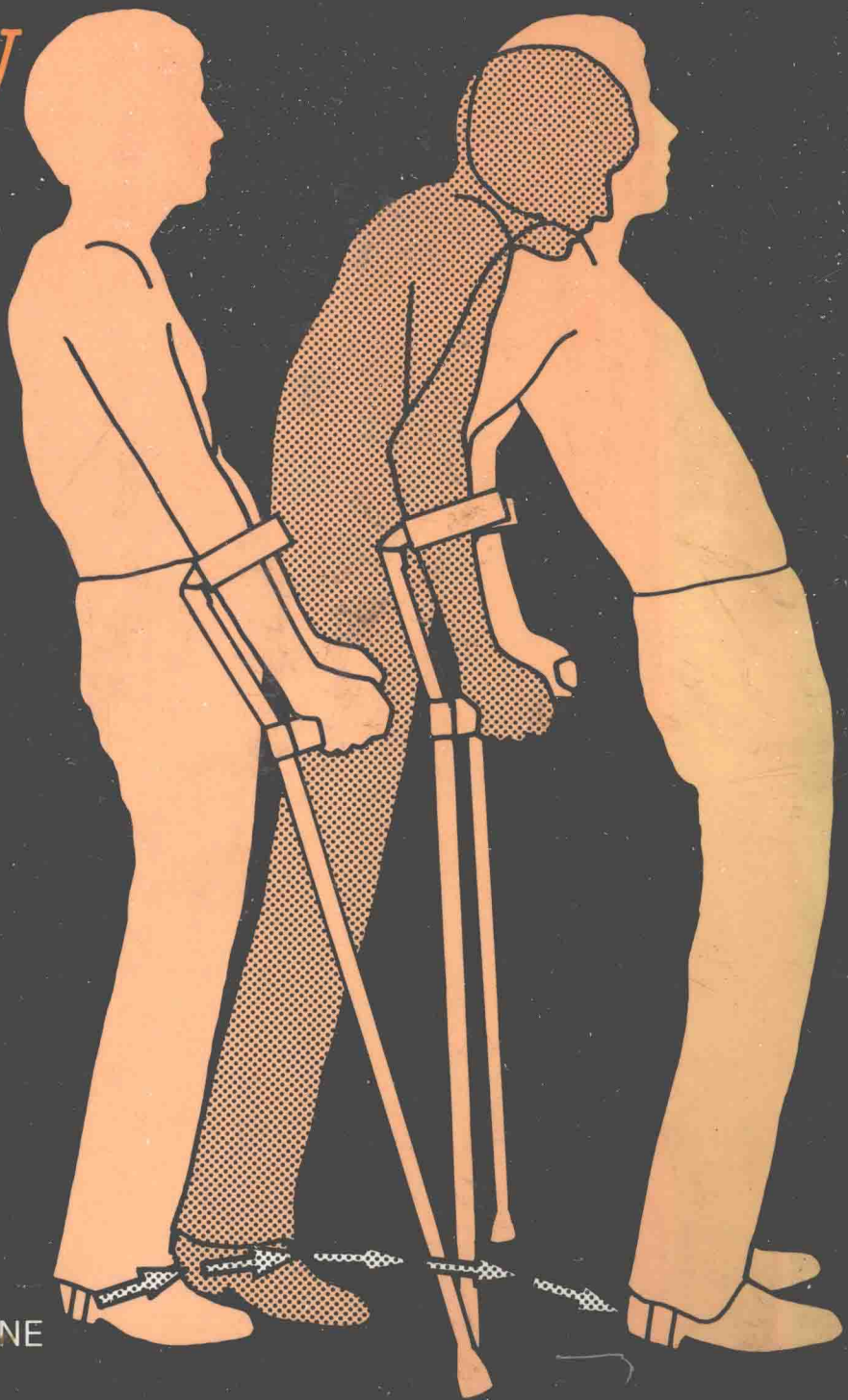
Tetraplegia and Paraplegia

A Guide for Physiotherapists

Ida Bromley

Second edition



CHURCHILL LIVINGSTONE

Tetraplegia and Paraplegia

A Guide for Physiotherapists

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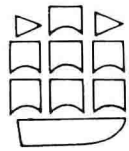


CHURCHILL LIVINGSTONE
Edinburgh London Melbourne and New York 1981

CHURCHILL LIVINGSTONE
Medical Division of Longman Group Limited

Distributed in the United States of America by
Churchill Livingstone Inc., 72 Fifth Avenue,
New York, N. Y. 10011 and by associated
companies, branches and representatives
throughout the world.

First edition 1976
Second edition 1981
Reprinted 1982

ISBN 0 443 01992 4

British Library Cataloguing in Publication Data
Bromley, Ida
Tetraplegia and paraplegia.—2nd ed.
1. Quadriplegia 2. Paraplegia 3. Physical
therapy
I. Title
616.8'37'062 RC406.Q33 80-40279

Printed in Hong Kong by Wing Tai Cheung Printing Co. Ltd.,

Tetraplegia and Paraplegia

Foreword

The profession of physiotherapy has come a long way in its approach to the problem of spinal paraplegia since the Second World War. The introduction of a new concept of comprehensive management of men, women and children suffering from injury or disease of the spinal cord, introduced at the National Spinal Injuries Centre, Stoke Mandeville Hospital, had its repercussions on the traditional methods of passive treatment widely practised hitherto in the treatment of these unfortunate sufferers. Massage and other passive treatments were replaced by active and dynamic methods, including clinical sport. Today, the physiotherapist plays a most essential part in the immediate, early, as well as long-term management of spinal cord sufferers. Actually, it is the detailed programme of physiotherapy, so instrumental in developing the remaining capabilities of paraplegics and tetraplegics, which helps them in their social reintegration into the community as useful citizens.

Many physiotherapists from all over the world have visited the Stoke Mandeville Spinal Centre to study our methods of physical therapy in order to be able to introduce them in their own countries. Having regard to the steadily increasing number of paraplegics and, in particular, tetraplegics, on the one hand, and the lack of adequate numbers of spinal injury centres in this country and abroad on the other, it is inevitable that a considerable number of spinal cord injured, in particular those with associated injuries to other parts of the body, must have their initial treatment in general hospitals. Therefore, it is of paramount importance that the knowledge of the specialised modern techniques of physiotherapy for tetraplegics and paraplegics is widespread amongst physiotherapists. This also includes clinical sport.

Miss Ida Bromley, who has been in charge of the Physiotherapy Department of Stoke Mandeville Hospital for many years and has become an outstanding expert in the physical rehabilitation of paraplegics and tetraplegics, has undertaken to collate all the

experiences gained at Stoke Mandeville and to write a guide for physiotherapists.

I am sure that this book will be of great value to all concerned with the physical readjustment of spinal cord sufferers and I wish it well.

1975

Sir Ludwig Guttmann,
C.B.E., M.D., F.R.C.P., F.R.C.S.
Founder and former Director,
National Spinal Injuries Centre,
Stoke Mandeville Hospital

Preface to the Second Edition

In the first edition of this book I omitted most of the material now contained in chapter 4 in an effort not to include anything which could be found in reference books normally used by physiotherapists. However, watching student physiotherapists use the book with the patient in the clinical situation it became apparent that some immediate reference regarding the segmental innervation of the major muscles was needed. Chapter 4 has been written primarily to give this information.

Charts of functional activities and of the degree of functional control of the joints of the limbs in relation to lesions at different segmental levels of the spinal cord are also included together with the results of a survey on the outcome of some aspects of physiotherapy and occupational therapy for patients with lesions complete below C_6.

The remainder of the text has been up-dated as necessary.

I would like to express my appreciation to the staff at Stoke Mandeville Hospital for their help and advice and especially to thank Dr Walsh, director of the National Spinal Injuries Unit during the latter part of my time there for his never failing support and readiness to listen and advise.

My grateful thanks are also due to the members of the staff of Churchill Livingstone for their help and, in particular, for their patience with me.

1980 Ida Bromley

Preface to the First Edition

This book has been written in response to many requests from post-graduate and student physiotherapists in Great Britain and overseas. The aim has been to produce a manual for use in the practical situation.

The layout of certain sections may appear repetitious to the casual reader. However, I hope that the arrangement of material will facilitate the use of the book for those who are involved in handling the patients and who believe, as I do, that efficient treatment depends upon detail.

The principles of treatment were initially laid down by Sir Ludwig Guttmann at the National Spinal Injuries Centre. Sir Ludwig's interest in and enthusiasm for physiotherapy is well known, and I am indebted to him for writing the Foreword and also for being a patient teacher over the years.

In writing this book I am indebted to many people:

To Miss Elvira Hobson, F.C.S.P., for permission to use the text for her book *Physiotherapy in Paraplegia*, which was the pioneer on this subject.

To all those in my own and allied professions who have criticised sections of the manuscript and given me their valuable and constructive help.

To Miss Pat Davies, M.C.S.P. (Superintendent Physiotherapist, Kings College Hospital, London) and Mrs Gay Harrison, M.C.S.P. (Deputy Superintendent Physiotherapist, Stoke Mandeville Hospital) for their patience in going through the entire manuscript and giving me unstintingly their time, criticism, and advice.

To my colleagues at Stoke Mandeville for their encouragement and their tolerance in repeatedly trying out the instructions for the functional activities, and to Mrs Peperell for her patient typing and re-typing of the manuscript.

I am specially grateful to Miss Jan Plested for her interest in and enthusiasm for her work on the illustrations. If this little

book fulfils its function, I feel it will be largely due to her excellent diagrams.

Lastly I wish to thank members of the staff of Churchill Livingstone for their unfailing help and advice.

July, 1975 Ida Bromley

Contents

1. Introduction

THE PURPOSE OF THE BOOK

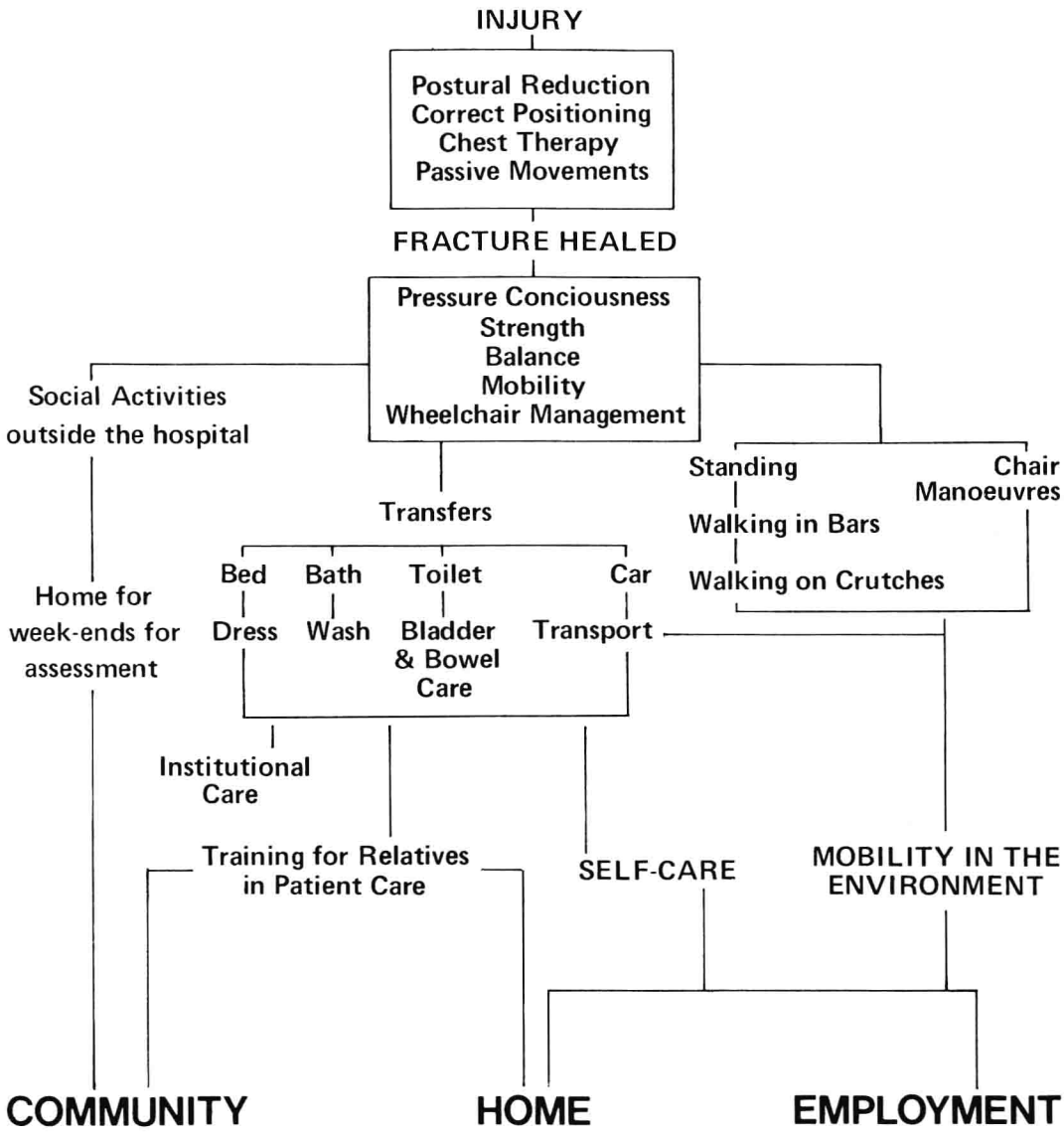
Between 500 and 600 people in Great Britain fracture their spines every year and as a result remain totally or partially paralysed for the rest of their lives. In addition to these there are victims of spinal cord injury or disease from many other causes. Thirty years ago such people died from the resulting complications. Today a normal life expectancy can be anticipated providing the correct treatment is given and the complications thus avoided.

It is the purpose of this book to give some guidelines to physiotherapists faced with the problem of treating patients with tetraplegia or paraplegia. These patients, who are initially totally dependent on those around them, need expert care and training if they are to become independent once again. It is an exciting challenge to be involved in and contribute to the metamorphosis which occurs when a tetraplegic or paraplegic patient evolves into a spinal man. (Fig. 1)

Maximum detail has been given in the sections dealing with the tetraplegic patient. Solutions to the majority of problems facing those with paraplegia have now been found, whereas the social, professional and industrial rehabilitation of those with tetraplegia still leaves much to be desired.

The tetraplegic patient needs a longer period of rehabilitation to achieve his maximum independence. He needs a team around him who will not give up easily, but who are willing to persevere to overcome the sometimes apparently insurmountable obstacles. The treatments given in the following chapters are suggestions only, some methods which have been tried and found successful in certain cases. They are in no way given as the total answer, but simply as a

REHABILITATION



SPINAL MAN RE-INTEGRATED
AT HOME, AT WORK AND IN LOCAL COMMUNITY

Fig. 1 Dependence to independence.

foundation on which other physiotherapists can build. They are initial guidlines only to encourage others to search for ways of achieving greater independence, whether physical or mechanical, for those with tetraplegia.

SPINAL CORD INJURIES

Of the cases admitted to spinal units approximately 70 per cent are traumatic, and between 30 and 40 per cent of these involve the cervical spine.

The majority of the traumatic cases, approximately 50 per cent, are the result of road traffic accidents. Industrial accidents account for approximately 26 per cent, sporting injuries 10 per cent, and accidents in the home approximately 10 per cent. Eighty per cent of the traumatic cases are found to have fracture/dislocations, 17 per cent fractures only, and a very small percentage are found to have involvement of the spinal cord with no obvious bony damage to the vertebral column, e.g., those with whiplash injuries. The most vulnerable areas of the vertebral column would appear to be:
Lower cervical C_{5-7}
Mid-thoracic T_{4-7}
Thoraco-lumbar T_{10}–L_2

The non-traumatic cases are mainly the result of transverse myelitis, tumours and vascular accidents. Thrombosis or haemorrhage of the anterior vertebral artery causes ischaemia of the cord with resulting paralysis.

Spinal cord damage resulting from either injury or disease may produce tetraplegia or paraplegia depending upon the level at which the damage has occurred. *Tetraplegia* is partial or complete paralysis involving all four limbs and the trunk, including the respiratory muscles, as a result of damage to the cervical spinal cord. *Paraplegia* is partial or complete paralysis of both lower limbs and all or part of the trunk as a result of damage to the thoracic or lumbar spinal cord or to the sacral roots.

Definition of the Level of Lesion

There are several methods of classification of the level of lesion at present in use throughout the world. The system generally used in Great Britain is to give the most distal uninvolved segment of the cord together with the skeletel level, e.g., paraplegia, complete or incomplete below T_{11} due to fracture/dislocation of T_{9-10} vertebra. (Fig. 2)

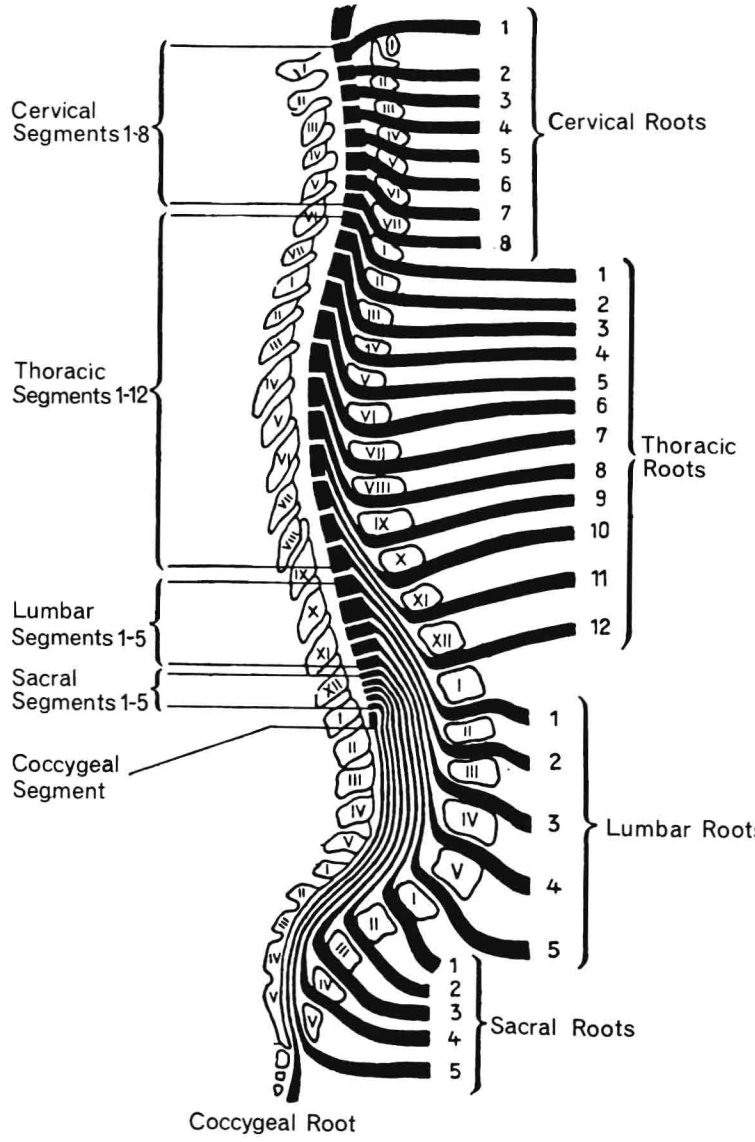


Fig. 2 Topographical correlation between spinal cord segments and vertebral bodies, spinous processes, and intervertebral foramina. (*From* W. Haymaker (1969) *Bing's Local Diagnosis in Neurological Diseases*, 15th edn. St. Louis: Mosby.)

It may be described for instance as a transverse spinal cord syndrome, complete or incomplete below T_{11} due to fracture/dislocation of $T_{9/10}$. A lesion may not be the same on both sides, e.g., C_{5L}/C_{7R}. To give some idea of the neurological involvement in incomplete lesions, the most distal uninvolved segment is given together with the last segment transmitting *any* normal function, e.g., incomplete below C_5, complete below C_7. In this case some motor power or sensation supplied by C_6 and C_7 is present.

2. The Team

TEAM WORK

The psychological reactions of the patient with spinal cord injury present problems as formidable as the results of the disaster which has suddenly reduced an individual in normal health and activity into a state of complete immobility and dependence upon others. The full psychological reaction to his physical defect inevitably develops as the patient recovers from the initial traumatic shock. The reaction will of course vary according to the intelligence, age and temperament of the individual.

To give maximum help to the patient during this period of psychological readjustment as well as to achieve successful physical rehabilitation, the team approach is essential. This can best be achieved in a spinal injuries unit, where the individual patient lives with others with the same disability and the various grades and disciplines of staff are specifically trained. Besides gaining confidence from the expertise of the staff, the patient's contact with others who are similarly affected but in the later stages of rehabilitation provides visible evidence of what can be achieved.

At the centre of the team is the patient. In overall charge is the director of the unit, who is the coordinator of the activities of the individual medical and paramedical members of the team. He is primarily responsible for the creation of the atmosphere of hope and confidence in the success of the treatment so essential to the patient. Team work according to the dictionary means 'cooperation' or 'to make joint effort'. To work successfully in cooperation with others demands general respect and understanding and an appreciation of the work of the various disciplines. The expertise of each member of the team is necessary if the needs of the

'whole man' are to be met. The patient has been precipitated into an unknown and unreal world, full of fears and problems. Only if he feels those around him are vitally interested in his welfare and have expert help to give will he regain confidence in himself. This confidence forms the basis of successful rehabilitation.

THE PHYSIOTHERAPIST–PATIENT RELATIONSHIP

Rehabilitation of the tetraplegic or paraplegic patient is a formidable and exacting undertaking for both patient and physiotherapist. For efficient rehabilitation in the shortest possible time there are two essential requirements:

1. The physiotherapist must know exactly what to ask the patient to do.
2. The patient must do exactly as he is asked.

The first depends upon the accurate knowledge and expertise of the physiotherapist, and the second depends primarily upon the confidence of the patient in the physiotherapist. Mutual confidence between the physiotherapist and the patient therefore plays a large part in successful rehabilitation. However, fear also plays a part in their reactions towards each other, and this must be overcome.

The patient fears:

a. that he will not be able to do what he is asked to do.
b. that he will fall or injure himself.
c. that he is not going to get better or 'make the grade'.

The physiotherapist fears:

a. that she will not know the right thing to say or do.
b. that she will not be able to answer the patient's questions.
c. that the patient will not do as she asks him.

Fear of failure is the keynote. From the earliest days of treatment the physiotherapist and patient must accept that they have a common objective and that their united efforts will result in progress, even though progress will be slow and variable. Without complete confidence, sympathy and cooperation between physiotherapist and patient, the prospect of success will be seriously prejudiced.

Confidence can be earned through concern and an honest approach and manner. The patient is, as a rule, acutely interested in his own condition, his reactions to treatment and his progress. It is essential that he should be given intelligible explanations of the treatment methods to be employed. He needs a reason for that which he is being asked