

Modern Low-Back Pain Diagnosis and Treatment Strategy

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Abstract

Background: Low back pain has serious adverse effects on the quality of life and is an important factor leading to systemic disability. At present, the increasing number of people go to the pain department due to back pain, leading to the increasing medical burden of back pain. The disease has caused a significant impact on people's life and health state, and has become a major health problem in modern society. Most people will experience low back pain throughout their lives^[1], Low back pain not only let a person feel physical discomfort, but also to the person's psychology, quality of life and labor ability have sustained negative effects, in 2010 global 291 kinds of disease burden study, back pain in the disabled health life loss years (years lived with disability, YLD, refers to the life in not ideal health years) more than any other disease^[2].

Keywords: modern; low back pain; diagnosis and treatment strategy

Epidemiology

The average lifetime prevalence of low back pain was 38.9%^[3]. In past reports in China, the prevalence of adult low back pain was as high as 7.21% to 39.0%, and the annual prevalence ranged from 20.88% to 29.88%, while the real-time prevalence was between 6.11% and 28.5%^[4]. Low back pain is common in people over 45 years old, with significantly more female patients than men. Furthermore, the prevalence was generally higher in rural areas than in urban areas^[5].

Cause of Disease

From a biopsychosocial perspective, the causes of low back pain can be divided into somatic factors^[6-9], psychological factor^[10] And social factors^[11, 12]. Somatic factors include: traumatic, inflammatory,

degenerative, congenital, and neoplastic diseases.

Clinical Diagnosis

Ask About the Medical History

By asking the history, the first to exclude specific LBP, which is of great significance to clear the diagnosis of non-specific LBP, especially first patients, the contents of the history collection should include the location of pain and degree, onset time and possible causes, past history, psychological mental condition, the work before the information, at the same time should pay special attention to the presence of patients^[13](Table 1). Hongqi sign reminds doctors to clarify the etiology of specific LBP, so as to guide the selection of auxiliary examination items.

Table1. Red flag sign of low back pain

age	action in chief	sign	medical history
<20 Years old	Low heat, night sweats Fever, chills	Spinal tenderness, percussion pain Spinal distension pain, activity pain	spinal tuberculosis Spinal infection
> 50 Years old	Bladder-rectal dysfunction	Neurological signs (lower limb muscle strength, anal anus, urinary retention or incontinence, sellar sensation, Tendon reflex abnormalities and pathological signs, etc.)	syndrome of cauda equina
	Trauma, low back pain	Spinal activity was limited	fracture of lumbar vertebra
	Low back pain, morning stiffness	Lumbar spine pain, deformity	ankylosing spondylitis
	Lback back pain accompanied by lower limb pain		Radicular pain lesions
	Nturnal pain, unexplained weight loss		A history of malignancy
	Urogenital symptoms		History of urogenital disease
	Menstrual abnormalities or amenorrhea		osteoporosis

Physical Examination

The physical examination covers the test of spinal palpation and range of motion, which includes checking the symmetry of the spine, deformity, range of motion and angle of the spine, and tenderness and percussion pain in the paravertebral tissue. These results can help doctors make a initial diagnosis. However, the physical examination lack of precision and reliability, doctors can not only rely on spinal palpation results to diagnosis of disease, but also need to collect the history of the examination of lower limbs and muscle strength, whether there is a saddle anesthesia or feeling weakened, through the rectal examination anal sensation is weakened or disappear, whether lower limb tendon reflex abnormalities and other positive signs, to help determine the diagnosis and treatment plan.

Auxiliary Inspection

X-ray

X-ray is a commonly used method of low back pain examination, which can help doctors determine the presence of fractures, dislocation, arthritis, tumors and other lesions. By looking at the images on the X-ray film, the doctor can tell whether the patient's spine is abnormal. In addition, X-rays can also be used to evaluate the treatment effect and monitor the disease progression. It should be noted that although X-ray is a

commonly used examination method, it cannot detect all the causes of low back pain, so the comprehensive analysis should be combined with other examination methods in practical application.

CT Tomography Scan

CT plays a crucial role in the radiographic evaluation of low back pain. It can clearly show the position, shape and size of the disc, help to determine whether the disc is protruding or bulging problems. In addition, CT can also show whether the nerve root is compressed, such as for aminal stenosis and nerve root compression, which is an important means to clarify the diagnosis of specific low back pain, and is also an important reference for the development of treatment plan.

Magnetic Resonance Imaging (MRI)

MRI can provide multiplane images, including cross section, sagittal plane and coronal plane, which can clearly show the soft tissue situation of intervertebral disc, muscle, ligament, smooth capsule and so on. Therefore, MRI has unique advantages in the comprehensive assessment of the lumbar spine and surrounding soft tissues.

Single-Photon Emission Computed Tomography (SPECT)

SPECT has high clinical utility in diagnosing elderly patients with back pain.

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Compared with traditional imaging methods, SPECT can help doctors better determine the etiology of back pain in elderly patients, which can reduce unnecessary surgical treatment^[14].

Bone Mineral Densitometry Technique

Bone mineral density measurement technology is mainly using the principle of X-ray through the attenuation of different media, the human bone mineral content, bone density for noninvasive measurement method. At present, the commonly used bone density measurement techniques mainly include double energy X-ray bone density measurement (DXA), limb DXA (pDXA) and quantitative CT (QCT). Bone densitometry techniques can be used to assess osteoporosis, confirm the risk of fracture, and can also be an important method to evaluate the therapeutic effect of abnormal bone metabolism^[15].

Assessment Scale

There are four commonly used clinical assessment scales for low back pain, namely, the 11-point numerical scoring method (NRS-11)^[16], And the Roland-Morris dysfunction questionnaire^[17, 18], SF-36 concise health questionnaire^[19] And ability assessment of activities of daily living (ADL)^[20, 21]. According to our survey, the four evaluation scales have different advantages, and doctors should choose the appropriate evaluation scale according to the actual situation and the real situation and requirements of the patients (Table 2). We routinely recommend the Roland-Morris dysfunction questionnaire and the 11-point numerical scoring method (NRS-11), because patients with low-moderate back pain in outpatient clinic, the Roland-Morris dysfunction questionnaire is particularly sensitive to this, while the NRS-11 is easy to record and easy to express.

Table2. Common low back pain assessment scale

Evaluation scale	characteristic
11-point number scoring method (NRS-11)	Patients are easy to understand and express, easy to record, significantly reduce the burden of medical staff
The Roland-Morris dysfunction questionnaire	Most sensitive to patients with mild to moderate disability due to acute, subacute or chronic low back pain,
The SF-36 Concise Health Questionnaire	It can be used for long-term follow-up of the quality of life of patients with low back pain
Daily Living, Activity Capacity Assessment (ADL)	The evaluation of the rehabilitation effect and the quality of medical care is of great significance

Treatment

Low back pain treatment usually includes five aspects: non-drug treatment, drug treatment, minimally invasive interventional treatment, preventive intervention and rehabilitation exercise.

Non-Drug Therapy

Because some diseases of low back pain are difficult to cure completely and easy to relapse, long-term treatment is

usually needed. When dealing with diseases with a long course of disease, doctors need to take into account the metabolic and economic burden of patients and pay attention to non-drug treatment. For this purpose, we collected 14 non-drug treatments. These methods include massage, acupuncture, electrical stimulation, phototherapy, and psychological and exercise therapy. The specific items, rationale and experimental results of these methods are listed in Table 3.

Table3. Non-pharmacological treatment for low back pain

Non-pharmacological treatment	Evidence and treatment outcomes
moxa-moxibustion ^[22]	It can dilate blood vessels, accelerate the speed of blood circulation, inhibit the permeability of blood vessels, reduce the exudation of inflammation, but also can accelerate the absorption speed of inflammatory exudate, relieve low back pain
massage ^[23]	Make the local tissue degeneration, tissue internal fluid displacement, so as to promote the metabolism, to achieve the effect of treating low back pain
acupuncture and moxibustion ^[24]	By piercing specific acupoints, help and improve the dynamic balance of various forces of the body to achieve the purpose of relieving low back pain
Muscle energy technology ^[25]	May involve alternating contractions of the antagonistic muscles and auxiliary stretching to reduce pain and discomfort

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manipulation ^[26]	In the spine related tendons, bones, joints and other tissues and meridians and acupoints for massage operation, in order to relieve the pain of skeletal muscle and improve the range of motion
psychotherapy ^[27]	Relieve the anxiety and worry of patients with back pain, prevent the occurrence of reinjury behavior, so that patients achieve the unity of body and mind.
Suspension motion ^[28]	Improve the blood circulation of the local tissue, inhibit the segmental muscle spasm, stimulate the brain to release analgesic substances, improve muscle strength, and achieve the purpose of relieving back pain
Yoga ^[29]	Improve body flexibility and muscle strength while making the body relax and relieve stress and reduce pain through breathing meditation exercises
cinesiatics ^[30]	Exercise promotes the generation of bone, and reduces the low back pain caused by the fatigue and spasm of the lumbar and back muscles
High-energy laser therapy ^[31]	Strengthen the function of fibroblasts, accelerate tissue growth and reduce prostaglandin synthesis, reduce the inflammatory response, and reduce pain
TCNS ^[32]	Stimulation of proprioceptive nerves, inhibiting pain signaling and the excitation of C-type nerve fibers, can also increase the release of endorphin molecules and relieve back pain
heat treatment ^[33]	Skin vasoconstriction, reduce local edema, reduce lower back pain
cold treatment ^[33]	Reduc the nerve conduction velocity and reduces pain sensitivity
Extracorporeal shock-wave therapy ^[34]	Shock wave stimulates sensory nerve endings to reduce nerve sensitivity, hinder nerve conduction and relieve pain

Drug Therapy

Low back pain is a common pain symptom that can be treated with medication to relieve the pain. Commonly used drugs include nonsteroid IDs, antidepressants and anxiolytics. Furthermore, skeletal muscle relaxants and opioids can also be used to lower back pain. Chinese medicine is also an effective way to treat back pain, which can relieve pain through Chinese medicine decoction.

Nonsteroidal Antiinflammatory Drugs (NSAIDs)

NSAIDs By inhibiting cyclooxygenase, reduce the inflammatory reaction and pain feeling, thus relieving the symptoms of back pain. It should be noted that NSAIDs cannot cure low back pain itself and can only improve the quality of life of patients by relieving symptoms. Moreover, long-term use of NSAIDs may cause some side effects, such as gastrointestinal bleeding, and kidney injury. Therefore, physician recommendations should be followed when using NSAIDs and attention to dose and medication duration.

Skeletal Muscle Relaxants

Muscle relaxants are mainly by inhibiting the conduction between nerve muscles, make muscle relaxation, so as to relieve muscle tension. Specifically, relaxants act by blocking impulse transmission between the neuromuscles, relaxing the muscles and relieving pain

Opioids

Opioids can bind to opioid receptors in the central nervous system to reduce pain sensation by inhibiting the release and delivery of neurotransmitters. Acting mainly on μ receptors can inhibit neuronal firing and neurotransmitter release, thereby inhibiting the transmission of pain signals. In addition, opioids can also enhance analgesia by promoting the release of endorphins. Opioids have good efficacy in relieving back pain, but they also have adverse reactions such as reduced gastrointestinal activity, respiratory depression, coma and confusion.

Antidepressants, Anxiolytics

Antidepressants and anxiolytics are adjuncts in the treatment of low back pain and the mechanisms are unknown. It is currently believed that patients with anxiety and depression will focus their attention on the physical discomfort, leading to an increase in pain sensitivity. Will also increase tension, make the skeletal muscle load increase, if maintain this state, easy to cause back pain ^[35, 36].

Chinese Patent Medicine Treatment

Commonly used Chinese patent medicine is xianling bone bao capsule, rheumatism bone pain capsule, Bi qi capsule, strong bone pain capsule and so on. Its treatment The principle is to promote qi and blood circulation, remove blood stasis, remove blood stasis and relieve pain, activate meridians and collaterals,

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strengthen liver and kidney, strengthen muscles and bones, so as to relieve the symptoms of back pain and improve the quality of life of patients^[37].

Minimally Invasive Interventional Therapy

Minimally invasive interventional therapy methods for LBP include injection therapy, minimally invasive interventional therapy, and neuromodulation therapy. In some interventional guidelines for LBP, the largest number of recommended treatments are radiofrequency ablation and facet thermo coagulation^[38].

Preventive Interventions and Health Education

Doctors should use a variety of ways to seize every education opportunity to spread the back pain disease information to the masses, help them establish health beliefs, and be responsible for their own health. This pattern of beliefs generated by knowledge that change behavior is called the know-letter-line pattern, which can help people better understand and prevent back pain and promote health. Preventive intervention plays a very important role in the treatment of back pain. Doctors should actively evaluate the risk of back pain caused by various factors and handle them appropriately, and the prevention measures of pain should be taken in daily diagnosis and treatment^[39-41]. In addition, patients should be constantly informed of the inducing factors to prevent back pain, so that patients can understand these LBP inducing factors and precautions in daily life.

The following are the common inducing factors of low back pain, which doctors should be familiar with and disseminate to patients as daily health knowledge. Whether standing, sitting, or walking, the correct posture should be maintained. Raise the head, chest, abdomen, avoid long bending or excessive force. Also avoid maintaining the same position for a long time, such as sitting or standing for a long time. Timed to stretch and relax to improve blood circulation and relieve muscle fatigue. Inappropriate seat and bed mattress may also aggravate the condition, should be paid attention to, timely replacement. Avoid long time bending and overload work, long time bending will

accelerate the wear of the lumbar spine, lumbar disc, in the work should pay attention to effort and compensation operation, torso to maintain a flexion position, to avoid direct force on the waist. At the same time, it is best to wear belt, wrist guards, knee pads when heavy manual labor, and take them off in time after labor.

Rehabilitation and Exercise

Back Back Muscle Exercises

Appropriate back muscle exercises, enhance the core muscle group, can improve the support and stability of the back, so as to prevent back pain. You can do some exercises for the core muscles, such as sit-ups, five-point lumbar and back muscle exercises, etc.

Healthy and Balanced Diet

Recommend enough calcium, vitamin D, and protein, which are key to maintaining bone health. And to control the amount of food, too heavy or too light weight may increase the burden of the lumbar spine, so we should maintain the appropriate weight.

Follow-up

Regular follow-up visits can monitor disease changes, adjust treatment plans, provide psychological support, and promote doctor-patient communication. The standardization and effectiveness of follow-up is crucial to improve the effectiveness of treatment and the quality of life of patients. In order to improve the effect of follow-up, doctors should be good at using modern information means, pay attention to personalized follow-up, improve the quality of follow-up and strengthen patient education, so as to meet the specific needs of patients.

Focus on Changes in the Condition

During the follow-up, attention should be paid to monitoring the physical condition of patients, such as whether there are tumor symptoms, emaciation, fatigue, fever, etc., and whether there is a trend of chronic development, such as persistent low back pain, pain, etc., so as to adjust the treatment plan in time.

Pay attention to psychological support

To pay attention to the patient's emotional state, if the patient has

depression, anxiety and other emotions, to provide timely psychological support and treatment.

Establish a reminder system

For patients with poor compliance habits or poor memory, doctors can advise patients to set reminders before taking medication, such as mobile phone alarm clocks or marking on the calendar. Family members can provide the necessary support and supervision to ensure that patients take their medication on time.

Summary

Low back pain is a common health problem in outpatient clinics and has a significant impact on the life and health status of patients. In the diagnosis and treatment of back pain, doctors need to use scientific diagnosis and treatment thinking, abide by the bio-psychological-social medicine model, and adopt accurate diagnosis and treatment strategies to provide patients with reasonable diagnosis and treatment plans. The etiology of low back pain is complex, including somatic factors, psychological factors and social factors. Doctors should comprehensively evaluate the patient's condition by means of medical history collection, physical examination, auxiliary examination and reasonable assessment. In addition, doctors should also pay attention to the mental health of patients, help patients establish a positive attitude and improve the quality of life. In terms of drug therapy, multiple drugs can be used, and TCM therapy is also a safe and effective treatment method. Preventive intervention occupies a very important position in the treatment of low back pain, including maintaining the correct position, strengthening labor protection, low back muscle exercise, and healthy and balanced diet^[42]. Regular follow-up can monitor condition changes, adjust treatment plans, provide psychological support and promote doctor-patient communication. To sum up, the treatment of low back pain requires comprehensive treatment methods, combining a variety of treatment methods and preventive measures to achieve satisfactory results.

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