksman and Woodruff (1942) investigated, *inter alia,* the penicillin-sensitivity of actinomyces, it has been shown (Ministry of Supply, 1945) that most pathogenic strains are penicillin-sensitive, but that sensitivity is variable and some strains are apparently resistant. McGregor (1944) stated that the majority of organisms from human cases of actinomycosis had proved very insensitive to penicillin. Hudson (1946) quotes six cases of actinomycosis treated with sixty thousand units of penicillin intramuscularly three-hourly, of which only one—and this an early case of the cervical type—in which this therapy was continued for twenty-one days, appeared to be cured. The five failures were treated with similar dosage, some for the same, and some for a shorter period. Kolmer (1945), advocating the administration of twenty thousand units of penicillin every four hours, to a total of four million to eight million units, together with sulphonamide therapy, quotes twenty cases of actinomycosis in which there was improvement or recovery in six, and in the remaining fourteen treatment was ineffective. He concludes that "it is highly probable that most cases will require repeated courses of treatment with penicillin, a sulfonamide compound, and iodide over three to five months or longer periods of time."

Fleming (1946) lays down the following four general rules for penicillin treatment:—

"1. It should be used only when there is infection by a penicillin-sensitive microbe." Elaborating this, he points out that sensitivity varies; that certain organisms that are insensitive to concentrations which can be reached in the blood,

are sensitive to the higher concentrations which may be reached by local application; and that in some cases it is permissible to institute therapy before sensitivity tests can be carried out.

"2. Penicillin must be administered in such a way that it comes in contact with the infecting microbe." Under this heading he reminds us that it is easy to introduce penicillin directly into an empyema or other infected cavity in far greater concentration than can possibly diffuse from the blood.

"3. The dose should be such that in the infected area the concentration of penicillin is sufficient to destroy the bacteria." In his discussion on this he mentions that penicillin is the only chemotherapeutic substance which is almost completely non-toxic; that the only reason for limiting the dose is an economic one; and that when there is any doubt it is wise to overdose rather than underdose.

"4. The treatment should be persisted in until the infection is defeated."

In view of the foregoing; the lack of a final decision on the optimum dosage of penicillin in actinomycosis; the impossibility of knowing the degree of sensitivity of the infecting organism until cultures have been made; the very serious and unpleasant results of the unchecked spread of an actinomycotic lesion in the thorax (or elsewhere); and, in this particular case the previous failure of response to sulphamerazine and smaller doses of penicillin, it is felt that Fleming's four rules were best complied with by the method employed, which aimed at getting as high a concentration of penicillin as possible carried by the blood stream to the growing intra-pulmonary granuloma and also a continuous high concentration in the actinomyces-infected pus flooding the pleural cavity, with sulphadiazine in the early stages as an additional weapon of attack. Even with the heavy dosage employed the condition temporarily relapsed on discontinuing penicillin-therapy after thirty days, and only finally cleared after a second shorter and somewhat less intensive course.

A few further points remain to be mentioned:—

The surgical drainage of the pus-filled pleural cavity follows soundly established and generally accepted principles.

Sulphonamides have in the past been found helpful in the treatment of some cases of actinomycosis, and one of this group of drugs was used in this case in addition to penicillin.

McGregor and others (1944) consider that radiotherapy is a useful method of treatment in actinomycosis. Iodides have for years been recommended. Neither of these forms of therapy was used in this case.

I am now of the opinion that the rounded opacity described in the lateral radiogram, which was originally interpreted as being an encysted empyema, was possibly the shadow of an intrapulmonary actinomycotic granuloma—the primary cause of the trabeculated empyema. (This shadow had disappeared when the patient was X-rayed again after treatment.)

Finally, the treatment adopted appears to have resulted in cure.

## Summary and Conclusion

A case of intra-thoracic actinomycosis presenting as empyema, and treated by rib-resection with drainage, penicillin, and sulphadiazine, is described.

Penicillin therapy in actinomycosis is discussed: arguments in favour of heavy and prolonged dosage are advanced. In this case a total of eighty-two and a half million units of penicillin was given by systemic and local administration in two courses of thirty days and sixteen days.

Other methods of treatment are briefly mentioned.

A satisfactory result appears to have been obtained.

Most pathogenic strains of actinomyces are penicillin-sensitive, though in varying degree. Actinomycosis would thus seem to be an example of a disease whose prognosis has been markedly altered for the better by the advent of penicillin therapy, provided that adequate dosage is maintained for a sufficient time.

I wish to thank Dr. S. I. Turkington for permission to report this case. Thanks are also due to Mr. G. R. B. Purce, who performed the rib-resection and supervised the subsequent drainage; to Dr. A. L. Wells, who cultured the actinomyces and demonstrated its penicillin-sensitivity; and to Dr. J. W. Dundee, House Surgeon in the City and County Hospital, Londonderry, for the full clinical notes which accompanied the patient from that hospital.

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# REVIEW

DYING, APPARENT DEATH, AND RESUSCITATION. By S. Jellinek, M.D. Baillière, Tindall & Cox. Pp. 263. 10s. 6d.

This is a textbook of thanatology. It includes chapters on clinical thanatology with reference to remissions and intermissions in the psycho-somatic state, thanatogenesis, scope, and potentialities of the psychium in the dying process, the swallowing phenomenon and its dual thanatological significance and other matters.

Those who are interested in these subjects will no doubt find they are getting full value for their half-guinea. R. W. M. S.

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# The Heraldry of Medicine

*By* R. W. M. STRAIN, M.D., B.SC.

"I SWEAR by Apollo the Physician and Aesculapius and Hygieia and Panacea and all the Gods and Goddesses that according to my ability and judgment I will keep this Oath and Stipulation . . ." So run the famous opening words of the Hippocratic Oath, and it is to the dim misty days of ancient Greek mythology that the Father of clinical Medicine himself directs us if we would find the beginnings of the symbolism so long associated with the art of healing.

Of all the tales of ancient Greece the one that lasts best in the memory of most of us who make no pretence to classical scholarship is the story of Jason and how he sailed with the Argonauts in search of the Golden Fleece. When Jason was a boy he was taken by his father to that strange school in a cave on the side of Mount Olympus and left there in charge of Cheiron the Centaur, that great wise creature, half man, half horse. There were many famous pupils at that school. There was Aeneas, the hero of besieged Troy, and Hercules who held the world on his shoulders while Atlas went to fetch the golden apples from the Garden of the Hesperides, and many another name famous in Greek story. But there was the strange quiet child, the reputed son of Apollo himself, who used to steal away alone while the others, their day's work done, were out with Cheiron hunting or playing games. This was Aesculapius, who would confess to the Centaur how he had seen a serpent cast its skin and renew its youth, or how he himself had gone down into the nearby village and had cured an old dropsical man with an infusion of a herb he had seen a sick goat eating on the mountain side. And then Cheiron would tell the others that the Gods had given them all different gifts and virtues —to some strength, to some wisdom, and to some beauty, but that to this lad had been given the greatest gift of all—the power to relieve suffering and to heal. And so it came about that in time Aesculapius grew to man's estate and became the greatest healer of the ancient world and the god of Greek Medicine. To no physician since has death come as it came to Aesculapius. Pluto, lord of the underworld, complained to the High Gods on Olympus that the prolongation of life on Earth due to the skill of Aesculapius was reducing the population of Hades, so to restore the balance Zeus killed him with a thunderbolt.

In this little group we have the beginnings of Medical symbolism. Aesculapius is shown in Greek statuary as having in his hand a staff, round which is twisted a single serpent. Heraldry uses this as the symbol of Medicine to this day. You will find it week by week on the cover of the British Medical Journal and it forms the centre of the badge of the Royal Army Medical Corps.

Apollo, the father of Aesculapius, is generally shown holding the Caduceus, which is a staff with two serpents. This represents not only Healing, but is the distinct badge of office of the Heralds of Greek Mythology and is therefore often shown winged. This is the badge which is seen in the insignia of the medical

branch of the Royal Air Force, in the Medical Services of the American Army, and on the cover of this Journal, the "Practitioner," and elsewhere.

The daughters of Aesculapius, Hygieia and Panacea, have left their names imperishably on Medical science, the one to preventive medicine and the other to therapy in the form of that long sought agent that will cure all ills.

Cheiron, the ancient teacher of Aesculapius, being himself a great healer and being half man and half horse, is often taken to represent the Veterinary Sciences, and he is to be found in the centre of the badge of the Royal Army Veterinary Corps.

The serpent as a medical symbol has at times been identified with that of Moses or Aaron, but there seems little doubt that the Greek foundation is the correct one.

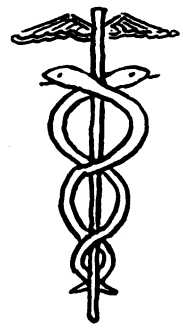
About one hundred and fifty years before Christ, John Hircanus of the Maccabees founded a Hospital close to the Temple of King Solomon at Jerusalem for the use of pilgrims, and this continued to be used up to the time of the Crusades. In the eleventh century a number of merchants from Amalfi in southern Italy were so impressed by this work that they gave the brethren who served the Hospital considerable sums of money and from this began the Order of St. John. The history of the Knights Hospitallers needs little recapitulation. For many years they helped the sick and injured of the Crusades till driven from the Holy Land.

After periods of occupation of Cyprus and Rhodes the Knights finally settled in Malta, where they remained till expelled by Napoleon.

The badge of the Order, the white eight-pointed star, is well known. The arms of the Order are not so well known—a white cross on a red ground or as a Herald would put it: "Gules, a cross argent." The Order used to confer the use of the insignia on their benefactors, often with some small difference. Thus it has appeared in the centre of the Italian flag until recently in return for help from the House of Savoy and similarly its use was conferred on the House of Piedmont "Differenced" —with the arms of the cross cut off—"Gules, a cross argent couped." This is to the present day the flag of the Swiss nation.

In 1859 at Solferino on the Plain of Lombardy, forty thousand men lay killed or wounded. A great battle had just been fought between the Austrians and the combined armies of France and Italy. Neither side had sufficient staff or supplies to look after its own wounded and no attempt was made to look after the captured wounded of the enemy. Watching the battle was a Swiss, Henri Dunant, who, inspired by the work of Florence Nightingale at the Crimea, did all he could for the wounded, irrespective of nationality. He gathered a band of helpers from the neighbouring towns and villages and carried out whatever measure of treatment could be improvised.

Shortly after his return to Switzerland he wrote a pamphlet in which he asked whether it would be possible for the wounded to be regarded as neutrals to be treated alike by the surgeons of both sides; whether it might not be arranged that prisoners could be exchanged, and putting forward the idea that in times of peace bands of voluntary workers could be trained to supplement impartially and internationally the medical services of armies in time of war. His idea was taken up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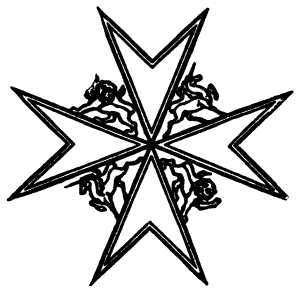
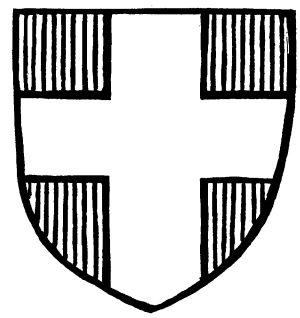
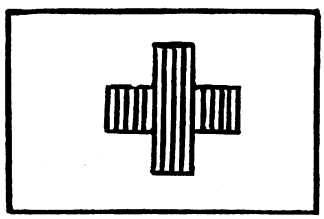
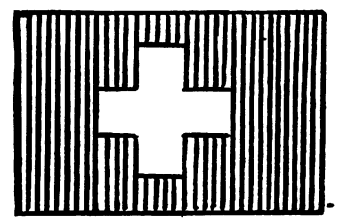




BADGE ARMS

Order of St. John —





THE RED CROSS SWITZERLAND

by a humanitarian society in Geneva and in 1863 and 1864 Conventions were held which outlined certain general provisions along the lines he suggested. The medical services and allied personnel were to be recognised by the wearing of a distinctive brassard and flag. This was the red cross we know to-day as the international emblem of such work and was chosen as a tribute to Henri Dunant, being in fact the Swiss national flag reversed.

On many occasions before Solferino the opposing generals had made humane arrangements for the care of the wounded. In 1734 at Dettingen, Sir John Pringle, a physician serving with the British, suggested to the Earl of Stair that an arrangement might be made with the Duc de Noailles in command of the French for the neutrality of the wounded and their attendants and for their free exchange afterwards. Such an arrangement was made and scrupulously observed by both sides. It was, however, the work of Henri Dunant that established the practice in international law.

There are, of course, many other examples of Heraldry in Medicine, but the various forms of the rod and serpent have from the most ancient times represented the healing arts of western civilisation, while in more modern days the Red Cross stands for those special services which help and protect the wounded in war, and the distressed, destitute victims of the calamities of Nature, even when Man is at peace, in all the countries of the world.

The history of the Red Cross emblem, however, can be traced, as I have shown, through many generations of service back to Old Testament days.

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## REVIEW

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ANATOMICAL TERMS: THEIR ORIGIN AND DERIVATION. By E. J. Field, M.D., M.S., and R. J. Harrison, M.A., M.B., B.Chir. Pp. 165. Cambridge: Heffer. 7s. 6d.

A casual glance at this little book suggests that, on the whole, one's money would be better put into a complete medical dictionary, but that is hardly fair; on further inspection, it is plain that there is far more information on derivation that would be found in any but a very full reference book. This is especially the case with the proper names with which the book abounds. This book may well find a place on the shelf of the real student of anatomy who is anxious to know not only the literal and metaphorical dry bones of his subject, but its historical background.

CHILD HEALTH: A "Practitioner" Handbook edited by Professor Alan Moncrieff, M.D., F.R.C.P., and W. A. R. Thompson, M.D. Pp. 254. Eyre and Spottiswoode. 14s.

This series of "Practitioner" books requires no introduction. The cover is of cloth with gold lettering, and suggests contents more æsthetic than a textbook of medicine. On the other hand, the title "Child Health" is really justified by the contents. Much the greater part of the book is devoted to the positive side of health and comparatively few chapters to disease processes. All aspects of child welfare are dealt with, including child guidance, the problems of the deaf, the blind, and the mental defective. It is interesting to note that one of the chapters is written by a Queensman. Dr. J. V. Hurford was a resident in the Royal Victoria Hospital in 1929-30 and was the first Editor of the R.V.H. Magazine. That publication only ran to two numbers and was followed immediately by the appearance of the Ulster Medical Journal. Those who were associated with the hospital magazine like to feel that in some degree, however modest, they encouraged the first notions of the Ulster Medical Journal.

DERMATOLOGY FOR NURSES. By G. H. Percival, M.D., Ph.D., F.R.C.P.E., D.P.H., and Elizabeth Toddie, S.R.N. Pp. 116. 90 illustrations, 40 in colour. Edinburgh: E. & S. Livingstone Ltd. 15s.

The time has almost come when it is unnecessary to be critical of a book published by Livingstone. This book is admirable for its purpose; indeed, it would not be too much to say that its contents, if thoroughly digested by medical students, would be sufficient to set their feet firmly on the narrow path of sound dermatological practice. There are few branches of medicine in which it is possible to go on classifying shades of difference between various manifestations of what is essentially one disease, but in this book there is no such trend. The common skin conditions are dealt with thoroughly from the point of diagnosis, which is made plain by the admirable illustrations, and treatment which is described in full detail. That all this has been done in the space of little over a hundred pages ensures that the book is likely to be read from cover to cover.

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