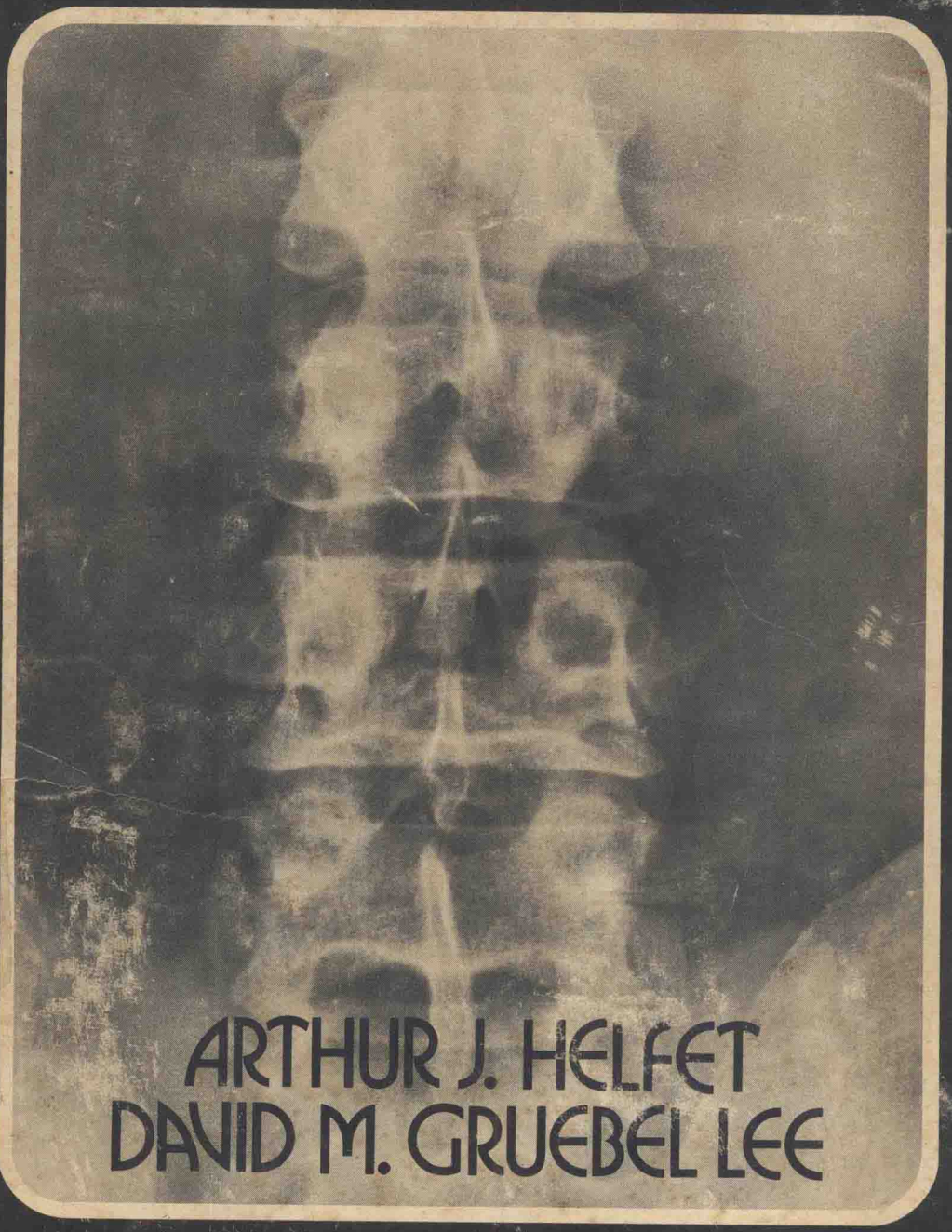
DISORDERS OF THE LUMBAR SPINE



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J.B. LIPPINCOTT COMPANY

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With 14 Guest Authors

J. B. Lippincott Company
Philadelphia Toronto

ISBN 0-397-50381-4
Library of Congress Catalog Card Number 77-16571
Printed in the United States of America
1 3 5 4 2

Library of Congress Cataloging in Publication Data

Helfet, Arthur J
Disorders of the lumbar spine

Bibliography: p.
Includes index.
1. Vertebra, Lumbar—Diseases. 2. Backache.
I. Lee, David M. Gruebel, joint author.
II. Title
RD768.H44 616.7'3 77-16571
ISBN 0-397-50381-4

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Preface

Man in sooth is a marvellous, vain, fickle and unstable subject.

Michel de Montaigne

The pattern of behavior of the normal back and the nature of the events and incidents which lead to derangement and misbehavior have intrigued the practitioner since primitive times.

The vast increase in knowledge and in the elegant aids to diagnosis and treatment in this golden age of science should ease our anxieties, but, alas, the vicissitudes of living in a world of increasing violence and mechanical complexity aggravate rather than solve the problems of man's back and its aches. Population explodes, transport is faster and less safe, both industry and the household present hazards, and even sport becomes relentless and ruthless. Pain in the back is a malady likely to be with us for a very long time.

Our concerns, then, must be to prevent accidents, to protect the patient from hurt and illness, and to heal and to readjust the injured, both physically and mentally. All disease is heir to the tyranny of pain, against which the genius of modern research is in constant rebellion.

For many centuries the medicine men of the East were aware of, and used, the influence of the psyche. Western medicine, on the other hand, is comparatively recent in its study of the role of the mind and emotions on the physical manifestations of disorder. Significant, therefore, is the increasing use in the West of Eastern techniques. The interrelationships of the systems are now better understood by both disciplines.

Through all these changes the traditional image of the "physician" has been one of compassion and clinical skill, all-observant and considerate of the patient. Indeed, amidst all the advances of treatment, these qualities, demonstrated nowhere more keenly than in the management of backache, remain essential.

The interest and advantage of 40 years of study of man's back and its ills have encouraged the authors to write this book for the clinician, be it physician or surgeon, who treats a *patient* as well as a disorder of the lumbar spine.

Arthur J. Helfet

Disorders of the Lumbar Spine

Contents

1 Introduction

The commonplace of schoolbooks of tomorrow is the adventure of today.
Jacob Bronowski

"Backbone" conjures up a picture of resolution and gallantry in nation, army, or man. The "spineless" are without courage or will. Such images have influenced our idea of the functions of the vertebral column. How else do we explain the mystique surrounding the manipulator's click or the dread of any surgical procedure on the backbone? The purpose of this book is to dispel these fancies not only by relating backache to the whole patient but also by establishing understanding and precise diagnosis.

When, during the earlier years of this century, it was realized that the prolapsed intervertebral disc could give rise to the symptoms of sciatica, a logical focus for the study of the mechanical features of backache was established. But backache may also be a symptom of vascular or renal disease, a manifestation of psychosomatic stress, a cloak for an unresolved personality conflict or underlying insecurity. One must always remember in the management of patients with backache, that the patient must be considered and not only the mechanical disorder.

This book discusses aspects of medical and surgical practice, of orthopaedics and physical medicine, of neurology and neurosurgery, of rheumatology and acupuncture, of radiology and physiotherapy, including the art of manipulation. As definition improves it is possible to distinguish clinically disabilities produced by derangements of the spine from those due to injury or strain of muscles and ligaments, with or without adjacent nerve involvement, and to recognize when back pain is of extraspinal origin. Treatment may thus be more reasonable and more precisely directed. The practice of rule of thumb trial of antiinflammatory medication, corsets and physiotherapy to initiate conservative treatment, and routine myelogram and laminectomy when it fails, is often unsatisfactory and time-wasting for patient and physician.

At the same time it is important to realize the limited role played by surgical intervention. P. H. Newman reports that of each 100 patients who consult their general practitioner, 10 are referred to hospital and less than 1 per cent are treated by operation. From the author's records (A.J.H.) over a 10-year period, 1260 patients were referred as "discs" for treatment. They included 63 disabled by spondylolisthesis or spondylosis. Using strict criteria, a clinical diagnosis of derangement of a lumbar disc was made in 684. In all, including those in whom instability was the prime indication, operation was necessary in 138, or 8 per cent of the total of 1260. Of these, 11 required reoperation during the next 5 years, usu-

ally fusion or, for some whose original procedure was for spondylolisthesis, refusion.

Since prolonged disability caused by a deranged disc affects associated joints and muscles, the treatment of low backache and sciatica due primarily to the affected disc is not merely its surgical removal. The associated strain or backache must be treated as well. Reablement and rehabilitation are essential and must be complete.

Clinical examination and management of derangement and instabilities of intervertebral joints and their discs are the main subjects of this book, with some emphasis on the phenomenon of anatomical instability, which the authors consider responsible for most back pain and disability of mechanical origin.

The text is complemented by a number of distinguished contributions. *Professor Kirkaldy-Willis, John Wedge* and *their colleagues* at the University of Saskatchewan demonstrate and explain the anatomical changes that are basic to the clinical syndromes of back pain and their treatment. There is also their thoughtful interpretation of the increasing significance of "spinal stenosis."

Investigation by the modern range of roentgenographic and neuroroentgenographic techniques is superbly illustrated and interpreted by *Dr. Pieter de Villiers,* who maintains, "Mistakes are less often due to faulty interpretation than to inadequate radiography."

Professor Louis Solomon and *Dr. Berman* discusses the pathological and clinical features of rheumatoid arthritis of the spine and the ankylosing spondyloarthropathies. The distinctions between these disorders are defined and a rational approach to treatment is outlined.

Dr. John Hannington-Kiff writes a refreshingly original description of the medical management of pain and inflammation based on his pharmacologic and biophysiologic research.

Dr. C. W. Coplans describes the physical and injection treatment of backache and defines the indications and methods of orthodox orthopaedic manipulation designed to restore the normal pattern of movement rather than to reduce unproven and ill-defined subluxations. Manipulation is valuable, but it can be useless or harmful when inappropriate.

Professors George Dommisse and *R. P. Gräbe* present the results of recent research into the "failed operation" and advocate the remedies, including the refined techniques of microsurgery. A spinal surgeon, rather than an orthopaedic or a neurosurgeon, is the appropriate leader of the team.

Mr. Michael Devas describes his own views after recently undergoing laminectomy for a prolapsed lumbar disc. It is not often that a distinguished orthopaedic surgeon has given us the benefit of his experiences on the "receiving end" of surgery.

Thanks are due to those whose help was ready and unstinted; especially to Lydia Gruebel Lee, who edited with skill and patience, and to J. Stuart Freeman, Jr., and Suzanne Boyd, who, in the Lippincott tradition, have encouraged and facilitated progress and production of this book.

2 Clinical Problems of the Lumbar Spine

A number of clinical syndromes that cause pain in the back will be discussed before the anatomical features of mechanical breakdown of the spinal column in the lumbar region are given. Patients suffering from lumbar pain and disability can be grouped for ease of diagnosis and treatment.

CHILDHOOD INSTABILITY

Pain in the back is rare in children before adolescence, but when it does occur it is sudden and severe. It is more common in the thoracic or thoracolumbar spine, but it may also affect the lumbar region. A trivial, rotational movement will provoke an attack of screaming. Even breathing is difficult. Medical advice is therefore sought at an early stage. The child fears examination, adopts a stiff posture, and tries to rest the back. Muscle spasm, both voluntary and reflex, is present.

There is no bony tenderness, although palpation of the erector spinae muscles causes pain. Any attempt at straight-leg raising may increase the child's symptoms, as may rotation of the legs and pelvis. The pain is localized precisely, but signs of root compression are absent.

The syndrome bears all the features of intervertebral instability, but it is uncertain whether the pain arises in the zygapophyseal joints or the disc itself. When the patient is sedated and put to bed, symptoms subside, suddenly or within a few days. This suggests a mechanical lesion occurring in normal tissues. Attacks may be frequent enough to warrant the wearing of a polythene brace for a time.

The child may have only one attack or repeated episodes over a few months or years, but the condition usually disappears with further growth. Roentgenographs show nothing abnormal, and the only significant feature is that the children usually have congenital ligamentous laxity.

THE ADOLESCENT LOCKED BACK

Adolescent backache is uncommon, but it is often resistant to treatment. The parents are likely to be concerned and to press for active treatment and a firm prognosis, since the young person's education and athletic abilities are threatened. It is often the best sportsmen who are vulnerable to such attacks. Adolescents who suffer from Scheuermann's epiphysitis or osteochondritis are especially at risk.

This condition causes pain in the thoracolumbar spine in a young person

during the final growth spurt. Slight spinal deformity of the kyphotic type, with a thoracic hump, craning neck, and straight (i.e., kyphotic) lumbar spine is characteristic. The greatest spinal deformity is at the thoracolumbar junction, where the meeting of thoracic and lumbar segments results in an almost angular kyphos, with poor posture and muscle spasm. It is difficult to know whether the tight hamstring muscles are a cause or a result of the condition.

The diagnosis is confirmed by roentgenography. Typical features include irregular ossification of the vertebral end-plates, narrowing of thoracic disc spaces, Schmorl's nodes in the thoracic and thoracolumbar region, and an increased anteroposterior diameter of the vertebral bodies of the kyphotic thoracolumbar segment with anterior wedging. The latter is considered pathognomonic.

Abnormality of the lumbar disc spaces is unusual, except in a variation of the condition without significant thoracolumbar kyphosis. In this case the thoracic curve is compensated by an extreme lumbar lordosis with abnormal compression on the mid-lumbar discs forcing them forward and downward. Since the strength of the abnormal vertebral end-plate is not equal to the compressive force, damage occurs to its anterosuperior portion, which may break. It ossifies separately, or remains unossified, to give the typical roentgenographic feature known as the Butler lesion.[2]

The mere absence of roentgenographic changes does not preclude damage to the lumbar discs. Acute locking of the lumbar spine may occur without it. Even after fusion of the end-plate epiphysis, the back can suffer sudden, mechanical locking.

Locking in an adolescent's back is probably discogenic. It is accompanied by loss of straight-leg raising, often bilaterally, and by pain in the legs. Nerve root signs are infrequent, but when present indicate that the condition will not resolve easily. Such recalcitrance is an indication of the strength of healthy tissue in the adolescent back. It takes a great deal of pressure to displace nuclear material. It cannot be squeezed like toothpaste; instead, large lumps are displaced to impinge against a strong, annular ligament. Such intervertebral prolapse is particularly difficult to reduce. Unlike degenerate material, nuclear tissue does not shrivel.

The stretched annulus causes reflex spasm, with muscle pain and tilting. Rupture of the annulus follows great provocation only, and the nerve roots are seldom stretched. Recovery does occur spontaneously but is often protracted. Occasionally, a patient is left with severe disability, so that operation becomes essential.

TRAUMATIC DISC PROLAPSE

Traumatic prolapse is found in young adults; more commonly they are male and are usually employed in heavy work, often involving the lifting of weights. Furniture movers, dockers, miners, truck drivers (who have to load their own trucks), and medical and nursing workers, are particularly vulnerable.

The patient develops acute pain in the back immediately after lifting a weight in a heedless way or unexpectedly bearing a heavy load, as for example, when the worker slips or his helpers release their grip prematurely. The sudden force is taken by the flexed and rotated spine. He develops an immediate, mid-line lumbar pain severe enough to stop him in his tracks. He is afraid to move and feels his back locked by the pain.

This may extend into the leg at the same time or shortly thereafter, in the sciatic distribution. There may be loss of nerve root function. The pain is severe enough to drive the sufferer to his bed in the first attack. Recumbency relieves his symptoms.

THE "YOUNG EXECUTIVE SYNDROME"

Of all types of severe back pain, that occurring in healthy adults between the ages of 35 and 45 is most common. It may be increasing in the urban population.

Patients with this syndrome tend to share personality traits and circumstances. They are often at the upper levels of executive responsibility but are seldom at the top of the ladder of command. They are more likely to have the position of "first lieutenant" and consequently are subject to the pressures of a subordinate role. Many have been recently promoted and feel that they have to prove themselves. They are hard-working, conscientious, and ambitious, but harbor secret fears about the ability to cope.

Women who feel restricted because they are not engaged in a business or professional career, or who may resent having to run a home and cope with the children while their husbands commute to the city or take sudden, overseas business trips, develop the syndrome.

The injury is often unexpectedly trivial: a briefcase lifted with rotated back, bending to pick up the morning paper, even a sneeze can precipitate the attack. The result is the same as in traumatic prolapse: sudden lumbar pain is followed by sciatica.

The story appears straightforward, but further questioning reveals that the patient may have had backache for months, often fluctuating in severity but not directly associated with trauma. It has seldom prevented him from doing anything. On the contrary, the extent and nature of the patient's physical activity during this period is surprising. Again and again one hears stories from those who, apparently fully employed in a challenging job, lay patios in their spare time, build house extensions, redecorate homes, or cope alone with infirm relatives. This illogical pressure of activity characterizes the syndrome.

From this pinnacle the patient is precipitated into profound incapacity. There is a precise logic in this physical breakdown. The businessman's incessant work has been a sign of this conflict. The question of whether he could cope has been answered in the negative. Insecurity manifests itself in psychosomatic distress and useless, even punishing, activity. The syndrome is one of "a storm in the midst of a calm."

Collapse is therapeutic, since it allows the patient to rest, and gives a socially acceptable reason for doing so. Even the strongest among us need such support. The only time the late President Kennedy appeared in public using crutches to rest his constantly painful back was on his return from his first meeting with Khrushchev in Vienna.

It must be emphasized that the prolapse is real and is as likely to lead to operation as any other. Unless the underlying stress is relieved, surgery is even more likely.

Not all attacks of lumbar pain at this age are predominantly psychosomatic. There may be a mechanical fault, either developmental or acquired. The patient may have developed the psychological overlay because of long-standing back pain and incapacity.

Patients of other ages with disc prolapse are less likely to have a psychological stimulus. The young develop other psychosomatic conditions due to the stress of growing, while the aging suffer from the realization of failing abilities; but the target organ is not the lumbar spine.

It seems that in the middle years, the disc material of the lower lumbar spine is vulnerable to psychological stress. It is known that nuclear material in this region has undergone sufficient chemical change to differ from the young man's disc, both macroscopically and biochemically.[4] It has lost elasticity and become "degenerate."

Presumably it is prone to swelling,

since prolapsed nuclear material in this age-group is often found at operation to be under great tension. Pathological increase in intervertebral pressure will cause pain by stretching the intact annulus and will allow disruption of the ligaments, with disc prolapse, by comparatively insignificant injury. It is thought that psychological stress may be one cause of such disc swelling, but the mechanism is not understood.

It is not only the lower lumbar spine that is vulnerable at this age. Similar symptoms may develop in the lower cervical spine, before, during, or after an attack of back pain. The discs in this region deteriorate at the same time.

DISC PROLAPSE IN THE MIDDLE-AGED

Middle-aged people also suffer lumbar disc prolapses. Except for a difference in emphasis, the essential features are similar. Psychological stress is not usually as evident as in younger patients, and the force required to precipitate the injury is less. More advanced degeneration means a softer disc to displace.

The history may reveal one attack or a series of episodes over a number of years, after which the attacks cease spontaneously. They are not usually as severe or incapacitating as in younger men and are less likely to require surgery.

The term "middle-aged" may apply to the disc and not to the patient himself. The disc has often reached the stage of collapse in which narrowing of the intervertebral space, sclerosis of surrounding, weight-bearing bone, and osteophytic lipping are roentgenographically visible: yet the disc with local roentgenographic changes is not necessarily the focus of the patient's symptoms. An apparently normal disc above or below may be the site of prolapse and may well behave like that in the young patient.

CLAUDICATION OF THE CAUDA EQUINA

Claudication of the cauda equina has been understood and diagnosed only recently. The term is appropriate, provided it is used to describe a symptom characterized by pain in the back and leg severe enough to cause a limp. *Claudication* is an allusion to the limp developed by the Roman Emperor, Claudius.

As in other forms of claudication, the symptom is intermittent, increasing with activity and relieved by rest. Usage has added a suggestion of vascular insufficiency to the term.

Some patients with mechanical disease of the spine, especially in late middle or old age, have pain in the legs and back on effort. They describe a precise effort tolerance before the symptoms begin. If walking is continued, the pain increases until the legs become weak, and further effort may produce sensory disturbance. In many cases the pain subsides and strength returns to the limbs if the patient stops walking: in others, the patient may have to sit or lean against something for a while before continuing. The period of rest may be brief or as long as a quarter of an hour. It seldom lasts longer. Patients with this condition are comfortable when sitting or lying down, but are unable to cope with the increasing oxygen demands of exercise.

Discomfort and pain are hardly ever limited to one segment of the spine but extend distally as far as the sacrum. Some cases gradually deteriorate; the patient complains of decreasing effort-tolerance and increasing weakness that makes him almost chair-bound. This is not invariable; as with intermittent claudication due to peripheral arterial obstruction, the condition may stabilize and the sufferer accommodate to his disability. The pattern of symptoms in the elderly, usually due to femoral arterial block, is familiar to vascular surgeons. It may also follow