Low back pain, part 2

Guide to conservative, medical, and procedural therapies

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For patients without a specific diagnosis, treatment of low back pain begins with strategies to avoid re-injury and exacerbation. Most patients benefit from some form of medical therapy, guided by the three-step World Health Organization analgesic ladder. Opioid therapy is appropriate when needed for low back pain, especially in the acute period. Adjuvant medication (eg, an anticonvulsant or antidepressant) may help reduce or eliminate the need for opioid therapy. Side effects are common with opioid medications, although many resolve with time. Patient education in exercise, back protection, nutrition, and sexual concerns is an important component of treatment. Some patients may benefit from referral to a pain center for multidisciplinary management. Those with a structural or mechanical cause of pain may do well with surgery.

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Low back pain in adults is most often related to one or more mechanical causes:

- idiopathic lumbar strain or sprain
- age-related degeneration of disks and facets
- herniated disk
- and—in older patients—osteoporotic compression fracture or spinal stenosis.[1]

In the past, pain perception was widely assumed to decrease with age. This discredited notion has contributed to underrecognition and undertreatment of geriatric pain complaints. Although pain mechanisms may change with age, recent anatomic evidence suggests that older adults are as sensitive to pain as younger adults.[2,3]

In part 1 of this article (page 26), we reviewed the practical components of a focused history and physical examination of older patients presenting with complaints of low back pain.[4] In part 2, we discuss primary care management, using up-to-date conservative, medical, and procedural approaches. Because most patients with low back pain benefit from some form of medical therapy, we describe how to administer analgesics including opioids, which are often appropriate therapy for the relief of acute low back pain.

Conservative treatment

Initial treatment of acute low back pain should be conservative for most patients, except for the 1% with significant neurologic impairment, severely increasing pain, or who are felt to be at risk for tumor, infection, or a vascular etiology such as abdominal aortic aneurysm. These patients require imaging, laboratory tests, and referral for definitive treatment.[5]

For patients with idiopathic low back pain, treatment begins with review and modification of daily activities to avoid re-injury and exacerbation. A quick return to normal activity is usually the best course, as evidence no longer recommends extended bed rest.[6] Simple remedies such as application of ice for 15 to 20 minutes, four to six times a day for the first 24 hours can be effective in reducing inflammation from acute injury. Amuse your patients by suggesting that a bag of frozen vegetables such as corn or peas can be used as a convenient ice pack that conforms to the back more comfortably than ice cubes. After 24 hours, heat can be alternated with ice to re-

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duce spasm and increase circulation to the painful area.

The two most comfortable sleeping positions are on the back with a pillow beneath the knees or in a lateral position with the upper knee flexed and resting on a large pillow that can also support the upper elbow. These can keep the back in alignment on a firm mattress and ease discomfort associated with improper positioning of the spine.

Pain diary. Have the patient keep a pain diary, making note of daily pain levels, circumstances affecting symptoms, and the results of treatments. Entries made when medications are taken that describe the duration and extent of effect may be helpful in adjusting analgesic dosage and frequency. As acute pain diminishes, encourage the patient to record daily activities achieved, such as walking or doing housework, especially those with which pain had interfered.

Alternative therapies. Popular alternative therapies for back pain include massage, acupuncture, and spinal manipulation. To date, evidence-based literature reviews show no advantage to acupuncture for back pain when compared with trigger-point injection or transcutaneous electrical nerve stimulation (TENS). Spinal manipulation has shown a minimal advantage. Massage therapy, as compared with TENS and manipulation therapy, is not advantageous.

Three-step analgesia

Most patients with low back pain benefit from medical therapy guided by the three-step World Health Organization (WHO) analgesic ladder (figure 1):[7]

Step 1. It is often appropriate to begin pain therapy with acetaminophen and/or a nonsteroidal anti-inflammatory drug (NSAID).[8] A recent evidence-based review of 51 trials with a total of 6,057 patients age 18 to 65 found no specific NSAID more effective than another for acute low back pain.[9] For patients without GI symptoms or use of anticoagulant medications, consider using price as a guide to NSAID selection.

Monitor closely for NSAID-related GI side effects. In patients with evidence of GI toxicity, consider switching to choline magnesium trisalicylate (Trilisate), salsalate (Disalcid, et al), or a COX-2 inhibitor such as celecoxib (Celebrex) or rofecoxib (Vioxx). For patients with a history of heartburn, gastroesophageal reflux disease, or peptic ulcer disease, consider using the prostaglandin E_1 analog misoprostol (Cytotec).

Step 2. If step-1 management is not effective in controlling pain and opioid therapy would be appropriate for the patient, add an opioid that is appropriate for mild to moderate pain (eg, codeine or hydrocodone).

Step 3. If step-2 management is not effective, continue the NSAID (if tolerated) and add an opioid for moderate to severe pain, such as sustained-release morphine sulfate (eg, MS Contin or Kadian), methadone, controlled- release oxycodone HCl (Oxycontin), or transdermal sustained-release fentanyl (Duragesic).

The WHO pain ladder includes the use of adjuvants at each step. For example, consider adding the tricyclic amitriptyline HCl (Elavil) if pain interrupts sleep or the anticonvulsant gabapentin (Neurontin) if pain has an electrical or lancinating character.

Age considerations. Because of age-related physiologic changes, special precautions are required when prescribing analgesics for older patients:

- Systemic disease or changes in renal or hepatic function may affect the time it takes for a drug to reach the site of action, be metabolized, and eliminated.
- Changes in blood chemistry can increase free concentrations of drugs in plasma, as can changes in total body water or blood volume, causing a significantly magnified drug effect or side effects.[10]
- Effects of aging on the CNS may make the older patient more sensitive to the sedative side effects of opioid medication.

WHO three-step analgesic ladder

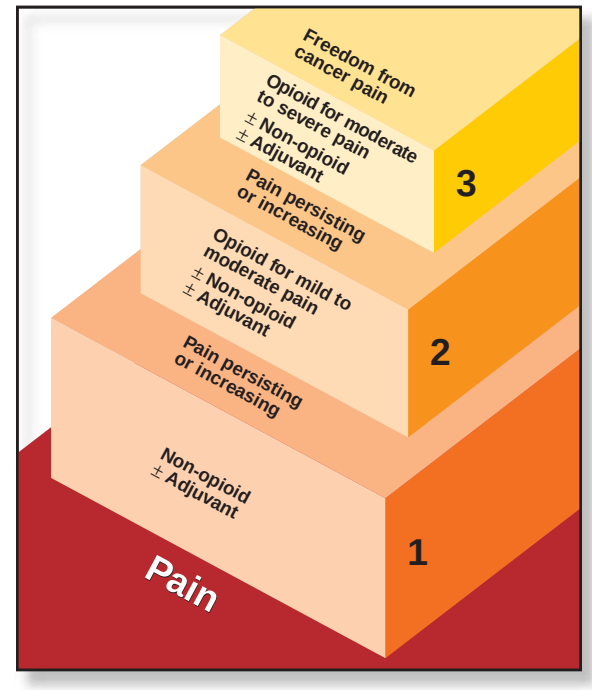

Figure 1. Developed as a guide to the management of cancer pain, the World Health Organization (WHO) analgesic ladder can also be used to guide medical management of low back pain.

Source: Reprinted with permission from World Health Organization. Cancer pain relief and palliative care. Report of a WHO expert committee [World Health Organization Technical Report Series, 804]. Geneva, Switzerland: World Health Organization; 1990.

Guide to opioid therapy

Use of opioids for the management of low back pain remains controversial. Opioids are among the most effective analgesics, although there are concerns about addiction and side effects. The literature on cancer pain management demonstrates that opioids can be used safely and effectively for patients experiencing severe pain.

Opioid therapy is appropriate when

Opioid tolerance versus addiction or diversion

A patient whose prescription of opiate medication is depleted before the refill date may have developed tolerance or may have a behavioral problem such as addiction or diversion. Qualitative drug testing of a urine sample can help distinguish:

- the addict (likely to test positive for multiple drugs)
- the diverter (likely to have a negative result)
- the tolerant patient (expected to have only the prescribed agent in the urine).

Note that the tolerant patient who ran out of medication 3 days prior to the office visit will also have a negative test. This patient may not be guilty of diversion but only of being underprescribed. If it is difficult to make this distinction in the office, referral to an addiction or pain specialist may be warranted.

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needed for low back pain, especially in the acute period. To avoid toxicity in older patients, gradually and systematically increase the dose until an adequate analgesic effect is achieved. In older or sicker patients in severe pain, consider admission to a hospital if rapid opioid delivery is needed.

If pain levels are high and an opioid at the prescribed dose has no effect, it may be safe to double the next dose. If the initial dose has some effect, then increase the dose gradually to lessen the possibility of toxicity. Signs of toxicity include nausea/vomiting, urinary retention, constipation, sedation, or respiratory depression.

By-the-clock dosing is preferable to prn, as most patients will refrain from taking the next "as-needed" dose until pain reaches high levels. Encourage a routine dose prior to bedtime if pain interrupts sleep. Consider gradually increasing this dose until the patient achieves restful sleep.

To avoid overdosing, use caution when introducing long-acting agents in patients previously treated with shorter-acting opioids. Calculate the equianalgesic dose for the long-acting agent based on total short-acting opioid consumed in 24 hours, then prescribe one-half this amount (divided in intervals based on pharmacokinetics) and encourage the patient to continue using the short-acting drugs for breakthrough pain. Over several weeks, gradually increase the dose of the long-acting opioid until pain control is achieved and breakthrough medication eliminated or minimized. Frequent telephone or visiting nurse checks may be necessary to monitor patient response to therapy.

If a patient has responded to an opioid for acute pain, it may be appropriate to consider using further opioids as part of long-term treatment of chronic low back pain (duration >6 months). In this setting, it may be beneficial to establish a multidisciplinary team to periodically review the case.

Drug holidays should be built into the treatment plan to reduce effects of tolerance and to re-evaluate the opioid's benefit in terms of pain intensity, function in daily living, and relief of suffering. If tolerance develops, increase the dose of opioid, try a different opioid, and/or add an adjuvant medication for its opioid-sparing effect (see "Opioid tolerance versus addiction or diversion").

Adjuvant medications

When opioids are considered appropriate but the patient experiences side effects, the first approach is to reduce the opioid dose and, if not done previously, provide an adjuvant medication (table). Anticonvulsant, antidepressant, or (in certain circumstances) antiarrhythmic agents may be of great value and may help to reduce or eliminate the need for opioid therapy.

Anticonvulsants. Anticonvulsants such as phenytoin sodium (Dilantin), carbamazepine (Tegretol), gabapentin, or topiramate (Topamax) have been used successfully in treating neuropathic pain.

Because gabapentin is neither hepatically metabolized nor protein-bound, it is relatively safe for older patients who are taking multiple medications and are at risk for drug-drug interactions. Start with a low dose, such as 100 mg at bedtime. Gradually increase (eg, 100 mg bid, 100 mg tid) until a satisfactory analgesic effect is noted or side effects such as impaired mental functioning occur.

If the patient reports significant side effects with gabapentin, reduce the dose or consider trying another agent. Reducing the dose may eliminate the side effect while maintaining a partial analgesic effect. Although the package insert cautions to withdraw gabapentin slowly, this is probably not necessary for patients without a seizure disorder.

Topiramate has been associated with weight loss, which may be a useful side effect for obese patients with chronic pain. Weigh patients at every visit if this medication is used. Nutrition counseling or discontinuation of the drug may be necessary if weight loss is significant. Topiramate has been associated with increased intraocular pressure and should be avoided if the patient has a history of renal calculi.

Gabapentin and topiramate reach steady state more quickly than phenytoin. Phenytoin may take up to a month to achieve a steady state level unless loading doses are given.

Antidepressants. Tricyclic antidepressants (TCAs) such as amitriptyline appear to have analgesic efficacy. The dose range for analgesia may be significantly less than that required to treat depression. Complaints of anticholinergic effects such as dry mouth and drowsiness can be minimized by starting with a very low dose (eg, amitriptyline, 5 to 10 mg), which has no initial analgesic effect but also little risk of side effects.

Its sedative side effect makes

Table Adjuvant medications for treatment of low back pain

Drug	Dosage	Remarks
Anticonvulsants		
Phenytoin sodium*† Dilantin	100 to 150 mg (2 to 3 mg/kg) bid to tid	Contraindicated with sinus bradycardia, sinoatrial block, second- and third-degree AV block, and Adams-Stokes syndrome; exercise caution in patients with CAD Analgesia enhanced when administered with other anticonvulsants, benzodiazepines, antidepressants
Carbamazepine*† Tegretol	**Initial**: 100 mg bid; may be increased by up to 200 mg/d at weekly intervals until satisfactory response is achieved	Monitor blood counts at baseline and monthly for first 6 months; expect early transient leukopenia; obtain informed consent before starting therapy Analgesia enhanced when administered with other anticonvulsants, benzodiazepines, antidepressants
Gabapentin† Neurontin	**Initial**: Week 1: 100 to 300 mg qhs Week 2: Increase to bid Week 3: Increase to tid **Maintenance**: Dosage may be increased to maximum 2,700 mg/d	Decrease dose by 50 to 75% in patients undergoing hemodyalisis or with impaired renal function
Topiramate† Topamax	**Initial**: 25 to 50 mg once daily; increase by 25 to 50 mg/week **Maintenance**: 200 mg bid	Avoid in patients with history of nephrolithiasis, myopia, acute glaucoma Can cause weight loss (helpful in obese patients)
Antidepressants†		Decrease dose in case of sedation, cardiovascular disturbances, anticholinergic effects
Amitriptyline HCl Elavil	**Initial**: 10 to 25 mg qhs **Maintenance**: 10 to 150 mg qhs	Patients with painful diabetic neuropathy may require up to 150 mg/d
Doxepin HCl Sinequan	**Initial**: 25 to 50 mg qhs; increase by 25 to 50 mg every 3 to 4 weeks as needed **Maintenance**: 25 to 150 mg qhs	Use with caution with CVD, seizure disorder, thyroid disease, BHP, urinary retention, increased intraocular pressure Must be administered on a regular schedule (not prn)
Nortriptyline HCl Aventyl, Pamelor	**Initial**: 10 to 50 mg qhs **Maintenance**: 10 to 150 mg qhs	Taper when stopping to avoid withdrawal symptoms Contraindicated in patients taking MAOI drugs
Others		
Cyclobenzaprine† Flexeril	**Initial**: 10 mg qhs **Maintenance**: 10 mg tid	Increased risk for confusion, hallucinations in older patients Use with caution with urinary retention, close-angle glaucoma, and in patients taking anticholinergic agents May enhance seizure risk in patients taking tramadol
Dextromethorphan Various	15 mg every 6 hrs or 30 mg tid	Contraindicated in patients taking MAOI drugs May cause drowsiness with other CNS depressants
Clonidine HCl Catapres	0.1 mg once daily; increase as tolerated to 0.3 mg/d in divided doses **Transdermal**: 0.1 to 0.3 mg/d; change patch every 7 days	Must be tapered off; abrupt withdrawal may trigger rebound hypertension, nervousness, agitation, tremor Use with caution in patients with severe CVD, peripheral vascular disease, renal failure
Tizanidine HCl† Zanaflex	**Initial**: 2 mg qhs or bid **Maintenance**: 4 mg tid	Test liver function at baseline and at 1, 3, and 6 months Lowers seizure threshold; monitor EEG periodically Abrupt withdrawal may lead to seizures, hallucinations
Baclofen† Lioresal	**Initial**: 5 to 10 mg tid; increase dose by 5-mg increments every 3 days **Maintenance**: 5 to 25 mg tid	Lowers seizure threshold; monitor EEG periodically Abupt withdrawal may lead to seizures, hallucinations

* Taper off, as abrupt withdrawal in epileptics can precipitate seizures; may be tapered off after 6 months; pain relief may be maintained after drug is discontinued

† May cause somnolence and/or impair mental or physical function; advise care in driving or working with machinery

Source: Prepared for Geriatrics by Robert I. Cohen, MD, Pradeep Chopra, MD, and Carole Upshur, EdD

amitriptyline an excellent adjuvant for a pain patient with sleep disturbance. To avoid morning oversedation, give amitriptyline several hours before sleep (rather than at bedtime) and gradually increase the dose.

Other TCAs such as doxepin HCl (Sinequan) and nortriptyline HCl (Aventyl, Pamelor) may be less sedating than amitriptyline, although some studies suggest they may also have less analgesic efficacy. When a TCA is not helpful or produces side effects the patient cannot tolerate, trials of other antidepressants including selective serotonin reuptake inhibitors (SSRIs) may prove helpful.

A muscle relaxant such as cyclobenzaprine HCl (Flexeril) is often useful in the acute period. Its efficacy may be explained by the similarity of its chemical structure with amitriptyline. Like TCAs, cyclobenzaprine can be sedating. Start with a low dose, such as one-quarter to one-half of a 10-mg tablet.

Antiarrhythmics. In a small percentage of patients for whom other medical regimens are not successful, a trial of IV lidocaine at a pain center can be considered. If a series of infusions given in a monitored setting in doses of up to 5 or even 10 mg/kg prove effective, an oral analog such as mexiletine HCl (Mexitil) can be considered. Because such high doses of lidocaine are considered toxic (ie, can lead to seizure or cardiac arrest), this intervention should be offered only in a setting with established protocols and a good safety record for this treatment.

Other options. Other adjuvants that may be suggested at a multidisciplinary pain center include dextromethorphan, an over-the-counter derivative of morphine that may improve opioid efficacy; the alpha-2 agonists clonidine HCl (Catapres) or tizanidine HCl (Zanaflex); and gamma amino butyric acid (GABA) agonists such as baclofen (Lioresal).

Managing side effects

Side effects are common with opioid medications, although many resolve with time. When side effects limit the ability to administer an effective dose, treatment of the side effects may be warranted.

Constipation. Constipation is an expected side effect of opioid therapy that does not resolve with time. Preventive treatment therefore must be initiated at the very beginning of an opiate trial. Increased daily fluids and dietary fiber may need to be supplemented with laxative and stool-softening products such as psyllium (eg, Metamucil), sennosides (eg, Senokot), or docusate sodium (eg, Colace).

Sedation. Sedation may respond to treatment with a CNS stimulant such as methylphenidate HCl (Ritalin) or dextroamphetamine sulfate (Dexedrine). Like opioids, stimulants are controlled substances and prescription writing may be monitored. To document appropriate prescribing, office records should include the diagnosis of intractable pain and explain how the pain responds to opioid therapy. Specifically document if effective opioid dosing is prevented by the presence of significant sedation, for which stimulants are approved therapy.

GI effects. GI side effects may respond to metoclopramide (Reglan), ondansetron HCl (Zofran), dolasetron mesylate (Anzemet), or a proton pump inhibitor. Because pain increases stress levels, monitor patients for peptic ulcer disease, especially when they are receiving H_2 blockers or proton pump inhibitors to treat GI side effects related to analgesics.

Patient education

Patient education is an important component of treatment to maintain good back health. Older or frail individuals may require the assistance of caregivers to participate in exercise or learn effective body mechanics.

Exercise. Although controversial in the acute phase of pain, exercise therapy is helpful for patients with chronic back pain, both in reversing deconditioning and increasing activity. Exercise can also help prevent recurrence of chronic back pain. When planning an exercise program, consider the patient's prior activity level and life style. For example, a 75-year-old with advanced osteoporosis will require a different program than a 55-year-old who was running daily before the onset of back pain.

Any exercise that enhances mobilization may be beneficial. Nonimpact aerobic exercise designed to strengthen the muscles that support the spine is often recommended. Gentle back extension exercise and limited abdominal flexion exercises (eg, partial sit ups with knees bent) may be included in the regimen.

For diskogenic pain, extension and stabilization exercises should be followed by exercises for flexibility, joint mobility, abdominal and other strengthening, and aerobic programs. Water walking and aquatic exercise are low-impact and well-tolerated.

The American Board of Family Practice recommends instructing patients how to exercise and perform daily activities.[11] A physician, nurse, or physical therapist with training in back care can teach correct stretching movements and exercises. Some patients may chose to hire a personal trainer.

Activities of daily living. Patients also need instruction in posture, safe lifting, and changing positions when sitting, bending, etc. A change in footwear should be considered, especially if the patient wears shoes with high heels. Use of special furniture, such as seats with lumbar support, should be considered for the home, office, and/or automobile.

Nutrition. Back pain may interfere with nutrition at many levels:

- The patient may be unable to shop for or stand and prepare food.
- Appetite can be altered by intense pain, by medications used to treat the pain, and by medication side effects such as nausea or sedation.
- Some medications, such as amitriptyline, can increase appetite.
- Depression, commonly associated with chronic pain, can be associated with weight loss or gain.

continued

Resolution of low back pain with conservative treatment

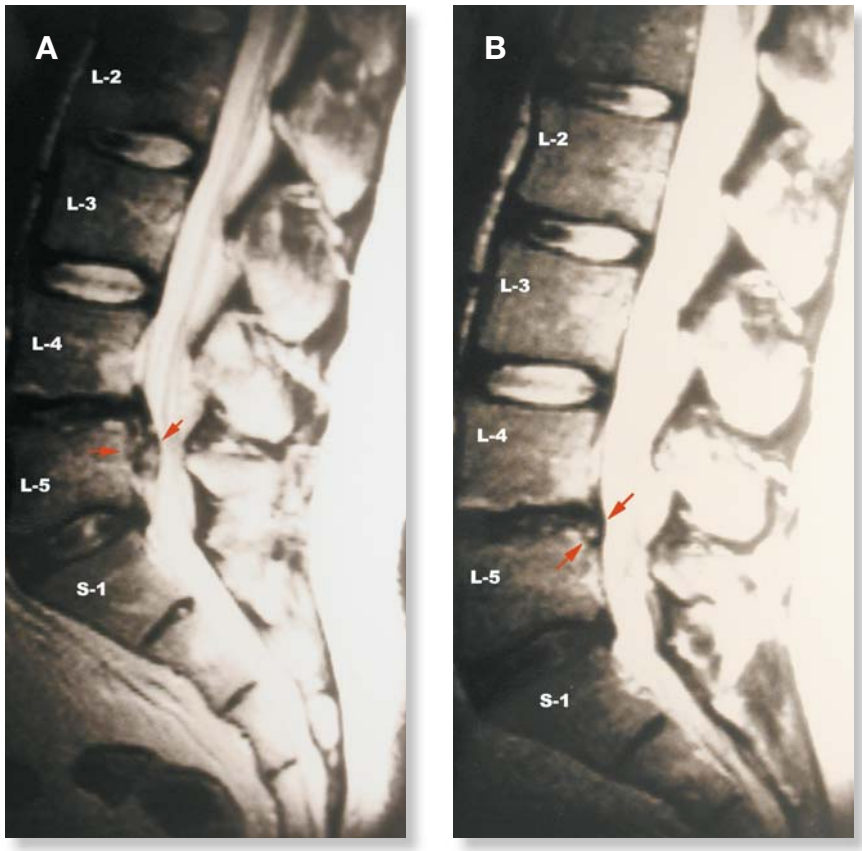

Figure 2. Sagittal T-2 weighted lumbar spine imaging shows (A) large caudally extruded disk herniation (arrows) and (B) the same patient, 3 months later. This patient had no surgery but essentially complete spontaneous regression of extruded disk. Patient recovered clinically as well. Note the residual dark (dessicated) L4-L5 disk; the L5-S1 disk is also dessicated.

Source: Reprinted with permission from Kleefield J. Magnetic resonance and radiological imaging in the evaluation of back pain. In: Aronoff GM (ed). Evaluation and treatment of chronic pain (3rd ed). Baltimore: Williams & Wilkins, 1999:492.

- Patients who are overweight may have difficulty participating in an exercise program and may be at increased risk for slower recovery or recurrence of pain.

Monitoring weight and helping the patient maintain good nutrition with dietetic consultation may be valuable.

Sexual concerns. Back pain may interfere with relationships, sexual interest, and performance. Although some patients may avoid discussing this topic, many will welcome any suggestions that can help restore normal sexual relations. Materials are available to facilitate discussion and assist the provider in educating patients in alternate techniques, based on what types of movement are painful.[12]

Pain center referral

Multidisciplinary pain centers offer a spectrum of medical, procedural, and behavioral therapies that may reduce pain levels and improve functional status, compared with other options such as surgery.[13] Referral to a pain center for assistance with diagnosis or treatment may be useful for patients:

- whose pain and function do not improve within 4 to 6 weeks of treatment
- who are not candidates for surgery
- and whose symptoms have no known cause (eg, cancer).

In making the referral, review the patient's pain history with special attention to treatment trials that have been successful or failed with reasons for failure, (eg, patient was unable to tolerate amitriptyline at a starting dose of 50 mg hs due to excessive drowsiness, although this did lessen the pain and improved sleep). Summarize findings from imaging, laboratory studies, and specialty consultations.

At a pain center, procedural therapies may include trigger point, epidural, and facet injection of local anesthetic and/or depo-steroid injection; radiofrequency or cryotherapeutic nerve ablation; and implantation of spinal cord stimulators and intrathecal infusion pumps. Partial pain relief lasting 3 years has been demonstrated with spinal cord stimulation.[14]

Surgery

Patients with a structural or mechanical cause of pain such as herniated disk or nerve compression due to foraminal encroachment may do well with surgery. Indications for a surgical referral include:

- progressive neurologic deficit such as progressive weakness or persistent motor weakness despite 4 to 6 weeks of nonoperative treatment
- cauda equina syndrome, a surgical emergency in which patients present with bowel or bladder dysfunction, loss of sensation in a saddle distribution, and/or onset of lower extremity weakness and numbness due to compression of the spinal nerve roots
- severe and disabling back pain with positive findings on MRI, such as mass effect of nerve compression.

Decompressive laminectomy can be a good option for severe symptoms caused by spinal stenosis. If the stenosis is due to spondylolisthesis, then decompressive laminectomy combined with fusion may be a more appropriate option. Although medication may be effective for treating the pain associated with spinal stenosis, medication cannot reverse the loss of proprioception and strength associated with this condition. For patients who have lost or are at risk for losing neurologic function, surgery can provide a more functional recovery for a few years, although

up to one-third of patients may develop recurrent severe pain beyond that time.

Diskectomy for herniated intervertebral disks appears to have initial benefit, but this may diminish over time so that a clear advantage cannot be demonstrated 10 years postoperatively (figure 2). Some evidence-based medical reviews suggest that surgery, such as diskectomy, may be as effective as conservative treatment for patients with low back pain associated with spinal stenosis, spondylolisthesis, or sciatica. Other reviews, however, suggest that the results for treatment of pain, instability, spinal stenosis, and nonacute spondylolisthesis with surgical decompression or fusion may have no increased efficacy compared with conservative treatment .[15]

Conclusion

Low back pain is a common complaint of midlife and older patients. Those with a history of cancer or neurologic impairment and those who do not improve within a few weeks deserve a thorough evaluation, including imaging, lab studies, and specialty consultation for definitive care. In most cases, however, conservative management is the recommended first-line treatment.

Appropriate medical management includes generous and thoughtful prescription of single or multiple drug regimens, based on the patient's pain levels and extent to which pain interferes with activities of daily living. Consultation with a pain specialist should be considered when daily use of standard therapies fails to reduce suffering and improve quality of life.

Patient education, self-monitoring of pain levels, and appropriate exercise are important components of successful therapy. Some older patients require assistance from caregivers to fully implement self-management programs. G

References

1. Deyo RA, Weinstein JN. Primary care: Low back pain. N Engl J Med 2001; 344(5):363-70.
2. Carey TS, Garrett JM, Jackman AM. Beyond the good prognosis. Examination of an inception cohort of patients with chronic low back pain. Spine 2000; 25(1):115-20.
3. Fernbach J, Langer F, Gross AE. The significance of low back pain in older adults. CMAJ 1976; 115:898.
4. Cohen RI, Chopra P, Upshur C. Low back pain, part 1: Primary care work-up of acute and chronic symptoms. Geriatrics 2001; 56(Nov):26-37.
5. Spitzer WO, LeBlanc FE, Dupuis M, et al. Scientific approach to the assessment and management of activity-related spinal disorders: A monograph for clinicians. Report of the Quebec Task Force on Spinal Disorders. Spine 1987; 12(suppl 1):51-9.
6. Hagen KB, Hilde G, Jamtvedt G, Winnem MF. The Cochrane review of bed rest for acute low back pain and sciatica. Spine 2000; 25(22):2932-9.
7. Cancer pain relief and palliative care. Report of a WHO expert committee. World Health Organization Technical Report Series, 804. Geneva, Switzerland: World Health Organization, 1990.
8. McCarberg BH, Herr KA. Osteoarthritis: How to manage pain and improve patient function. Geriatrics 2001; 56(Oct):14-24.
9. van Tulder MW, Scholten RJPM, Koes BW, Deyo RA. Nonsteroidal anti-inflammatory drugs for low back pain: A systematic review within the framework of the Cochrane Collaboration Back Review Group. Spine 2000; 25(19):2501-13.
10. Freedman GM, Peruvemba R. Geriatric pain management: The anesthesiologist's perspective. Anesthesiol Clin North Am 2000; 18:(1):123-41.
11. Copeland LR, Gambrell RC, Thorsteinsson G, et al. Low back pain reference guide. Lexington, KY: American Board of Family Practice, 2001.
12. Hebert LA. Sex and back pain patient manual. Greenville, ME: IMPACC, 1994 (http://www.impaccusa.com/sexback.html).
13. Rosomoff HL, Rosomoff RS. Low back pain: Evaluation and management in the primary care setting. Med Clin North Am 1999; 83(3):643-62.
14. Turner JA, Loeser JD, Bell KG. Spinal cord stimulation for chronic back pain: A systematic literature synthesis. Neurosurgery 1995; 37:1088-96.
15. Gibson JN, Waddell G, Grant IC. Surgery for degenerative lumbar spondylosis. Cochrane Database Syst Rev 2000; 3:CD001352.