LOW BACK PAIN by Dr.C.A. Gauci

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GRAPHICS AND LAYOUT
BY BASIA JANKOWIAK

I. The Facts (Boring or Otherwise)

Today, more than a million people will awake in agony, scarcely able to move because of backache, an innocuous word for a major problem. For some it will be the first time; for most, this will be a common way to start the day. Many will have spent the night trying and failing to sleep, or crashing out, so tranquillised on anti-depressants, sleeping tablets or painkillers that this morning they drag themselves into consciousness as if coming round from a general anaesthetic. Both insomnia and too-heavy sleep will leave them feeling so dopey this morning they can barely function. For some, the back pain will be a low-level ache, not sharp or agonising, but always there, permeating everything you do, like a nagging headache, and the longer it lasts, the more damage it will do, both physically and mentally. For others, it's like having a wrecking ball hitting your spine, or lightning bolts striking you at random and frequent intervals – but no matter what form your pain takes, it's a big problem.

The back is the cause and source of more chronic pain than any other part of the body. During the course of this year, 16.5 million people in the United Kingdom will rely on drugs or physiotherapy or the scalpel, or any number of medical, complementary or alternative treatments, to manage their back pain[1]. Four out of five people in this country will suffer from low back problems at some point in their lives: that's eighty per cent of our adult population brought down by chronic pain for 24 hours or more[2]. And that figure is rising dramatically: ten years ago it was thirty per cent[3] of adults; today it is just under half.

There are innumerable statistical studies covering every aspect of back pain, ranging from the number of working days lost to the amount spent on pain medication, and they all add up to one thing: the cost is huge. Back pain is an enormous and increasing problem in the Western world, not just in terms of money and work output, but also in emotional and psychological wellbeing.

DID YOU KNOW?

In a typical National Health Service year[4] up to 7 million patients will consult a GP because of back pain. Of these, 1.6 million will be referred to consultants in hospital out-patient departments, and 100,000 of these referrals will be admitted to hospital. Just under a quarter of the referrals, around 24,000 patients, will have surgery to treat their back pain.

These referrals, from the GP right through to surgery, cost the NHS £500 million a year. Add in private consultations, treatments and prescriptions and you have a total healthcare bill of £700 million – but that almost pales into insignificance next to the benefits payouts and the lost production hours. The government spends about £1.4 *billion* on half a million back pain sufferers. Industry losses are estimated at £3.8 *billion*.

So in one year back pain will cost this country nearly £6 billion. And that's underestimating the problem.

In twenty-five years the number of working days lost as a direct result of back pain has increased tenfold, from 8 million to 81 *million*. Half of this is accounted for by the eighty-five per cent of people who are off work for short periods – seven days or less. And the longer a person is off work with back pain, the less likely they are to go back to work. After six months there is a fifty/fifty chance of returning to their job, but that drops to five per cent for those who have been on sick leave for more than a year[5].

Back pain is spread fairly evenly across the country in terms of age, sex and geography, and there is even more bad news: it is not only adults who are at risk. There are many reasons for the increase, not just our ageing population. How we sit, how we work, how – *if* – we exercise, what we eat, what we drink, what we wear, what we drive: all these things can have long-term, often dire consequences for the lower back.

As a society we are far less active today than at any previous time, and lack of exercise plays a major role – even for children, now PE and sports are a much smaller part of their daily school-lives than even twenty years ago. Many of us have sedentary jobs, and most people will use lifts rather than stairs to get to offices or classrooms, and cars to get to work or school, rather than walking. Gym membership is on the increase, but gym *attendance* is not! Most adults drive, but how many bother to properly adjust the car seat to their own body? Such a simple thing often has a major, long-term impact on back health.

Diet affects physical health too, but not just in the obvious ways. It is common knowledge that too much fat, especially in fast food, is bad for you, but what is maybe not so well-known is that it can also exacerbate back pain: fatty food clogs arteries, slowing blood circulation, and that makes it harder for the body to heal itself – so a relatively simple back injury like a sprain could take three times as long to repair itself because of bad eating habits. Obesity obvious impacts on backs; the more you weigh, the more the back strains to deal with it.

Even the bag you carry or the shoes you wear can, over a period of time, damage your back – wearing high heels all the time can throw your body out of alignment, putting strain on joints that were never designed for those awkward angles. It's easier to trip over, twisting your back (or ankle, or other parts of the body), and

that can have knock-on effects. Right across Europe there are fears that the weight of schoolbooks is having an adverse effect on our children[6]. Though the first reports were jumped on (and often exaggerated) by news media hungry for scare stories, there is a very real problem, for no child should carry more than ten per cent of his or her body weight, and many carry much, much more. At least the current fad for backpacks helps – although the trendiest may not distribute the weight properly – but even the worst designed is better than a heavily laden canvas shoulder bag, for example, which can damage not just the shoulder joint and the neck, but the whole of the spine, even hurting the hips and knees. But fashion changes with the wind and before we know it wicker baskets or something equally impractical will be in and we'll have a spate of children complaining of sore arms and backs and physically damaged for the rest of their lives.

Other things that make a difference include choice of job: back pain complaints are most common in those who have manual labouring jobs, both skilled and partly skilled, and unskilled jobs[7]. More surprising, especially to those with little medical knowledge, low back pain can be one of the side-effects of smoking – along with abnormally high blood cholesterol levels and damaged blood circulation, smoking can cause lumbar spondylosis (bony growths on the vertebrae) and degenerative disorders of the intervertebral discs (the springy pads that connect the vertebrae), amongst other things. Teens who smoke are two and a half times as like to develop low back pain.

It isn't just physical factors that affect backs. Psychological and social factors can cause or contribute to chronic low back pain, in all age groups. Parents with non-specific low back pain will often pass the condition on to their children[8]. Job satisfaction is important: most pilots love their jobs, and they report far fewer back

problems than their stressed-out flight crews. It may look like truck and bus drivers have similar jobs, but investigators found that bus drivers have more back problems despite having less strain on the back – because they have much lower job satisfaction than truck drivers. Television is another surprising culprit: not just lifting them, but watching: in one study nearly sixty per cent of children who watched TV between one and two hours each day had experienced back pain – and that's down to poor posture and furniture that doesn't properly support the body.

Today 1.3 million people have awakened wondering what's wrong with them and if they will ever be pain-free again.

THERE IS GOOD NEWS: THESE DAYS THERE ARE OPTIONS.

II. The Back: The Cause of So Many Problems.

One of the big difficulties with back pain, as with any form of chronic pain, is finding out what is causing it, and where the problem actually is – it may not always be what looks obvious. Until you have identified the type of pain and its cause, you cannot properly treat the problem. It's no good just telling your doctor, 'It's my back: it hurts all over'; you need to be able to describe far more if you are going to get the right treatment for your condition.

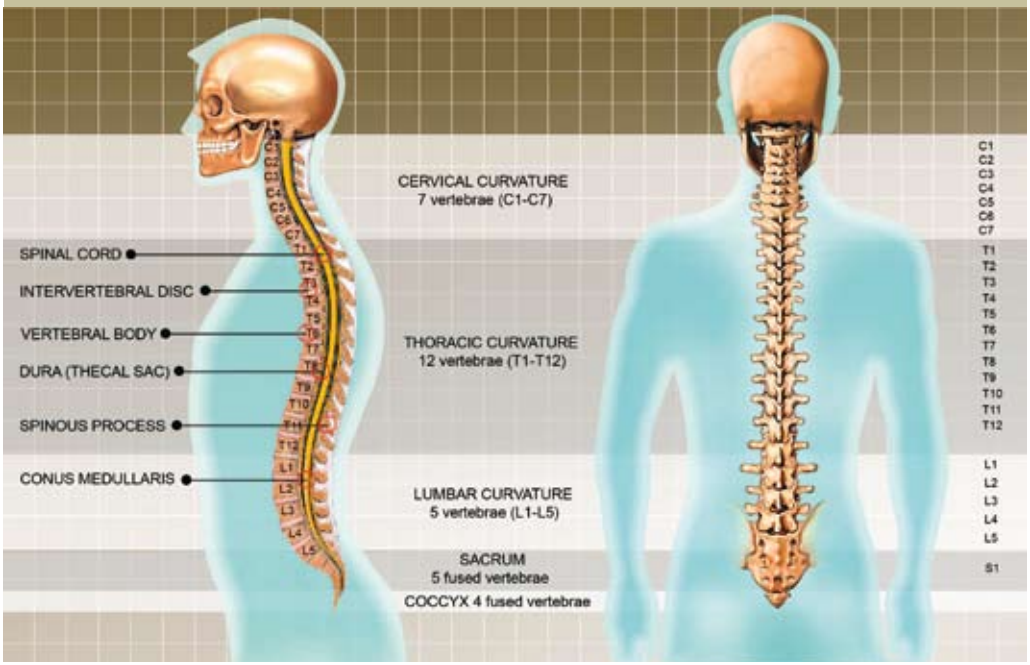
To start with, it helps to understand the back itself and how it works, and to be able to translate into plain English a long list of bony parts with complicated names, often in Latin, that appear to bear no relation to anything. Getting to know that complicated medical terminology for the bits that make up your back will pay dividends when you are faced with a doctor who doesn't take into account your lack

of a medical degree. This inability to explanation is not always intentional, but even if it is, the golden rule is: *if you don't understand, ask*. And don't be put off by heavy sighs and looking at watches: it's your body and if you're still confused, keep asking questions until you get it.

The spine, or backbone, stretches from the head to the pelvis. Its proper anatomical name is the *vertebral column* **[PICTURE A]** and it acts as a support to the body, bearing its weight. The vertebral column also houses the spinal cord and the spinal nerve roots. The bony building blocks of the vertebral column are called the *vertebrae*.

There are seven movable vertebrae in the neck (called the *cervical spine* and

PICTURE A The Vertebral Column, seen from the side & from the back



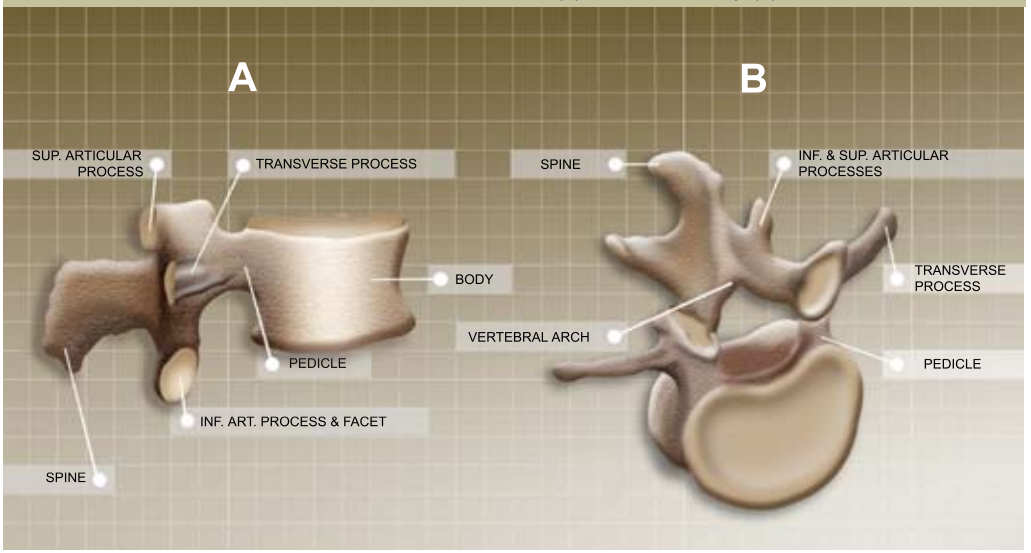
numbered C1 to C7), twelve movable vertebrae in the trunk (the *thoracic spine*, T1-T12) and five movable vertebrae in the lower back (the *lumbar spine*, or L1-L5). As well as these movable vertebrae, there are a number of vertebrae joined together at the lower end of the spine: five of them form the sacrum and four vertebrae make up the *coccyx*, or tailbone.

The lower end of the back is often called the *lumbosacral spine*, and it is this area that is most often affected by back pain. It is made up of the *lumbar vertebrae*, the *sacrum* and the *coccyx*.

This is the basic structure of a lumbar vertebra **[PICTURE B]**. Lumbar Vertebra 1 (L1) starts at the top end of the lower back, with Lumbar Vertebra 5 (L5) at the lower end, separated from the sacrum by the *lumbosacral disc* (L5/S1).

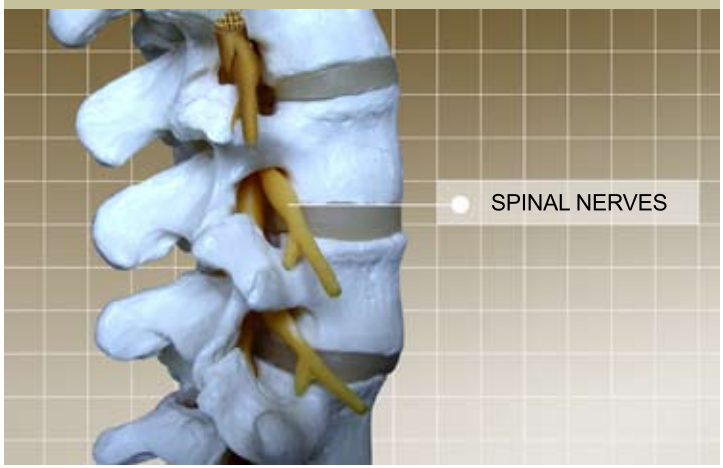
Each vertebra consists of a solid front bit, called the *vertebral body*, and a hollow back bit, the *vertebral arch*. The vertebral arch is made up of two *pedicles*,

PICTURE B A Lumbar vertebra seen from the side (A) and from the top (B)



stubby bits of bone that extend from the sides of the vertebral body, and two *laminae*, the broad flat plates that project from the pedicles and join in a triangle to form a hollow archway (the *foramen*). The space inside the vertebral arch, the *spinal canal,* contains the *spinal cord* and spinal *nerve roots*: these join up to form the *spinal nerves* **[PICTURE C]**. The spinal nerves pass through openings between the vertebrae (known as the *intervertebral foraminae*) to reach various parts of the back and legs. The spinal nerve roots, which come from the end of the spinal cord, pass down through the spinal canal before exiting from the laminae; they are collectively called *cauda equina* – horse's tail in Latin – and that is what they look like.

PICTURE C A Spinal Nerve



Each vertebra has two large wings of bone on either side, called the *transverse processes*, and a single bony tail, the *spinous process*. The processes are attachments for the *muscles* and *ligaments* that make up the back.

The body of each vertebra is connected to the one above and the one below by a springy pad called the *intervertebral disc*: this vertebra-disc-vertebra unit is

called the *intervertebral joint*.

The discs are numbered according to the vertebrae they separate, so the disc between the second and third lumbar vertebrae (L2 and L3) is called the L2/L3 disc; the one between the fourth and fifth lumbar vertebrae (L4 and L5) is the L4/L5 disc. The disc between L5 and the top of the sacrum (S1) is the *lumbosacral disc*. This disc is immensely important because it bears the entire weight of the upper part of the body, and it is a very common source of back trouble.

The discs are made of a tough outer envelope called the *annulus fibrosus*, with a soft, jelly-like centre, the *nucleus pulposus*, which is a sac filled with water, rather like a jelly with a liquid centre. A normal healthy disc is ninety per cent water, which makes it very elastic and flexible, but the water content decreases with age and with degenerative disc disease, and the disc becomes prone to problems as it gets less supple.

At the back of the vertebrae lie the *facet joints*, which work in pairs to connect the vertebrae together. It is this three-joint complex – the vertebral arches, discs and facet joints – which allow flexing, bending, rotating and stretching movements, both between the individual vertebrae, and of the vertebral column as a whole.

The skeleton of the back is supported by a series of *ligaments*, tough bands of tissue which anchor the bones together. They make the back stable and prevent excessive movement.

The muscles, which are attached to the bones and ligaments, are responsible for supporting the spine and, most importantly, for generating movement.

III. Common Causes of Low Back Pain

STRAINS & SPRAINS

If a sudden force is applied to a muscle before it is fully ready for action, it can *strain* the muscle, sometimes rupturing the muscle components, known as *muscle fibres.* This results in localised pain, swelling and muscle tightness *(muscle spasm)*. Overstretching a ligament can cause a *sprain*, or even a complete tear of the ligament, which can be very painful, often more painful than a broken bone.

Sprains and strains in the back are caused by lifting heavy objects the wrong way, or by sudden twisting movements. Very often a simple strain or sprain will recover spontaneously, within three to four weeks, without the need for any treatment other than hot and cold compresses, a few days' rest (if the pain is very severe) and then some simple back exercises.

TREATMENT

Treatment for simple strains and sprains where the pain persists should start with hot and/or cold compresses on the area, more stretching exercises, physiotherapy, including Ultrasound (which uses pulsed sound waves to help damaged tissues to heal) and interferential therapy (low-frequency electrical stimulation which also promotes faster healing), osteopathy (restoring, maintaining and improving the working of the musculoskeletal system), and medication in the form of a suitable *analgesic* (pain killer) or *anti-inflammatory* drug to bring down the swelling.

SLIPPED DISC

The twenty-three vertebral discs in the spine act as shock absorbers, allowing the flexibility the back needs for normal daily activities, so as the body twists and bends and stretches, so the discs are constantly changing shape. The term 'slipped disc' is one of the most common – and *wrong* descriptions of back pain, but it doesn't really describe what has actually happened. When someone says they have a slipped disc, what they generally mean is that they have a *herniated (or subligamentous) disc*, which is what happens when part of the disc slides out from its normal position between two vertebrae.

Over a lifetime the annulus can suffer from tears, caused by acute injuries like falls or car crashes, or by long-term problems ranging from poor posture to obesity.

There are four types of herniated or slipped disc; the first two cases are also known as *contained disc herniations* and the latter two *uncontained disc herniations*. Ordinary X-rays will show up disc degeneration, but an MRI (Magnetic Resonance Imaging) scan is needed to determine a herniated disc.

When the disc bulges out between the vertebrae, with the tough outer covering, the *annulus fibrosus,* remaining intact, rather like a bulging tyre, it is called a bulging or protruding disc.

A *prolapsed disc* happens when the soft central part of the disc *(the nucleus pulposus)* leaks into the tough outer casing, the annulus, but the outer rim of the annulus fibrosus remains intact, even though it sticks out from between the vertebrae.

An *extruded (transligamentous)* disc is when the annulus, the outer covering, tears all the way through and some of the nucleus pulposus, the soft central part of the disc, flows out into the outer space which surrounds the spinal cord (the *epidural*

space). In this condition, the jelly-like nucleus pulposus is still connected to the disc.

A *sequestered disc* is the end-stage of an extruded disc, when the central jelly-like nucleus pulposus is no longer attached to the annulus and floats freely in the epidural space, like a piece of loose cartilage in the knee.

When the disc 'slips', it can compress a spinal nerve root in the epidural space, and this causes *nerve root (radicular)* pain. An otherwise simple disc compression can be made worse by the disc itself, because the material that makes up the nucleus pulposus is an irritant: this can cause a very painful inflammation around the nerve root. The nerve roots move in the epidural space as the back and legs move and if the inflammation is left untreated (becoming chronic), scar tissue will form around the affected nerve root(s). That will in turn limit free movement within the epidural space, which will make the pain worse.

This condition is commonly called *sciatica,* and the pain doesn't just affect the lower back, but can be felt travelling down the leg into the foot. It is often accompanied by very sharp pins and needles, and sometimes by a weakness in the leg. Simple involuntary actions like coughing or sneezing usually make the pain worse.

Different nerve roots project pain down different parts of the leg, so clinical examination needs to be supplemented by an MRI (Magnetic Resonance Imaging) scan, which produces cross-sectional images of organs and other internal body structures. This will show the doctor which disc is causing the problem.
If nerve compression is left untreated, it can lead to actual nerve damage in the affected nerve root(s), and this creates *neuropathic pain*, which further complicates the clinical picture.

TREATMENT

Surgery is only used for a slipped disc when there is nerve root compression (diagnosed both clinically and by use of an MRI scan) which has not responded to other treatment. If the MRI scan shows a disc slipped to one side with pain down the opposite leg, the surgeon will not normally operate. Treatment for a slipped disc is usually a combination of physiotherapy and medication (analgesics to deal with the pain and anti-inflammatories to take the swelling down), often supplemented by a *caudal epidural injection*. In this procedure a large needle is used to insert a mixture of local anaesthetic and steroid into the epidural space around the painful nerve roots, to reduce swelling and pain. It is a very safe and useful procedure when carried out by a skilled doctor.

In certain cases of compression (known as a *central disc prolapse*) there may be problems with the bowel and bladder: this is the only time emergency surgery would be performed.

Surgery for a slipped disc (*decompression*) involves removing the bit of disc that is compressing the nerve. If this is an option for the condition, make sure the surgeon explains in detail what is going to be done, and the advantages and disadvantages of that particular operation, including recovery periods and after-effects. There are several techniques currently in use:

Discectomy is very common and usually very successful. The surgeon makes a small incision over the level of the slipped disc and removes that bit of the disc which is pressing on the nerve root. You would normally be in hospital for 48 hours following surgery.

Microdiscectomy is similar to **discectomy**, but the surgeon uses an operating microscope and makes a much smaller incision. The hospital stay is generally shorter.

Percutaneous discectomy is carried out using a local anaesthetic and a very small incision, through which the surgeon inserts a small tube called an *endoscope* which is equipped with a miniature video camera. This enables the surgeon to see the disc fragment which is compressing the nerve, to cut it away using special instruments and then to suck it up through the endoscope. This procedure reduces damage to the rest of the body and is done on an out-patient basis. The recovery period is very fast, and you are often sent home the same day. The disadvantage of this technique is that the limited vision means the surgeon cannot be sure that the disc fragment has been *completely* removed.

Laser discectomy is similar to **percutaneous discectomy**, but the disc fragment is destroyed using a laser beam.

OSTEOARTHRITIS OF THE SPINE

There are more than a hundred different types of arthritis, and the cause of most of them is still unknown. Osteoarthritis is a 'wear and tear' condition, a term used to describe the pain, stiffness and swelling that results from damage caused to joints by wear and tear, trauma (an accident, or fall, for example), old age – or for no good reason at all. Osteoarthritis is probably the most common cause of back pain, and it usually affects people in their fifties and sixties (although there are always exceptions to every rule). It seems to affect women slightly more often then men.

Osteoarthritis changes the lining of the joint surfaces (*articular cartilages*),

and as a result, the surface of the joints in the vertebral column become roughened. This in turn reduces the joint space, until eventually the bones end up rubbing on one another. Bony outgrowths, or *osteophytes*, may appear along the junction of the vertebrae and the discs. Sometimes these osteophytes join together to form bars of bone, and the vertebral bone next to the intervertebral joints may also become eroded.

Osteoarthritis of the spine is often accompanied by degeneration of the intervertebral discs, which leads to *discogenic pain*.

The main symptoms of spinal osteoarthritis, stiffness and aching, can be helped enormously by exercise, but the osteoarthritis may itself contribute tospinal canal stenosis and to *facet joint pain*.

TREATMENT

The pain from osteoarthtitis can be helped by drugs, i.e. analgesics and anti-inflammatories; when it is causing specific types of pain e.g. facet joint pain, it can be helped by specialised interventional procedures.

SPINAL CANAL STENOSIS

When osteophytes, the bony growths caused by osteoarthritis, form along the junction of the vertebrae and discs, they can narrow the spinal canal (which contains the spinal cord and spinal nerve roots). Osteoarthritis can enlarge the facet joints (which lie at the back of the vertebrae and connect the vertebrae together), and it can cause thickening of the ligaments inside the spinal canal.

All these growths intrude into the space normally occupied by the spinal cord and its nerve roots, and the bigger they grow, the more pressure they put on the cord

and nerve roots – and pressure equals pain. When the osteophytes invade the space through which the spinal nerves leave the vertebral column (the *foraminal stenosis*), that puts pressure on the nerves themselves, and an already painful condition becomes agonising.

Spinal stenosis (stenosis is a Greek word meaning choking) causes pain or numbness in the back and down the legs, and walking makes it worse. Legs may feel cramped, tired or weak, and the bad news is that although it may improve if you sit, crouch, or lie in the foetal position (on your side with your knees tucked up to your chest), it reappears as soon as you start walking again. This is called *spinal claudication*. In severe cases, stenosis can cause bowel and bladder problems.

TREATMENT

Severe spinal stenosis may require an operation called a *laminectomy*, where the surgeon takes out the laminae, the bones on the back of the damaged vertebrae, to create more space in the spinal canal for the spinal cord and nerve roots.

In some cases, the surgeon will perform a *foraminotomy* (also known as a *foraminectomy*), a more limited operation than removing all the laminae; it is used to create more room in a foramen which is clogged up by osteophytes.

FACET JOINT PAIN & SACROILIAC JOINT PAIN

The *facet joints*, which sit at the back of the vertebrae, can be damaged by a sudden twisting injury, which will cause very acute pain, or by osteoarthritis, which is felt as a chronic low-grade ache with regular acute flare-ups.

The facet joints are a *very* common trouble spot, and although the pain is felt in the back, it often travels down the leg(s), usually (although not always) as far as the

knees. The pain is made worse by both prolonged sitting and by prolonged standing, but it can be helped by limited gentle movement. Disturbed sleep is a common side-effect, because of the need to get up and walk about to relieve the pain at regular intervals. The back is often very stiff first thing in the morning.

TREATMENT

Initially facet joint pain is best treated by physiotherapy and/or osteopathy, with analgesics (painkillers) to help deal with the pain. The use of carefully targeted injections of local anaesthetic and steroid can offer longer-term relief – often for up to three months. This can be done as an out-patient procedure, and is carried out under X-ray control: the medical team will be watching the whole operation on a scanner to ensure the precise placement of the needle. These simple injections may be all that is required for acute injuries.

Longer-term problems often respond to the technique of *radiofrequency facet joint denervation*, where the pain specialist locates the tiny nerves which supply the joint and destroys them with a high-frequency electrical current. The medic will always carry out initial simple injections to locate the nerves in question before destroying them. This technique, in the hands of experienced practitioners, is very straightforward. It is done as an out-patient procedure under local anaesthesia and intravenous sedation.

ANKYLOSING SPONDYLITIS

The *Sacroiliac Joint* lies between the sacrum (the five joined-up vertebrae near the end of the spine) and the part of the pelvis near the hip joint. It can be affected by the same conditions as the facet joints, and is treated in a similar way.

Sometimes sacroiliac joint pain can be the first sign of a condition called *ankylosing spondylitis* (AS), a form of arthritis which attacks the spine, causing increasing stiffness and immobility. The name is Greek: ankylosing means fusing together; spondylitis means inflammation of the vertebrae. The basic cause of AS is a disturbance of the body's immune system, which makes the body literally attack itself. The joint linings and the spinal ligaments get inflamed, and calcium is deposited in the area of inflammation, forming new bone which fuses the vertebrae together. The disease nearly always begins in the *sacroiliac joints* and then extends up the spine. Though the spine – particularly the lower back – is the part of the body most commonly affected, other large joints can also be involved. AS can also damage the eyes (*iritis or uveitis*, inflammation of the iris and its attachment to the outer wall of the eye, the uvea; usually the first symptom is a slight blurring of vision in one eye but the main symptom is a sharp pain and a dramatically bloodshot eye which will require immediate treatment). The heart can be at risk (the aortic valve may leak and the electrical activity within the heart itself can be uneven).

Ankylosing spondylitis affects many more men than women – one in 500 women to one in 200 men – and runs in families. Young white males between the ages of fifteen and twenty-five are particularly susceptible. Nine out of ten people with AS will have a specific genetic tissue type (*HLA-B27*, for those with an interest in genetics), but this is not the case in approximately ten per cent of sufferers. As sometimes occurs in people who also suffer from *psoriasis* (a non-contagious skin disease) and/or *ulcerative colitis*, also known as colitis or proctitis, a disease that causes inflammation and sores (ulcers) in the lining of the large intestine.

The main symptoms of AS are pain, and an increasing stiffness which creeps up the back. These symptoms are usually worse in the mornings or after periods of

rest or inactivity, and they can often be relieved by gentle exercise, but flexibility and mobility inevitably worsen over time.

If enough joints are affected by AS, the entire spine becomes damaged and flexibility is completely lost: in these cases, the spine will not bend at all. The ligaments which join the ribs to the spine may also be affected by the disease and become rigid themselves, which can cause breathing difficulties.

TREATMENT

Medications are used to treat ankylosing spondylitis, both to reduce inflammation and to suppress immunity. Physiotherapy and exercise will help improve posture, spine mobility and lung capacity.

SPONDYLOLISTHESIS

When a vertebra slips forward on the vertebra below it, the condition is called *spondylolisthesis*. Very rarely, the vertebra may slip backwards, which is called *retrospondylolisthesis*.

Factors which contribute to spondylolisthesis include defects in the *neural arch (spondylosis)*, osteoarthritis of the facet joints or trauma. Sometimes people are born with it.

The symptoms can range from minimal to considerable – if it is mild, you may not even know you have it unless it shows up in an X-ray. It will vary with the degree of slip, which can also range from moderate to severe. In some cases there may be some back pain and stiffness, but if the slip causes pressure on the nerve roots, then pain may radiate down the leg. In extreme cases it affects the posture, causing a swayback, protruding stomach and a shortened torso, and walking becomes more difficult.

TREATMENT

Mild degrees of spondylolisthesis can usually be managed with physiotherapy and painkillers. More severe cases may require a surgical procedure called *spinal fusion*, when the vertebrae are joined together (fused) to form a single, stable, unit. Spinal fusion is used to give stability when a spine is unstable because of spondylolisthesis,

or other conditions, including trauma. It may involve one level (*single level fusion*) or many levels (*multilevel fusion*).

The operation may be done by using your own bone (normally taken from the pelvis), or by using all manner of artificial aids: plates and screws, wires, metal cages filled with bone chips – even elastic bands can play their part! A spinal fusion is a major operation, and you will be in hospital for seven to ten days following surgery.

In some cases of spondylolisthesis, the pain specialist may be able to reduce pain by carrying out *radiofrequency denervation of the facet joints* where the slip is, destroying the nerves that feed the joint with a high-frequency electrical current.

OSTEOPOROSIS

Calcium and other minerals are the raw materials for healthy bone production. They, together with body hormones (especially oestrogen in women and testosterone in men) play an important role in bone formation. Vitamin D is needed to help with the absorption of calcium from the food we eat; it also works to incorporate this vital mineral into our bones.

Bone density and strength gradually decrease with age in everyone, but with osteoporosis, or brittle bone disease, the affected bones become severely depleted of calcium and phosphorous, which makes the bones more fragile and highly

susceptible to fractures.

Contrary to popular belief, osteoporosis is not a female-only complaint: in the UK alone one in three women and one in twelve men over the age of fifty will develop the disease. As we get older, that figure increases until, at the age of sixty-five, eighty per cent of women (excepting women of Afro-Caribbean origin, who are less prone to the disease than white or Asian women) will have osteoporosis. Brittle bone disease has serious consequences financially as well as physically: every three minutes someone in the UK breaks a bone because of osteoporosis, and the three million sufferers currently cost the NHS and the government more than £1.7 billion each year.

Smoking has a direct impact on decreased bone density, and increases the risk of fracture – and smokers who break a bone take longer to heal, and may experience more complications. Women who smoke produce less oestrogen, which in turn can lead to earlier menopause.

Alcohol is also associated with increased risk of osteoporosis; whilst many doctors have been suggesting drinkers cut down to no more than one unit a day for women, two for men, increasingly they are suggesting that the only safe limit for alcohol is to stop drinking completely. Long-term steroid use can also lead to osteoporosis.

The disease affects every bone in the body, but the first symptoms often appear in the back, because the bones of the spine are constantly under an enormous amount of pressure. The hip and wrist bones are also particularly susceptible to osteoporotic fractures; osteoporotic hip fractures contribute to 15,000 deaths a year..

The loss of bone material that occurs in osteoporosis does not in itself hurt, but the fractures of the bones which result from osteoporosis can be very painful,

particularly if nerves get trapped by the fractured bony ends.

The best way to prevent osteoporosis is by making sure there is enough calcium and Vitamin D in your diet. Regular weight-bearing exercises to strengthen the back muscles are also very important: the stronger the back muscles, the stronger the bones of the vertebral column, and the less likely they are to fracture. Every woman over the age of sixty-five should be tested for osteoporosis, which is easily detected by special tests which can be ordered by family doctors; the best at this time is the *Dual Energy X-ray Absorption (DXA scan)* Scan.

TREATMENT

There is medication available for both the prevention and the treatment of osteoporosis:

Biophosphonates are drugs which reduce the rate of bone turnover and increase the amount of healthy bone, which in turn reduces the incidence of fractures. These drugs, which include Alenderic Acid (*Fosamax*®), Risedronate Sodium (*Actonel*®), Disodium Etidronate (*Didronel*®) and Strontium Ranelate (*Protelos*®), are very useful in both the prevention and treatment of osteoporosis.

Calcitonin is a hormone which slows down bone removal. It may be useful for those with a high risk of osteoporosis for whom biophosphonates are unsuitable.

Hormone Replacement Therapy (HRT) is not normally the first-line treatment for long-term prevention of osteoporosis in women above the age of fifty, but it may be necessary if other medication doesn't work or cannot be tolerated.

Selective Oestrogen Modulators (SERMs) mimic the beneficial effects of oestrogen on the bones without the risks of cancer of the breasts and/or uterus; these include Raloxifene (*Evista*®).

Testosterone hormone therapy may be useful in men with low testosterone levels to help maintain bone density.

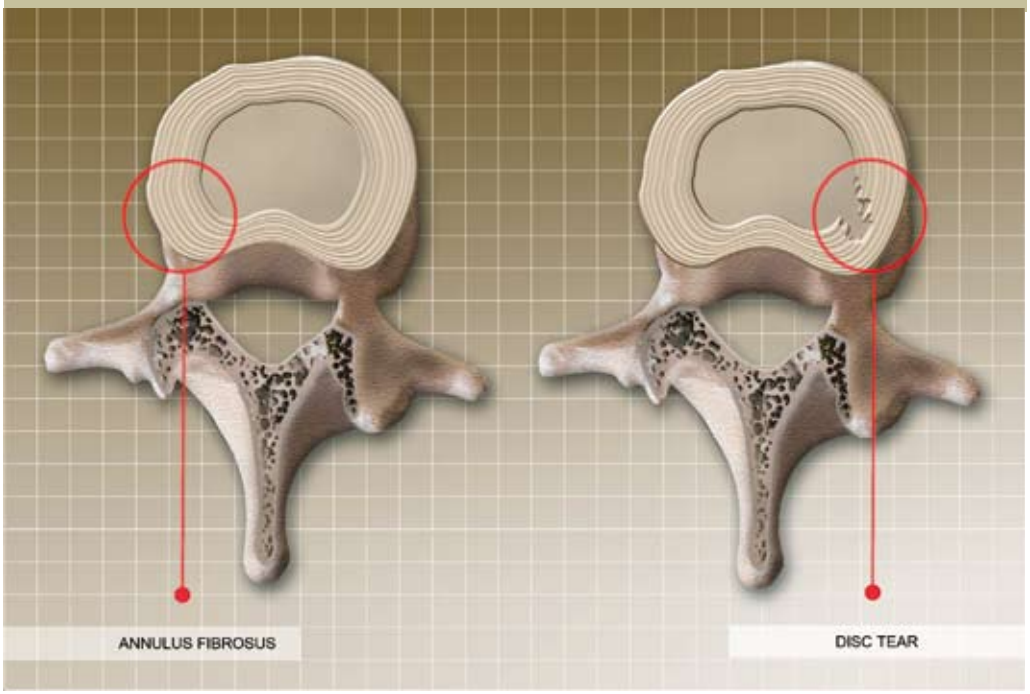
In some cases, pain specialists may be able to help people suffering with pain from a spinal fracture (*crush fracture*) using a technique called Vertebroplasty, where acrylic cement is inserted into the damaged bone. The cement acts as a scaffold, helping to prop up the fracture.

The National Osteoporosis Society has a very informative website (***http://www.nos.org.uk/***) which is full of useful advice about the prevention and treatment of osteoporosis.

DISCOGENIC PAIN

A *prolapsed disc* can cause nerve root pain, but a damaged disc can also trigger back pain *without* causing any nerve root pain. Pain from a damaged intervertebral disc is called *discogenic pain*. Discs are like skin, and with age, they lose water and elasticity and become much less supple. As they lose their elasticity, they become much more susceptible to the effects of pressure and of general wear and tear. They can graduallydegenerate and shrink. In some cases the tough outer casing, the annulus fibrosus, may crack (*annular tear*) **[PICTURE D]**, and irritant material from the nucleus pulposus can seep into the tear and make the nerve endings in the annulus more sensitive to the effects of pressure and movement.

PICTURE D The Annulus Fibrosus of the Lumbar disc



A disc can also be damaged by inflammation (*discitis*); those most at risk include the elderly and those with suppressed immune systems, diabetics, those undergoing certain drug therapies and anyone with an immune deficiency disease.

Discogenic pain mimics facet joint pain, but it doesn't respond to the same treatments, like facet joint injections or radiofrequency facet joint denervation (where nerves supplying the joint are destroyed).

Disc problems can be picked up by an MRI scan, but in some cases further exploration in the form of a *discogram* may be necessary to pinpoint which particular disc is causing the pain. In this procedure, the doctor will insert a needle into the disc and inject an X-ray dye; this has a two-fold effect: as well as allowing a much better

picture of the damaged disc, it also allows the specialist to see if the pain can be reproduced.

TREATMENT

Physiotherapy to strengthen the back muscles and medication to relieve pain are usually the first ports of call for discogenic pain. The technique of *Pulsed Radiofrequency* can be useful: a high-frequency current is used to 'stun' the nerves responsible for carrying pain information from the lumbar discs to the brain.

A torn disc can be treated by either the *IDET* (intradiscal electrothermal therapy) procedure, or by *RF Annuloplasty* – they are different methods of applying heat to contract and shrink the disc wall fibres, closing up tears, and cauterising nerve endings in the disc, making them less sensitive to pain.

In very severe cases, spinal fusion may be necessary to immobilise the affected area of the spine. The damaged disc will removed and the space previously occupied by the disc is then filled in with bone chippings (usually taken from another part of your body). The vertebrae above and below the space are then locked together by one of several techniques and the bone gradually fuses across the space previously occupied by the flexible disc.

The immediate pain relief can be very good; there's generally an eight per cent chance of success – but spinal fusion has a number of downsides. Fusing the vertebrae means that segment of the back will no longer bend and twist like a normal back. Because the amount of movement is severely decreased, that can lead to a stiff back – and that stiffness in turn means the segments of spine above and below the fusion are subjected to increased stresses and the end result is that someone who has a spinal fusion at one level is very likely to develop problems with the discs

above or below that level.

These problems have led to the development of a new operation, *Disc Replacement Surgery,* where the damaged disc is removed and replaced with a metal and plastic (or carbon fibre) implant which is designed to move like a normal disc. The obvious advantage over conventional spinal fusion is that it should (in theory, at least!) allow movement, and so remove the probability of extra stress on the spine around the damaged area. However, this is a relatively new operation, and there are no long-term results yet.

MYOFASCIAL PAIN SYNDROME

Myofascial pain (MPS) is a chronic musculoskeletal condition characterised by muscle spasm and pain. The fascia is a tough connective tissue which covers the body in a three-dimensional web. It surrounds every muscle, bone, nerve, blood vessel and organ of the body, all the way down to the cellular level, so if there is a malfunction of the fascial system (whether it is caused by trauma, bad posture or inflammation) it can lead to MPS. It has *trigger points*, small areas, usually within a tight band of muscle, which are very sensitive to pressure. If you press one of these trigger points with a finger, it will produce pain at a distant but defined site. Sometimes there's a local twitch when the trigger point is tapped.

As well as the pain, which can be intense, MPS can make muscles stiff and sore and joints difficult to move easily, sometimes seizing up. General fatigue is also a huge problem, and not just because of the sleep and psychological disturbances that are part and parcel of the unpleasant condition. People who suffer from myofascial pain syndrome often adopt a protective posture to avoid using the affected area, but hunching over, for example, rather than relieving pain, can actually

make things worse, as it strains other areas of the body which are being forced into unnatural positions.

Although the precise cause of myofascial pain is still not known, tissue injury is a common factor, either from an accident, or from RSI (repetitive strain injuries like tennis elbow or housemaid's knee), as is stress or nervous tension. MPS can exist as either a *primary condition* – the main problem – or as a *secondary condition,* associated with anything from damaged discs, nerve roots, spinal facet joints, ligament tears, or from nerve compression of any sort. It is quite common with whiplash injuries to the spine.

Left untreated, the affected muscle tissue stiffens up until it has lost all elasticity (this is called *fibrous tissue*), and because it no longer stretches and contracts properly, the way muscles work, it becomes a vicious cycle, and the more muscle vanishes, the more fibrous tissue is formed, and less well the affected joint will function.

TREATMENT

The best treatment for myofascial pain is active physiotherapy, but sometimes the muscles spasm so badly that it is very difficult for the physio to do anything useful.

In this case, injecting local anaesthetic into the trigger points (*Trigger point Injections*) can help; there will be an assessment a week later, and if these injections have produced good (even if short-lived) relief, the trigger points can be re-injected, produced good (even if short-lived) relief, the trigger points can be re-injected, this time with *Botulinum toxin* – these days better known as Botox, and famous for its cosmetic applications – to calm the spasms. Botulinum toxin (*Botox*® or *Dysport*®) temporarily relaxes the muscle fibres so the physio can use stretch physiotherapy on the main muscle mass.

There is mounting evidence that Botulinum toxin can be doubly beneficial: as well as calming muscle spasm, it also reduces actual muscle pain, by blocking the localised production of pain-producing substances.

FIBROMYALGIA

Fibromyalgia (also known as FMS) is a common, chronically painful and frequently disabling musculoskeletal disorder of unknown origin, which isn't terribly helpful. Unlike myofascial pain, this is not really a muscle disorder, and there is no muscle spasm: fibromyalgia is *total body pain*, chronic, diffuse, and felt *all over* the body, in all the soft tissues (muscles, ligaments and tendons). Essentially, tolerance of pain drops rapidly until you end up in a state of 'low pain threshold' – so things that wouldn't normally hurt feel painful all the time. Fibromyalgia causes changes in the chemicals in the brain and spinal cord which would normally reduce pain perception. It is these changes that change the pain tolerance levels and account for the body-wide suffering: aching and/or burning all over, and muscles feeling like they have been overworked or stretched beyond their limits.

Fibromyalgia causes pain all over the body, but there are also 'tender spots', points of tenderness all over the body, on both muscle and bone. (These differ from the trigger points of myofascial pain: with tender points the pain is felt only in the place where the pressure is applied; with trigger points, pain is felt both where the flesh is pressed and also at a more distant site.) Chronic fatigue is a major part of the disorder, and you might feel like your plug has been pulled, leaving you with no energy at all. Sleep is badly affected: most people have an associated sleep disorder (called the *alpha-EEG anomaly*), where deep level (or stage 4) sleep is constantly interrupted by bursts of awake-like brain activity, and *sleep apnoea*, *sleep myoclonus*

(night-time jerking of the arms and legs) and *restless legs syndrome* are also common. *Irritable bowel syndrome*, (constipation, diarrhoea, frequent abdominal pain, abdominal gas, and nausea); recurrent tension headaches or *migraine*, *Temporomandibular Joint Dysfunction Syndrome* (sometimes referred to as TMJ or TMD, it causes tremendous jaw-related face and head pain, related to the muscles and ligaments surrounding the jaw joint), and various other nasty symptoms are often part of fibromyalgia.

Fibromyalgia affects up to six per cent of the general population, and accounts for a large number of referrals to pain clinics. It is much more common in women (ten women to every one man) and although the average onset is between forty and sixty, it can occur at any age.

In twenty per cent of cases, fibromyalgia is triggered by injury, in twenty per cent it may be due to a viral infection and in ten per cent, there are emotional triggers (including stress and breakdowns). In fifty per cent of cases no one knows what has set it off.

Fibromyalgia is not the same as *somatisation* (where a psychological problem is transferred into other symptoms, including pain), and the help of a clinical psychologist can be very useful to determine this.

TREATMENT

Fibromyalgia is a chronic condition, and it is treated by medication, exercise and change of lifestyle (eating properly, giving up smoking and drinking if necessary, &tc.).There is no permanent cure, although symptoms can wax and wane, so traditional treatments are geared towards improving sleep and reducing pain. Deep

level (stage 4) sleep is crucial for many body functions, including tissue repair, so drugs that boost serotonin and norepinephrine levels (responsible for modulating sleep, pain, and immune system function) can be helpful. *Antidepressants* (such as Amitriptyline) and *Anticonvulsants* (including Pregabalin) may be helpful. *Muscle relaxants* and *painkillers* like Tramadol can also help.

BACK PAIN IN PREGNANCY

Hormonal and physical changes occur during pregnancy which can have a major effect on the body. Early on, the posture of the lower back changes as hormones are released to increase joint laxity – this means the spine, abdominal and back muscles become more relaxed. As the pelvis tilts backwards, the curve of the lower back (the lumbar curve) starts to increase, and this puts pressure on the muscles of the back.

If a woman has poor posture and weak muscle tone before she becomes pregnant, the hormonal changes and relaxation in spine, abdominal and back muscles can start to trigger attacks of low back pain. As pregnancy advances and the baby grows, the abdomen gets bigger as its contents get heavier and the lumbar curve increases. The muscles of the lower back become increasingly relaxed. All these changes place considerable stress on the lower spine and back muscles, causing increased back pain.

In some cases this can be made much worse if the baby's head is putting direct pressure on the lumbar nerves; this causes sciatica – although this form of sciatica almost always disappears after the baby is born.

TREATMENT

Good posture is very important at this time: it may feel as if you're relieving the pressure when you slouch, but in fact you are putting more strain on your already overburdened spine. Use your abdominal muscles to help walk talk and avoid exaggerating the arch in your back. High heels are out until you've given birth! Midwives are excellent sources of knowledge for relieving back pain here.

Exercise is very important: walking for twenty minutes a day can help enormously, as can building strong abdominal muscles, which reduce the possibility of back pain significantly. Never bend down with your legs straight; squat down or kneel down to pick something off the floor. Good lifting techniques are vital – not just now, but after the child is born too.

THE FAILED BACK

Back surgery is not always successful: *Failed Back Syndrome* (also known as Failed Back Surgery Syndrome, or FBSS), is how the specialists refer to this situation in Britain; in American it is the *Previously Operated Back Syndrome*, but they both mean the same thing. Failed back syndrome is a bit of a misnomer, as this is not actually a syndrome, but a generalised term used to describe the condition where back and/or leg pain persists, even following (and despite) surgery to discs or vertebrae. There is no equivalent in any other type of surgery (so no failed knee surgery syndrome, for example). There are many reasons why surgery may or may not work, and even with the best surgeon, there is never a one hundred per cent chance of success.

There are a variety of possible structural causes for failed back syndrome, which include *damage to posterior elements*; during surgery to the back, unavoidable damage is caused to the facet joints, spinal ligaments and muscles.

Osteoarthritis may set in after surgery and cause *spinal stenosis*, where the spinal cord or nerve roots are choked by bony growths (osteophytes), producing symptoms of pain, tingling, weakness or numbness that radiates into the buttocks and legs.

Recurrent slipped discs can happen when, following surgery for one slipped disc, another disc slips, causing fresh pain. Or the initial pain continues when fragments of disc remain after surgery, in some cases of *percutaneous discectomy*, for example, where the damaged disc is sucked up through a tube. The operation is carried out by a surgeon viewing the site through a tiny camera attached to an endoscope, and because vision is limited, sometimes bits of the damaged disc escape notice and get left behind.

Spondylolisthesis can occur when surgery creates an unstable back, causing one vertebra to slide over the one below it.

Non-structural causes are usually down to nerve pain (*neuropathic pain*) in the spinal cord and/or its *nerve roots*. The surgeon can accidentally or unavoidably damage the nerve roots during the operation.

Scar tissue can form in the epidural space following surgery, strangling the nerve roots, which causes severe pain.

Arachnoiditis is a more severe form of scarring which involves the delicate lining of the spinal cord, called the arachnoid mater.
The spinal cord itself may be damaged, by bruising, for example.

Central pain syndrome is the term for when there is no apparent reason for the pain, and it can only be controlled by the use of strong medication.

TREATMENT

Further surgery will only make matters worse, and in cases of this kind, treatment with *antidepressants* (such as Amitriptyline) and *anticonvulsants* (such as Pregabelin) may be helpful. Sometimes a pain specialist may be able to help by clearing the scar tissue using a special pipe (*RACZ Catheter*) inserted into the epidural space, or by using a special telescope to see the scar tissue and then removing with it under direct vision (*spinal endoscopy*).

The moral of the story is that surgery on the back should only be a very last resort! Whilst there are operations to cure sciatica that are usually very successful, surgery for back pain is less guaranteed, and too often it can even make the problems worse. If your specialist is suggesting surgery, *always* discuss matters in detail. Take a list of questions with you, and write down the answers so that you can consider your options in more peaceful surroundings later. Do not make a decision then and there unless you have already had a chance to consider all the facts. It is very easy to be intimidated when you are sitting in front of busy medics who, having made a decision – *their decision* – want you out of the office and into the operating theatre so they can get on with the job, but don't let that stop you. You need as much information as possible, and this way you don't forget anything.

If you're facing back surgery, these are the things you need to know:

1. What is my problem, and how did it happen? If it's an old injury, what's made it worse?
2. Are there any other options that you know of, and how do they compare to this operation in terms of success rates and secondary problems?
3. Exactly what is this operation, and how will it be performed? What will you remove or fix? Is your surgeon a specialist at this type of surgery?

4. What are the odds of success and failure? Don't be afraid to listen to the worst-case scenario as well as the best-case one. You need to know what the risks are, in full, and how likely they are. If you look at the information given with any medicine, you'll see a list of potential side-effects. Most of them are as likely as you winning the lottery, but the drug companies have a duty to tell you. Your surgeon should have that duty too.
5. Will it be under general or local anaesthetic? A general anaesthetic is where you are unconscious throughout the operation; a local anaesthetic takes away all feeling in just the area under the scalpel.
6. How long will the operation take? You need to know if you will be seen as a day-patient, or admitted to a ward as an in-patient – and if it's the latter, how long you are likely to be in hospital.
7. How long is the recovery period likely to be, and what sort of aftercare will I need? Being told, in a blasé manner, 'Oh, you'll need to see a physiotherapist' is one thing; it's better to know from the start that means six months of intensive treatment, not a couple of appointments and a bit of Ultrasound. If you have to sleep on your front for a month or six, or are advised to get hold of some special piece of equipment, you need that information before you go in for surgery. It helps to know how long before you can return to normal life – not just working, but shopping, or driving, or going to a football match or the cinema.
8. What are the likely side-effects or after-effects – am I going to be in a lot of pain? Am I likely to develop osteoarthritis or irritable bowel syndrome? You might have to take different medication after the operation: knowing

constipation is one of the side-effects of opiates like morphine, the best analgesic we have, makes it easier to deal with.

9. Above all, insist that both the pros *and* the cons of the surgery are clearly explained.

Finally, take time to investigate other treatment options before invasive surgery, for there are often other routes to be tried that have the same or nearly the same chance of success. Sometimes a certain sixty per cent reduction in pain is better than the *chance* of an eighty per cent cure that may leave you even worse off. So far no one's invented a replacement spine, and if the surgery doesn't work, you're the one who is going to suffer, no one else. If you have suffered from chronic back pain for any length of time, you may have reached the point where you believe that nothing can be worse, but however bad your situation, things can always degenerate.

Back surgery can be extremely successful, and new operations are invented all the time, but all surgery, even the simplest little operation, is a risk, and deserves a lot more consideration than most people realise.

Above all, remember: it's your back.

NOTES

[1] *Bandolier,* the medical information website.

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[3] Palmer T., Walsh K., Bendall H., Cooper C. & Coggon D., 'Back pain in Britain: comparison of two prevalence surveys at an interval of 10 years' *British Medical Journal* 2000, 320, 1577-1578

[4] *Bandolier.*

[5] Carter J.T., Birrell L.N. (Editors), principal recommendations, 'Occupational health guidelines for the management of low back pain at work', Faculty of Occupational Medicine, London, 2000

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