UNIT NO. 5

LOW BACK PAIN

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ABSTRACT

Low back pain is a common musculoskeletal ailment. The causes range from benign and innocuous causes such as a pulled muscle or sprained ligaments to more serious causes involving the nerves and other diseases such as cancer or infection. A good history and physical examination are the keys to diagnosis. Investigations are usually unnecessary and unhelpful in the assessment of the mechanical low back pain of acute and recent onset. On the other hand, the presence of nerve root pain, red flags like weight loss, or severe and/or persistent symptoms in spite of adequate conservative treatment for several weeks, will require referral for further investigations and appropriate management. The natural history of the benign causes is one of spontaneous resolution. However, notwithstanding the good prognosis in the majority of patients, some attacks of low back pain may be of such severity that treatment may be required, and such treatment if properly administered may greatly alleviate the symptoms and perhaps shorten the overall duration of the attack. Such treatments include bedrest, local applications, back exercises, lumbar corsets, physiotherapy and medications. Referrals to the specialist may be indicated for persistent backache despite conservative treatment, recurrent episodes, chronic backpain and red flags.

INTRODUCTION

Low back pain is one of the most common musculoskeletal ailments that afflict the population. In February 2000, the Back Society of Singapore conducted a survey of 1001 adults aged 15 years and above who were randomly selected and interviewed over the telephone. This was the first such study conducted on a national level in Singapore to assess the frequency of neck and back problems in our population. The Back Survey showed that over the previous 6 months prior to the survey, 18% or 1 in 5 adults had suffered an episode of neck or back pain. 50% of back pain sufferers had experienced an attack at least once a month or more frequently. 10% of the afflicted had deemed it serious enough to have taken medical leave. 16% of those afflicted with pain had sought help from a doctor with a further 4% seeing a specialist. Although these figures appear staggering at first, this is only because such data were not previously available in Singapore. The magnitude of the problem is similar to that of other developed nations. In the United States, United Kingdom and Scandinavia, where such data have been available for a long time, it is known that back and neck pain constitute one of the major causes of physical disability and is responsible for more insurance claims than any other medical condition.

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APPROACH TO SYMPTOMS

There are many causes of low back pain, ranging from benign and innocuous causes such as a pulled muscle or sprained ligaments to more serious causes involving the nerves and other diseases such as cancer or infection. Table 1 shows the overview of management guidelines for acute back pain.

When assessing a patient, a good history and physical examination are the keys to diagnosis. The following points should be noted.

1. How long has the patient had the pain?

If the pain is of recent onset, within the last one or two days, more likely than not, with appropriate treatment, the pain will get better. On the other hand, if the attack of pain has already lasted several weeks, then a more serious cause of pain needs to be excluded.

2. Is the pain intermittent and episodic, or constant and continuous?

If the pain is intermittent, with pain free periods in between attacks, the cause of the pain is likely to be mechanical in nature. Mechanical causes include sprained muscles and ligaments, the prolapsed intervertebral disc and spondylolisthesis. Mechanical pain is not as serious and usually is expected to resolve quickly with appropriate treatment. If the pain is constant, with no pain free periods at all, even at rest and throughout the day and night, than such pain is termed non-mechanical or inflammatory type pain. Causes of such pain include infection and cancer. In such cases, further investigation is warranted to exclude possible serious underlying disorders.

3. Is the pain localised to the low back or does the pain radiate to other areas such as the legs?

Pain radiating to other regions of the body often implies that the nerves have been affected. Thus radiating pain, or sensations of numbness, paraesthesia, aching or "tired" or "sore" muscles in the thighs and legs often implies that the nerves to the legs have been affected by the spinal disorder. Such leg symptoms are often collectively termed sciatica. Once the nerves are affected, the underlying disorder is usually more serious and treatment is more urgent. As the condition resolves, often the first symptoms that improve are the leg symptoms which gradually disappear leaving only

the residual backache. On the other hand, when the condition deteriorates, the leg symptoms are likely to get worse, and may sometimes become the predominant feature of a patient's symptoms. (Table 3).

4. Are there definite aggravating or relieving factors?

The pain from a prolapsed disc is usually worsened by activities such as repeated bending, lifting of objects, coughing and sneezing, and changes in posture such as when getting up from a seated to a standing posture. Pain from osteoarthritis is often worse in the morning or when first getting up after a long period of sitting. Bending backwards is also likely to be more painful than bending forwards. If the pain is worse with prolonged walking or standing, an element of spinal canal stenosis has to be excluded. In the presence of significant spinal instability such as spondylolisthesis, pain may be present with changes of posture and even on turning in bed.

5. What is the nature of your work, and what are your leisure activities?

Activities such as gymnastics are associated with a higher incidence of spondylolysis or spondylolisthesis. Manual workers and truck or bus drivers have a higher incidence of low back pain, while sedentary workers or those who work for long hours in front of computers, often suffer from neck and upper back pains. Housewives performing repetitive tasks such as handwashing of clothes in the squatting position and scrubbing floors are often prone to developing low back pain.

6. Is there marked stiffness of the spine associated with the pain?

Most times, the patient who has mechanical pain will have some restriction of spinal motion particularly in flexion. As the back pain resolves, the stiffness should also improve. However, when stiffness is marked, especially when range of motion is limited in all directions, conditions such as spinal infection, or inflammatory disorders such as ankylosing spondylitis have to be excluded.

7. Are there general symptoms such as weight loss, loss of appetite, lethargy, fever, etc?

When such symptoms are present, underlying disorders such as cancer or infection needs to be excluded. (Table 4).

8. Are the bladder and bowel habits normal?

A change in the ability to control voiding or defecation may imply a severe involvement of the spinal nerves and warrants urgent attention. (Table 5).

9. Is there muscle spasm or diffuse tenderness over the paravertebral muscles?

Mechanical low back pain is often associated with muscle spasm and and diffuse tenderness over the paravertebral muscles. The presence of exquisite focal tenderness may imply a focal pathology such as spinal fracture, infection or tumour.

10. Are there nerve root tension signs?

There are several nerve root tension signs of which the straight leg raise (SLR) and the bow string test are the most important. A limited SLR or the presence of a positive bow string test signifies root irritability or inflammation especially of the lower lumbar roots (L5 and S1). A femoral stretch test is positive when the upper lumbar roots (L2, L3,L4) are under tension.

11. Are there abnormalities on neurological examination?

Over 90% of all clinically significant radiculopathy in the lower limb as a result of a prolapsed intervertebral disc involves the L5 or the S1 roots at the L4-5 or the L5-S1 disc levels respectively. The patient's inability to toe walk (calf muscles, mainly S1), heel walk (ankle and toe dorsiflexors, mainly L5), or do a single squat and rise (quadriceps, mostly L4) may indicate muscle weakness. Specific testing of the extensor hallucis longus (EHL) and flexor hallucis longus (FHL) will elicit dysfunction of the L5 and the S1 roots respectively. The ankle reflex is absent in S1 radiculopathies, while the knee reflex is absent in L4 radiculopathies. Testing for sensation in the medial aspect of the shin (L4), dorsum of the foot (L5) and the sole (S1) is also important.

COMMON CONDITIONS THAT PRESENT AS BACKACHE

1. Acute Musculo-ligamentous Strain

Simple back strain is probably the most common cause of acute low back pain. (Table 2). It may be the result of a pulled muscle or sprained ligament. Typically, in the history, there is a definite aggravating factor such as lifting of an object or twisting of the spine. The pain is always localized to one area of the spine and should not be associated with any radicular symptoms. The pain is usually mild and of limited duration, often improving with very little treatment or spontaneously within several days. Recurrences are uncommon.

2. Prolapsed Intervertebral Disc (PID)

PID is one of the most common causes of recurrent back pain in adults between the ages of 20 to 50 years. The history is usually long standing. The pain is typically mechanical in nature, with long pain free periods in between attacks. In the early stages, the discogenic pain may be localized to the back, but as the prolapse becomes progressively more severe, radicular symptoms may arise. Thus thoracic disc prolapses may be associated with radiating chest pain or abdominal discomfort, while upper lumbar disc prolapses may present as groin discomfort or pain down the anterior thigh. Lower lumbar prolapses are sometimes associated with the typical sciatica in full blown cases of root impingement, but in mild cases of root irritation, may present as just vague aching sensations around the region of the calf muscles or the ankle. (Table 3).

3. Lumbar Spondylosis

Lumbar spondylosis describes the syndrome of disc degeneration coupled with loss of disc height, facet osteoarthritis, and osteophyte formation. The pain associated with lumbar spondylosis is typically mechanical, and may either be discogenic in character when it arises from an underlying PID, or facetal pain, which is worsened on extension of the spine. Spondylotic pain tends to be chronic and may occur even on a daily basis.

4. Spinal Canal Stenosis

Spinal canal stenosis is a condition in which part or all of the entire spinal canal is stenosed. Primary stenosis results from congenital or developmental causes such as in patients with achondroplasia, and those with a constitutionally small spinal canal. Secondary stenosis results when the spinal canal is compromised by various disorders such as degenerative spondylosis, spondylolysis and spondylolisthesis, previous trauma such as burst fractures of the spine resulting in retropulsed fragments of bone impinging on the spinal canal, and iatrogenic causes. Symptomatic stenosis typically occurs in patients in the fifth to seventh decades of life. Degenerative spondylolisthesis has been found to be four times more common in women. The clinical presentation is often diagnostic.

Most patients report a long history of intermittent back pain with progressive leg symptoms. The lower extremity symptoms often start at the back and radiate down the buttocks and legs in a radicular fashion and are typically worsened by walking or standing and relieved by sitting or squatting. This is referred to as neurogenic claudication. Examination of the spine may reveal a loss of lumbar lordosis and decreased spinal range of motion especially in extension. The SLR is usually normal. Careful assessment of the peripheral pulses including the dorsalis pedis and posterior tibial pulses is important as some patients with peripheral vascular disease present with similar claudication symptoms.

5. Isthmic Spondylolisthesis

A defect in the pars interarticularis is present in 5 to 7% of the adult population. Patients with spondylolisthesis typically present in early adulthood with symptoms of mechanical low back pain which may progress later to acute sciatica and root impingement, or at a much later age to spinal stenosis and neurogenic claudication.

6. Ankylosing Spondylitis (AS)

This is a seronegative spondyloarthropathy affecting an estimated 1 to 3 per 1000 of the general population. 80% to 90% of patients are HLA-B27 positive. AS typically affects healthy young adults between the ages of 17 and 35. It is more common in males. AS may present as low back pain but is classically associated with marked stiffness of the spine. Other areas such as the cervical and thoracic spine and the sacroiliac joints may also be affected. 20% to 30% of patients have involvement of peripheral joints especially the hips, shoulders and knees.

7. Miscellaneous

Other causes of pain that are much less common include primary spinal tumours such as schwannomas, and other benign (eg osteoid osteomas, osteoblastomas, etc) or malignant primary bone tumours (eg osteosarcomas, multiple myeloma, etc), and secondary malignancies that involve the spine. Malignancies that commonly metastasise to the spine include carcinoma of the lung, thyroid, breast, prostate, kidney and nasopharynx. Spinal infections such as osteomyelitis and epidural absesses may occur as a result of tuberculosis or pyogenic infections especially in immunocompromised patients. The pain arising from such causes is likely to be of short duration in terms of weeks or months rather than years, constant and not relieved by rest. In addition, there may be systemic symptoms as well. (Table 4). Traumatic injuries such as compression fractures need to be excluded especially in the elderly with osteoporosis, or pathological fractures in patients with a history of primary malignancy elsewhere.

THE INVESTIGATION OF LOW BACK PAIN

For routine mechanical low back pain of acute and recent onset, investigations are usually unnecessary and unhelpful. However, in the face of atypical symptoms such as pain suggestive of a non-mechanical cause, or severe and/or persistent symptoms in spite of adequate conservative treatment for several weeks, then further investigations should be performed.

1. Plain AP and Lateral Radiographs of the Lumbar Spine

These are often the initial investigation of choice. These simple X-rays are valuable in ascertaining the severity of lumbar spondylosis, the presence of spondylolysis or spondylolisthesis, and traumatic or pathological fracture. Many patients with significant prolapsed discs will demonstrate radiological changes of decreased disc height. In addition, patients with spinal stenosis often have significant osteophytic formation. Occasionally, standing lateral X-rays of the lumbar spine will demonstrate instability in the form of spondylolisthesis. Standing AP X-rays are useful in assessing whether there is concomitant degenerative scoliosis.

2. Flexion and Extension Stress Lateral Radiographs of the Lumbar Spine

A more reliable method of assessing spinal stability would be the use of stress lateral X-rays. Slippage of more than 25% to 30% of vertebral body width is rare in degenerative spondylolisthesis.

3. Left and Right Oblique X-rays

These are useful in excluding isthmic spondylolisthesis (Scottish dog sign).

4. Magnetic Resonance Imaging (MRI) Scans

In the event that conservative management of the patient's symptoms fails, further investigation would be required to confirm the diagnosis and assess the severity. At this time, MRI

scans are the preferred mode of investigation. MRIs however are expensive and very sensitive. Approximately 20% of asymptomatic individuals have MRI evidence of prolapsed disc or spinal stenosis.

5. CT-myelography

A less commonly used method of imaging the spine is computed tomography scanning (CT) in combination with myelography. CT-myelography is especially useful in evaluating the severity of dynamic nerve compression on flexion-extension views in patients with spondylolisthesis. It is also often preferred where there is distorted anatomy such as in patients with a combination of degenerative scoliosis, spinal stenosis and spondylolisthesis.

6. Electromyography (EMG)

EMGs are particularly useful when the presence of peripheral neuropathy is suspected. EMG reveals abnormalities in as many as 80 % of patients with spinal stenosis. The presence of these abnormalities may support the diagnosis of spinal stenosis, but their absence does not exclude the diagnosis.

7. Radionuclide Bone Scan

Bone scans are done when there is a history of malignancy elsewhere and there is a need to exclude the presence of multiple metastases.

TREATMENT BESIDES MEDICATIONS

Following the visit to the family physician, one of several common measures may be undertaken to alleviate the pain. The natural history is in most cases one of spontaneous resolution. About 90% of episodes of low back pain improve spontaneously without the need for any treatment, and approximately 90% of cases have resolved within 6 to 12 weeks of onset of pain. However, notwithstanding the good prognosis in the majority of patients, some attacks of low back pain may be of such severity that treatment may be required, and such treatment if properly administered may greatly alleviate the symptoms and perhaps shorten the overall duration of the attack. Such treatments include:-

1. Bedrest

Medical leave for one to two days may be given in order for the person to rest when he is in acute pain. Rest implies complete bed rest, allowing getting up only for meals or to go to the toilet. Sitting is to be discouraged. In most instances, the pain should be much better after one or two days of rest. If not, further bed rest is usually not helpful and is not encouraged.

2. Local applications

Hot or cold packs may be applied to the painful area to relieve spasm. Liniments which are often salicylate based or gels containing non-steroidal anti-inflammatory medications (NSAIDs) may be applied for local pain relief. Medicated plasters fall into this category and may also be helpful in reducing pain.

3. Teaching patients how to use their back wisely

Sitting in a proper chair with good lumbar support, keeping the back straight and avoiding slouching, avoiding bending and lifting and other repetitive activities, will help the back heal faster and do much to alleviate the symptoms.

4. Lumbar corsets

Wearing a corset gives additional support to the back and may help relieve symptoms especially if the person is continuing to perform manual work during the painful period.

5. Physiotherapy

Physiotherapy is often useful in managing both acute and chronic back pain. In acute pain, modalities such as shortwave diathermy, ultrasound, deep tissue massage and spinal mobilisation, and intermittent lumbar traction may help to relieve symptoms. Manipulation has also been shown to be effective in some patients with acute pain. In patients with chronic back pain, exercises have been proven to be of benefit, both general exercises to increase physical stamina and specific spine exercises to increase flexibility of the lumbar spine and strength of the abdominal and paravertebral muscles.

MEDICATIONS

When patients are in acute pain, medications are often prescribed. These medications often help in reducing pain and discomfort and may be useful in reducing inflammation as well. When specific points of acute pain and localised tenderness over the paravertebral muscles of the spine are present, injections of small amounts of local anaesthetic coupled with a steroid into the "trigger points" are often very helpful in relieving the pain and muscle spasm. As most attacks of low back pain are self limiting, medications are required mainly in the acute stages, and can be tailed down as healing progresses.

There are several categories of medications that are commonly prescribed.

Non-steroidal anti-inflammatory drugs (NSAIDs). These are often the first medications prescribed for mild to moderate pain. Apart from their analgesic or pain relieving properties, NSAIDs are also valuable in that they reduce the inflammation that occurs when there is an acute disc prolapse. NSAIDs have a ceiling effect that is increasing the amount of medication above the recommended dose does not result in increased pain relief but increases the number and severity of side effects.

Acetaminophen. Acetaminophen (paracetamo), is also commonly used to treat mild to moderate pain, especially when there is no associated inflammation.

Opioids. Opioid medications are the analgesics of choice for treatment of severe acute pain and cancer pain. These include codeine, morphine, pethidine and fentanyl. Generally such

medications are rarely administered on an outpatient basis, as they have significant side effects such as nausea, vomiting, drowsiness, confusion and constipation. Additionally, physical dependence develops in many patients who take opioids for 2 weeks or longer.

Muscle relaxants. Muscle relaxants such as the benzodiazepines (diazepam, lorazepam, etc), baclofen, orphenadrine and others are sometimes helpful in providing relaxation of muscle in spasm. They have little direct effect on pain. However, they should generally be prescribed only on a short term basis, and they have a common side effect of drowsiness.

Steroids. Steroids are the most powerful form of anti-inflammatory medications. They are useful for acute inflammation such as occurs in patients with acute sciatica from a prolapsed disc. They are not useful and should not be prescribed for chronic pain where the element of inflammation is negligible. Thus steroids are contraindicated for low back pain without sciatica, and for spinal canal stenosis. They are also contraindicated for pain when underlying infection or malignancy cannot be excluded. A suggested course of steorids is prednisolone 40mg once a day tailing down every day to 30 mg, 20 mg, 10 mg and 5 mg over a five day period. Prolonged usage of steroids beyond a week for acute sciatica is not only not useful but may be positively harmful.

INDICATIONS FOR REFERRAL TO SPECIALIST

The following are indications:

- Mechanical back pain that persists in spite of conservative treatment for more than 4 - 6 weeks
- Recurrent episodes or chronic back pain
- Severe acute pain requiring additional pain control
- Urgent referral for possible serious spinal pathology when red flags present
- Emergency referral when there is acute spinal cord damage, cauda equina syndrome or significant neurological impairment

INTERVENTIONAL PROCEDURES

These may occasionally be necessary:

Pain management procedures

- caudal epidural steroids
- facet injections
- radiofrequency procedures for facet denervation
- trigger point injections with/without Botox
- acupuncture
- nerve root injections
- intradiscal electrothermal therapy (IDET)

Surgical procedures

- Percutaneous endoscopic discectomy for prolapsed discs
- Microdiscectomy or microscopic-assisted decompression of the spinal canal
- Conventional Laminectomy and decompression
- Spinal stabilisation procedures with/without instrumentation
- Artificial disc replacement

LEARNING POINTS

- In the acute treatment of low back pain, a thorough assessment is important to exclude more severe underlying causes of pain and looking out for red flags
- Most attacks of pain are self limiting. Effective treatment in the early stages will do much to alleviate the symptoms and may result in shortening the attack
- If the pain is not resolved rapidly, further treatment such as with physiotherapy may be required. Investigations may also need to be done to confirm the diagnosis and assess the severity of the underlying problem
- Referrals to the specialist should be considered for assessment and management when there are red flags present, or when the patient does not improve following conservative treatment.

TABLE 1: Overview of Management Guidelines For Acute Back Pain

Initial consultation

Diagnostic triage

- Simple backache
- Nerve root pain
- Serious spinal pathology

Early management strategy

Aims: symptomatic relief of pain, prevent disability

- **Prescribe simple analgesia, NSAIDs**
  - avoid narcotics if possible
- **Physical therapy if symptoms last more than a few days**
  - manipulation
  - active exercise and physical activity
- **Rest only if essential: 1-3 days**
  - prolonged bed rest is harmful
- **Encourage early activity**
  - activity is not harmful
  - reduces pain
  - physical fitness beneficial
- **Advise absence from work only if unavoidable;**
  Early return to work

At 4-6 weeks, if no improvement

- Review diagnostic triage
  ESR, X-ray lumbosacral spine, MRI if specifically indicated Active rehabilitation programme
- programme of physical reconditioning
- Incremental aerobic exercise and fitness
- Workplace and lifestyle modification

Secondary referral required

- Second opinion
- Rehabilitation
- Vocational assessment and guidance
- Surgery
- Pain management

TABLE 2: Simple Backache – Clinical Features

- Presentation generally age 20 – 55 years
- Lumbosacral region, buttocks and thighs
- Pain 'mechanical' in nature (episodic, worse with activity, relieved by rest)
- Patient well
- Prognosis good
  – 90% recover from acute attack in 6 weeks

TABLE 3: Nerve Root Pain

- Unilateral leg pain > back pain
- Pain generally radiates to legs
- Numbness, paraesthesia, weakness in the same distribution
- Nerve root tension signs
  – reduced SLR which reproduces leg pain, positive bow string test
- Motor, sensory or reflex change
- Prognosis reasonable
  – 50% recover from acute attack within 6 weeks

TABLE 4: Red Flags

Red flags: possible serious spinal pathology

- Age of presentation < 20 or onset > 55 years
- Violent trauma, e.g. fall from a height, RTA
- Constant, progressive, non-mechanical pain
- Thoracic pain
- PMH – Carcinoma
- Systemic steroids
- Drug abuse, HIV
- Systemically unwell
- Weight loss
- Persisting severe restriction of spinal movement in all directions
- Significant neurological deficit
- Structural deformity of spine such as scoliosis

If there are suspicious clinical features or if pain has not settled in 6 weeks, an ESR and plain X-ray should be considered:

- ESR > 25
- X-ray – vertebral collapse or bone destruction

TABLE 5: Cauda Equina Syndrome/Widespread Neurologic Disorder

- Difficulty with micturition
- Loss of anal sphincter tone or faecal incontinence
- Saddle anaesthesia about the anus, perineum or genitals
- Widespread (> one nerve root) or progressive motor weakness in the leg with gait disturbance and difficulty walking
- Sensory level present