

FRACTURES & ORTHOPAEDIC SURGERY FOR NURSES AND PHYSIOTHERAPISTS

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PREFACE TO THE FOURTH EDITION

IN the Fourth Edition the opportunity has been taken to replace obsolete illustrations, while many new photographs and diagrams have been added. The sections dealing with shock, hand injuries and nerve injuries have been expanded.

I am indebted to Mr. P. Harrison, M.S.R., who, ably assisted by my Nursing and Physiotherapy Staffs, has kindly prepared the new illustrations.

A. NAYLOR.

1960

PREFACE TO THE FIRST EDITION

AS in other fields of medicine and surgery, the success of orthopaedic surgery is dependent upon the knowledge, skill, and care of the nurses and physiotherapists to whom after-care and treatment is delegated. With so much to learn in the time available during training, the student nurse has often only a bare minimum of instruction in orthopaedic surgery and is liable to have a restricted view of its scope and methods. Yet approximately one-fifth of her surgical work will be concerned with this branch of surgery. With the expansion of surgery in general, and of "orthopaedics" in particular, it is impossible to cover the whole of a special branch of surgery without overburdening a very full curriculum. The principles of surgery are the same for general and for special surgery, hence the emphasis upon these general principles and general surgery during the training period. This book is written with the object of showing the nurse how these principles are applied in orthopaedic surgery and as a supplement to her lectures in surgery. It is assumed that these general principles have already been assimilated.

I trust that this book will be useful to those whose names are already upon the State Register and who intend to undertake or are engaged in nursing in orthopaedic wards, or at special hospitals, or in the Public Health services. I hope that it will be of value to physiotherapists as a general outline of the clinical and surgical aspects of orthopaedic conditions which they often do not see until after-treatment has begun. It is my earnest desire to leave my readers with the impression that of the three essentials of treatment, prevention of deformity, correction of deformity, and maintenance of correction, "the greatest of these" is prevention.

I have pleasure in acknowledging my indebtedness to all who have helped, directly and indirectly, in the production of this book. Firstly, to Mr. F. W. Goyder for his valuable advice, instruction, and constructive criticism and for permission to reproduce photographs of many of his patients.

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A. NAYLOR.

BRADFORD

January 1945.

FOREWORD

I will go before thee and make the crooked places straight (ISAIAH XLV. 2).

THE orthopaedic surgeon could well preach his sermon from the above text. Recently the speciality has come to include not only the "crooked places," the result of disease, but also those caused by trauma. The orthopaedic and traumatic clinic has become a definite and distinct department of every well-organised hospital. Its work is now being extended to its logical conclusion of restoration of function by rehabilitation, which should commence the split second after the injury. To get the best results the treatment of the case should be in the hands of the same team of surgeons, casualty officers, nurses, physiotherapists, etc., from the beginning to the end. If this is done, then the work of an orthopaedic and traumatic clinic plays a great part in attaining the Social Security for which at present all are planning.

It is, however, a speciality which should not be taken just for its inherent glamour, or pity for crippled children. The latter would be the first to resent pity; they are usually endowed with acute understanding and application, as all who have educated them can testify. They do not want "care" but "cure" in so far as the latter means restoration of function. The great qualification for inclusion in the team is a sound training in the principles of general surgery and nursing. Mr. Naylor has written this book to help those who devote themselves to the nursing of traumatic and orthopaedic cases. He rightly must assume that they have had a sound training in basic principles; but in order to widen their interest in, and understanding of, the treatment, they will find much information here which will be of real help.

The term "orthopaedics" was first coined by Nicholas André in 1714, and the first Orthopaedic Institute was founded in 1780 in Switzerland by Venel. In this country William John Little established the Royal Orthopaedic Hospital in 1837 and published his text-book on Deformities in 1853. In spite of this early start little progress was made in establishing the speciality until the present century; and

this is associated with the names of Hugh Owen Thomas and Robert Jones and their band of disciples up and down the country.

The progress of orthopaedic and traumatic surgery, with its near relation plastic surgery, is perhaps one of the few good things that have emanated from the Two Great Wars. Progress in the surgical art is inextricably bound up with warfare. The first surgical problem must have been the treatment of a wound, as it may well be the last. The problem seemed solved as the result of the Listerian Renaissance. Haemorrhage, though still a surgical bugbear, could be controlled, and pain had been in great part eliminated by anaesthesia.

Infection was to be prevented by antisepsis and asepsis. Medical and Surgical "nursing" had been established—all seemed well. Speed in operative technique had become an accomplishment and no longer an aim. The surgical anatomist had made way for the surgical pathologist. On 18th November 1895, William Conrad Röntgen (1845-1923), Professor of Physics at Wurzburg, had discovered X-rays and reported it to the local Medical Society on 28th December 1895. The surgeon was thus provided with vision to see deeper structures; visual anatomy was a fact.

The surgical pathologist in due course was joined by the surgical physiologist. The surgery of Reconstruction and Function was added to that of Incision and Excision. The preservation and restoration of function became recognised as the great aim of surgical intervention. The decision when not to operate was becoming as important as its opposite. Under these circumstances it was natural that specialisms in surgical procedures should become more numerous.

It therefore became more important that the entry to such specialism should be through the portal of general surgery. No matter where the wound occurred, whether in superficial or deep tissues, the basic principles of Rest, Conservation of Blood Supply and Prevention of Infection must be applied.

No matter what number of drugs may be introduced and whatever their nature may be, the greatest reparative factor

the human body possesses is LIFE. The difference between the living and the dead is that the former carries out its own repairs.

It is to help nurses and masseuses to understand and follow the principles of orthopaedics that Mr. Naylor has written this book, and as such it is hoped that they will possess and prize it.

ERNEST FINCH.

SHEFFIELD

January 1945.

INTRODUCTION

WITH the advance of the surgical art, orthopaedic surgery is rapidly developing into a wide speciality.

The term "orthopaedic" is derived from the Greek words *ὀρθός*, meaning straight, and *παῖς, παιδός*, a child, and "orthopaedics" were originally associated with deformities of children. Later in the nineteenth century orthopaedic surgery was concerned with the correction of deformities and diseases of the locomotor system by mechanical means. To-day orthopaedic surgery is that branch of surgery outlined by Sir Robert Jones, viz. the surgery necessary for the repair of the injuries, deformities, and diseases of the locomotor system. This includes the prevention as well as the treatment of the injuries, deformities, and diseases of the skeleton, joints, ligaments, cartilage, tendons, bursae, muscles, and their nerves, by mechanical, manipulative, surgical, and re-educative means. It must be emphasised that *prevention* of the development of deformity and disease should play a major part in orthopaedic treatment.

While we speak of the speciality as orthopaedic surgery, it should be borne in mind that operative methods comprise only about one-third of the treatment. It is important at the outset that one should realise that orthopaedic conditions involve the body as a whole, and the problem should be viewed from that standpoint. Further, one should take a broad view of the affection in question, bearing in mind the effects of treatment over a number of years and not of one isolated incident in the treatment. Operative measures should be regarded as incidents and not as the essential part of a long-term plan of treatment, whilst attention to minute details is essential and necessary if a successful outcome is to be ensured.

A crooked body is apt to be associated with a warped mind because of the relative loneliness and the sense of inferiority felt by these unfortunate people. This attitude must be rectified if orthopaedic treatment is to be successful.

Behaviour depends on emotion, and emotional stability is necessary for satisfactory adjustment to life. Emotional upsets are often traceable to disturbances in early life, which may be due to a knowledge of being different from other children.

When nursing young orthopaedic patients, the nurse must remember that the child may be emotionally unstable because of his physical disability and also because of his removal from home and mother. He is likely to be more easily frightened and lonely, and the nurse must reassure him and try as nearly as possible to replace his mother. He must be constantly encouraged to overcome his physical disability, as orthopaedic after-treatment depends largely upon the patient's own efforts. Some children develop aggressive tendencies as a result of an inferiority complex, and these need tactful and very patient handling if this is not to be increased. Other children react by developing a negative and sullen attitude which can seriously hamper after-treatment, especially when muscle re-education is required.

On the other hand, while a certain degree of spoiling is necessary, the patient must not be allowed to become the centre of interest or the object of pity. If this occurs, the patient is apt to do nothing to help himself to overcome his disability and he becomes absolutely reliant upon others, especially when he leaves hospital.

The burden of a prolonged stay in hospital can be lightened considerably by the provision of educational facilities and occupational therapy. When children who are under orthopaedic supervision for severe defects leave hospital and commence school, it is better that they first attend separate schools set apart for cripples. There they are not subject to the taunts of other children devoid of such physical handicaps, and so any tendency to a sense of inferiority is removed. Our aim is to equip these children so that they can compete with normal children when they leave school and embark on their careers. We can help them to achieve this only by constant observation and correction of the many psychological factors in their make-up in addition to amelioration of their physical deformities and disabilities.

With adult patients suffering from fractures and orthopaedic disabilities it is just as important for the surgeon, nurse, and masseuse to treat them psychologically as well as surgically. They should be imbued with the desire to get well by constant encouragement from their medical attendants. While surgical treatment is progressing the patient should be gradually brought to a fit condition to resume his former work by a series of exercises and occupational therapy. By close co-operation between employers and the surgical team, through the offices of an almoner and other welfare organisations, the patient should be allowed to engage in some form of work before he is really fit to perform his normal occupation. This gives him confidence in the use of his injured limbs. Those who will never be fit to return to their previous employment need training for new occupations (vocational training). These processes are collectively known as rehabilitation. Rehabilitation is not a new form of treatment to be practised by rehabilitation specialists. It is the mechanism of placing the patient in a position to pursue his former or equivalent occupation by means of surgery, nursing, physical and psychological treatment, and requires co-operation between surgeon, nurse, masseuse, patient, and employer.

A. NAYLOR.

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CHAPTER I

ORTHOPAEDIC APPARATUS

THE correct use of orthopaedic apparatus is just as essential to the success of orthopaedic treatment as well-executed operative measures. It serves the following purposes:

1. To prevent deformity.
2. To correct deformity.
3. To maintain position and enforce rest.
4. To restore function by gradual encouragement of movement of joints.

The apparatus employed in the treatment of orthopaedic conditions consists of plaster of Paris casts, braces, splints, and traction devices.

Despite the advances made in medicine and surgery, one finds that the principles, and often practice, of fracture and orthopaedic treatment are the same to-day as were used many centuries ago.

Hippocrates (460-377 B.C.), in his writings, gives explicit instructions concerning the treatment of fractures, and advocates the use of methods which are "modern" to-day. For the treatment of a fractured humerus he says: "Having got a piece of wood, a cubit or somewhat less in length, like the handles of spades, suspend it by means of a chain fastened to its extremities at both ends; and having seated the man on some high object, the arm is to be brought over, so that the armpit may rest on the piece of wood, and the man can scarcely touch the seat, being almost suspended; then having brought another seat, and placed one or more leather pillows under the arm, so as to keep it a moderate height while it is bent at a right angle, the best plan is to put round the arm a broad and soft skin, or broad shawl, and to hang some great weight on it, so as to produce moderate extension; or, otherwise, while the arm is in the position I have described,

a strong man is to take hold of it at the elbow and pull it downward. But the physician, standing erect, must perform the proper manipulation." He used fixed traction for leg fractures.

Bruynswyke (1525), in a text-book on surgery, described various forms of extension apparatus, similar to modern screw-traction apparatus.

Splints and stiffened bandages have been used for immobilisation for some two thousand years. Bandages soaked in gum were used by the ancient Egyptians for the immobilisation of fractures, whilst bandages stiffened with egg-white were popular in the Middle Ages.

We first hear of plaster of Paris being used as a splinting agent in the writings of Rhazes, an Arabian physician, during the ninth century. The advance to the walking plaster came in 1887, when Krause described the results of ninety-eight fractures of the lower limb treated by this method, but the method was never popular until Böhler, in the second and third decades of this century, demonstrated the value of functional use of the injured limb by means of walking plasters.

To-day one finds plaster of Paris being used to a greater extent than previously, replacing various types of splints.

Where the cast or splint is required for a prolonged period, one made from a plastic material such as the polyvinylesters is an advantage. They are light, radiolucent, waterproof and produced by moulding over plaster models of the part.

PLASTER OF PARIS TECHNIQUE

To make Plaster Bandages.—Materials required are:

1. Fine dental plaster. Plaster of Paris is made by heating and crushing calcium sulphate. Heating causes the calcium sulphate to lose its water of crystallisation, resulting in an amorphous anhydrous form of the salt. When plaster of Paris is soaked in water, physical union with water and recrystallisation occurs. This process is coincident with

“setting.” During this process the plaster expands a little in all directions, and thus a cast encircling a limb will set with its internal diameter slightly reduced.

It is important that the powdered plaster and the finished bandage should be stored in air-tight tins to avoid moisture from the atmosphere producing the above crystallisation and so rendering the plaster useless.

2. Book muslin, 32 threads to the inch. This may or may not be impregnated with starch according to the preference of the surgeon. This is cut into strips 2 in., 4 in., and 6 in. wide and 4 yds. long. My own preference is for muslin lacking starch and size, as this retains the plaster powder better.

Making the Plaster Bandage.—The strips of torn muslin have three threads drawn from each side, otherwise the



FIG. 1.—Three threads are drawn off each edge of the muslin strip.

threads fray and separate, thus preventing uniform unrolling of the bandage when the plaster is being applied. (Fig. 1.) These strips are then loosely rolled. The plaster powder should be placed on a smooth surface in a heap, and the bandage unrolled gradually and passed through the plaster, rubbing the latter into the muslin. This is gradually re-rolled so as to allow 12-16 in. of the strip to be exposed to the