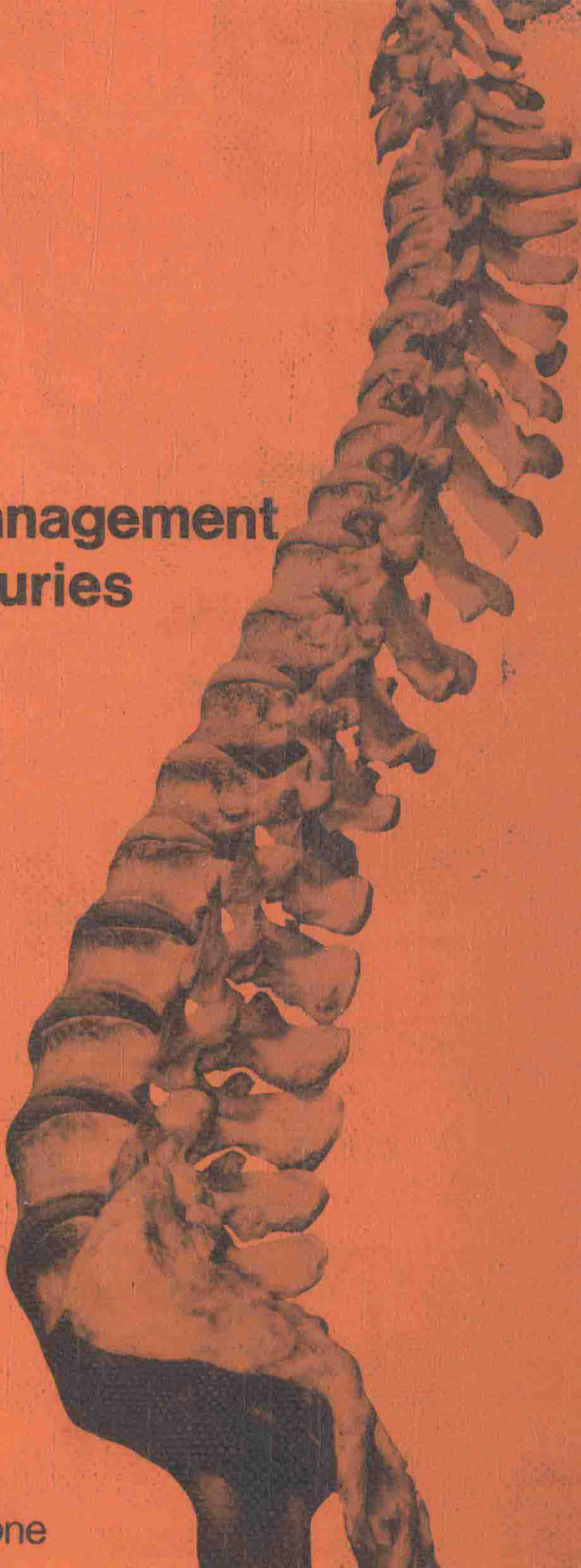


Practical Management of Spinal Injuries

Alan G. Hardy
Reginald Elson

Second Edition

Churchill Livingstone



Practical Management of Spinal Injuries

A Manual for Nurses

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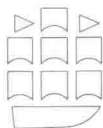
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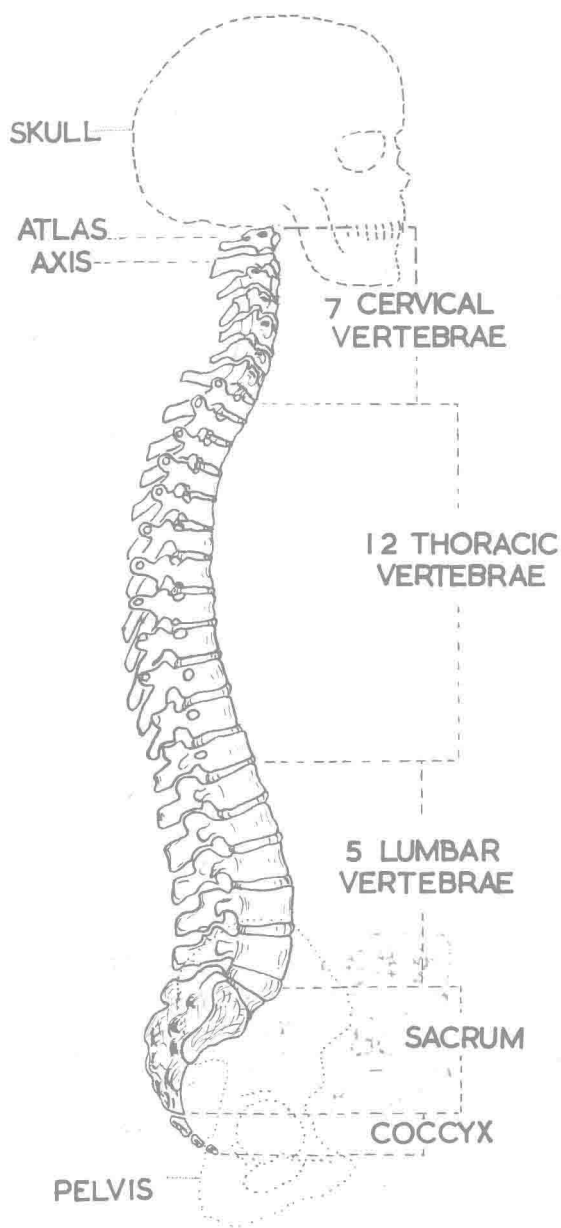
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Practical Management of Spinal Injuries



The human vertebral column.

Foreword

Throughout history medicine has been beset with problems; for many centuries these have centred on the cure of established disease. Today the emphasis is on prevention of many of the diseases by which we were formerly afflicted, for example, skeletal tuberculosis and acute anterior poliomyelitis are almost unknown to the young doctors and nurses of the post World War Two generation.

But accidents—domestic, road and industrial—still produce formidable problems which seem likely to be with us indefinitely, in spite of the excellent research work carried out by the Medical Commission on Accident Prevention, inaugurated by Lord Porritt under the chairmanship of the late Norman Capener, now succeeded by Professor A. Harding Rains.

Of all the vast number of accidents throughout the world those that affect the spinal column and the spinal cord present in the survivors some of the most difficult problems in treatment and management—problems which involve the medical and paramedical disciplines, e.g. First Aid, nursing, physiotherapy, social workers, voluntary welfare bodies and so on.

In 1965 a wonderfully helpful monograph, *Practical Management of Spinal Injuries*, was written by Mr Reginald Elson, F.R.C.S. based on his experience in the Spinal Injuries Unit at the Robert Jones and Agnes Hunt Orthopaedic Hospital, Oswestry, which was instigated to serve the Midland Regions in 1955 by Professor Robert Roaf, and so successfully continued by Mr Terence McSweeney. In the second edition Mr Elson combined the authorship with Mr Alan G. Hardy, F.R.C.S. from the Spinal Injuries Unit, Lodge Moor Hospital, Sheffield whose vast and concentrated experience is in many respects similar to the pioneering work of Sir Ludwig Guttmann at Stoke Mandeville Hospital, Aylesbury.

This new edition emphasises even more than the first the difficult problems of visceral management and the importance of efficient nursing in the prevention of bed sores. With typical modesty the authors in their Preface maintain that the book is intended primarily 'for nurses specialising in the care of patients with spinal injuries'. So it is, but it should enjoy a much wider audience. In my view it should be a *vade mecum* for all lay and professional personnel dealing with these always difficult, and frequently formidable, injuries, for as the late Sir Reginald Watson-Jones wrote in the foreword to the first

edition, quoting Mr Ernest Nicol, F.R.C.S.: 'Patients with paraplegia should be treated either superlatively well or not at all'. How true!

London,
1976

H. Osmond-Clarke

Preface

This book has been written for nurses specialising in the care of patients with spinal injuries. It is assumed that they have already gained working experience in general orthopaedic nursing.

It is difficult to gauge the amount of information which should be contained in a volume of this type. Although the basic principles are well established and unlikely to change, there are many controversial aspects. Another difficulty lies in the balance between medical and nursing care; while one consultant is prepared to allow nursing personnel to perform a particular duty or technique, another will be of the opinion that this is the task of a doctor. This book does not presume to dictate; suffice it to say that, in some institutions, the nursing staff are required to assume increased responsibilities in various ways. Accordingly, we have tried to indicate priorities and describe good techniques.

It is hoped that the book may prove of value to nursing staff who have been called upon to look after the occasional patient who, for some reason, has not been transferred to a spinal injuries centre; although written for nurses, it may be that doctors, physiotherapists and other experts in their own fields will find some points of interest herein.

The main differences between ordinary orthopaedic nursing and that required by patients with spinal injuries lie in the presence or absence of cord damage—before considering tetraplegia and paraplegia, injuries of the vertebral column have been described in order that the mechanisms responsible for the more serious conditions should be understood. It is for the purposes of description only that vertebral fractures and dislocations are dealt with separately from cord lesions; in practical management, bony, ligamentous and neurological damage comprise a single entity and must be treated as such. The brief section on disc lesions and minor back injuries has been included for the sake of completeness.

This presentation does not purport to present the *only* methods of treatment; there is immense scope for variation. All good centres have developed methods which in their hands give good results.

No attempt has been made to give detailed description of the management of very high spinal cord lesions. It is felt that these patients require treatment in super-specialised units where experience of respiratory and other problems can accumulate, as well as the

availability of modern mechanico-medical devices. Probably one or two such centres should serve the whole of Great Britain until, as has been the case in lower lesions, more knowledge and experience is accrued.

A. G. H.
R. A. E.

Sheffield.
1976

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The First Edition of this book was written in collaboration with many members of the staff of the Robert Jones and Agnes Hunt Orthopaedic Hospital at Oswestry. While much of the original text and illustrations are retained, many details have changed. The authors are grateful to Mr Brookes and Mr Martin for additional photographs, and to Sister Couldwell and Charge Nurse Crownshaw, Mr Goddard and Mr Charles, and the staff of the Spinal Injuries Unit of Lodge Moor Hospital, for making these possible. As always, patients have co-operated without exception in allowing themselves to be used as models.

A. G. H.
R. A. E.

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Introduction

Accounts concerning the nature and management of vertebral injuries have appeared in medical literature for more than four thousand years; the uniqueness of spinal cord involvement has been well appreciated. The tragic loss of communication between two parts of the body which are, in themselves, healthy, has exercised a fascination for doctors and philosophers alike, and yet it is not until relatively recent times that we have been able to improve the lot of these unfortunate patients.

Most of the old writing on the subject described aspects of the vertebral and spinal cord injuries themselves; various methods of treatment of the injured parts were suggested in the hope that displacement of the bones might be corrected and resumption of cord function be achieved. Scant reference was made to what could be done for the victim should his spinal cord injury remain permanent.

It was during the First World War that the mass occurrence of this type of injury stimulated constructive interest in the situation, and much theoretical and practical study was performed; despite this, treatment compared with modern concepts was very poor. In the Second World War there was another wave of tetraplegic and paraplegic patients, and by this time there were men of vision who were able to show that by using modern methods of therapy and nursing, they could be taught a new way of life which, despite their affliction, was worthwhile and happy; no account of the management of spinal cord injuries must pass without tribute being paid to those who, with foresight and energy, tackled the seemingly hopeless and depressing subject of paraplegia and showed that it was wrong to regard these patients as 'better dead,' a hitherto common attitude. They showed the potential of good management so convincingly that new hope was found for the even greater task of improving the lot of patients with tetraplegia. It now appears that, given the right overall approach, patients having the highest lesions, compatible with life, can find some measure of happiness. It is not suggested that tetraplegia and paraplegia are to be regarded lightly, nor that management is easy—it is not; but because the mind has an immense facility for making the best of almost any circumstance, if the care is right in all respects, learning a new way of life is both possible and worthwhile. Without the right care, the statement made many years ago to the effect that cord injuries constituted 'an ailment not to be treated,' is probably justified.

Most of the war victims were healthy young adults. Now, another type of mishap is providing an increasing stream of spinal injuries—the road traffic accident. Domestic falls sustained by elderly people are also becoming more common; industry continues to contribute a fairly constant number of cases. There is a disproportionate increase in cervical lesions, some of which become tetraplegic; tetraplegia is the most serious consideration in this field because it demands such great aid for effective rehabilitation.

In England the patients with injury to the spinal cord are referred generally to one of the Spinal Injuries Units, and the pioneering work of Sir Ludwig Guttmann at Stoke Mandeville deserves the highest mention. Other units at Cardiff, Hexham, Oswestry, Pinderfields, Sheffield and Southport have also made contributions and any nurses wishing to study this subject should apply to visit one or more of the Centres and observe the programmes of overall treatment at first hand. The clear cut and decisive policies laid down by Sir Ludwig Guttmann will surely stand the test of time. Likewise in America the great work of the late Donald Munro and the now retired Dr Bors and Dr Comarr must receive special mention. The Veterans' Administration has provided facilities for the care of spinal cord injuries in a number of their hospitals throughout the length and breadth of the United States, and the pattern of these services is now being followed in Units established within civilian hospitals in some areas.

In 1964, the International Medical Society of Paraplegia was founded to co-ordinate, and report on, the work in the various Spinal Cord Injury Centres and to foster communication and co-operation on a world wide scale. The journal of the Society, which is called *Paraplegia*, reports on all aspects of spinal cord paralysis with a particular emphasis on trauma.

Sporting activities at local, national and international levels are now commonplace and the International Stoke Mandeville Games, which have been held annually, have a worldwide reputation.

The Disabled Living Foundation and the more recently formed Spinal Injuries Association furnish information about every facility and aid for the disabled, and details of all their services and equipment can be obtained from the respective headquarters, as well as through the Social Services Departments of the new local authorities. These services are designed to help patients to help themselves to achieve the highest degrees of compensatory physical independence within their capabilities. It is in this way that many patients can regain a life worth living, finding happiness in their home and interest in their local communities.

1. Vertebral Fractures and Dislocations

Usually, injury to the spine follows the forceful trauma of road traffic accidents, falls from a height and mishaps in heavy industry, e.g. mining; a special class of accident occurs in old people in whom the bones are weakened due to osteoporosis and deformed by degenerative osteoarthritis (especially cervical spondylosis). Injuries in warfare are commonly open wounds from gunshot or other missile, but civilian injuries are usually closed. Most of this account applies to the civilian type of injury; the incidence is rising steadily, especially in cases following road accidents.

It is necessary to have a clear understanding of the basic principles which underlie all aspects of management if these patients are to be nursed successfully.

The aims of management are:

1. To protect the spinal cord from injury, or to protect a spinal cord already injured from further damage
2. To aid healing of the injured vertebral column, thereby achieving stability and yet preserving mechanical function.

Anatomy

The vertebral column consists of a series of bones joined together by ligaments.

Each bone consists of a vertebral body on to the back of which is fixed a neural arch (Fig. 1.1).

Processes of bone protrude from the sides and posterior aspect of the neural arch which are levers on which the muscles controlling the vertebral column are attached. The range of movement between adjacent vertebrae is small, but because there are so many bones (seven in the cervical region, 12 in the thoracic region, five in the lumbar region; the last rests on the sacrum which is a solid bone), the total combined range of movement is considerable; the cervical part is the most mobile (Frontispiece).

The vertebral bodies are joined together by intervertebral discs which act as cushions and permit movement. These consist of a tough ring of ligamentous material uniting the outer part of the adjacent vertebral bodies, and this encloses a fluid cushion. The ring is called the annulus fibrosus and the fluid, the nucleus pulposus (Fig. 1.3).

The nucleus pulposus has been described as fluid, but with

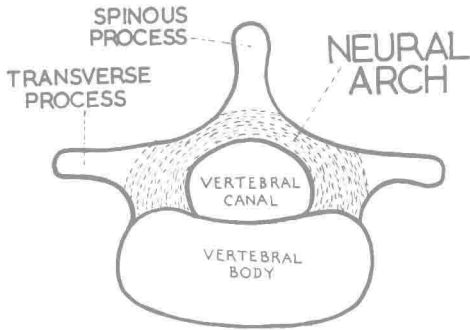


Fig. 1.1 The body and neural arch of a vertebra as seen from above.

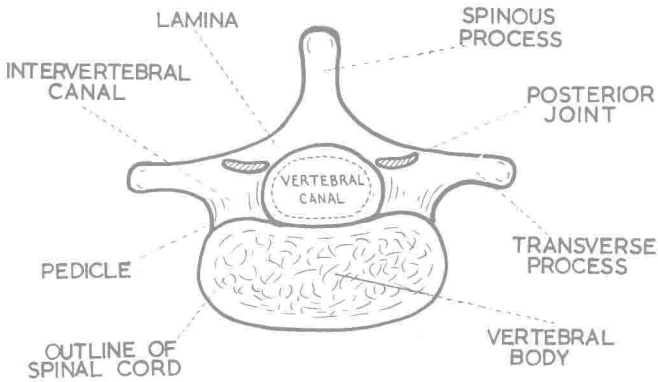


Fig. 1.2 The body and neural arch of a vertebra showing positions of the posterior joints and intervertebral canal.

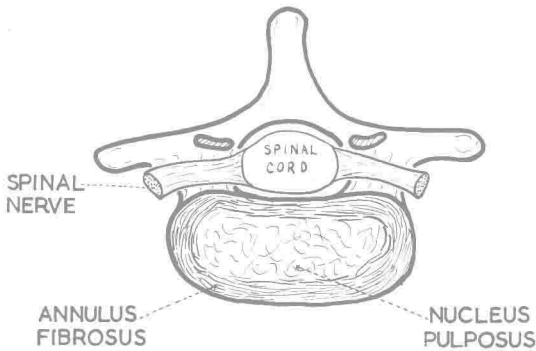


Fig. 1.3 Structure and position of the intervertebral disc.

increasing age it becomes progressively drier and ultimately, in the elderly, it is largely solid; this drying process is accompanied by a

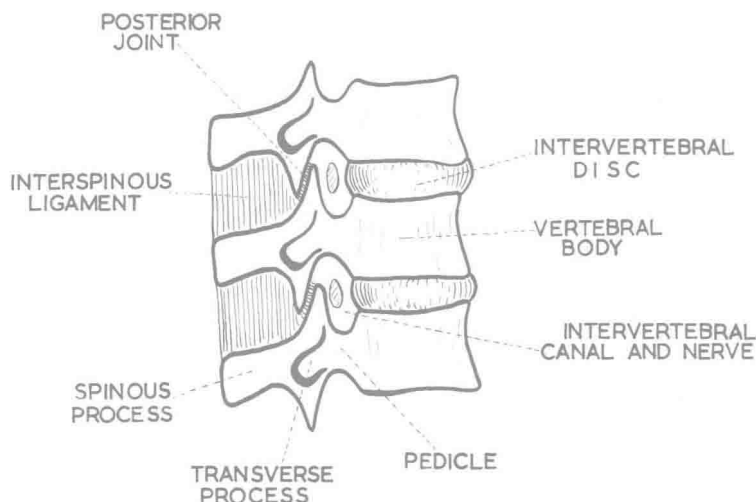


Fig. 1.4 Lateral view of three vertebrae showing the intervertebral discs (the anterior joint) and the posterior joints. Note the spinal nerves emerging from between these parts through the intervertebral canals.

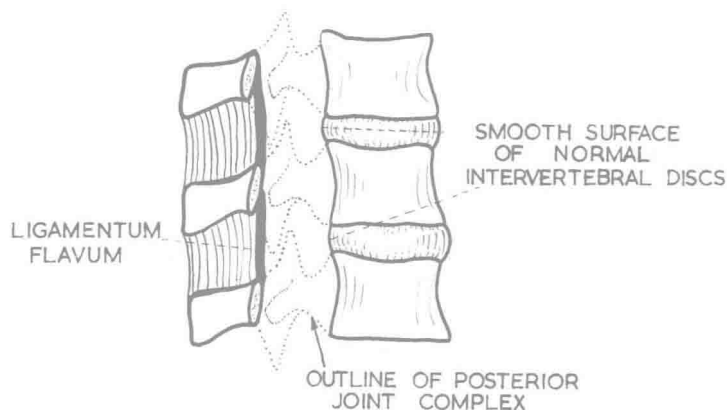


Fig. 1.5 Lateral view of three vertebrae showing the spinal canal; the lateral parts are shown in outline.

loss of mobility; the discs become flatter. At the same time the annulus becomes weaker.

Between the neural arches there is a synovial joint on each side (the posterior joints) (Fig. 1.2). The posterior part of the neural arches (the laminae) are joined together by elastic membranes called the ligamenta flava (Fig. 1.5). Other ligaments join the transverse processes and spinous processes. The ligaments which bind the bones together limit the range of movement between them, this range being normally controlled by the muscles. When distortion of the normal alignment is excessive, as may occur in violent accidents, the ligaments tear or, alternatively, pull off parts of the bones; the bones may be crushed in some types of violence.

The space enclosed by the neural arch is called the vertebral canal and it contains the spinal cord. Nerves escape from the vertebral canal through spaces between the front parts of the neural arch (Fig. 1.3) called the intervertebral foramina (singular: intervertebral foramen).

Other muscles are attached to the backs of the laminae, to both sides of the spinous processes and to the bodies themselves. The whole spinal apparatus forms a solid yet flexible and immensely strong column. Further control of movement is derived from the rib cage and abdominal musculature. Below, the column sits between the great bones of the pelvis, whence weight is transmitted to the lower limbs in the erect posture and to the ischial tuberosities when sitting. Above, the column supports the skull at the very mobile atlanto-occipital and atlanto-axial joints, where the bulk of nodding and shaking of the head occur respectively.

Unstable and stable vertebral injuries

When the spinal column is subjected to severe stress, the ligaments which join the vertebrae together may be sprained or ruptured, or the bones themselves may fracture. In some cases, following such an injury, a highly dangerous state can exist in which inexpert movement of the patient can cause further displacement at the site of damage, sufficient for the soft spinal cord to be squeezed between the bony fragments (Fig. 1.6). This type of injury is said to be *unstable*. In other cases, because mechanical linkage between fragments remains intact, further displacement cannot occur easily and the injury is said to be *stable*. The distinction between stable and unstable injuries is most important; without experience and exhaustive X-ray examination, it is not possible to say which state exists, and, because of this, the most important rule in the management of spinal injuries is: *all spinal injuries must be regarded as unstable until proved otherwise*. This rule applies in first-aid treatment, during transport, in Casualty and in the X-ray department. Even today occasional examples are seen of patients becoming paralysed from secondary cord damage while actually in hospital, because the rule was not followed.