

# An approach to back pain

## Part 1: Background and three practical techniques

— S W Brighton



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### Curriculum vitae

Dr SW Brighton studied at the University of Pretoria and received the MBChB in 1963. After some years in hospitals in Durban and London (UK) and then general practice in Pretoria, he joined the staff of the Department of Physical Medicine, University of Pretoria 1975 - 1979, obtained the M Med-degree, and since 1980 has been attached to the Department of Rheumatology (UP). In 1979 Dr Brighton was elected Fellow of the Faculty of Physical Medicine of the College of Medicine of SA. He has published in many medical journals, in RSA and abroad, and is actively involved in research work at the University of Pretoria.

**KEYWORDS:** Backache;  
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### Summary

*The different causes of back pain are discussed, giving practical examples of risk factors and manipulative techniques.*

In looking at the epidemiology of back pain the causes are often far from definite. There are in all probability many causes of back pain besides that of disc prolapse. Of individual characteristics contributing to back pain, age and sex are important. Taller and heavier people also tend to have more back pain.

The influence of age enables us to detect at least 2 types of back pain: the early maturity back pain, often labelled the 'disc syndrome'; and the late onset back pain, often called the 'degenerative back'.

It has been found useful to employ a very simple taxonomy of back pain.

#### 1. Transient back pain

The odd twinges all of us so often get that disappear as quickly and never require therapy.

#### 2. Acute back pain

These range from mild to severe, and include amongst others the acute disc syndrome.

#### 3. Chronic back pain

Fortunately in the minority.

### The Disc

Only the periphery of the end plates ossify, the central part remaining cartilaginous and up to about 1 mm thick. The outer layer of the disc, the *annulus fibrosis*, consists of layers of fibrous tissue that run spirally at 45° to the body of the vertebrae.

The fibres of the alternate layers run at right angles to each other. This criss-crossing of the fibres resists flexion and torsion strains.

The soft centre of the disc, the *nucleus pulposus*, is enclosed by the *annulus fibrosis*. The *nucleus pulposus* being largely an incompressible fluid, pressure is distributed in all directions.

The posterior longitudinal ligament is firmly attached to the discs in the spinal canal, but the anterior ligament is not attached.



There is a gradual decrease in the water content of the disc from 80 % at birth to about 70 % in later life, which is about the same as the outer annulus. With ageing there is a steady increase in the amount of collagen in the nucleus and in later life it has a consistency very similar to the annulus.

It has been shown that an increase in the amount and thickness of collagen fibres in the outer part of the nucleus of the disc as well as the annulus, leads to a resistance to flexion and extension. This restriction could then subject the annular wall to great strains in flexion and extension movements and thus make it susceptible to rupture or tearing.

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### *There are many more causes of back pain besides that of disc prolapse*

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After middle-age, clefts and fissures are often found in the discs which run parallel with the end plates. These clefts extend in the posterior and postero-lateral direction. Often the central part of the disc becomes isolated by these clefts to form a loose body in the centre of the disc. These clefts may extend right through the annulus. They appear to be caused by tearing of the tissues, as they rarely contain any nuclear material.

#### **Herniation of the nucleus pulposis**

Normally the cartilage end plates are strong enough to prevent displacement of the nucleus. There are two potential weak points in a disc, i.e. the *cartilage end plates* and the *posterior segment* of the disc.

Posterior and postero-lateral prolapse is an important cause of both acute and chronic back pain. At autopsy 15 % of male and 19 % of female discs had posterior prolapses, often at multiple levels. This was rare under the age of 30 years.

Direct posterior herniations are rare as the disc material usually tracts around the posterior longitudinal ligament.

The presence and the severity of back pain depends upon the direction taken by the protruding material. Some discs only bulge into the canal during certain movements.

Vertical prolapse (Schmorl's nodes) occurs in 75 % of autopsy spines, but only in 13 % of radiological examinations.

Osteophytes forming postero-laterally in relation to the intervertebral foramina may themselves, or together with protruded disc material, cause nerve root compression.

### **The degenerative spine**

The condition of so-called degenerative spondylitis is characterised by osteophytes along the anterolateral margins of the vertebral bodies and is sometimes accompanied by back pain. Pathological changes in the intervertebral discs, osteophytes and osteoarthritis of the apophysial discs co-exist in the majority of cases. All these changes are almost certainly pathologically interrelated. The sequence of events leading to degenerative spondylitis may be summarised as follows:

1. Structural derangement of the disc due to ageing, degeneration or prolapse.
2. Thinning of the disc as a result of these structural derangements.
3. Forward tilting of the upper vertebrae about the axes of the apophyseal joints.
4. This tilting leads to antero-lateral bulging of the annulus and stimulation of marginal osteophyte formation.
5. The abnormal stress on the apophyseal joints leads to bone remodelling and osteoarthritis. Osteophytes forming on the margins of the apophysial joints often project into the intervertebral foramina. Reactive proliferation of the soft tissues further narrows the canal.

### **Treatment of low back pain**

It should be remembered that in many patients we are uncertain as to the exact cause of their back pain, with the exception of a true disc lesion with sciatica due to sequestration of disc material impinging on a nerve root. For the patient with a true disc syndrome with neurological signs a number of studies have shown that simple disc removal is superior to conservative treatment, and surgical intervention should probably not be delayed.

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### *For a patient with true disc syndrome and neurological signs, surgical intervention should probably not be delayed*

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#### **Intra-discal pressures**

Increased mechanical load on a spine invariably increases any back pain which might be present. Further, it is known that disc prolapse usually occurs where mechanical stresses are the greatest. It would thus seem logical that avoiding situations that abnormally increase discal pressure will reduce stress on an already damaged disc and possibly reduce the chance of a reoccurrence.

Intra-discal pressures have been measured in various static positions. Lying in the horizontal position



intra-discal pressures are only 25 % of what disc pressure in the standing position would be, while values of 150 % are achieved with forward bending. Sitting upright with no support gives pressures of 150 % over that of standing pressures. There is also a sharp rise in pressures with coughing and straining. Intra-discal pressure measurements during lifting have shown that lifting with the legs straight and the back bent gives very high pressures compared with lifting with the legs bent and the back straight.

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### *The presence and severity of back pain depends on the direction taken by the protruding material*

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Studies of different types of seats have shown that the better the lumbar region is supported the lower the intra-discal pressures. Posture while driving a car may also be an important cause of back pain. Long car trips can provoke acute attacks or aggravate chronic back pain. This is particularly so if the seat causes excessive flexion of the hips and knees.

Other studies have shown that when carrying weights the weight should be carried close to the body, as intra-discal pressure increases the further the weight is carried away from the body.

There is little evidence that strong back muscles prevent painful episodes. On the other hand, an increase in intra-abdominal pressure relieves the load on the lumbar discs. It is thus logical that exercises that strengthen the abdominal muscles,

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### *Exercises which strengthen the abdominal muscles are important*

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which when contracted increase intra-abdominal pressure, should be prescribed in a rehabilitation program. Studies have shown that isometric exercises raise the intra-discal pressures the least. Exercises like straight leg raising and sit-ups done to strengthen the abdominal muscles raises the intra-discal pressures to much higher levels and as such should be avoided in a back pain rehabilitation program.

Considerable emphasis should be placed on quadriceps exercises as strong leg muscles give the

patient more confidence in using his legs to lift weights, rather than using the back.

Occupational aspects of back pain are of growing interest but most research has only been done in recent times, and much still has to be done.

Back pain remains an important cause of absenteeism in industry. Proof that occupation can cause permanent changes to the discs, ligaments, vertebrae and supporting structures is difficult to assess. Lack of diagnostic clarity in many of the painful back conditions has made the subject very confusing.

It has been claimed that violent trauma can damage cartilage and ultimately cause osteoarthritis. It would thus seem logical to postulate that heavy loads on the back could lead to degenerative changes. There is reasonable agreement that trauma, malalignment or deformity can lead to disc degeneration per se. Various surveys have shown that jobs making the greatest demands on the back had the highest incidence of back pain. Stooping for prolonged periods of time also has a high prevalence of back pain. Those in sedentary employment involving a lot of sitting also had a higher prevalence of back pain. Those in sedentary employment also had a higher prevalence of back pain compared to those whose work involved standing and walking about.

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### *Lifting with legs straight and back bent: very high pressures Lifting with legs bent and back straight: lower pressures*

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#### **Prevention of back pain in industry**

At least in theory it should be possible to prevent much of the back problems arising in industry, by either primary or secondary prevention.

**PRIMARY PREVENTION.** This involves laid-down maximum loads which may be carried as well as specific instructions to those involved in carrying, lifting or handling heavy weights. By using correct posture it is possible to carry weights considerably in excess of the maximum recommended (25 kg compression and 68 kg overall weight) by the International Labour Office, particularly if the individual is trained by regular experience in carrying the weight. Further, lifting an unexpectedly light weight when the muscles are braced for a heavy weight can cause severe back pain.

There is some evidence that systematic instruction in back care does reduce work absenteeism. Modifying work conditions is another important measure in prevention. Pre-employment screening is being



used in some countries. Obviously any definite back abnormality should exclude that person from work involving heavy strain on the spine, but what of the person with say, mild changes on X-ray? It is very difficult to predict the outcome here.

### SECONDARY PREVENTION

#### Ergonomics

All patients should be well-versed in understanding the movements and postures known to cause back pain. Standing straight is better than unsupported sitting. When sitting the back should have a good

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*– keep the weight as close to the body as possible*

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lumbar support, preferably with the lower lumbar region pushed into slight lordosis. Stooping or bending forward, and in particular for prolonged periods of time, must be avoided. When lifting weights the back must be kept straight and the legs used for lifting. It is equally important to keep the weight as close to the body as possible.

### THERAPY

#### 1. Physical therapy

Exercises are frequently prescribed for back pain. Many of the flexion and extension exercises prescribed raise the intra-discal pressures to very high levels. As far as disc pressure is concerned, isometric exercises affect intra-discal pressures the least and in a number of trials this, combined with traction, seems to give the best results.

With acute back pain bed rest is essential, with simple analgesics. Flexing the hips and knees while lying in bed may also further relieve the pain.

#### 2. Manipulation

A proportion of cases of back pain respond dramatically to manipulation. It is very difficult to determine which cases will do well with manipulation, but as

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### *Bed rest is essential*

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the techniques are safe if done carefully, a therapeutic trial of manipulation can be used. If no improvement takes place within a few treatments, there is no point in continuing. Acute discs with neurological fall-out should not be manipulated as there is a risk of further tearing the disc.

For practitioners contemplating doing the manipulation themselves, a mastery of 3 manipulative techniques should be enough: one for the cervical spine, one for the dorsal spine, and one for the lumbar spine. It should be adequate for the majority of cases where manipulative therapy would be of use. The skills of manipulation are best gained by practical demonstration classes. Force must never be used.

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### *Force must never be used*

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1). A simple but effective lumbar manipulative technique is done with the patient lying on his side (Fig I). The patient's upper leg is flexed to 90° with



Figure I

the knee also flexed, so that the foot rests on the other leg's calf. The therapist, while facing the patient, then places his arm under the patient's upper arm, with his own hand over the lumbar vertebrae to be manipulated. His other arm is placed with the forearm resting on the patient's buttock and the hand on the patient's vertebrae just below his other hand. The patient's upper torso is rotated away from the therapist while simultaneously using the other arm to rotate the patient's pelvis towards the operator (Fig. II). This movement is continued until all the slack has been taken up. Thereafter, a slight additional thrust is given, and the vertebrae will be felt to jump slightly under the fingers, usually accompanied by a slight cracking sound if the procedure has been done correctly.

2. The dorsal spine is best manipulated in the sitting position (Fig. III). The patient sits on a fairly low stool. The therapist stands behind the patient and places his foot on the stool behind the patient.





Figure II

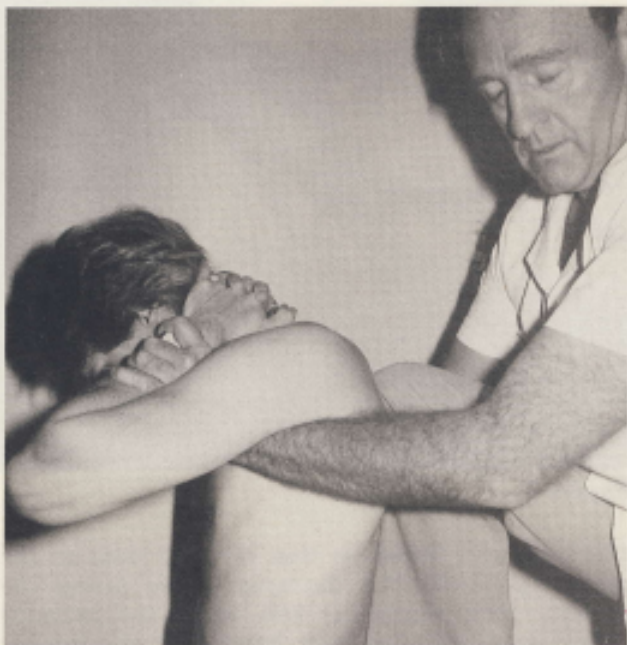


Figure III

His knee is placed against the patient's dorsal spine at the level he wishes to manipulate. With a small cushion in front of the knee, the knee must be pressed firmly against the posterior spine of the vertebrae to be manipulated. Then the therapist grasps the patient's wrists and asks the patient to place his hands behind his neck with the fingers interlocked. The therapist will now be standing behind the patient with his arms passing under the patient's axilla into slight flexion, while at the same time preventing the patient's arms from abducting. While keeping the patient in slight flexion, he is pulled back against the knee, and with a slight thrust with the knee the dorsal vertebrae should manipulate.

3. The cervical spine is best manipulated with the patient lying on his back on the examination couch. The therapist stands at the head of the couch. He then cradles the patient's head in his hands with his fingers interlocked under the patient's head (Fig. IV). He then places his forefingers against the side

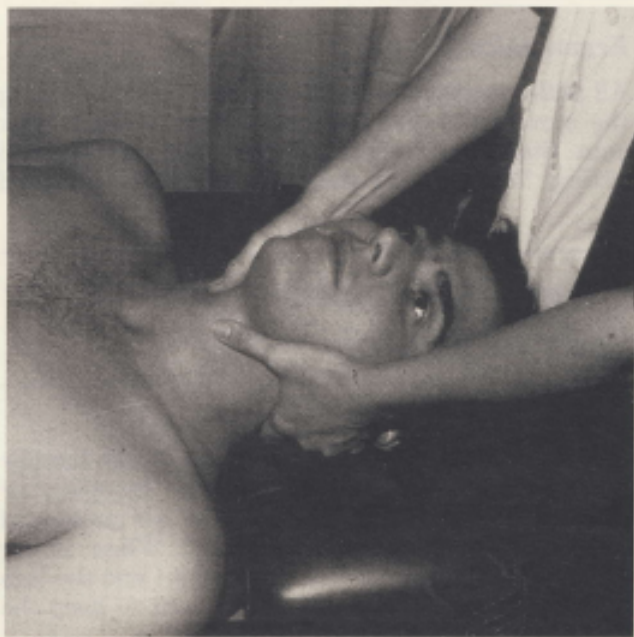


Figure IV

of the patient's neck, pressing firmly against the lateral bony column of the cervical vertebrae, at the level of the cervical spine he wishes to manipulate. The head and neck above the level of where the forefinger is pressed is then bent sideways around



Figure V



the forefinger (Fig. V) and at the same time the head is rotated in the opposite direction about 10° (Fig. VI). Thereafter a slight thrust is given with the finger pressing against the neck, and at the same time increasing the rotation of the head. If done correctly, the cervical vertebrae will be felt to manipulate.



Figure VI

It must be emphasised that force must never be used, and the patient must never feel pain. Pain with a manipulative technique is a sign that it is being done wrongly.

## Academy News

### Academy Annual General Meeting and Council Meeting

#### Motions accepted on 15 and 16 April 1986

- "THAT this Academy meeting notes with concern the possible effect of the removal of the rights of the dispensing doctor might have on the standards of Primary Health Care in South Africa and therefore re-affirms its offer to conduct appropriate research into this area."
- "The Academy expresses itself strongly against the fragmentation of health services in South Africa and calls for a unified health department with its services and facilities open to all South Africans, in order to ensure an equal standard of primary health care for all."

## Academy News

### Academy News

Dr S Furman wishes to advise his colleagues: as from August 1st 1986, he will be moving his practice to:

302 Centre Point, Milnerton.

Please note new telephone number (021) 52-5060.

The SA Balint Society can also be contacted at the above address and number.

### The S.A. Balint Society Statement

'...That the SA Balint Society is a body which has as its central focus, the psychological aspects of patient care and the doctor/patient relationship –

Notes with abhorrence the frequent reports of maltreatment of detainees, and particularly the physical and mental effects of solitary confinement;

and, calls for the immediate abolition of the system of detention without trial, and requests that as long as this system is in operation, detainees should have access to the doctor of their own choice.'

