Low back pain and the post-laminectomy pain syndrome

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Summary

Back pain is one of the most common disorders seen in general practice. Patients with chronic low back pain form a large proportion of the work of any pain relief unit. The aetiology of low back pain and the post-laminectomy pain syndrome are briefly presented and treatment of the 'failed back surgery patient' and the patient with arachnoiditis are discussed.

S Afr Med J 1989; **76:** 20-23.

Low back pain is a common complaint the world over. Patients with intractable low back pain continue to plague pain relief units. In the UK alone, back pain accounts for a total loss of 19 million working days per year.[1] In our unit, intractable back pain accounts for 28% of patients treated. It cannot be overemphasised how important it is to take a thorough history and conduct an adequate clinical assessment of every patient with low back pain.[2] This enables the correct special investigations to be ordered, the diagnosis made and the treatment planned in a logical and scientific way.

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Accepted 16 Sept 1988.

Aetiology of low back pain

Prolapsed intervertebral disc

This is a prolapse through the posterior longitudinal ligament most commonly at L5-S1, then L4-L5. In 90% of patients, the pain improves markedly with 5-6 weeks of strict bedrest. Pelvic traction, physiotherapy, a corset and transcutaneous electrical nerve stimulation are also used.[3]

If after 6 weeks the patient is no better, careful clinical reassessment plus myelography needs to be carried out. If, on myelography, a prolapsed disc is suspected, then computed tomography (CT) with intrathecal contrast outlining nerve roots should be performed.[4]

Cauda equina claudication

Patients with this condition are usually over 60 years of age. They suffer from sciatic pain and tingling on standing and walking, but not on sitting or lying. They become virtual prisoners in their own homes, and can only walk 50-100 m before having to stop and sit down. A myelogram will show marked stenosis due to lumbar spondylosis superimposed on a congenital stenosis. The treatment is a wide decompressive laminectomy. If lumbar canal stenosis is found on myelography and there is no pain, then surgery is not indicated.

Cauda equina tumours

These include neurofibromas, meningiomas and ependymomas (e.g. from filum terminale). Tumour can present as back pain plus sciatica or just with incontinence, or with wasted legs without pain. When pain occurs, it can be without signs, and these patients are often labelled neurotic. The pain is, however, characteristic. It is worse by night, and awakens them. Typically, they get out of bed, walk around, then sit in a chair in an attempt to relieve the pain.

Lumbar spondylosis or lateral gutter syndrome

There is progressive degeneration of the intervertebral disc leading to changes in the adjacent vertebra and ligaments. Lipping and osteophytic formation occurs leading to narrowing of intervertebral foramina. Flashes of pain occur with odd movements with or without wasting and sensory loss. Superimposed on a congenital narrowed spinal canal, the clinical symptoms become worse.[2] Treatment is, firstly, conservative, aiming at strengthening back muscles. If this fails, then a decompressive laminectomy should be carried out.

Spinal angioma

This occurs as twisted blood vessels, usually in the posterior mid-thoracic region. It presents as atypical cauda equina claudication. Pain occurs with sitting as well as with standing. It is diagnosed by thoracic myelography, and can be missed if only lumbar myelography is performed.

Others

Bony metastases occur from carcinoma of the breast, prostate, lung, kidney, thyroid and gastro-intestinal tract. These can cause spinal nerve root compression. Radio-active isotopic bone scans and whole-body CT are used for diagnosis. Rarer malignant conditions include myeloma, which often presents as osteoporosis and sarcoma.

Spondylolisthesis is caused by congenital disruption of the pars interarticularis with the shifting of one vertebra on another. It may present as back pain that is cured by lying down. Treatment for this instability is spinal fusion.

Other rarer causes of backache are osteoporosis, infections (tuberculous or non-tuberculous) and entrapment neuropathies (e.g. the sciatic nerve).

Post-laminectomy pain syndrome

The 'failed back surgery patient'

This group of patients should never have had surgery in the first place. They may well have had 6 weeks of pain relief (probably a placebo response) before the pain recurred. Each operation makes them worse. In order to prevent this, it must be remembered that if the causes of back pain and sciatica are not known, then surgery should not be performed.

Prolonged postoperative pain

This may be the result of a disc protrusion not being adequately removed or an operation performed at the wrong level and the prolapsed disc not found. There may have been two discs and only one was removed or disc prolapse was not the cause but a neurofibroma (e.g. at top of the conus), spinal angioma or an arachnoid hernia was present.

Recurrent prolapsed intervertebral disc

Here, the patient presents with backache and sciatica, and a prolapsed disc is found on myelography. A laminectomy is performed with pain relief for 2-3 years and then the pain returns. This may be the result of a prolapsed disc higher or lower than the original one. Myelography should be performed and the offending disc then removed.

Arachnoiditis

This occurs after repeated myelography, repeated disc surgery and fusions. Iophendylate myelography in particular has been implicated, although it does occur with other dyes. This, plus rough surgery with intrathecal bleeding, causes intrathecal adhesions on the nerve roots and the spinal cord. It is usually diagnosed radiographically with myelography, CT or nuclear magnetic resonance imaging (NMRI) since clinical signs and symptoms vary.[4] It has become the scrapheap diagnosis for the 'failed back surgery patient'. It is an unpleasant condition with no cure. Patients often experience burning pain, which is made worse by exercise. It is often ineradicable. Patients may later develop numbness and weakness.

Treatment of the 'failed back surgery patient' and the arachnoiditic patient

Treat the cause

If the wrong disc was removed, remove the correct one. If the wrong diagnosis was made, remove the real cause — such as a neurofibroma, spinal angioma or arachnoid hernia.

Physiotherapy

Extension back exercises. These restore the strength of back muscles after prolonged bedrest or the use of a corset. They break the cycle of muscle wasting, inactivity, more pain, more inactivity and more muscle wasting. Exercises need to be started slowly morning and evening and built up gradually with time.

Hydrotherapy. Here the support of the water is used during exercise.

Continued back care. Patients need to be taught not to lift heavy items, to bend their knees and to keep their backs straight when lifting anything, and to sit in chairs that support the spine.[5]

Epidural corticosteroids plus local anaesthesia

A mixture of 0,5% bupivacaine (Marcaine; Saphar-Med) and 40 mg (1 ml) methylprednisolone (Depo-Medrol; Upjohn) is used. The earlier pain is treated, the better the relief. A two-catheter technique is used — one inserted into the epidural space in the thoracolumbar region above the laminectomy scar and one inserted through the caudal hiatus into the sacral epidural space. Top-ups can be given daily for a total of 3 doses.

Corticosteroids have a membrane-stabilising effect on abnormal pain conduction. In addition, they have anti-inflammatory properties and relieve pain associated with nerve and spinal cord compression. It is important not to exceed 120 mg (3 x 40 mg) of methylprednisolone to avoid systemic side-effects.

Facet nerve blocks

The indication for a facet nerve block is low back pain radiating to the buttock. Pain is usually worse with sitting and

standing, and better from sitting to standing, or when walking. Radiography is often unhelpful. A diagnostic facet block is first performed by injecting a mixture of corticosteroid and local anaesthetic into the facet joint.

If this works, the block can be made semipermanent by use of a cryotherapy probe, which gives 6 - 8 weeks of good pain relief, or a radiofrequency probe attacking either the facet joint itself or the nerve to the facet joint at the base of the transverse process.[6]

Injection of trigger points

Trigger points are areas of localised muscle spasm or of referred pain. They can be part of a myofacial syndrome, and need to be carefully identified and injected with a mixture of local anaesthetic and corticosteroid. This injection helps to decrease the total afferent barrage of pain. A dextrose-glycerine phenol solution has also been successfully used recently as an injection into specific fascial and ligamentous sites in patients with chronic low back pain.[7]

Antidepressants and anticonvulsants

Antidepressants have a direct analgesic action by interfering with serotonin uptake in the descending amine pathway. In addition, they act as mood elevators. Amitryptiline (Tryptanol; Logos) is the most common tricyclic used. It is given in a dosage of 2 or 3 times a day or 75 mg at night. Amitryptiline can be combined with a phenothiazine, such as perphenazine, in the combination called Etrafon-D; Scherag). Mianserin (Lantanon; Donmed (Organon)), is the most common tetracyclic antidepressant used. Its tetracyclic structure ensures less anticholinergic side-effects, but it is a sedative and is thus given an hour before bedtime in a dose of 30 mg. This dispenses with the need for a benzodiazepine hypnotic at night. Other antidepressants used include imipramine (Tofranil; Geigy), clomipramine (Anafranil; Geigy), dothiepin (Prothiadin; Boots) and maprotiline (Ludiomil; Ciba).

Anticonvulsants have membrane-stabilising properties and are used to stabilise abnormal conduction on pain tracts. The lowest blood level necessary for the therapeutic control of epilepsy is needed for the control of pain. Clonazepam (Rivotril; Roche) is a benzodiazepine with a wide therapeutic index, and no blood levels are needed for therapeutic control. A major side-effect is sedation and treatment should begin with a small dose of 0,5 mg twice a day working up to 1 mg 3 times a day over 4 weeks. Sodium valproate (Epilim; Labaz) is another anticonvulsant used. The dosage is 200 mg 2 - 4 times a day in adult patients and a therapeutic blood level of at least 60 μg/l should be aimed at. If carbamazepine (Tegretol; Geigy) is used, the starting dose is 100 mg/d for an adult, increasing by 100 mg every 4 days to a maximum of 400 mg/d. The therapeutic blood level aimed at is at least 4 μg/ml. With the use of phenytoin sodium (Epanutin; Parke-Davis) the initial dose is 100 mg/d in adults, increasing by 25 mg increments to a maximum of 300 mg/d. The therapeutic blood level aimed at is at least 10 μg/ml.

Other adjuvant drugs. *Pyridoxine* (Beesix; Lennon) is vitamin B_6 and is said to increase encephalin release. It is given in a dose of 25 mg 3 times a day for at least 6 weeks. *L-tryptophan* is a serotonin precursor and is said to release endorphins from the pituitary gland. It is given in a dose of 500 - 1 000 mg 4 times a day. *L-dopa* and *lithium carbonate* have a number of side-effects and must be carefully controlled.

Combinations of antidepressants and anticonvulsants need to be given a trial of at least 6 weeks: (*i*) mianserin 30 mg at night plus clonazepam 0,5 mg twice a day to 1 mg 3 times a day over 4 weeks; (*ii*) amitryptiline 25 mg 3 times a day and sodium valproate 200 mg twice a day to 200 mg 4 times a day; and (*iii*) amitryptiline 25 mg 3 times a day and carbamazepine 100 - 400 mg /d.

Use of drugs for muscle spasm pain

Diazepam (Valium; Roche). This benzodiazepine increases the efficiency of γ-aminobutyric acid (GABA)-ergic synapses by acting on specific benzodiazepine receptors in the central nervous system. In addition, it causes muscle relaxation from inhibition of polysynaptic reflexes in the spinal cord. The dosage is 2 - 5 mg 3 times a day. It should be used for a short period of time only.

Baclofen (Lioresal; Ciba) is a GABA derivative. It exerts $GABA_B$ agonism mainly at spinal cord level. Dosage is between 30 mg and 75 mg daily, starting with 5 mg 3 times daily and slowly working upwards.

Dantrolene (Dantrium; SK & F) decreases the release or increases the sequestration of Ca^{++} from the lateral sacs of the sarcoplasmic reticulum. It is contraindicated in acute hepatic disease. Dosage is between 25 mg and 50 mg daily.

Orphenadrine (Norflex; Riker) blocks muscarinic cholinergic receptors and is given in a dosage of 100 mg twice daily. It has anticholinergic side-effects.

Treatment of arachnoiditis

Three injections of epidural 0,5% bupivacaine and 40 mg methylprednisolone. The two-catheter technique may be more effective in getting the corticosteroid to the damaged pain tracts.

Epidural clonidine (Catapres; Boehringer Ingelheim). 150 μg of clonidine is diluted to 5 ml with normal saline. It is used with 50 mg of lignocaine to confirm its presence in the epidural space. It works in approximately 25% of patients with deafferentation pain (C. J. Glynn — personal communication, 1987). If effective at spinal cord level, the patient is maintained on oral clonidine (Dixarit; Boehringer Ingelheim) 25 - 50 μg twice a day.

Epidural buprenorphine (Temgesic; R & C). Buprenorphine is a mu partial agonist which is 25 - 55 times more potent than morphine. It has also been found to decrease muscle spasm in paraplegics when given intrathecally (C. J. Glynn — personal communication, 1987). It thus could be a GABA agonist or have some specific effect of its own. Buprenorphine 0,3 mg is diluted to 5 ml with normal saline and injected into the epidural space over the affected nerve roots. If effective at spinal cord level, maintenance with a sublingual tablet 200 μg 8-hourly is used. The sublingual preparation is not yet available in South Africa.

Epidural morphine. Morphine 5 mg is diluted to 5 ml with normal saline and injected into the epidural space over the affected nerve roots. Side-effects include pruritus, nausea, vomiting and urinary retention. If effective at a spinal cord level, maintenance with MST Continus (Keatings), starting with 10 mg twice a day is used.

It must be noted that sublingual buprenorphine and oral morphine should only be used as last resorts to temporarily maintain control over the patient's pain while other methods are tried. The dangers of physical addiction are carefully explained to the patient beforehand, as well as the side-effects of opiates. This regimen should not be forced on the patient and should not last longer than a few weeks.

Intrathecal baclofen relieves pain as well as muscle spasm. The mechanism is unknown. The intravenous preparation is, however, not available in South Africa.

Psychological support, evaluation and psychotherapy

Many patients with low back pain suffer from severe depression. They can be aggressive towards the medical profession. Frequently, they have been 'doctor-shopping' or have been handed from one doctor to another with little improvement — or even worsening — in their condition. Their plight has not only affected their own lives, but also their family. These patients thus need a great deal of understanding and support and a clinical psychologist is vital for their evaluation. They are placed on a pain management programme to teach them relaxation therapy, distraction techniques and how to live with their pain. Depression must be actively treated. An occupational therapist is used to help in rehabilitation.

Transcutaneous electrical stimulation

Electrical stimulation of the skin at non-painful levels increases activity along larger myelinated fibres, thus 'closing the gate'. There is also evidence that transcutaneous electrical stimulation causes the release of encephalins at the spinal cord level. The patients are loaned electrical stimulation machines to try for at least 6 weeks. They are taught to vary the position of the electrodes as well as the intensity and frequency of the current. This method is generally very safe. Occasionally, allergy to the electrode, tape or gel occurs.

Dorsal column stimulation

This can be used if the patient responds well to transcutaneous electrical stimulation. An epidural electrode is used. 'Closing the gate' occurs. Good results have been obtained in 60% of patients with arachnoiditis, but there is no lasting relief after 1 year. (P. Teddy — personal communication, 1987).

Acupuncture

This needs to be performed at regular intervals, preferably in group sessions.

Deep brain stimulation

There are few indications for deep brain stimulation. It is usually applied in de-afferentation pain, where an electrode is inserted into the ventroposteromedial nucleus of the thalamus, or the peri-aqueductal grey area.

Analgesia

First-line drugs

Paracetamol (Panado; Saphar-Med). Dosage is 500 - 1 000 mg every 4 - 6 hours. This is better tolerated than aspirin, provided that total daily dose does not exceed 6 g, so as to prevent free radical scavenger depletion.

Paracetamol 325 mg plus **propoxyphene napsalate** (Distalgesic; Eli Lilly) **50 mg**. Dosage is 1 - 2 tablets 4 - 6-hourly.

Paracetamol 320 mg, caffeine 32 mg, codeine phosphate 8 mg, meprobomate 150 mg (Stopayne; Rio). Dosage is 2 tablets 4 - 6-hourly.

Non-steroidal anti-inflammatory drugs

The top dose should be used. Failure is usually apparent by 7 days, and if this occurs, other classes should be tried.

Nefopam (Acupan; Riker)

Acupan is a central non-opioid analgesic. It is thought to prevent the re-uptake of biogenic amines. It does benefit a small number of patients. Dosage is 30 - 60 mg 3 - 4 times daily.

Strong opiates

Oral controlled-release morphine 10 - 30 mg twice a day or sublingual buprenorphine 200 - 400 μg 8-hourly are used on a temporary basis to break the pain cycle.

Conclusion

There are many pitfalls in the diagnosis and treatment of patients with low back pain. The taking of a good history and thorough clinical assessment at the first consultation is imperative. The treatment should be planned in a scientific and logical way. In order to prevent further suffering and economic outlay in 'failed back surgery patients', management is best undertaken at a specialised pain relief unit.

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