



Living with Back and Neck Pain

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MY SPINE EXPLAINED

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My Spine Explained

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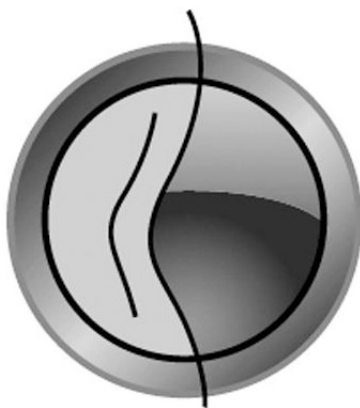
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My Spine Explained

by

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CHAPTER 1



ANATOMY OF THE SPINE

The spine consists of bones (vertebrae) that encircle and protect the spinal cord. These vertebrae are responsible for allowing the spine to move while protecting the spinal cord. To allow for movement and stability, the vertebrae interlock with one another by means of a joint on either side. The vertebrae are also separated from one another by intervertebral discs.

These intervertebral discs are made of a type of cartilage. The disc is made up of a soft, gel-like centre, called the nucleus pulposus, and this gel is kept in position by a tough outer fibrous layer called the annulus fibrosus. The vertebrae of the spine are further kept in position by an array of ligaments. Muscles also attach to the vertebrae. Nerves leave the spinal canal, formed by the vertebrae, through small openings called the neural foramina.

There are 7 neck (cervical) vertebrae, 12 chest (thoracic) vertebrae, 5 lower back (lumbar) vertebrae and 5 sitting bone (sacral) vertebrae. The sacral vertebrae are fused into a single mass called the sacrum or sitting-bone.

It is unusual for the thoracic spine to undergo wear and tear changes as it is stabilised by the rib cage that is attached to it. The cervical spine and the lumbar spine, on the other hand, are subject to a lot of movement and this is where most of the wear and tear takes place. The lower part of the neck where it attaches to the rigid thoracic spine, is under a lot of biomechanical stress. The same is true for the lumbar spine. The bottom end of the lumbar spine is attached to the sitting-bone and the pelvis, which is rigid. The same types of mechanical stresses are found here as well as where it attaches at the top to the thoracic spine.

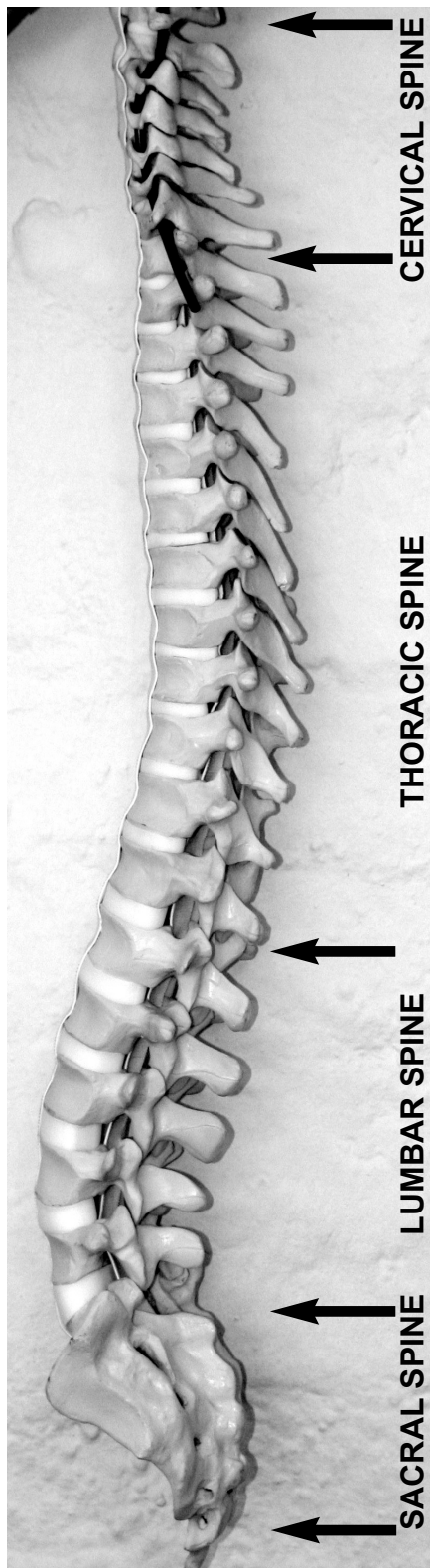


Figure 1.1

This image is a side-on view of the spine.

Note that the spine consists of vertebrae stacked on top of one another. There are 7 cervical vertebrae, 12 thoracic vertebrae, 5 lumbar vertebrae and 5 sacral vertebrae. The sacral vertebrae are fused into a single mass called the sacrum.

There are three mobile curves; one is where the neck (cervical spine) and the chest (thoracic spine) meet. The lower curve is where the thoracic spine and the lower back (lumbar spine) meet. The third curve is a natural bend in the thoracic spine.

There is one last curve, but this curve is fixed and does not move and is the sacral curve and consists of the sacral vertebrae that are fused together.

The three mobile curves are important for the normal biomechanical balance of the spine. The integral stability and movement of the whole body is dependent on the spine, which acts as our central core. The second and equally important function of the spine is to protect the nerves that come from – and travel to – the brain and control all the functions of our body.

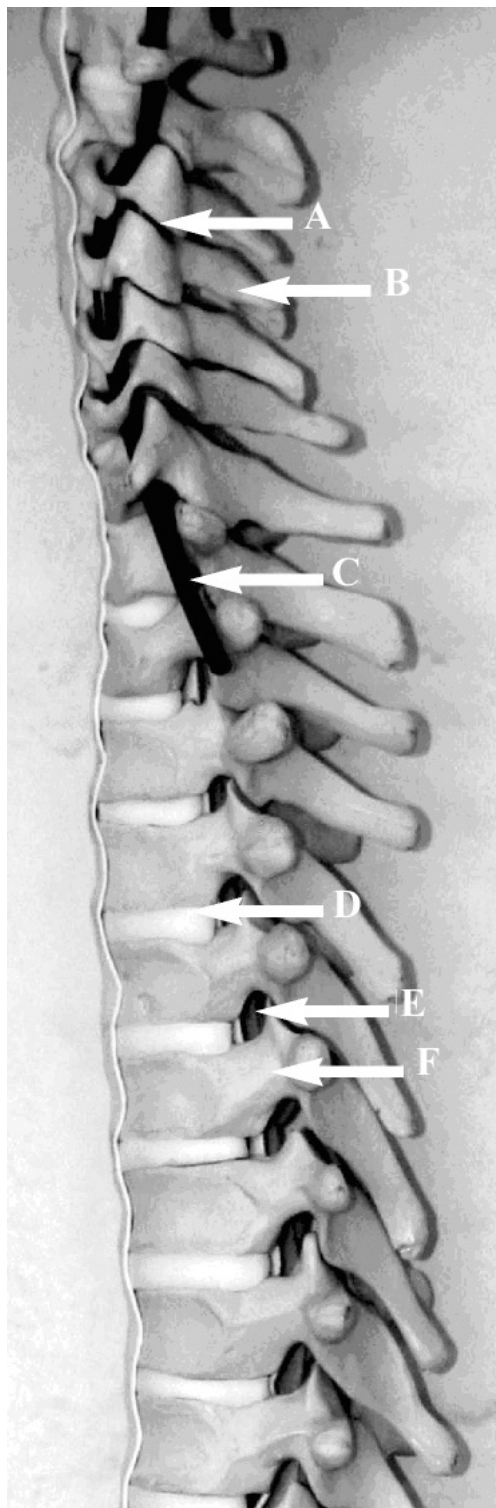


Figure 1.2

This image is a side-on view of the upper part of the spine.

A: *This is a joint in the cervical spine. These are the same joints that we find in the lumbar and thoracic spine. Their proper names are facet joints.*

B: *This is a cervical spinous process. Note how both the joints and the spinous processes are smaller than in the lumbar spine.*

C: *The black tube-like structure is the vertebral artery that runs through the side of the cervical vertebrae. This artery supplies the brain with blood.*

D: *This is a thoracic disc (intervertebral disc).*

E: *This is a foramen through which the nerve runs to reach the chest wall.*

F: *This is a pedicle, which is the bone that connects the back part of the vertebra with the body of the vertebra in the front.*

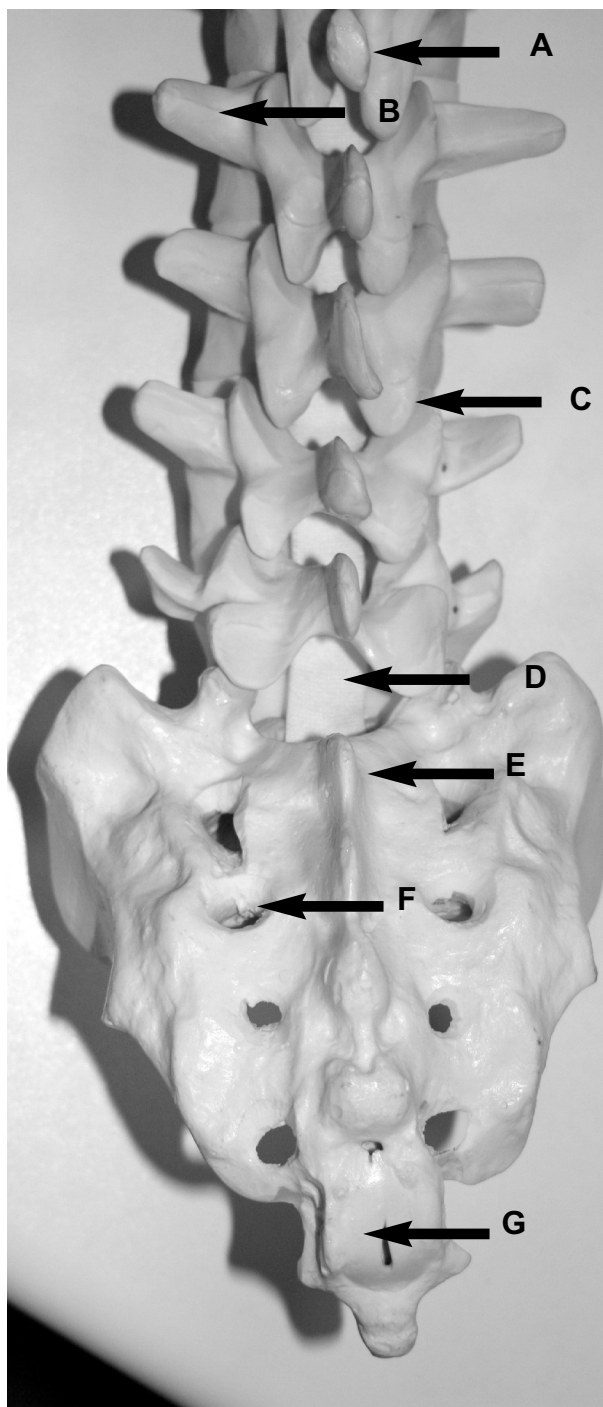


Figure 1.3

This image is a back-to-front view of the lumbar spine.

A: *This is the spinous process of the first lumbar vertebra.*

B: *This is the transverse process of the second lumbar vertebra.*

C: *This is the joint on the right between the third and the fourth lumbar vertebrae.*

D: *This is the spinal canal in which the spinal cord and spinal nerves run.*

E: *This is the spinous process of the first sacral vertebra; it is fused to and continuous with the spinous process of the second and other sacral vertebrae.*

F: *This is the second sacral hiatus. The second sacral nerve leaves the spine from here and extends to the pelvis.*

G: *This part of the spine is called the coccyx and is located at the very bottom of the spine.*

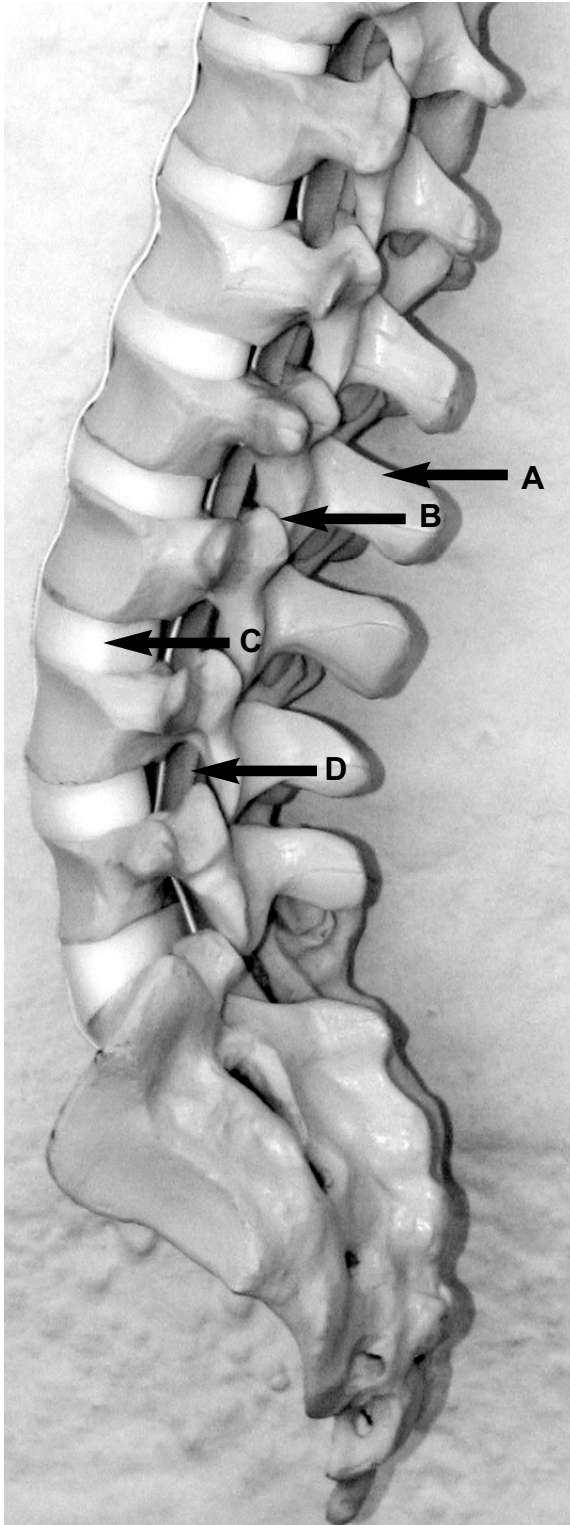


Figure 1.4

This image is a side-on view of the lumbar spine.

A: *This is a spinous process of the lumbar spine. Spinous processes are present on the back of all vertebrae and are palpable through the skin.*

B: *This is the joint between two vertebrae; each vertebra in the spine is joined to the vertebra below and above by these joints on the side. The intervertebral disc separates the vertebrae in the front.*

C: *This is an intervertebral disc. These discs act as shock absorbers and allow for a certain amount of movement between the vertebrae.*

D: *This is a foramen. It is where the nerves that come from the spinal cord exit the spine on their way to the legs. The nerves that run through these foramina control movement in the legs and allow sensation to pass from the legs to the spinal cord and from there to the brain.*

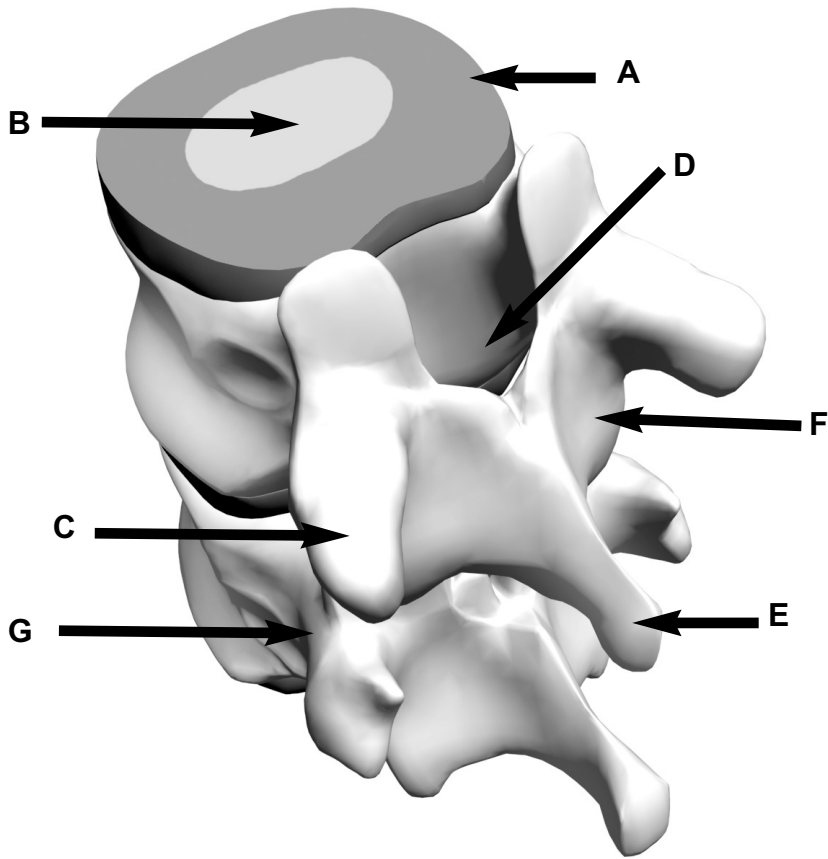


Figure 1.5

This is an illustration of a section of the lumbar spine.

A: *This is the outer, tough part of the intervertebral disc, called the annulus fibrosus. This is the part of the disc that tears when a patient develops a slipped disc.*

B: *This is the soft, gel-like centre of the disc, called the nucleus pulposus. It is the component that thrusts outward in a slipped disc.*

C: *This is the transverse process and is the part of the vertebra that protrudes sideways. In the thoracic spine the ribs attach onto these processes.*

D: *This is the spinal canal that is formed by the vertebrae, in which the spinal cord and nerves run.*

E: *This is the spinous process of the vertebra.*

F: *This is the lamina of the vertebra.*

G: *This is the pedicle of the vertebra.*

CHAPTER 2



BACK PAIN AND NECK PAIN

Back and neck pain is a very common complaint among people of all age groups. It is, however, more commonplace among people in their thirties and onwards.

Back and neck pain is mostly due to degenerative (wear and tear) changes in the spine and is usually part of a progressive disease. Thus, the underlying problem responsible for the pain will slowly but surely worsen over time. It is therefore of paramount importance that treatment is focused on supporting the structures of the back and neck and to prevent excessive stress on the spine.

Pain can be acute or chronic. Chronic pain is pain that lasts for more than three months. There are three types of spinal pain: mechanical pain, referred pain and radicular pain.

Mechanical pain

This is pain that is caused, as the name suggests, by the mechanics of movement.

There are muscles, tendons, vertebrae, discs and joints between the vertebrae, nerves and other structures that can cause pain. Mechanical pain is based on inflammation of these structures and the aggravation of this inflammation by movement.

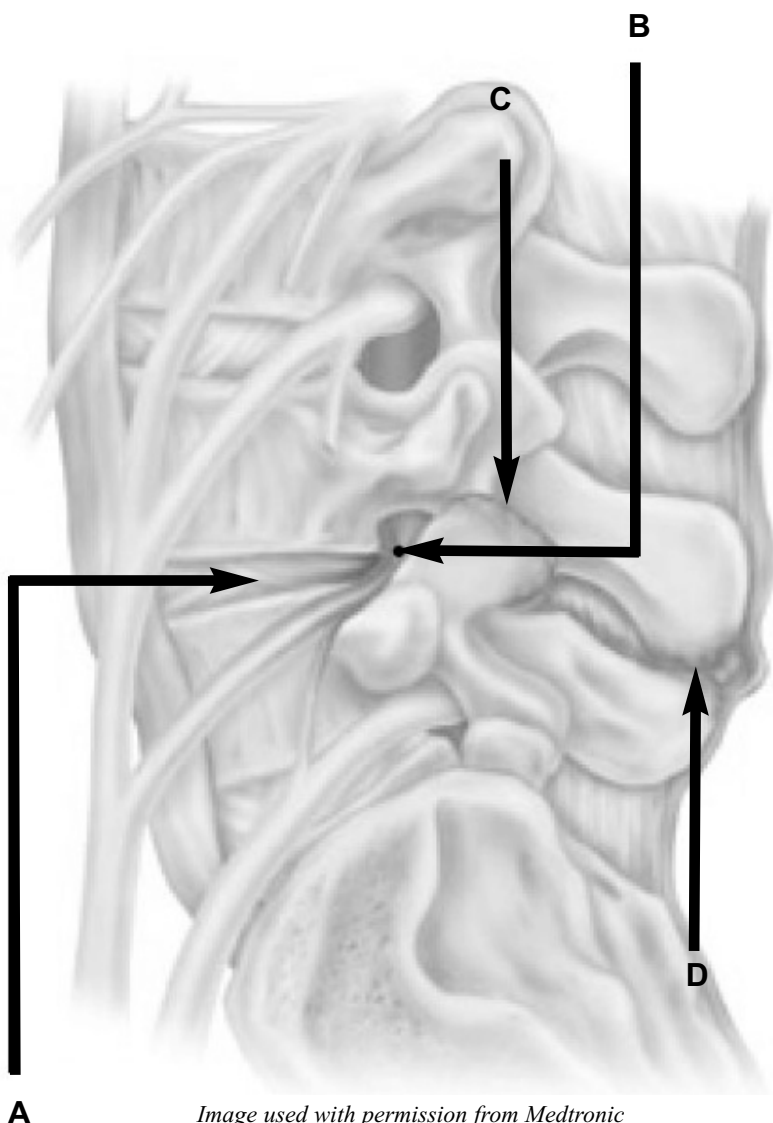


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Figure 2.1

*This is an illustration of a collapsed, inflamed lumbar disc, **A**, that is compressing a nerve root, **B**, leaving the spinal canal.*

*When the disc collapses, it does not support the weight of the spine the way it should and the weight is transferred to the facet joint, **C**, which becomes inflamed and arthritic. The distance between the spinous processes, **D**, is also reduced, causing them to rub against each other.*

My Spine Explained

The main source of mechanical pain is the joints between the vertebrae called the facet joints. This pain is typically increased by movements such as turning over in bed and getting out of bed. Turning and bending the neck can be uncomfortable and frequently associated with crunching sounds and a feeling of stiffness.

Many people, who suffer from mechanical neck pain, have associated headaches. This is frequently caused by inflamed joints, which in turn cause the muscles of the neck to go into spasm. These muscles are attached to the head and cause headaches by pulling on the head. Stress headaches are also caused this way. It is important to treat the facet joints itself and the inflammation of these joints, as well as the associated muscle spasm.

Medical treatment may include the use of anti-inflammatory medication, pain medication and muscle relaxants. Manual treatment may include pressure point therapy, massage therapy, physiotherapy and chiropractic therapy. Non-surgical management such as radiofrequency rhizotomies, local blocks and facet blocks are options in treating this kind of spinal pain. Mechanical back or neck pain associated with spinal instability may be treated by performing a fusion operation.

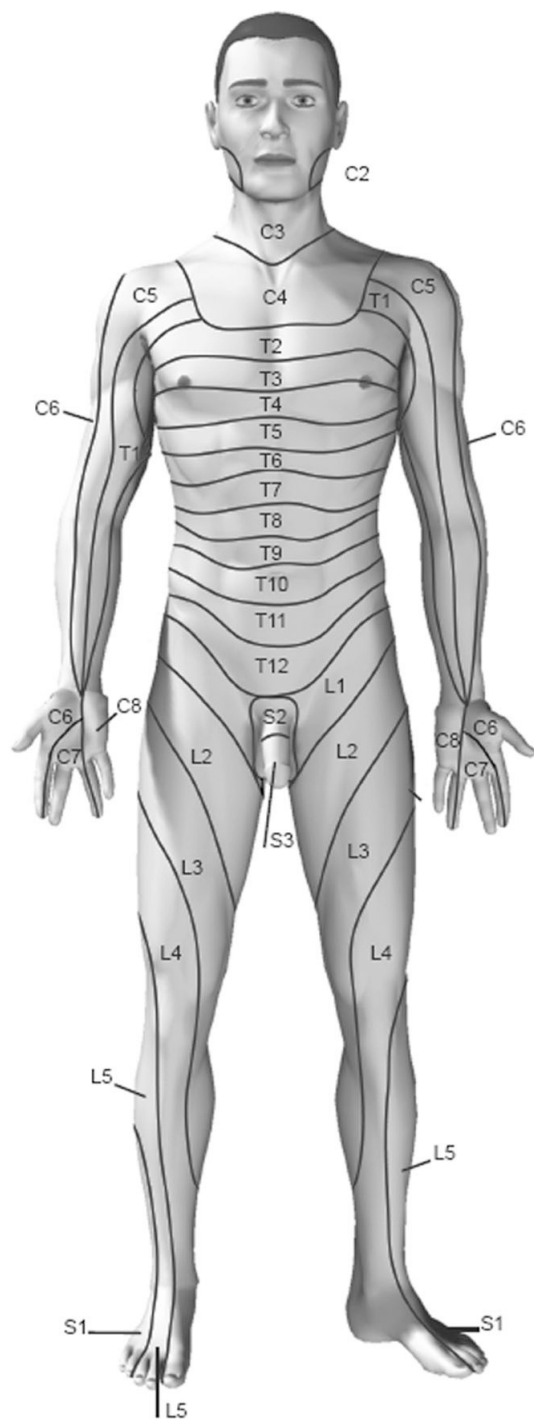
Referred pain

Referred pain is experienced at a site distant to the source of the inflammation and is frequently associated with mechanical pain. Referred pain is pain that spreads from the inflamed tissue in the spine along nerves to other parts of the body. This would frequently be experienced in the area of the hips, the thighs, between the shoulder blades, the head, or even behind the eyes.

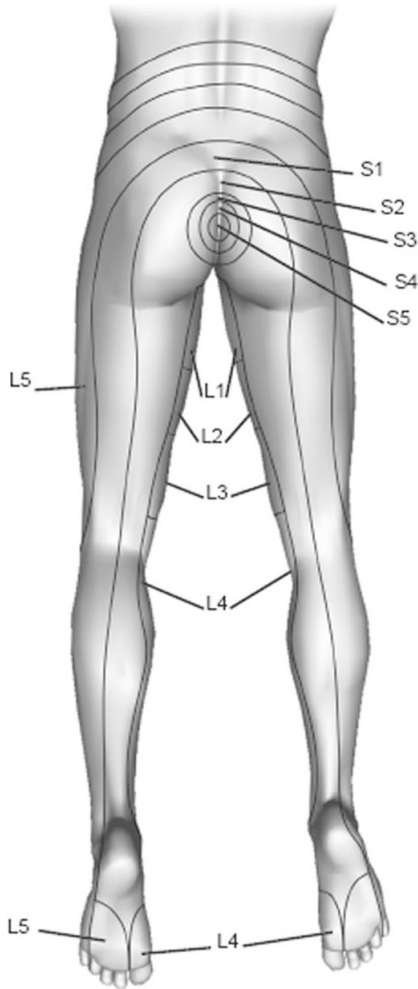
Referred pain is a frequent cause of headaches. The nerves that supply the skin of the head come directly from the neck and pain can spread along these nerves. Where the lower back is concerned, it is sometimes difficult to correctly diagnose the specific type of lower back pain, because the patterns of referred pain frequently overlap somewhat with sciatica.

The treatment for referred pain is the same as for mechanical pain.

My Spine Explained



My Spine Explained



Figures 2.2

These two illustrations demonstrate the dermatomes of the body.

A dermatome is the area of the skin that is being supplied with sensation by a specific spinal nerve.

Your specialist will use this map to get an idea of which nerve is being compressed in nerve root mediated pain (radiculopathy). Note for instance that compression of the fourth lumbar nerve (L4) will cause pain over the shin and compression of the fifth nerve root (L5) will cause pain over the outer part of the shin and on top of the foot.

The whole body is divided into dermatomes and the dermatome map is an invaluable aid for your specialist. These areas are, however, not completely fixed and there is some overlap and certainly differences between the exact locations of dermatomes from patient to patient.

It is important to confirm the nature of nerve compression with an MRI scan or CT myelogram (see the chapter Tests and Scans). Radicular or nerve root pain is experienced in a specific dermatome and should not be confused with referred pain, which is pain that spreads from inflamed tissue such as the disc and the facet joints to non-specific areas on the skin. Referred pain is frequently said to be non-dermatomal, as it does not comply with dermatomal patterns, and is therefore an indication that it is unlikely to be nerve root-related.

My Spine Explained

Radicular pain

Radicular pain is caused by a pinched nerve and the pain will travel down the length of the nerve and be most severe at the distal point of the nerve.

Radicular pain can, however, manifest at any point along the length of the nerve. Both the physical compression of the nerve root and the inflammatory changes in and around the nerve root are responsible for the pain.

When the nerve, for instance, between the fifth cervical vertebra and the sixth cervical vertebra is being pinched, the pain will be experienced at the thumb and index finger as this is where the nerve ends up. When the nerve, for instance between the fourth lumbar vertebra and the fifth lumbar vertebra, is being pinched, the pain will be experienced at the ankle and on the top of the foot. It is typical that referred back pain spreads to the upper leg, but sciatica would normally spread beyond the knee.

A pinched nerve may require surgery. Although surgery is very effective in fixing unstable areas of the spine and loosening nerves that are being pinched, it almost always leads to increased stress on the rest of the spine and is believed to speed up the wear and tear of the spine.

The main aim of treating spinal pain should always be to support the normal biological recovery processes of the body. Surgery is always the last option and the aim of surgery would be to relieve the symptoms and to maintain the normal biomechanical stability of the spine.

The Genetics of spinal pain

There is a definite and clear genetic trend in spinal pain that can be traced to an inherent weakness of the cartilage of the intervertebral discs and the joints of the spine that lead to wear - and - tear of the discs and oateoarthritis of the joints. The wear - and - tear in the discs lead to mechanical pain and in cases of severe damage to the discs, disc herniation and nerve root compression. The arthritic changes in the joints lead to mechanical spinal pain.

My Spine Explained

This knowledge is very important as knowing your family is at risk, will allow you to identify those that have the same genetic tendency early. Not all the members of the family will have the same tendency and sometimes only one member of the family will have the genetic trait.

Identifying members of your family who have the same tendency allows for early referral for a MRI scan, which will allow for the diagnosis to be made. Conservative and corrective exercise programs can then be instituted by a team of appropriately qualified personnel which may include an occupational therapist with an interest in spinal conditions, physiotherapist or biokinethetist.

Oral medication that reduce the inflammation of the spine can be used in the short term and in the medium to long term, facet blocks and facet rhizotomies are a conservative procedure that can relieve the inflammation and pain from the spine without resorting to surgery. These are performed by appropriately qualified spinal specialists as day cases.

My Spine Explained

CHAPTER 3



OSTEOPOROSIS

What is it?

The hallmark of this disease is brittle bones. The weak bones are due to a decreased absorption of calcium into the body and a depletion of calcium and bone protein. It is a common type of metabolic bone disease in which bones become less dense and weaker as a part of ageing. The bones are subject to fractures and heal slowly, occurring especially in women following menopause. If it is left untreated, the skeletal bones will become fragile and some of them will be likely to break or fracture, especially the hip and spinal bones (vertebrae).

Osteoporosis is most common in women over the age of 50 years. Following menopause, women experience rapid bone loss due to the decrease in oestrogen production. Any part of the skeleton can be affected, but of special concern are fractures of the hip and spine. Spinal, or vertebral, fractures can lead to a loss of height, severe back pain, nerve compression and deformity.

The following risk factors are associated with osteoporosis: smoking, chronic diseases, alcohol consumption, high caffeine consumption, early hysterectomy with associated removal of ovaries, hyperthyroidism and chronic steroid medication usage. Vitamin D plays a crucial role in calcium absorption. Building strong bones by eating calcium-rich foods, maintaining a well-balanced diet and exercising during early life can be the best defence against osteoporosis.

My Spine Explained



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Figure 3.1

These images demonstrate the effects of osteoporosis.

The top image shows a fracture of the thoracic spine. This type of fracture is called a compression fracture. Note the wedge shape of the vertebra as it collapsed at the front.

The bottom images are of a normal vertebra on the left and an osteoporotic vertebra on the right. In the osteoporotic vertebra, there is a notable loss of bone density in the body of the vertebra.

My Spine Explained

What are the symptoms?

Bone loss occurs without symptoms. People can lose bone mass over a long period of time without being aware of it. The first indication of osteoporosis is frequently a fracture of the spine, hip or wrist following a simple fall. When bone loss is severe and osteoporosis is advanced, the following symptoms can occur:

- Pain in the lower back
- Neck pain
- Leg cramps at night
- General bone pain and tenderness
- Abdominal pain
- Rib pain
- Broken vertebrae
- Brittle fingernails

Loss of height of the vertebrae and a stooped posture are the main effects of osteoporotic spinal fractures.

How is it diagnosed?

Osteoporosis is diagnosed with spinal X-rays, a spinal CT scan or a bone density scan (Dexa scan). A suspicion of osteoporosis is usually present when a spinal fracture is caused as a result of minimal force, such as a simple fall.

How is it treated?

The best treatment is prevention. Adequate calcium and vitamin D intake and exercise are important preventative aids against osteoporosis. Avoiding smoking and excessive alcohol intake are other important factors. There are a number of drugs that may help to increase bone density. The antiresorptive medications, biphosphonates (alendronate, ibandronate and risedronate), calcitonin, oestrogens and raloxifene affect the bone remodeling cycle.

My Spine Explained

Teriparatide, a form of parathyroid hormone, is a newly approved medication for osteoporosis. It is the first drug to increase the rate of bone formation in the bone remodeling cycle.

Fractures that are sustained because of osteoporosis can be treated with Kyphoplasty, Vertebroplasty, bed rest or external bracing. Kyphoplasty is a procedure where a balloon is inserted into the vertebra to raise the collapsed segment and bone cement is then injected into the space created by the balloon. In a Vertebroplasty procedure, bone cement is injected into the vertebra without a balloon being inflated. These procedures are performed with needles that are inserted through the skin of the back. External bracing requires that a patient wears a brace.

Does this treatment have any complications?

There is a small risk with Kyphoplasty and Vertebroplasty that the bone cement may leak out into the blood vessels or into the spaces where the nerves are located. This is rare and is avoided by careful surgical techniques.

Speak to your specialist about the other risks involved.

What are the long-term expectations?

Osteoporosis is a progressive disease that can lead to ongoing fractures that can be disabling. Prevention is the best advice, but there is hope with newer treatments that are available. It is crucial to diagnose osteoporosis as early as possible.

CHAPTER 4



SLIPPED DISC

(ALSO CALLED HERNIATED OR PROLAPSED DISC)

What is it?

The spine consists of a series of vertebrae that are stacked on top of one another from the neck to the pelvis. These vertebrae are connected and kept in the correct position by the discs that are between the vertebrae and also the facet joints that interlock with one another. There are also supporting ligaments and tendons. The discs between the two adjacent vertebrae are composed of a central, soft, jelly-like substance, called the nucleus pulposus, and an outer, tougher fibrous part, called the annulus fibrosus.

In some cases the tough annulus fibrosus becomes damaged and tears, leaving a defect in the strong outer layer. A bit of the nucleus pulposus can then break through this tear and end up in the spinal canal and press against the nerves in the spinal canal. When a part of the nucleus pulposus breaks through the annulus fibrosus, it is commonly called a slipped disc, but a herniated or prolapsed disc is a more accurate description, because the disc does not literally slip. A disc herniation can be caused by a traumatic injury, but is usually due to an inborn predisposition towards weak discs.

Compression of a nerve root may lead to pins and needles, pain, and weakness of that part of the arm and hand which is supplied by that specific cervical nerve. Symptoms may be experienced in the leg and foot if a lumbar nerve root is being compressed. See the description of dermatomes in the chapter *Back Pain and Neck Pain*.

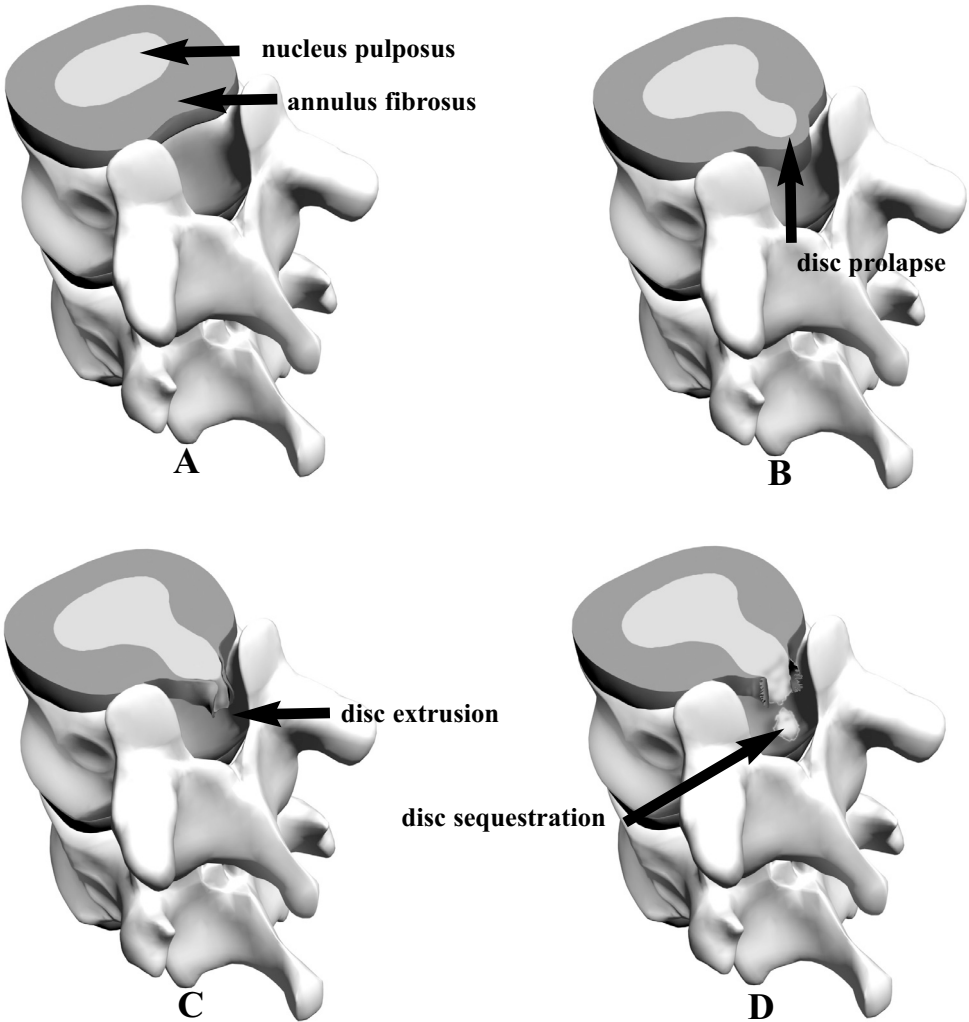


Figure 4.1

The four stages of disc damage, leading to herniation (prolapse) of disc material.

A: Annular tear: At this stage the disc is intact and there is only a small tear in the tough outer layer (annulus fibrosus).

B: Disc prolapse: The soft centre of the disc (nucleus pulposus) is starting to protrude from its normal position, but is still contained within the outer layer.

C: Disc extrusion: At this stage the soft nucleus is extending beyond the annulus fibrosus.

D: Disc sequestration: The nucleus has burst through the annulus fibrosus and a piece of the nucleus has broken off from the rest and is lying loose in the spinal canal.

My Spine Explained

The spinal cord extends from the brainstem to the lower spine and ends just below the level of the thoracic and lumbar spine junction. A slipped lumbar disc simply compresses nerve roots that are dangling in the spinal canal. This is because there is no spinal cord at this level, but only nerve roots that originate from the spinal cord. A herniated cervical or thoracic disc, on the other hand, can compress the cord or the nerve roots as they leave the spinal cord.

Compression of the spinal cord is very dangerous and can lead to paralysis. One of the earliest signs of impending paralysis is very brisk reflexes when the specialist taps your knee or elbow.

What are the symptoms?

When the part of the nucleus that herniated compresses the nerves in the lumbar area, you may experience back pain and pain in one or both legs. Some people experience pins and needles in the legs and feet. You may also feel pain and discomfort in the hip, between the shoulder blades and in the groin. Eventually, symptoms such as weakness and unsteadiness of the legs and feet may occur.

In Cauda Equina syndrome the nerves to the bladder and bowel are affected, leading to dysfunction of control of the bowel and bladder.

When the part of the nucleus that herniated compresses the nerves in the cervical area, you may experience neck pain and pain in one or both arms. Some people experience pins and needles in the hands. Pain and discomfort may also be sensed in the shoulder, between the shoulder blades or at the front of the chest (thorax). At a later stage, weakness in the arms and hands may be experienced.

How is it diagnosed?

A clinical examination by your specialist or therapist will allow for a reasonable suspicion, but the only definite way is by doing a magnetic resonance imaging (MRI) scan.

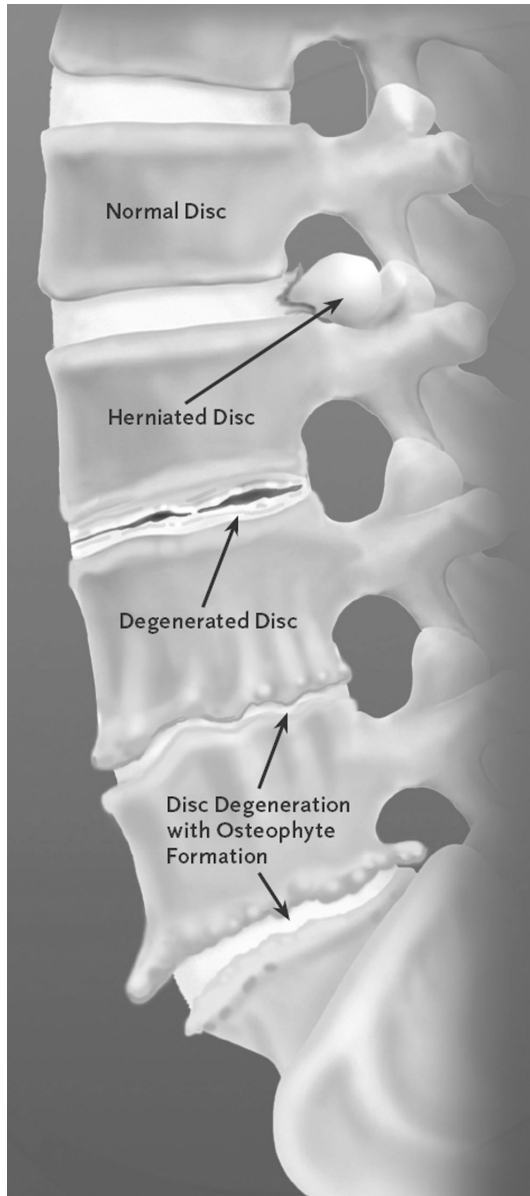


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Figure 4.2

This drawing illustrates different phases of disc disease. Discs may degenerate with or without accompanying bony outgrowths (osteophytes). Sometimes the disc degeneration will lead to a disc prolapse (disc herniation). See Figure 4.1 for the different stages of disc herniation.

My Spine Explained

Sometimes, because of technical factors, a CT scan is performed. This is usually when an MRI scan cannot be performed due to the unavailability of an MRI scanner, when there are contra-indications to doing a scan or when technical factors such as the presence of certain metal fusion apparatus in the spine make an MRI scan unreliable.

Other tests that might be used are discograms and nerve blocks. Sometimes electromyograms (EMGs) are also used.

See the chapter *Tests and Scans* for a detailed explanation of the different tests involved and the terminology that you will find on the test reports.

How is it treated?

There are always four options:

No treatment – This is acceptable if there is no serious nerve compression, in other words, there is no spasticity or muscle weakness. There are always people who choose this option for a variety of personal reasons. There are a certain proportion of patients whose symptoms will get better with time without an operation.

Non-invasive treatment – The initial treatment for a disc herniation is conservative treatment, which might include anti-inflammatory medication, analgesic medication, physiotherapy and other manual treatments such as chiropractic treatment, pressure point therapy, massage therapy and traction.

This would usually be followed for a period of at least six weeks.

Semi-invasive treatment – This includes procedures such as radiofrequency rhizotomy, nerve root block, caudal or sacral block, epidural block and other minimally invasive procedures. These treatments may be highly effective, have very few side-effects or complications and are performed as day procedures. These procedures have a very definite place in the non-surgical management of spinal disc disease.

My Spine Explained

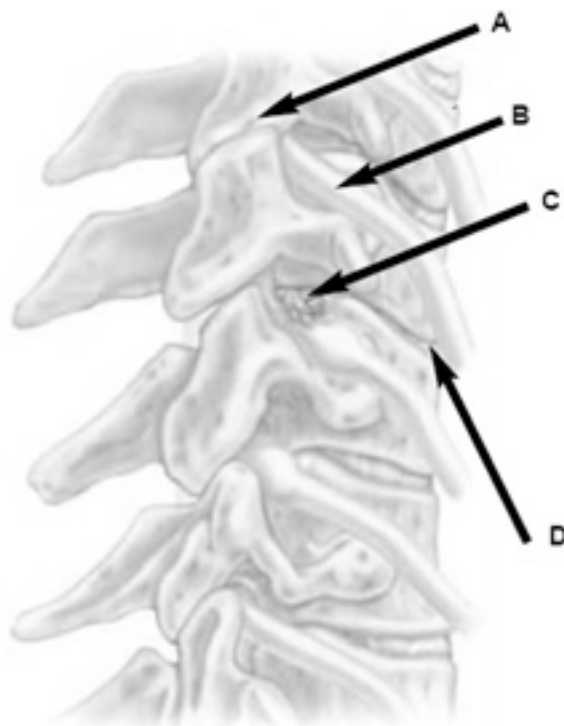


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Figure 4.3

*This drawing illustrates a cervical nerve root that is being compressed by a disc prolapse. The facet joints, **A**, form the roof of the canal through which the nerve root, **B**, runs on its way to the arm.*

*The slipped disc, **C**, is pressing directly on a nerve root and this can cause pain, pins and needles and ultimately weakness in the arm. The intervertebral disc, **D**, acts as a shock absorber between the vertebrae.*

My Spine Explained

If conservative management is unsuccessful, surgery is usually indicated. In situations where there is muscle loss or sensation loss due to a compressed nerve, surgery is considered much earlier. Compression that continues for too long can cause permanent nerve damage; the longer the duration of the symptoms, the less the chance of success when operating to decompress the nerves.

Invasive (surgery) – The indications for surgery are:

1. Failed conservative management. This would include the use of analgesic medication, anti-inflammatory medication, physiotherapy and chiropractic treatment for a period of at least six weeks before surgery is contemplated.
2. Pain that does not respond to any other treatment modality and is sufficiently severe to limit your daily activities and quality of life. This includes local lower back pain, referred pain and radicular pain.
3. Muscle weakness due to nerve compression (radicular weakness).
4. Spasticity of the legs.
5. Cauda Equina syndrome or Conus Medullaris syndrome. These are serious conditions that are characterised by weakness, sensory loss and bowel and bladder dysfunction. These are emergencies that require immediate surgery.

There is a whole spectrum of operations that might be suitable for treating a herniated (prolapsed) disc. Please see the relevant chapter regarding the procedure that your specialist is suggesting.

Does this treatment have any complications?

There are no real complications regarding conservative management of a slipped (herniated or prolapsed) disc beyond the fact that the clinical effects may increase, leading to surgery.

The surgical management carries rare, but potentially serious complications. The most common complications of surgery are infection and wound haematoma (bleeding under the skin). The most feared complication is nerve damage, but this is extremely rare, although not unknown. The outer layer of the nerves (the dura) can also be torn and this will lead to a leakage of spinal fluid (cerebrospinal fluid). This needs to be repaired.

My Spine Explained

For a comprehensive list of possible surgery risks, you should discuss the matter with your specialist. Some of the most feared risks would include nerve damage, which may be damage to the nerves leaving the spinal canal or damage to the spinal cord itself. The potential effects of this could be partial or complete dysfunction of these nerves and can include numbness, pain, weakness of the muscles or complete paralysis of one or more muscle groups.

What are the long-term expectations?

Spinal degeneration and spinal disc disease are progressive entities. In cases where the disease is conservatively managed, it is possible that the herniated portion may retract and no longer cause symptoms or require surgery. When only a portion of the slipped (herniated) disc is surgically removed, there is a possibility that another piece of the remaining disc may herniate and compress a nerve root, requiring further surgery. When the disc is completely removed and a fusion is formed, this may accelerate the degeneration process in the adjacent discs. It is obvious that disc degeneration is a progressive entity that may well require further treatment in the future, no matter what treatment is instituted.

In cases where the symptoms settle with conservative measures, the symptoms may reappear at some stage. In cases where a discectomy and fusion are performed, the symptoms are usually relieved immediately in almost all patients and improvement is usually permanent.

CHAPTER 5



LUMBAR SPINAL STENOSIS

What is it?

This condition is characterised by a narrowing of the spinal canal. This leads to compression and ultimately dysfunction of the spinal nerve roots. Often it begins with a decrease in the height and weight-carrying ability of the disc. The collapse of the disc leads to compression of the nerve roots. A combination of facet joint enlargement and a thickening of the ligamentum flavum (see the chapter *Anatomy of the Spine*) cause the compression.

The facet joints enlarge in response to their greater weight-carrying responsibility as the disc deteriorates. There is usually a degree of slippage of the vertebrae on top of one another and the spine can be curved from side to side (scoliosis) or excessively curved forward (kyphosis) or backward (lordosis). This is part of the normal ageing process and is called acquired spinal stenosis. Another term is spondylosis or spinal osteoarthritis. Another type is that of an inborn abnormality. People who are born with congenital spinal stenosis have a very small spinal canal. The reason for this is because the pedicles (see the chapter *Anatomy of the Spine*) are shorter than normal and do not allow for sufficient space in the spinal canal.

Spinal stenosis leads to a syndrome of nerve compression that is usually a slow and progressive disease. Spontaneous remission does not occur as is sometimes seen in intervertebral disc disease, but there are periods of slow deterioration interspersed with periods of quick deterioration in a permanently progressive condition.

My Spine Explained

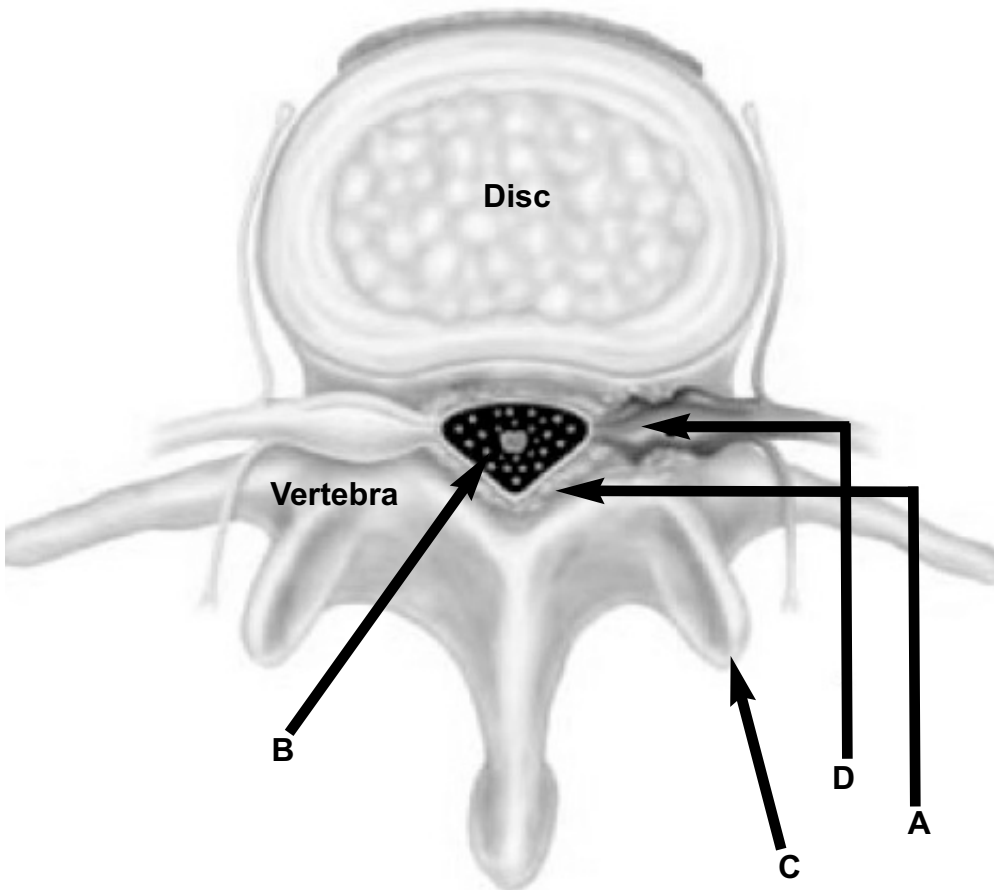


Image used with permission from Medtronic

Figure 5.1

This image depicts spinal stenosis, a condition characterised by a narrowing of the spinal canal.

*The thickened ligament, **A**, called the ligamentum flavum, and the enlarged joints, **C**, compress the bundle of nerves in the spinal canal, called the Cauda Equina, **B**, as well as the single nerve root, **D**, leaving the spinal canal.*

My Spine Explained

What are the symptoms?

The inflamed facet joints and discs lead to local back pain and referred pain to the thoracic spine (chest) and upper part of the legs. The compressed nerve roots lead to discomfort and pain in the legs called spinal or neurogenic claudication. This is a discomfort that typically occurs when walking or standing, and becomes better when sitting down.

Spinal stenosis is frequently part of scoliosis. The degenerative discs, in combination with the scoliosis, compress the nerve roots as it leave the spinal canal, causing radicular symptoms (see the chapter *Slipped Disc*).

How is it diagnosed?

A clinical examination by your specialist or therapist will allow for a reasonable suspicion, but the only definite way is by doing an MRI scan. Sometimes, because of technical factors, a CT scan is performed. This is usually when an MRI scan cannot be performed due to the unavailability of an MRI scanner, when there are contra-indications to doing a scan or when technical factors such as the presence of certain metal fusion apparatus in the spine make an MRI scan unreliable. Other possible tests are discograms and nerve blocks. Sometimes electromyograms (EMGs) are also used.

See the chapter *Tests and Scans* for a detailed explanation of the different tests involved and the terminology that you will find on the test reports.

How is it treated?

There are always four options:

No treatment – This is usual if there is no serious nerve compression, thus in the absence of spinal claudication or radicular symptoms. People choose this option for a variety of personal reasons. This is also the preferred option for people with serious medical conditions who cannot have general anaesthesia. It is rare for this condition to improve without surgery and it usually follows a progressive course whereby the range and severity of symptoms increase.

My Spine Explained

Treatment that does not require intervention – Courses of painkillers and anti-inflammatory drugs can be combined with therapeutic treatments to control symptoms. This is appropriate for patients with limited spinal claudication and radicular symptoms, and for patients who are medically unfit to undergo more invasive treatment.

Limited intervention – This include procedures such as caudal or sacral block, radiofrequency rhizotomy and other non-surgical procedures. These treatments may be highly effective, have very few side-effects or complications and are performed as day procedures.

Intervention (surgery) – The indications for surgery are:

1. Failed conservative management. This is when painkillers, anti-inflammatory medication and manual therapy such as physiotherapy and chiropractic treatment have been utilised for at least six weeks without improvement.
2. Pain, including local lower back pain, referred pain and radicular pain that does not respond to any other treatment modality and is sufficiently severe to the extent that it limits your daily activities and quality of life.
3. Muscle weakness due to nerve compression (radicular weakness).
4. Cauda Equina syndrome and Conus Medullaris syndrome (see the chapter *Slipped Disc*).

Does this treatment have any complications?

The most common surgery complications are that of infection and wound haematoma (bleeding under the skin). The most feared complication is that of nerve damage, but this is very rare. The outer layer of the nerves (the dura) can also be torn and this will lead to leakage of spinal fluid (cerebrospinal fluid). For a comprehensive list of possible surgery risks – you should discuss the matter with your specialist.

What are the long-term expectations?

This progressive disease can be treated without surgery up to a point, but mostly ends up in surgery. Surgery is successful in halting deterioration and is effective in reducing pain in most patients. Older people, who have difficulty walking, may not completely recover, due to the long-standing nerve compression that may have caused nerve damage prior to surgery.

CHAPTER 6



CERVICAL SPONDYLOTIC MYELOPATHY

What is it?

The spine consists of a series of vertebrae that are stacked on top of one another. These vertebrae are connected and kept in the correct position by the discs that are between the vertebrae and also the facet joints that interlock with one another (see the chapter *Anatomy of the Spine*).

There are also supporting ligaments and tendons. The discs between the two adjacent vertebrae are composed of a central, soft, jelly-like substance, the nucleus pulposus, and a tough outer fibrous part, the annulus fibrosus. The discs act as shock-absorbers and maintain height between the vertebrae. As we age the nucleus dehydrates and the height between the vertebrae diminish and bony ridges on the edges of the vertebrae, called osteophytes, can develop. These bony ridges (bone spurs) can cause compression of nerve roots and in the case of cervical spondylotic myelopathy, the spinal cord itself.

In other cases the tough annulus fibrosus of the disc may tear, leaving a defect in the strong outer layer. A bit of the nucleus pulposus can then push through this tear and end up in the spinal canal and press against the nerves in the spinal canal. This can be caused by a traumatic injury, but is usually due to an inborn predisposition towards weak discs and is a degenerative disease.

The facet joints can also undergo osteoarthritic changes. The combination of loss of height and facet joint arthritis lead to an imbalance of the cervical spine.

My Spine Explained

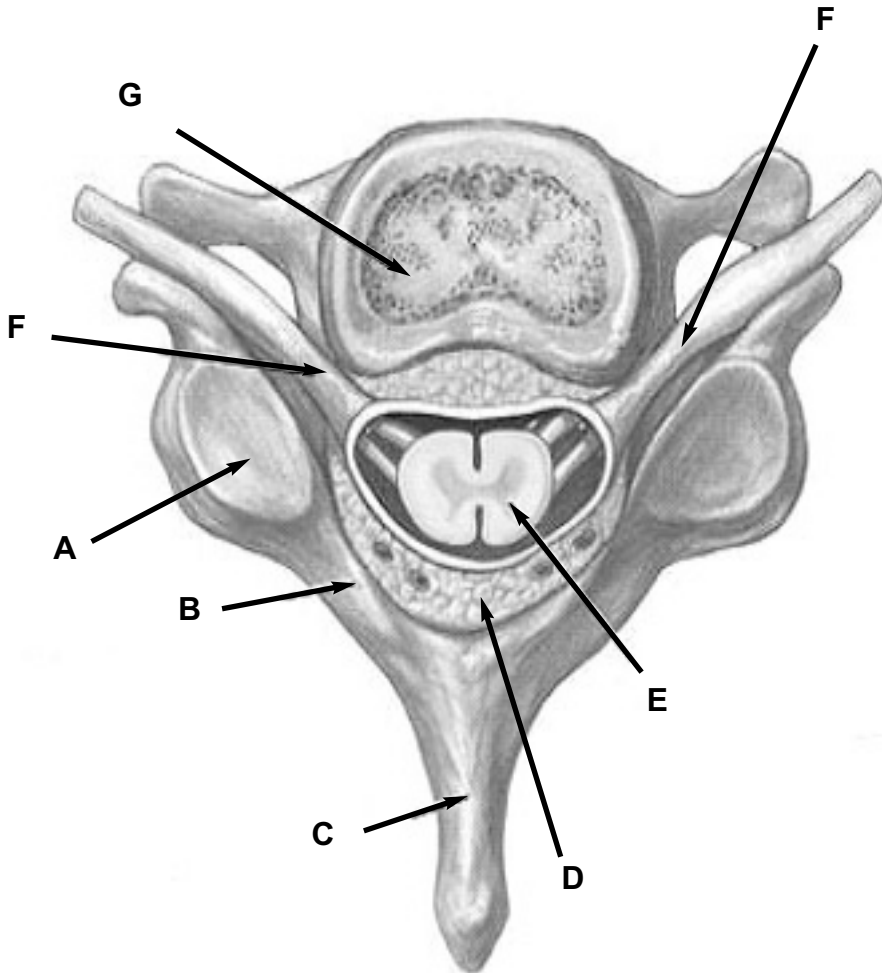


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Figure 6.1

*This drawing demonstrates a cervical vertebra seen from above. **A** indicates the facet joint. **B** indicates the lamina which forms the back part of the spinal canal along with **C**, the spinous process. **D** indicates the ligamentum flavum. **E** indicates the spinal cord and **F** indicates a nerve root in its foramen. **G** indicates the vertebral body which forms the front margin of the spinal canal and the intervertebral disc rests on top of it. Spinal stenosis occurs once there is narrowing of the canal, **E**, as a result of enlarged ligaments inside the canal, enlarged facet joints, **A**, and when the intervertebral discs that rest on the vertebral body, **G**, herniates (prolapses) backwards into the canal.*

My Spine Explained

At the same time the arthritic changes in the joints and abnormal alignment of the spine cause local nerve and muscle irritation which leads to muscle spasm and referred pain. The combination of enlarged facet joints, disc herniation, osteophytes and spinal ligament enlargement leads to narrowing of the spinal canal.

Cervical osteoarthritis and abnormal alignment is called cervical spondylosis. When the spinal canal is narrowed and the spinal cord is being compressed, it leads to dysfunction of the nerves of the spinal cord.

What are the symptoms?

Compression of nerve roots causes pain and sensory abnormalities (pins and needles) in the arm(s) and weakness of the arm muscles supplied by those nerves. This is called radiculopathy. The dysfunction of the spinal cord as a result of compression is called myelopathy. Myelopathy is a disease of the spinal cord that manifests as pain and weakness in the arms and also spasticity of the arms. The early manifestations can often be the inability to perform intricate tasks with the hands and fingers and stumbling when walking. It can also cause dysfunction of the nerves to the bladder and the bowel.

How is it diagnosed?

A clinical examination by your specialist or therapist will allow for a reasonable suspicion, but the only definite way is by doing a magnetic resonance imaging (MRI) scan. Sometimes, because of technical factors, a CT scan is performed. This is usually when an MRI scan cannot be performed due to the unavailability of an MRI scanner, when there are contra-indications to doing a scan or when technical factors such as the presence of certain metal fusion apparatus in the spine make an MRI scan unreliable.

Other tests that might be used are discograms and nerve blocks. Sometimes electromyograms (EMGs) are also used.

My Spine Explained

How is it treated?

The clinical deterioration in myelopathy can usually not be reversed but only halted. This is only achieved by surgery. Mild improvement can occur, but is not guaranteed. The treatment consists of surgical decompression of the spinal cord and the nerves that arise from the spinal cord.

The operation can be from the front of the spine and these operations are called discectomies and corpectomies and are usually accompanied by an intervertebral fusion.

Sometimes the operation is done from the back and these operations are called a laminectomy and laminoplasty and they may sometimes be accompanied by a posterior spinal fusion. A posterior cervical fusion is performed if the surgery to decompress the nerves is so extensive that it leaves the spine unstable.

Does this treatment have any complications?

Managing this condition without surgery almost always leads to a progression in the symptoms of the patient. Should surgical treatment not be performed, the clinical symptoms can remain unchanged for long periods of time, but sudden deterioration can occur without warning. The surgical management carries rare, but potentially serious complications. Some of the most feared risks would include nerve damage, which may be damage to the nerves leaving the spinal canal or damage to the spinal cord itself.

The potential effects of this could be partial or complete dysfunction of these nerves and can include numbness, pain and weakness of the muscles or complete paralysis of one or more muscle groups. Infection and the formation of blood clots are also possible complications. Speech impediments can be caused by traction or damage to certain nerves.

My Spine Explained

What are the long-term expectations?

In cases where the symptoms improve with decompressive surgery, the symptoms may reappear at some stage. In patients where the nerves have been damaged permanently, the dysfunction of the nerves (numbness, pain and weakness) may not clear up.

In patients where the operation successfully treated the symptoms, ongoing spinal degeneration may lead to pathology of the adjacent (or a distant) spinal level resulting in future surgery on that level. This is believed to be a process that, even though part of the normal ageing process, is accelerated by surgery.

CHAPTER 7



SPONDYLOLISTHESIS

What is it?

In spondylolisthesis one of the vertebrae slips forward on the vertebra directly below it. This can lead to the compression of the nerves that exit through the foramina. The disc is also damaged by the forward movement of the vertebra. The term spondylolisthesis is a Greek term and is derived from the word ‘spondylos’, which means vertebra, and ‘listhesis’, which means to slip or to slide.

There are different types of spondylolisthesis:

Inborn (congenital) – In this case the slippage is caused by abnormal bone that does not develop normally at birth and predisposes the vertebrae to slip.

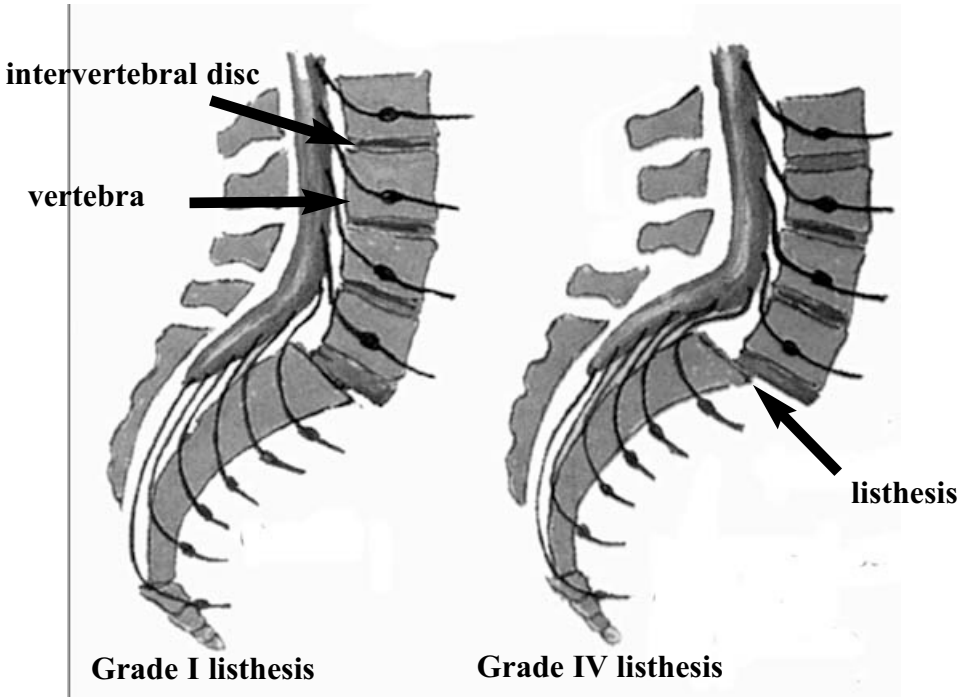
Isthmic – In this case there is breakage of the bony elements that support the joints, which in turn are responsible for keeping the vertebrae in place. This breakage is called spondylolysis.

Degenerative – In this case degeneration of the discs and facet joints leads to slippage of the vertebrae.

Traumatic – Trauma can lead to a fracture of the stabilising complex that houses the intervertebral joint and this in turn leads to the slippage.

Post-surgical – Overzealous decompression of the lumbar spine during surgery can lead to instability and the inability of the intervertebral joints to stop slippage from occurring.

Pathologic – This is when the bone is weakened by a pathological process such as a tumour, infection, bone disease or osteoporosis.



Images used with permission from Stryker

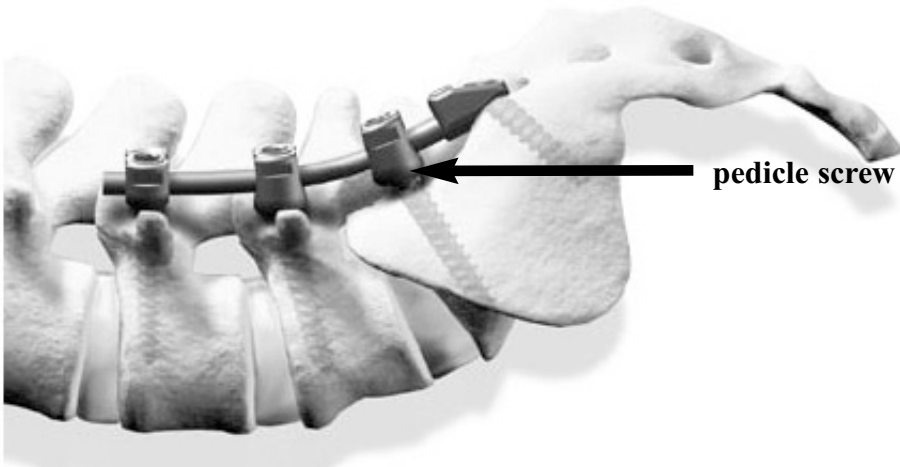


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Figure 7.1

The top illustration demonstrates the slip of the lumbar vertebrae. The picture on the left depicts a Grade 1 listhesis; the picture on the right depicts a Grade IV listhesis. Treatment consists of decompression of the nerves and fixation of the spine by pedicle screws, as demonstrated in the bottom picture.

My Spine Explained

What are the symptoms?

Back pain is the most common symptom. Many people are, however, unaware that they have this condition and it can be completely asymptomatic. Spondylolisthesis may lead to mechanical back pain and referred pain. When the slippage is so severe that a nerve root is compressed, it can lead to radicular pain (see the chapter *Back Pain and Neck Pain*).

How is it diagnosed?

It can be diagnosed on X-ray, CT scan and MRI scanning. There are different grades of spondylolisthesis and the grading is based on the degree of slippage that has taken place of the one vertebra in relation to the other.

- Grade I – up to 25% slippage
- Grade II – 25% to 50% slippage
- Grade III – 50% to 75% slippage
- Grade IV – more than 75% slippage

MRI scanning is used to evaluate not only the degree of slippage, but also whether there is compression of any of the nerves.

How is it treated?

As a general rule, Grade I and Grade II slips can be treated conservatively. The symptoms are generally limited to mechanical back pain and referred pain. These are treated with the usual conservative therapies of analgesic medication, anti-inflammatory medication, physiotherapy and chiropractic treatment. The back can be supported by following an exercise programme overseen by a biokinetician. A brace can be worn for external support.

Performing facet blocks and facet nerve denervation by radiofrequency can be very effective. Sacral or epidural steroid injections can also have a positive effect.

My Spine Explained

There are generally only two indications for an operation. The first is ongoing disabling back pain that is not relieved by any conservative measure and a definite loss of quality of life. The second indication is impending permanent nerve damage. This is usually indicated by sciatica (radicular pain) or dysfunction of the nerves that supply the bladder and the bowel as well as sexual function (see the chapter *Back Pain and Neck Pain*). The sacral nerves supply the outonomic (automatic) function of bowel, bladder and sexual function and can be compressed if the listhesis is severe.

The first part of the operation is a decompressive procedure to free the nerves and this is supplemented by a pedicular screw spinal fusion. This is necessary because the spine is even further destabilised by doing the laminectomy. Please see the relevant chapters for a description and explanation of these operative procedures.

Does this treatment have any complications?

The only complication of conservative therapy is the fact that it might be unsuccessful and therefore not prevent a spinal operation. It should, however, in the absence of impending permanent nerve damage, be the first line of treatment.

What are the long-term expectations?

For Grade I and II spondylolisthesis conservative therapy can be successful in up to 80% of cases. Surgical treatment can be successful in up to 90% of people. There has to be an ongoing commitment from the patient to strengthen their back and to apply good back habits for the rest of their lives (see the chapter *Everyday Life*).

CHAPTER 8



KYPHOSIS AND SCOLIOSIS

What is it?

The spine normally has a straight alignment when viewed from behind and three curves when viewed from the side. The neck (cervical) is lordotic, or curved with the concavity at the back, the chest area (thoracic) is curved in a forward direction, and the lower back (lumbar) is curved once again towards the back.

Scoliosis is a three-dimensional deformity where the spine has an abnormal curvature when viewed from behind. This sideways curving and twisting (rotation) of the spine can result in chest and waist deformity, and the alignment of the shoulder and waist is often altered.

Kyphosis is purely an excessive forward curve when viewed from the side. There is no associated twist or sideways deformity. Kyphoscoliosis is a condition that comprises both kyphosis and scoliosis.

What causes it?

There are many causes that can lead to these spinal deformities. They may be due to a birth defect (congenital) where one or more vertebrae fail to develop normally, resulting in asymmetrical growth. Kyphosis is frequently seen in infective conditions of the spine such as tuberculosis where the front part of the spine (vertebral bodies) is destroyed and collapses, resulting in the forward curved position.

My Spine Explained



Image used with permission from Prof RN Dunn

Figure 8.1

This reconstructed CT scan demonstrates kyphosis (forward bend) and scoliosis (sideways bend). The malalignment causes spinal instability and can cause nerve root compression.

My Spine Explained

Many neuromuscular conditions, such as cerebral palsy, spina bifida and muscular dystrophies, cause muscle weakness and abnormal curves (scoliosis). This can be troublesome in the patient's everyday usage of a wheelchair. Inadequately treated fractures from trauma may result in both kyphosis and scoliosis. Common causes include the group described as "*idiopathic*" (where the cause is unknown). This is a well-recognised group of young, tall, slim girls developing scoliosis during their teenage years as they go through their growth spurt.

In later life, asymmetrical discs and facet joint (the joints between the vertebrae) degeneration may cause segmental instability and degenerative (wear and tear) scoliosis.

What are the symptoms?

Symptoms vary based on the cause. Congenital (inborn) deformities may be incidentally picked up on a chest X-ray done for other reasons, as these children often have other associated problems with their kidneys and hearts.

The *idiopathic* group is often noticed at around 10–12 years of age when a posterior thoracic (torso) prominence is noted or hip or shoulder asymmetry. It is usually not painful. There may be breast asymmetry, which concerns the young teenage girl. The *degenerative* group usually presents with both back and leg pain due to narrowing of the spinal canal and nerve root foramina, which causes compression of the lumbar nerve roots. These patients may also complain of progressive loss of height and increasingly prominent hip bones.

How is it diagnosed?

Once the deformity is noticed by the patient, the treating specialist will ascertain the history to define the cause. A clinical examination will include the forward bend test which exaggerates the chest wall prominence around the shoulder blades. The diagnosis is confirmed on a full-length X-ray taken both from behind and the side while standing. Further views in flexed or extended positions may be needed to determine the flexibility of the curve. MRI and CT scans may assist in determining the underlying cause.

My Spine Explained

How is it treated?

Dangerous underlying factors should be excluded. If the deformity is mild, the patient is carefully monitored and if no progression occurs, it is left untreated. If progression is expected based on the patient's age, curve size and type, intervention is required. Bracing is an option, but not always successful, because patients find it hard to wear the brace for the required 20 hours per day. The more pronounced and progressive curves are treated with surgery.

Does this treatment have any complications?

The general risk of infection is present and relatively low at around 0.8%; it is lower with the anterior approaches. There is a risk of non-union, or failure of the bone to fuse; should this occur, the instrumentation will fatigue and break at around 12–18 months post-operatively with pain and loss of correction. The risk most feared is neurological injury (paralysis) and although rare, is ever present with a chance of 1:300 of any neurological event from some numbness to total paraplegia (unable to move or feel legs). This can occur from the corrective process and increased strain on the spinal cord or from reduced blood supply to the cord. To reduce this risk, some specialists use spinal cord electrical monitoring during the procedure; this is not fail-safe and has its own technical challenges. Should there be a problem in the immediate post-operative phase; urgent instrumentation removal may be required. Speak to your specialist about a more comprehensive list of possible complications.

What are the long-term expectations?

It depends on the type and underlying cause. Severe scoliosis, greater than 70 degrees, poses a risk to lung function, and greater than 100 degrees increases the risk of mortality. Smaller curves remain a cosmetic and psychological issue, but not a medical threat. Curves less than 40–60 degrees in the younger age group usually don't progress after maturity and do not have an adverse effect on enjoyment of life. Curves greater than 60 degrees will progress and surgery should be considered. The degenerative type tends to progress and increasingly causes nerve root pain.

CHAPTER 9



WHIPLASH INJURIES

What is it?

The spine consists of a series of vertebrae that are stacked on top of one another from the neck to the pelvis. These vertebrae are connected and kept in the correct position by the discs that are between the vertebrae and also the facet joints that interlock with one another. There are also supporting ligaments and tendons.

The discs between the two adjacent vertebrae are composed of a central, soft, jelly-like substance called the nucleus pulposus and an outer, tougher fibrous part called the annulus fibrosus. See the chapter *Anatomy of the Spine*.

A whiplash injury is caused when the neck is forcefully jerked backward and then forward. When the neck is forcefully flexed forward, the movement is stopped by the chin hitting the chest. There is, however, no barrier to stop the neck from going backward and the main function of headrests in cars is to limit this movement.

When the neck is suddenly and forcefully jerked, for instance during a motor vehicle accident where the car is hit from behind, there is tremendous strain on the tissues of the neck. The muscles, tendons, vertebrae, discs and joints can be damaged.

My Spine Explained

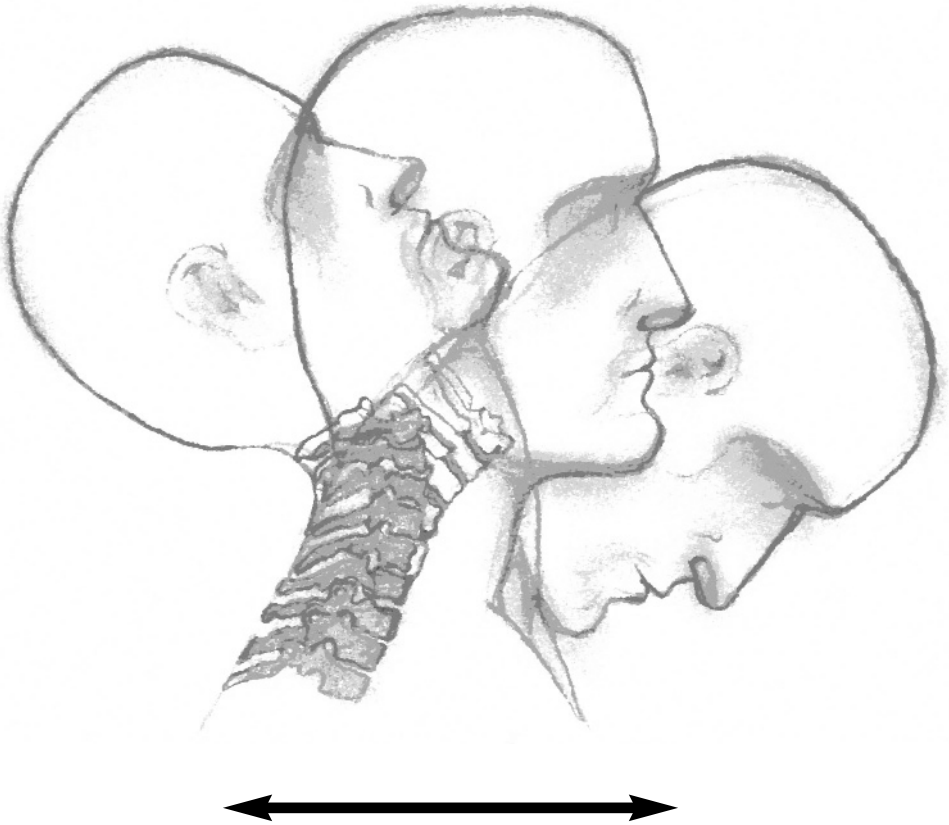


Figure 9.1

This diagram illustrates a whiplash injury. Note how the neck is overextended and then hyper flexed. Especially the extension injury damages the facet joints of the neck. The disrupted joint surfaces become inflamed and can lead to arthritic changes.

The ligaments, muscles, nerves and other soft tissue can also be damaged by the tremendous strain that is placed on them during a whiplash injury. The intervertebral discs can also be damaged and can lead to neck pain and stiffness. If the disc tears, it may press against a nerve root or even the spinal cord leading to nerve irritation or damage. This can lead to pain in the arms, pins and needles and even weakness of muscles.

My Spine Explained

What are the symptoms?

The muscles that tear can trap nerves in the scar tissue that forms during the healing process of the torn muscles and this can cause chronic headaches and neck pain. However, the main cause for neck pain is the damage that the joints suffer. The damage to these joints causes ongoing mechanical neck pain and referred pain. Sometimes symptoms appear over a period of time after the accident took place.

Damage to the facet joints between the second and third cervical vertebrae can cause referred headaches. Damage to the joints between the fifth and sixth vertebrae are usually responsible for neck pain, arm pain and pain between the shoulder blades. Cervical facet joint pain is typically a unilateral (one-sided), dull and aching neck pain with referral into the back of the neck and between the shoulder blades.

Shortly after the accident, neck pain may be minimal with an onset of symptoms during the subsequent 12–72 hours. If the damage also caused disruption of the intervertebral disc, then there could be compression of a nerve root and radicular pain (nerve root pain) that may extend down the whole length of the arm.

Some patients experience dizziness which may result from injury to facet joints that are supplied with balance receptors (proprioceptors), which can cause confused feedback to the midbrain and brainstem, where balance is controlled.

There is a grading system that is used to define the seriousness of the injury.

Grade 0 – No neck pain complaints, no physical signs.

Grade 1 – Neck pain complaints, stiffness and/or tenderness, but no other physical signs.

Grade 2 – Neck pain complaints and musculoskeletal signs (decreased range of motion and point tenderness).

Grade 3 – Neck pain complaints and neurologic signs (weakness, sensory and reflex changes).

Grade 4 – Neck pain complaints with fracture and/or dislocation.

My Spine Explained

How is it diagnosed?

A clinical examination by your specialist or therapist will allow for a reasonable suspicion, but a CT scan and radio isotope scan can assist the specialist in making the diagnosis. A CT scan can provide information about the anatomy of the joints and the radio isotope scan can reveal inflammation in the joints. Tests can, however, only give an indication and should be interpreted along with the clinical picture.

How is it treated?

The available treatment includes anti-inflammatory medication, analgesics, physiotherapy and other manual treatments such as chiropractic treatment, pressure point therapy, massage therapy, traction and other therapies. Rhizotomies can be very successful in the management of whiplash injuries.

Does this treatment have any complications?

The only real complication is the fact that this condition is difficult to treat and treatment is not always successful. There have been reports that overzealous chiropractic treatment of the neck can have complications, but modern chiropractic techniques are much better tolerated.

What are the long-term expectations?

In cases where the symptoms settle with conservative measures, the symptoms may reappear at some stage. This is a condition with ongoing morbidity and treatment has to be ongoing. In some cases symptoms are resistant to all treatment and this can be a challenging situation to manage.

CHAPTER 10



PAIN AND EMOTIONAL DISTRESS

Pain is a complex experience that includes both physical and psychological factors. Pain can be defined as ‘an unpleasant sensory and emotional experience associated with actual or potential damage, or described in terms of such damage’. Acute pain can frequently lead to emotional reactions such as fear and anxiety.

A large part of the fear and anxiety that accompany spinal pain is the unknown underlying cause of the pain and the uncertainty around the effect that this may have on the patient’s everyday life.

Knowledge about the condition, the treatment and expected outcome is paramount in countering the emotional reaction associated with the pain and aids in faster and more complete recovery.

Important steps in conquering the emotional effects of pain

1. The underlying condition must be diagnosed and defined.
2. The expected treatment and possible success should be outlined.
3. The prognosis should be established.
4. Both physical therapy and treatment to reduce pain should be instituted as promptly as possible, as this will prevent a cycle of ongoing pain and fear to develop.

My Spine Explained

What do you need to know?

Understanding your condition is paramount for successful treatment. It is important to ask your specialist as many questions as you can.

When you have asked all your questions and have made sure that you understand the answers, you should write them down and then do thorough research. Talking to other patients is rarely helpful, as they would most likely have a different cause for their back or neck pain and misinformation is much more dangerous than no information. Other patients will also frequently have preconceptions and misconceptions about the nature of spinal pain as well as its treatment.

The internet is a good source of information, as are information leaflets and books written by professionals. It is important to go back to your specialist following your research and clarify anything that you are still not sure about.

The (vicious) cycle of pain

The effects of acute pain are many and varied. Acute pain can cause enormous amounts of stress and anxiety in patients. The factor of the unknown, the reduced ability to deal with everyday life, anger, uncertainty and fear combine in a heady cocktail that can spell disaster.

Certain types of personality traits and also certain perceptions or misconceptions add fuel to the fire. Think for instance of the anxious type of person who has seen a family member have a bad experience with spinal pain, perhaps compounded by unsuccessful treatment or surgery.

The enormous amount of stress that the pain, the associated fear and anxiety and burdens of everyday life can place on a person is usually detrimental to a normal sleeping pattern. If you add the physical effects of pain, a vicious cycle develops.

My Spine Explained

During certain stages of deep sleep, an important hormone called serotonin is released by the body. This is a natural pain killer (endorphin, so-called because it is the body's own morphine) and is also important in combating depression. Reduced sleep leads to fatigue, which makes the perception of pain more acute and also reduces the levels of endorphins (serotonin) secreted because of lack of sleep. This reduces the body's ability to fight pain and causes depression.

Making sure that you sleep properly is therefore of paramount importance. This can be achieved by ensuring that you have adequate pain relief from anti-inflammatory medication as well as simple analgesics and that their administration times allow you to have a good night's rest. Certain drugs such as amitriptyline increase the levels of serotonin and are also sedative without having addictive properties and can be taken on a chronic basis.

In patients where neglected pain is not managed properly and promptly, chronic pain may develop. The problem with chronic pain is that instead of becoming used to pain, patients become less able to deal with pain and their perception of pain changes. This means that instead of being able to tolerate pain better, they become less tolerant of pain and even if treatment at this stage is partially successful, the level of pain that would previously have been perceived as acceptable or tolerable, is now perceived as intolerable.

Action plan to avoid depression and anxiety associated with pain

1. Know and understand the source of the pain.
2. Understand the consequences of the condition as well as the long-term outlook.
3. Understand the possible treatment as well as your individual treatment plan and make sure that you do not have unrealistic expectations.

My Spine Explained

4. Make sure you follow the treatment to the letter as well as any physical therapy that is prescribed. Report back if the treatment is not effective so that your specialist may adjust your treatment.
5. Sleep is of paramount importance; this cannot be stressed enough.
6. Adjust your daily activities to cope with your condition. Be frank with your employer and make them part of your rehabilitation process. Keep them updated and they will support you much better than if you hide your condition or keep them in the dark.
7. Depression and anxiety are normal adaptive responses to severe pain and if these manifest, treatment by a professional that may include counseling as well as antidepressants can be invaluable.

CHAPTER 11



CARING FOR YOUR BACK

People with spinal pathology usually have a genetic tendency or susceptibility towards spinal disease. The spinal column is one organ and people who have lower back problems frequently will develop, or at the same time have, neck problems. Spinal surgery should be reserved for nerve compression and intractable pain that impairs a patient's everyday life and functionality substantially. Spinal surgery changes the biomechanics of the spine and frequently leads to further spinal surgery. The mainstay in the treatment of back pain therefore is prevention. This chapter aims to explain how to go about putting as little strain on your spine as possible.

Precautions

Sleeping:

Do not sleep on your stomach. It is better to lie on your side with a pillow between your knees, preferably on your better side. You may also lie on your back with pillows under your knees. Make sure that your mattress provides proper support.

Rolling in bed:

When you roll to your right, bend your left knee and keep your right leg straight. Press with your left hand against your left knee. Push away with your left leg to roll. It is important to remember that when you roll from your back to your side, your shoulder and hip must move together (log rolling).



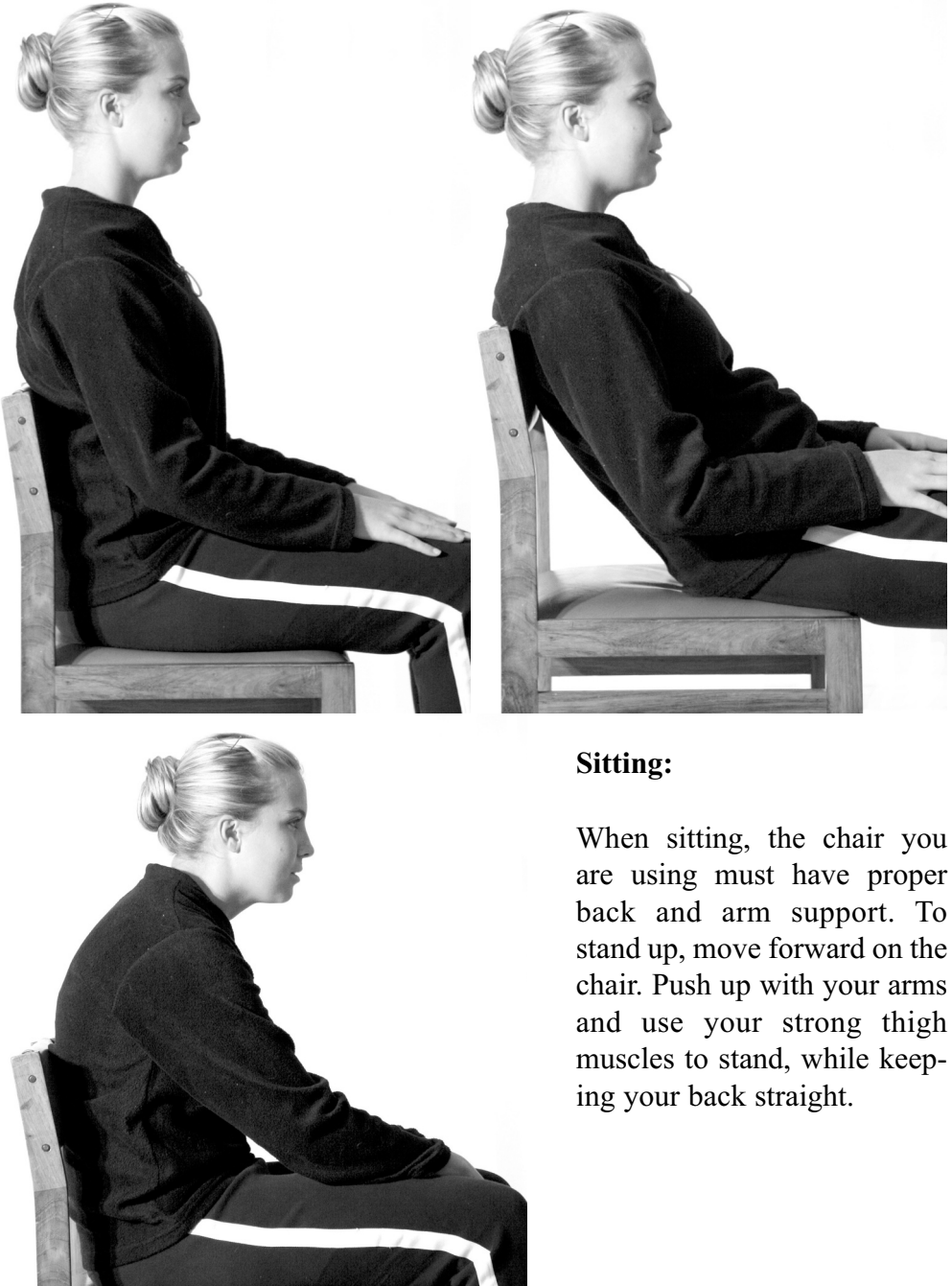
Figure 11.1

These photos demonstrate how to get out of bed. Note how the top picture shows that you should use your left hand to support yourself when you are lying on your right side. Bend your knees and move your feet over the edge of the bed. Press up with your elbow to lift the upper body while letting your legs down the bed until you sit over the edge of the bed as demonstrated on the opposite page. Then stand up straight, using your legs without bending your back.



Getting out of bed:

If you have to wear back support (brace), it must be in position before you continue. Roll on your side as in the step above. Bend your knees and move your feet over the edge of the bed. Press up with your elbow to lift the upper body while letting your legs down the bed until you sit over the edge of the bed. Glide off the bed until your feet touch the floor and stand up straight. The first time you stand up after surgery, your physiotherapist must be with you. Sit over the edge of the bed or stand next to the bed for a few seconds and take a few deep breaths to avoid dizziness.



Sitting:

When sitting, the chair you are using must have proper back and arm support. To stand up, move forward on the chair. Push up with your arms and use your strong thigh muscles to stand, while keeping your back straight.

Figure 11.2

These photos demonstrate how to sit. Note how the top left picture shows how to sit properly and the other two photos show poor posture that increases the strain on the spine and specifically the joints and the intervertebral discs.



Figure 11.3

These photos demonstrate how to stand. Try to stand with your back straight, head up and chin in. The use of a footstool helps to relieve swayback and relieves the pressure on the lower back.

Standing:

Do not stand for long periods at a time. Do not stand slouching with the lower back arched. Try to stand with your back straight, head up and chin in. The use of a footstool helps to relieve swayback.

Driving:

When you get in the car, first sit on the seat with your feet still outside the car on the ground. Then swing your legs into the car. Remember to stabilise with your core muscles. The same applies for when you want to get out of the car. First swing your legs out, and then stand up. Remember to stabilise with your core muscles.

When driving long distances, it is advisable to stop every 1-2 hours and walk a few times around the vehicle before you continue on your journey.



Figure 11.4

These photos demonstrate the correct driving position and the correct way of getting in and out of a car. The picture on the left demonstrates how to enter the car. Note that you should sit down with your back straight and your knees together. The swing your legs into the car while you tighten your stomach muscles. This puts the least strain on your back and is especially important if you have diagnosed abnormality of your intervertebral discs.



If you have had recent spinal surgery it is advisable to lie down at least at an angle of 30 degrees in the passenger seat by reclining the front seat. The picture on the left shows how to get into and out of the drivers seat. It is important that you sit down with your back straight and your knees together and then swing your legs in. When getting out of the car the legs are swung out first and then, with the back kept straight, you should stand up out of the car.



The bottom picture demonstrates how you should sit when driving. It is important to check with your doctor or therapist on when you could drive and when you should not. Note that the back is kept straight at all times. If your car seat has lumbar support, it is important to engage this as well. Note that the position of the arms are such that the elbows are slightly bent and that you should be able to reach the steering wheel without effort.



Figure 11.5

This photo demonstrates the incorrect way of getting out of a car. Note how the back is bent and how the model hangs on to the steering wheel.

Bending:

When you bend down, keep your back straight and bend your knees. Remember to stabilise with your core muscles while doing the movement as been shown to you by your physiotherapist.

Avoid picking up, pushing or pulling heavy objects for at least three months. After that you are only allowed to do it if you follow the correct instructions. When you need to lift a heavy object (after three to six months):

Use your strong thigh muscles to lift, not your back muscles.

Place feet apart and firmly on the ground.

Bend your knees and not your hips.

Face the direction that you intend to go.

Hold the object close to your body.

Lift the object by straightening your knees and hold your back as straight as possible.

Do not lift objects above your head.
Put the object down the same way you picked it up.
Try not to carry unbalanced weights.
Push rather than pull.



Figure 11.6

These pictures demonstrate lifting. The top picture demonstrates the correct way of bending and lifting. Bend your knees and not your hips. Face the direction that you intend to go. Hold the object close to your body. Lift the object by straightening your knees and hold your back as straight as possible.



The bottom picture demonstrates the incorrect way of lifting. The amount of strain that you place on your lower back with this manoeuvre is extremely high.



Figure 11.7

Bend your knees and not at your hips. Face the direction that you intend to go. Hold the object close to your body. Lift the object by straightening your knees and hold your back as straight as possible.

Walking and exercise:

If your back is extremely painful, try to avoid going up and down stairs. Walking and swimming are strongly recommended. Walk as much as possible, without exhausting yourself. Do not engage in competitive sports for the first three to six months. Ask your doctor when you are allowed to start with your specific sport. You are not allowed to do sit-ups ever again. Do your exercises daily as prescribed by your physiotherapist.

Around the house:

Daily activities need to be done correctly for the rest of your life. All equipment should have long handles so that you do not have to bend down too much.

Vacuuming: The vacuum cleaner should be pushed with short sweeps rather than long lunges to avoid excessive strain on your back.



Figure 11.8

All equipment should have long handles so that you do not have to bend down too much. The vacuum cleaner should be pushed with short sweeps rather than long lunges to avoid excessive strain on your back..

Kitchen: Do not reach for objects on high shelves, rather use a step ladder or get some assistance. Arrange your kitchen so that articles that are used daily are within reach. If you need to stand for long periods of time such as when ironing or at the kitchen sink, stand with one foot on a box/footrest. Never bend forward with your knees straight when reaching for anything out of lower cupboards.



Figure 11.9

Do not reach for objects on high shelves, rather use a step ladder or get some assistance. Arrange your kitchen so that articles/objects that are used daily are within reach. In the photo on the left the model has used a footstool to reach a box on a high shelf - this is the correct way. The photo on the right demonstrates the incorrect way of reaching for an object on a high shelf.



Figure 11.10

Never bend forward with your knees straight when reaching for anything out of lower cupboards. Make sure that you bend in the correct manner as in the photo below. Try to arrange your cupboards so that the cupboards that you use the most is at waist height and above.



Figure 11.11

It is important that you keep your back straight when doing chores that involve standing, like ironing or doing the dishes. If you need to stand for long periods of time, stand with one foot on a box/footrest.

Laundry:

Never carry clothes in a heavy laundry basket, rather use a small basket.

It is better to make several trips instead of staggering under a load of heavy wet washing. Do not bend or stretch to hang the washing. Put the clothes basket on a chair/table and use a step ladder to hang the washing.



Figure 11.12

Never carry clothes in a heavy laundry basket, rather use a small basket.

It is better to make several trips instead of staggering under a load of heavy wet washing. The top picture illustrates the incorrect way and the bottom picture the correct way to carry laundry.



Figure 11.13

Do not bend or stretch to hang the washing. Put the clothes basket on a chair or table and use a step ladder to hang the washing. The top picture illustrates the incorrect way and the bottom picture demonstrates the correct way of hanging the laundry to dry.

Making beds:

Your back pain will be aggravated by bending forward when you need to tuck in the sheets. The best way to tuck in the sheets would be to do so while kneeling at the bedside. ever attempt to turn the mattress by yourself. Ask for assistance.



Figure 11.14

Your back pain will be aggravated by bending forward when you need to tuck in the sheets. The best way to tuck in the sheets would be to do so while kneeling at the bedside. Never attempt to turn the mattress by yourself. Ask for assistance. The top picture demonstrates the correct way and the bottom picture demonstrates the incorrect way of tucking in the sheets.

My Spine Explained

General advice

Avoid sudden or jerky movements.

Try not to hold any position for too long.

Do not exhaust yourself.

Do not wear high heels for long periods of time.

It is better to shower than to bath.

If your back aches, try to relieve the pain before it gets worse.

Soak in a hot bath or shower.

Apply any other form of heat to painful area e.g. hot water bottle or a hot beanbag.

Curl up in the foetal position and hold for 5 minutes.

Literature teaches us that walking for an hour a day for the rest of your life is the best treatment of back pain and the best prevention of future back pain.

A Suggested exercise program

Before you start with these exercises, allow your physiotherapist to go through them with you to make sure that you do them correctly. Your therapist will also adapt them if necessary and explain to you when you may start with a specific exercise.

When performing these exercises, make sure that you are on a firm, yet comfortable surface. Use an exercise mat or a bench to do the exercises on. The exercises should never be painful. If they are painful stop them and discuss it with your physiotherapist the next time you meet.

My Spine Explained

Warm up exercises

Lie flat on your back and bend your knees to a 90-degree angle. Stretch your arms out at your side and begin to swing your legs to your left. Proceed to move them as close to the ground or as far as you can manage without pain. Bring them back up and proceed to the other side. Remember to not lift your shoulders off the ground when your knees go down. Repeat this exercise 10 times on each side, holding for 2 seconds with each time.



Lie flat on your back and bend your knees to a 90-degree angle. Once in this position, place your hands near your hips to feel your stomach muscles. You will notice an arch in your lower back. Proceed to flatten your back into the ground and hold that position for 5 seconds. You will feel your stomach muscles contract. Repeat this exercise 10 times.



My Spine Explained

Stretches

Lie flat on your back. Proceed to bring your knee up to your chest. Once the knee is as high as it can go on its own, use your hands to bring it up further as far as your body allows without pain. Try and keep your other leg straight. Hold this stretch for 30 seconds and repeat twice. Do the same with the other leg.



Lie flat on your back. Proceed to bend both knees up to 90 degrees. Once in this position straighten your leg above you and use an elastic band or a towel to maintain the position. Hold this position for 30 seconds and repeat twice. Do the same for the other leg



My Spine Explained

Sit down on a hard surface and straighten both legs. Bring your leg up so that your knee is bent outward and the bottom of your foot is against your straightened knee. Try to push your bent knee down toward the ground, go as far as you can without causing pain. Hold this position for 15 seconds and repeat twice. Do the same with the other leg.



My Spine Explained

In a standing position, bend your knee and clasp it with the hand of the same side. Try to remain in an upright position while bending the knee. Hold onto a wall or chair for balance, and maintain the stretch for 30 seconds. Repeat with the other leg



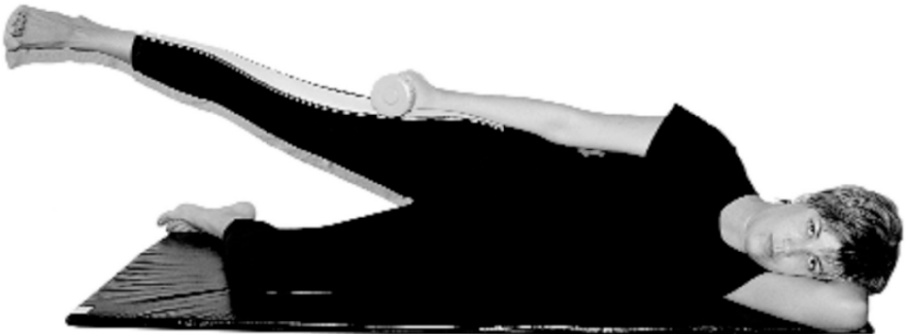
My Spine Explained

Strengthening exercises

Lie flat on your stomach and proceed to lift yourself up onto your elbows. Be sure that your back is straight and hips are lifted off the ground. Bring your feet together to make the exercise more effective. Hold this position for 10 seconds. Repeat 5 times.



Lie on your side and bend your bottom leg. With your top leg straight, lift it up as high as you can. You can use your arm to support your head. Repeat this exercise 10 times. Take a 10 second break and do another 10. Repeat with the other leg



My Spine Explained

Lie flat on your back and bend your legs to a 90-degree angle. Place your hands on your stomach to locate your stomach muscles, contract them and then lift your hips off the ground. Repeat this 10 times, holding your hips in the air for 3 seconds each time.



Get into position on all fours on the ground and proceed to lift your right arm in line with your neck. Now lift your left leg up in line with your lower back, remember to keep the knee as straight as possible. Hold this position for 5 seconds and repeat 10 times. Do the same with the left arm and right leg.



These exercises can be done once to twice a day. Remember that if any of the exercises cause you any pain, to stop that particular exercise, and ask your Physiotherapist about it at your next session.

CHAPTER 12



CARING FOR YOUR NECK

It is very important that you adapt your lifestyle when you have neck problems. In this chapter you will receive advice on proper positioning and what to avoid or change in and around the house to protect your neck. Thereafter you will find an exercise program that includes correcting the posture of your spine, stabilising the neck muscles, mobilising the neck muscles and joints, and strengthening the neck muscles.

General Advice

Try to avoid any quick or sudden neck movements.

Do not keep your neck in one position for prolonged periods.

When you have neck pain, it helps to apply heat to your neck. Use a hot pack or a hot water bottle.

Try to sleep on your back or side and preferably on the side that is not painful.



My Spine Explained

Do avoid sleeping on your stomach. When sleeping on your side or your back, keep your neck straight by shaping the pillow to support your neck.



Avoid sitting in bed with your legs straightened and it is important to sit at a table or over the edge of the bed when reading or eating and do not read whilst lying in bed.



My Spine Explained



Try to avoid performing activities above the level of your head and rather use a footstool if it is necessary to work above the level of your head. When hanging washing, use a little footstool instead of stretching above our head.



My Spine Explained



Sit on a chair with proper back support. Make sure you sit up straight and do not slouch as in the picture on the right. Avoid sitting in deep chairs as it places extra strain on your neck.

A Suggested Exercise Program

Before you start with these exercises, allow your physiotherapist to go through them with you to make sure that you do them correctly. Your therapist will also adapt them if necessary and explain to you when you may start with a specific exercise.

When performing these exercises, make sure that you sit in a proper upright position, making specifically sure that your pelvis is in a perfectly upright position. This can be achieved by making sure that your back and buttocks are firmly pressed against the back of a straight-backed chair.

Warm-up Exercises

All movements must be comfortable and must not cause pain. Only a slight stretch must be present.

My Spine Explained



Warm-up exercise 1

Keep your head up and look straight ahead. Ensure that your head is not tilted, twisted or turned. Now drop your chin to your chest and maintain the position for two seconds. Then look up towards the ceiling and hold the position for two seconds. Repeat these movements 15 times.



Warm-up exercise 2

Drop your ear towards your right shoulder and hold the position for two seconds. Then drop your ear towards your left shoulder and hold the position for two seconds. Repeat 15 times to both sides.

My Spine Explained



Warm-up exercise 3

Look over your right shoulder and hold the position for two seconds. Then look over your left shoulder and hold the position for two seconds. Your chin must stay at the same level while performing the movements. Repeat 15 times to both sides.



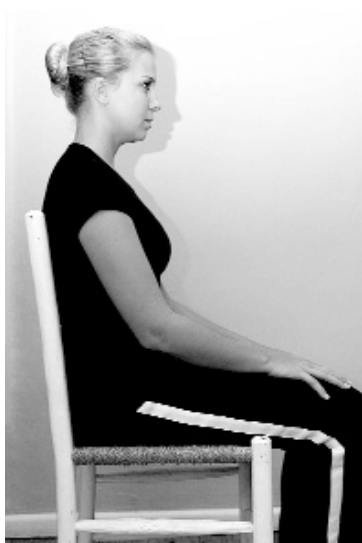
Warm-up exercise 4

Roll your shoulders backwards. You must actually feel that your shoulder blades are moving. Repeat 15-20 times.

My Spine Explained

Warm-up exercise 5

Lock your fingers together and hold your hands before your chest. Move your arms forward until you feel the muscles stretch between your shoulder blades. Hold for 15 seconds.



Warm-up exercise 6

Sit up straight. Inhale as deep as possible until you can feel the lungs expand to their maximum capacity. Hold your breath for five seconds, and exhale fully. Repeat 10 times.

My Spine Explained

Stretches

When performing the following stretches it is important to maintain each stretch for 10 seconds. Progress the duration of the stretches to 30 seconds within the first 10 days. Repeat every stretch twice. When you do your stretches, limit the stretch until you can feel a slight pull. This is the position that you must hold.

If the stretch becomes painful or uncomfortable, relax the intensity of the stretch on the muscle until you feel only a slight pull again. If, after a while, you do not feel a stretch, extend the range of the stretch until you feel a slight pull again.



Stretch 1

Put your left hand behind your back. Tuck in your chin and then bend your head forward. Tilt your ear towards your right shoulder. Now use your right hand to pull your head forward at a 45° angle towards your right. Repeat the stretch on the opposite side.

My Spine Explained



Stretch 2

Put your left hand behind your back. Tuck in your chin and then bend your head forward. Tilt your ear towards your right shoulder and **turn your chin to the right**. Now use your right hand to pull your head forward at a 45° angle towards your right. Repeat the stretch on the opposite side. Remember only a slight pull may be felt in your neck on the side of the arm that is behind your back.

My Spine Explained



Stretch 3

Put your left hand behind your back. Tuck in your chin and then bend your head forward. Tilt your ear towards your right shoulder, **but turn your chin to the left**. Now use your right hand to pull your head forward at a 45° angle towards your right. Repeat the stretch on the opposite side. Remember only a slight pull may be felt in your neck on the side where your arm is behind your back.

My Spine Explained

Exercises

Keep your head up and look straight ahead. Make sure that your head is not tilted, twisted or turned (preferably in front of a mirror). Only a slight contraction of the muscles must be felt.



Exercise 1

Put both your hands against your forehead. Apply slight pressure with your head into your hands, but no movement must take place. Hold the contraction for six seconds and repeat five times. Do the same whilst applying pressure against one elbow with the other hand to intensify the pressure that you need to use.

My Spine Explained



Exercise 2

Put your hands behind your head. Apply slight pressure with your head into your hands, but no movement must take place. Hold the contraction for six seconds and repeat five times.



Exercise 3

Put your right hand on the right side of your head at eye level. Apply slight pressure with your head into your hand, by trying to tilt your head. No movement must take place. Hold the contraction for six seconds. Do the same to the left. Continue to alternate sides and repeat five times to the left and the right.

My Spine Explained



Exercise 4

Put your right hand on the right jaw line. Try to rotate your head slightly into your hand, but no movement must take place. Hold the contraction for six seconds. Now do exactly the same to your left. Continue to alternate sides and repeat five times to the left and the right.

The following two exercises are to correct the posture of your spine. Correct your posture every 15 minutes during the day. It must become a natural position for your body.



Exercise 5

Sit on a chair and look straight forward. Sit up straight with your pelvis in a good position. (Make yourself “tall”). Relax your shoulders. Now lift the back of your skull a few millimeters off your cervical spine. If you do it correct, your chin will be slightly tugged in. Hold the contraction for 10 seconds and repeat it 10 times.

My Spine Explained



Exercise 6

Stand up straight with your arms hanging at your sides. Make yourself “tall”, by stretching your spine and standing completely upright. Correct your neck posture as in exercise 5, tuck in your navel and relax your shoulder blades. Imagine an elastic band from your chest to your shoulder on both sides. Try to stretch the “band” open for two to three cm by rolling your shoulders back and down. Your back must stay straight throughout the movement. If you do the action correctly, your shoulder blades will move downwards. Hold the contraction for 10 seconds and repeat 10 times.

My Spine Explained



Exercise 7

Stand facing a wall. Put your hands against the wall with your wrists, elbows and shoulders at the same height. Relax your neck and shoulder muscles while standing in this position. Now try to push the wall away. If you do the action correctly, your toes will automatically lift. Hold the contraction for five seconds and repeat 10 times.



Exercise 8

Bend your head 15° forward. Apply slight pressure with your head into your hand as described in exercise 1, but no movement must take place. Hold the contraction for six seconds. Now bend your head further forward and repeat the contraction as described at different angles.

My Spine Explained



Exercise 9

Use the same starting position as in exercise 2. Bend your head 15° backwards. Apply slight pressure with your head into your hands as described in exercise 2, but no movement must take place. Hold the contraction for six seconds. Now bend your head gradually further backwards and repeat the contraction at different angles.



Exercise 10

The same starting position as in exercise 3. Tilt your head 15° sideways to the right. Apply slight pressure with your head into your hands as shown in exercise 3, but no movement must take place. Hold the contraction for six seconds. Now tilt your head gradually further sideways and repeat the contraction at different angles. Repeat towards your left side.

My Spine Explained



Exercise 11

Use the same starting position as in exercise 4. Turn your head 15° towards your right shoulder. Apply slight pressure with your head into your hands as shown in exercise 4, but no movement must take place. Hold the contraction for six seconds. Now continue to turn your head gradually towards your right shoulder and repeat the contraction at different angles. Repeat towards your left side.



Exercise 12

Do exactly the same as in exercise 6. Now bend your elbows 90° and hold them at your sides. Hold the elastic band at both ends with your hands, thumbs facing upwards. Stretch the band slowly while your elbows stay at your sides. Only a small movement must take place. Maintain the correct posture as described in exercise 6 throughout. Repeat 15 times.

My Spine Explained

As your muscles get stronger, progression can be done by doing more repetitions and/or holding the contractions for longer for each of the exercises.

This program must be done once or twice per day.

Remember that none of the stretches and exercises must cause any pain. If any of the stretches or exercises cause any pain, reduce the intensity. If it still causes pain, stop that specific exercise until you see your physiotherapist again

CHAPTER 13



EVERYDAY LIFE

Spinal pain can limit your activities of everyday life and decrease your quality of life dramatically if not properly managed. Pain is a warning system and is the body's way of informing you that something is wrong.

Maintaining the correct body posture during everyday life activities can significantly assist in reducing back pain and progressive spinal damage.

The following advice could be helpful in managing your back pain during everyday activities.

Sitting

A well designed chair should provide comfortable seating and accommodate a wide range of body shapes and sizes. To maximise sitting comfort, it is essential that the chair is adjustable.

Make sure that you maintain a correct posture and are supported comfortably in the chair:

Your feet should be flat on the floor; do not cross your legs.

The height of the chair is important, because your hips should be at a right angle or ideally between 90° and 120°.

If your feet do not comfortably touch the floor, use a low footrest.

A low footrest may also be necessary to reduce pressure behind the knees and strain in the lower back.

My Spine Explained

Ensure that your back is well supported and that you maintain an upright position.

The backrest of the chair should be upright and provide proper support for your back, neck and head.

A small cushion or rolled towel can be placed in the hollow of your back to allow for better lumbar support.

Correct sitting posture while writing

Ergonomically designed posture chairs are ideal to prevent spinal pain.

Your head should be aligned with your shoulders and hips.

The seat should ideally be able to tilt slightly forward.

Adjust the height of the chair so that your hips are slightly higher than your knees.

Place one foot slightly more forward than the other and alternate the position of your feet throughout the day.

Writing on a surface that slopes upwards will help you in maintaining an upright position of your head and prevent you from slouching.

The height of the desk is also important, because your elbows should be just below the level of the desk.

It is important to maintain an upright position; do not slouch.

Do not sit for long periods at a time and try to get up and move around every half hour.

Correct sitting posture while working at a computer

Ergonomically designed posture chairs are ideal to prevent spinal pain.

Your head should be aligned with your shoulders and hips.

The seat should ideally be able to tilt slightly forward.

Adjust the height of the chair so that your hips are slightly higher than your knees.

Place one foot slightly more forward than the other and alternate the position of your feet throughout the day.

The height of the desk is important and your elbows should be on the same level as the keyboard; keep your shoulders relaxed.

My Spine Explained

When using a desktop computer, the screen should be raised so that the top of the computer screen is more or less level with your eyes. The screen should preferably be tilted upwards so that you do not have to flex your neck.

Laptop computers should not be used on your lap, but should rather be placed on a desk with the screen at the same height as was described for a desktop computer.

It is important to maintain an upright position; do not slouch.

Do not sit for long periods at a time and try to get up and move around every half hour.

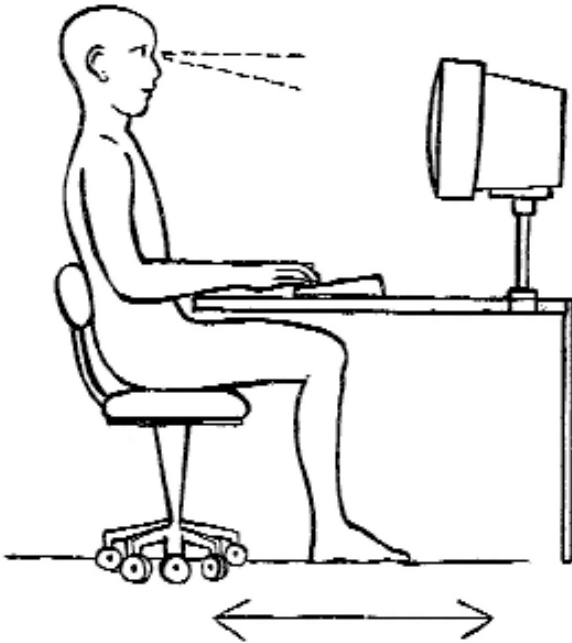


Figure 13.1

My Spine Explained

Moving objects by pushing and pulling

It is important to know that pushing puts less strain on the back than pulling.

Keep your back straight and tighten your stomach muscles.

Make sure you are close to the object by leaning in slightly towards the object.

Keep your feet shoulder width apart and one foot slightly more forward than the other.

Bend your knees and use the strength of your leg muscles and the weight of your body to move the object.

Rather than pushing or pulling by facing the heavy object, you can turn around and push the load with your back braced against the support.

Use the strength of your leg and thigh muscles to do the work and do not twist your body.

Lifting heavy items

It is very important never to lift an object with an improper lifting technique, as this could result in serious spinal injury.

The illustration on the opposite page indicates how pressure on the discs (that are located between the vertebrae) increases during an improper lifting technique (drawing on the left). Note how the pressure in the disc is unevenly distributed when the back is bent (flexed). This can result in a tear (rupture) of the disc and the soft centre can squeeze out and press against a spinal nerve, causing leg pain and even leg weakness, and may result in surgery.

Always keep your back straight and tighten your stomach muscles when lifting an object.

Make sure you are close to the object and have a firm hold on it.

Keep your feet shoulder width apart to ensure a firm base of support.

Bend your knees and use the strength of your leg muscles to lift the object.

Do not twist your body, but rather give small steps with your feet to move the object.

My Spine Explained

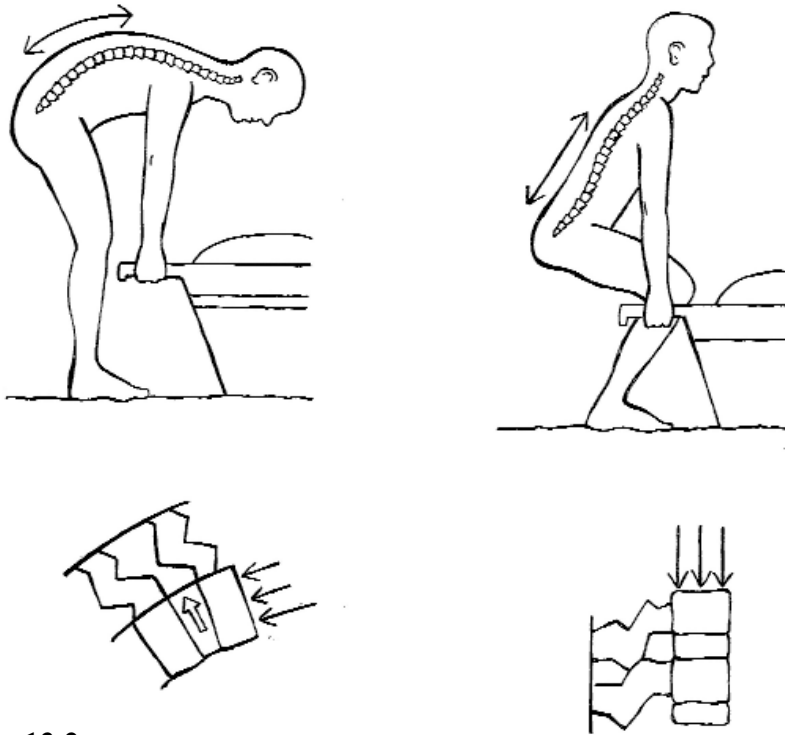


Figure 13.2

Going shopping

It is sensible to go shopping during off-peak hours to reduce the amount of time spent shopping and also to avoid the need to stand for prolonged periods in long queues. When reaching for articles on the shelves, you should bend your knees to reach the shelves that are very low or you should ask for assistance. You should also ask for assistance when reaching for articles above eye-level. Use a trolley that runs smoothly and do not fill it too heavily so that it is difficult to manoeuvre.

Consider online shopping and delivery services.

Ask a shop assistant to carry your parcels and load them into your car.

Go shopping more often and buy smaller quantities at any one time.

When lifting groceries in and out of the car, keep items close to the body, bend your knees and keep your back straight.

My Spine Explained

Pregnancy and child care

During pregnancy the joints and ligaments in the area of the back and pelvis become more lax (due to hormonal changes) in preparation of the birth of the baby, making a pregnant woman more prone to pain and back injury. A pregnant woman's posture is affected by adapting to compensate for the effect of the added load of the growing baby at the front of the body. There is a tendency to arch the back and slightly lean backwards when standing and walking, especially in the later stages of pregnancy. Try and maintain a proper posture by "standing tall" and tightening your stomach and pelvic floor muscles. Take extra care to protect your back during pregnancy and also caring for your baby after birth.

Wear comfortable, low heeled shoes when walking.

Sit with your back properly supported. Do not sit in a chair that is too low, for it is difficult to stand up again. Try not to sit for long periods at a time; get up every half hour and move around.

When feeding your baby, sit in a chair with your hips, knees and ankles at a right angle.

The baby cot should be at a proper height so that you do not have to bend your back to pick your baby up.

Lower the side of the baby cot before lifting your baby or putting your baby down.

If the baby cot is close to the floor, make sure that you kneel or squat when lifting your baby.

When lifting your baby, remember to always keep your back straight, to tighten your stomach muscles and to keep your baby close to your body.

Use a changing table or elevated work surface (with the proper height) when changing your baby's clothes or nappy.

Place the bath on a sturdy surface at your hip height. Kneel when bathing your baby in a regular bath.

Before lifting your baby from a regular bath, empty the bathwater, but cover your baby to retain the heat; then step into the bath with one foot (remember to use a non-slip bath mat). Sit on the rim of the bath and avoid twisting your back when lifting your baby.

My Spine Explained

Remember to hold your baby close to your body when lifting her out of the bath.

Once you are holding your baby firmly, carefully bring your leg back over the rim of the bath and stand up with both feet firmly on the floor.

Avoid carrying your baby on one hip for extended periods of time, for this places excessive stress on your spine.

Go down on your knees when you want to pick your child up from the floor or a low chair. Once again, remember to keep your elbows close to your body. If your baby is on the floor, you can always go down on the floor and allow your baby to crawl onto your lap.

When your child is old enough, she can stand on a chair or step before you pick her up. You can then let her slide onto your knee or use a squat-lift while keeping your back straight.



Figure 13.3

My Spine Explained

Sport and exercise

A degree of physical activity is most often beneficial in limiting spinal pain. Sport and regular exercise assist in keeping your body fit and your muscles strong and it could help in reducing back pain. It is essential that you strengthen your stomach muscles and your leg muscles.

When participating in sport, it is important to keep the following in mind: Sport that requires a twisting action of your back or that involves excessive jumping (causing a jarring force on the discs) could have an adverse effect on your back pain.

Avoid sport or exercises that increases your back pain. Sporting activities that are recommended for people with back pain would include swimming, walking, cycling and low impact aerobic exercises.

Some sporting activities such as bowls require a great deal of bending. Protect your back by keeping it straight and by tightening your stomach muscles. Use your strong leg muscles as much as possible when executing movements that involve bending.

Thorough warm-up exercises should be completed before commencing with your sporting activity. Regular stretching exercises are also important in preventing sport related injuries.

Sexual activity

Sexual activity is frequently inhibited by acute pain. A positive attitude and proper communication with your partner could help you overcome apprehension and anxiety caused by your spinal pain. Try a different approach to making love by adapting to a position that your back can tolerate.

Sexual intercourse provides a natural pelvic tilt movement which is to be encouraged to relieve lower back pain. However, sexual intercourse can exacerbate the pain in acute phases.

My Spine Explained

To help reduce the tension, it is important that your partner understands your condition. Together you can experiment with different positions and try to work out which position is most comfortable and satisfactory. The endorphins that are released during intercourse help block pain signals and promote the feeling of well-being.

There are many different positions to experiment with, but the basic rule is that the partner in pain should be in the most comfortable position.

The partner in pain should adopt the most favourable position with regards to comfort.

Try a position in which the natural curve of the back is maintained.

Avoid excessive arching of the lower back.

Avoid bending forward.

Avoid vigorous thrusting. You may find that the less active role may be the most comfortable, but not necessarily less enjoyable and satisfying.

A firm mattress is vitally important.

A pillow can be used for extra support.

You may find that analgesics taken 30–40 minutes prior to sexual activity or taking a warm bath may be beneficial in lessening pain and alleviating the fear of pain.

If sexual intercourse causes increased pain, non-penetrative sexual activity can be just as satisfying.

For further advice or to discuss specific problems with regards to back pain and sexual activity, a health professional or sex therapist should be consulted.

My Spine Explained

These illustrated sexual positions can be helpful for people experiencing back pain.



Figure 13.4

The positions above are beneficial for women with back pain.



Figure 13.5

The positions above are beneficial for men with back pain.

My Spine Explained



Figure 13.6

This would be the correct position to adopt if both partners suffer from back pain.

My Spine Explained

CHAPTER 14



CHIROPRACTIC TREATMENT

Spinal pain and chiropractors

Among people seeking back pain relief alternatives, most choose chiropractic treatment, followed by physiotherapy in popularity. Chiropractors also treat many other conditions, but for the focus of this chapter, we will only refer to spinal conditions and their associated conditions.

Up to 60 – 90% of people will have spinal pain some time during their lives and it is one of the most common forms of disability. Spinal pain can be the result of underlying damage to the structures of your spine like the discs between the vertebrae or inflammation of the joints between the different vertebrae. It can also be the result of problems located in the structures adjacent to your spine, or those involved in the alignment of your spine.

Therefore inflammation and problems in your hips, knees, legs, shoulders and arms can cause indirect spinal pain. Abnormalities of the muscles or inborn abnormalities of your spine like scoliosis (a skew spine) can also cause spinal pain.

Many factors predispose towards the development of spinal pain:

- 1.) Genetic factors such as an inborn tendency to have weakness of the cartilage in the discs between the vertebrae and the spinal joints lead to disc damage and inflammation in the joints.
- 2.) Obesity and inactivity or a lack of physical fitness.

My Spine Explained

- 3.) Work related factors such as a poor posture or the maintenance of the same postural position for prolonged periods or alternatively repetitive tasks; Bending, lifting, twisting, whole body vibration and heavy physical work have been associated with low back pain
- 4.) Smoking, drug abuse and alcohol abuse.

Many of the symptoms of spinal pain result from muscle spasm secondary to inflammation in the spine as well as reduced motion around joints due to the muscle spasm. When muscle have a reduced range of motion due to pain and inflammation, they shorten and scar tissue can form, even limiting movement further.

If you are experiencing spinal pain the duration of your symptoms, severity and the associated symptoms will determine whether the underlying cause is serious or not.

What do chiropractor do, and how do they function with other medical professionals?

Chiropractors rely on non-invasive physical treatment of spinal conditions by active manipulation of the tissues and structures involved in causing your spinal pain. Chiropractors also specifically promote healthy lifestyles, habits and the avoidance of smoking, excessive alcohol intake and other habits that are harmful for the spine and the body as a whole.

Your general practitioner, spinal specialist, chiropractor, occupational therapist, biokinethetist and physiotherapist will work together as a team to evaluate your underlying problem diagnose the problem and treat it in a multi-disciplinary fashion. None of the components can function independently and all are inter-linked and dependent on each other.

Patient will be referred from general practitioners and specialists alike to chiropractors for the non-invasive management of spinal pain.

My Spine Explained

Chiropractors on the other hand will refer patients back to their general practitioners and specialists should medication or surgical procedures be indicated. The physiotherapist is involved in working with you for the long-term management of your mobility and the biokinethetist is involved in restoring the muscle balance of your body and strengthening your muscles. The occupational therapist is involved in evaluating the stressors placed on your body and spine in your activities of daily living and also and more specifically, the factors at work that influence your spinal health and your health in general.

Visiting a Chiropractor - how does chiropractic treatment work?

When consulting a chiropractor, a history will be taken of your complaint. Thereafter a general physical examination will be performed and an examination that focuses on your whole spine as well as the specific areas of your spine where you experience pain.

Remember that the spine is a single organ and that problems in the upper part of your spine can cause problems lower down and vice versa. Sometimes your chiropractor will take X-rays of your spine to evaluate the condition of your spine, the alignment of your vertebrae and signs of wear-and-tear affecting your spine and your health.

The physical exam typically includes a variety of assessments, such as range of motion tests, palpation, reflex testing, muscle strength comparisons, and neurological and orthopaedic tests focused on the main complaint.

Chiropractic treatment hinges on the evaluation of the spine and associated neuromuscular structures (the joints, tendons, muscles and nerves), the pathology is identified and the problem is corrected by physical manipulation to increase the range of motion, re-establish the spinal balance and to counteract the inflammation present.

This is done by performing highly specialised manipulative techniques often referred to as adjustments.

My Spine Explained

Adjustments are performed by hand and consist of a high velocity; low amplitude thrust being applied to a specific vertebra in the spine. These adjustments can cause the patients experience immediate relief as the normal joint motion and the associated physiological changes occur, which result in decreasing pain, swelling and muscle spasm.

However in some patients several treatments will be necessary. When some adjusting techniques are applied a popping or cracking sound may be heard which is due to the gas and fluid inside the joint shifting around. This will not happen every time a manipulation is performed and is not an indication that the treatment is more or less effective.

Due to the fact that the pathology underlying the spinal pain is essentially a wear-and-tear condition, there will be further pain and dysfunction at some point in the future and the patient will have to return for further treatment if the symptoms do recur. They number of treatments required and the period that the patient will have relief of their symptoms depend on a whole host of factors. This include the type of underlying problem, the severity of the problem, associated factors that have an influence on the underlying problem and many more.

It is a frequent question from many patients whether chiropractic treatment is safe. This is due to the fact that the manipulations performed can be seen as a threat to the person and is mainly due to a lack of knowledge of this treatment method. It is a well-studied and well developed treatment that has a long and successful history.

However as with any medical treatment there are some risks. These can include sprains and strains of the muscles or nerves, aggravation of the underlying inflammation, dislocation of the bony elements and rarely a fracture of the underlying bony elements or damage of the blood vessels associated with the spine. You should always ask your chiropractor about the risks and complications that may potentially be associated with this kind of treatment and whether you personally may be more prone to any of these complications.

CHAPTER 15



TESTS AND SCANS

There are several tests that your specialist may want to perform to confirm your diagnosis. It is important to understand how these tests work, why your specialist orders them and what the terminology means in plain language.

What is a CT scan (CAT scan)?

Computed tomography or CT scans have been with us for many years and are performed for many different disease entities. A CT scan is made up of ordinary X-rays (tomograms) that are fed into a computer (computed). They can be performed with a contrast medium (dye) that is injected into the patient's veins. This contrast medium is usually iodine-based and circulates in the vascular system of the body. It is taken up in areas where there is increased blood flow such as areas of inflammation, infection or cancer. It is also used to examine patients' arteries and veins.

A CT scan is the best test to evaluate the integrity, alignment and pathology of the vertebrae of your spine. It is, however, not as effective when evaluating the softer tissues such as discs, ligaments and nerves. MRI scans are the best for evaluating softer tissues.

When undergoing a CT scan, you are placed in a large machine that is shaped like a doughnut. The table you are lying on will move forward and backward as the scan is being performed. Older-generation CT scanners could do only one slice (exposure) at a time; modern scanners do many cuts at the same time and are much faster.

My Spine Explained



Figure 15.1

This is a picture of a CT scan machine.

The large square part in the back with the round opening is where the X-rays are generated around the patient. This is called the gantry and can be inclined at angles to allow for better visualisation of the tissues of the body.

Modern scanners are called spiral CT scan machines and can currently take many images at a time. The table moves with an electric motor and allows the X-rays to pass over different tissues of the body as the patient passes through the gantry. CT scan machines generate a large amount of radiation and a CT scan should therefore only be performed for specific clinical indications.

My Spine Explained

What is an MRI (magnetic resonance imaging) scan?

This scan is performed with magnetism. A very large magnet aligns and realigns the molecules of the body and a computer then interprets the signals that are received and converts them into images. These images are really very clear and all the tissues in the body can be seen in great detail. As with CT scans, contrast can be used to give greater detail to blood vessels and also to indicate inflammation and cancer.

Since this technology works with a large magnet, patients who have certain metal implants cannot undergo this test.

When you undergo this test you will be placed in a machine that has a narrow tunnel and claustrophobic patients frequently need some form of sedation for this procedure. The machine makes quite a lot of metallic banging and clattering noises and you will usually be offered earphones to block out the noise and in some institutions soft music is piped through these.

Several types of pictures are taken. The most frequently used images are T1-weighted and T2-weighted scans. This is a description of the different ways that the scan manipulates the magnetic field of the tissue that is being examined. It is not important to know anything about the difference between these different types of MRI pictures that are taken.

It is, however, useful to know that there are several cuts (planes in which the body is examined) that are done. The most frequently used cuts are the sagittal images. These are images that are taken of your body from a side-on view. They are very useful in giving an overview of the spine in its entirety.

The images that are more important for depicting the finer detail of the pathology are the axial cuts or planes that are taken straight through the spine and are like slices taken of a sausage. The nerves that are leaving through the foramina are seen side-on and look like little worms as they leave the spinal canal. This way your specialist can see a lot of detail about the nerves and any compression of the nerves.

My Spine Explained



Figure 15.2

This is a picture of an MRI scan machine.

The section that generates the magnetic field is a tubular structure and patients are moved into this cave-like tube on the table, which has an electric motor. The room is devoid of loose metallic objects, as these would become airborne when the machine is activated because of the magnetic field, which is extremely powerful. Objects such as the magnetic strips on bank cards are rendered useless by the machine, so make sure that you leave these outside the room.

These machines tend to be quite noisy on the inside with all manner of tapping and banging noises. These are perfectly normal and you should not be alarmed by them. Some institutions will have earphones with music available to reduce the noise.

My Spine Explained

There are other cuts as well, such as coronal cuts where the body is viewed from front to back. Both coronal cuts and sagittal cuts are useful for revealing the alignment of the spine. The coronal cuts demonstrate scoliosis well. Scoliosis is where the spine is bent (has an abnormal curve) when viewed from the front. The normal curve of the spine can be evaluated on the sagittal views.

When the curve is more pronounced to the front, it is called kyphosis and when it is more curved towards the back, it is called lordosis. The coronal cuts are also useful for evaluating the nerve roots as they leave the spinal canal through the foramina and can demonstrate extraforaminal (outside of the foramen of the spinal canal) disc compression of the spinal nerves.

What is a myelogram?

This test is performed with a contrast medium that is injected into the spinal canal with a technique called a lumbar puncture. The patient is placed on a table that can tilt and is tilted so that the contrast medium can run up and down the spinal canal. A CT scan of the spine is performed at the same time and images are then generated that can indicate whether there is an obstruction of the nerves of the spine. This procedure has mostly been replaced by MRI scans. It is still performed in cases where patients cannot undergo an MRI scan due to certain metal implants in the body and for other specific indications.

What is an electromyogram (EMG)?

This is a test of the electric conductivity of the nerves of the body. This can be done by measuring the transit time in nerves and measuring the response in the muscles that are supplied by these nerves. The measuring instrument is a small needle that is placed in the muscle and then connected to a machine that measures very small electric impulses. When your specialist receives a report that there is slowing in transit time in one of the nerves, this may indicate, among other things, that the nerve is being compressed by a lesion like a slipped disc.

My Spine Explained



Figure 15.3

This is a picture of an EMG machine. It has several wires that are attached to electrodes inserted with small needles into the muscles of your arm or leg. It has a recording facility that measures the flow of electricity in your nerves to identify which of these nerves are being compromised.

My Spine Explained

What is a discogram?

In this test, contrast (dye) is injected with the help of fluoroscopy (mobile X-ray machine) directly into the intervertebral disc. The test has two elements. Firstly, your specialist attempts to mimic your pain by injecting fluid into your disc to place stress on the disc. This is a diagnostic test that can be very difficult to interpret. Secondly, your specialist will look at the image on the fluoroscopy to see what the fibres of the disc look like and to see whether there is any damage.

What is a radio isotope scan?

In this test, radio isotopes are injected into a vein and allowed to circulate. A scan is then performed, which picks up radio isotope uptake. The radio isotopes are taken up in bony areas of the body where there is inflammation and will help your specialist decide where the main inflammation is located that causes your pain.

Terminology in the lumbar and cervical regions for CT scans and MRI scans

Spinal stenosis – This means that the spinal canal is narrowed; this is usually because the joints that are between the vertebrae, called the facet joints, have hypertrophied (become larger) secondarily to osteoarthritis of these joints. At the same time the ligament that runs inside the spinal canal, the ligamentum flavum, has also hypertrophied and is pushing on the nerves. The third component that causes spinal stenosis is the pressure from discs that push into the spinal canal.

Facet joint hypertrophy – This is when the joints between the vertebrae become large and irregular. This is because the joints are damaged by arthritis (osteoarthritis).

My Spine Explained

Annular tear – This describes the condition where the intervertebral disc has early damage. The damage comprises of a tear in the annulus fibrosus (see the chapter *Anatomy of the Spine*). The tear causes different inflammatory substances to be released by the body and this can cause local back pain, referred pain and even radiculopathy (see the chapter *Slipped Disc*).

Disc bulge – This describes the condition where the nucleus pulposus (see the chapter *Anatomy of the Spine*) starts to bulge through the damaged annular fibres.

Disc herniation/disc extrusion – Both these terms mean that a portion of the nucleus pulposus has now extended outside of the confines of the annular fibres into the spinal canal (see the chapter *Slipped Disc*).

Broad-based disc herniation – This is where the disc is damaged extensively and there is usually a decrease in the height of the disc and the disc looks a bit like a flat tyre with the whole or a large part of the nucleus projecting beyond the confines of the annular fibres.

Foraminal disc herniation – In this case the disc herniation is on the side of the spinal canal where the nerve roots leave the spinal canal through the foramina. Even relatively small disc prolapses or hernias can cause a lot of pain or even weakness, as the space is very restricted in this area.

Extraforaminal disc compression – In this instance the nerve is compressed outside of the spinal canal and outside of the foramen as it leaves on its way to the leg. This is usually caused by a broad-based disc herniation.

Central disc herniation – In this case the disc herniation is in the middle of the spinal canal. Since this is a fairly large space, the disc herniation has to be fairly large compared with a foraminal disc prolapse before symptoms occur.

In some cases the spinal canal is already partly occluded by facet joint hypertrophy and compression from the ligament inside the spinal canal – the ligamentum flavum – and even small disc herniations can cause symptoms in these patients.

My Spine Explained

Thecal sac – This is the name given for the elongated membranous tube that extends from the brain to the end of the spine in which the spinal cord and nerve roots run. It is made up of – and is continuous with – the membrane that covers the brain.

Flattening of the spinal cord – This is a description of the situation that occurs when a herniated (slipped or prolapsed) disc has extended so far into the spinal canal that it is pushing on the spinal cord.

Flattening of the thecal sac – This is a description of the situation that occurs when a lumbar herniated (slipped or prolapsed) disc has extended so far into the spinal canal that it is pushing on the thecal sac.

Nerve root – The nerve root leaves the spinal cord, or the thecal sac in the lumbar area, and exit the spine through the intervertebral foramen. Most of the exiting nerve roots can be seen side-on in the axial planes as well as the coronal planes and are seen end-on in the sagittal plane.

Foraminal stenosis – This is a narrowing of the foramen and the exiting nerve root can become compressed in the foramen by either a disc herniation or a hypertrophied facet joint or a combination of both.

Synovial cyst – The joint space of the facet joints are lined with a membrane – the synovial membrane – which allows for free and easy movement of the joint. Sometimes, as the joints become damaged, this synovial membrane can bulge out and form a cyst.

The cyst is filled with synovial fluid that is usually found in the joint space for lubrication. These are completely benign (harmless) lesions and should not be confused with cancerous lesions. They can, however, cause nerve compression and foraminal stenosis.

Tarlov cyst – This cyst is filled with spinal fluid and develops in the membrane that covers the nerve roots. If it is large, it can cause nerve compression and pain. Surgery for this benign lesion can be difficult. The diagnosis is made based on the fact that the cyst is in direct contact with a nerve root.

My Spine Explained

Arachnoid cyst – This is also a benign lesion and is formed from the inner layer of the covering of the spinal cord. It is usually asymptomatic and will only require surgery if it is very large and is causing symptoms secondary to nerve compression.

Spondylolisthesis – This is the term that describes a slip of one vertebra on the vertebra directly below and is secondary to a weakness in the bone that supports the facet joints that keep the spine stable.

Spondylolysis – This is frequently the cause for spondylolisthesis and is the process where the bone supporting the facet joints is weak and fractures.

Spondylosis – This is spinal degeneration and is characterised by bone spurs (osteophytes) that develop on the vertebral bodies and are usually asymptomatic, except if they compress nerves.

Cauda Equina – This term is Latin for horse's (Equina) tail (Cauda). It describes the nerve roots that dangle down from where the spinal cord ends and looks like a horse's tail. The spinal cord ends at approximately the level of the first lumbar vertebra. When these nerve roots become compressed the resulting syndrome of pain, weakness and paraesthesia (pins and needles) in the legs with associated bladder and bowel dysfunction is called Cauda Equina syndrome. This is a spinal emergency and requires immediate surgery.

Conus Medullaris (Conus) – This is the name given to the end of the spinal cord. It has a tapered conical shape and the nerve roots of the Cauda Equina exit from here. It is usually at the level of the first lumbar vertebra.

Filum Terminale (Filum) – This is the continuation of the conus medullaris and is the thin cord-like structure that extends down to the end of the spinal canal.

ABOUT THE AUTHOR

Dr Liebenberg is a neurosurgeon who specialises in spinal conditions and the treatment of these conditions. This includes both the conservative and the surgical management of these conditions.

He practices in Cape Town, South Africa and holds a master's degree in neurosurgery from the University of Stellenbosch and is a Fellow of the Colleges of Neurosurgeons of South Africa. He trained at Tygerberg Hospital and did a Fellowship at the Hurstwood Park Neurosciences unit in Sussex in the United Kingdom.

He is the author of multiple scientific articles and several textbooks in neurosurgery. He presents his research at conferences and his passion is patient education.

Dr Liebenberg works with a dedicated team of professionals that include occupational therapists, physiotherapists, biokinethetists and other allied medical personnel.

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