■ REVIEW ARTICLE ■ SPINE SURGERY AND RELATED RESEARCH

The Recent Trend in Diagnosis and Treatment of Chronic Low Back Pain

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Abstract:

Introduction: Development of evidence-based medicine has made a big change in diagnosis and treatment of chronic low back pain. The recent trend is assessed through a review of literature. Methods: The articles published in these 10 years are reviewed, and important points are examined. Results: In diagnosis, challenges for history taking and limit of imaging or clinical guidelines are revealed. In treatment, cognitive behavioral treatment and exercises are proved effective. Sleep disturbance has recently attracted attention as a factor associated with low back pain. Cost-effectiveness of diagnosis and treatment modalities has come to be emphasized. Conclusions: Diagnosis and treatment of chronic low back pain have been significantly changing. Multidisciplinary and multidimensional approach is essential. Chronic low back pain should be treated as a total pain, not a local pain.

Keywords:

chronic low back pain, diagnosis, treatment

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Development of evidence-based medicine (EBM) has made a lot of studies based on that, and it has caused a big change in diagnosis and treatment of chronic low back pain. This article presents the recent trend in diagnosis and treatment of chronic low back pain.

Diagnosis

Recent studies have pointed the importance of findings by interview and evaluation of physical examination. Definition of low back pain or chronicity varies from study to study. Hence, attention should be made on these definitions when evaluating studies.

Is pain a disease?

A disease should be defined first. According to the American Heritage Dictionary, it is an abnormal condition of the body or mind that causes discomfort or dysfunction, or an abnormal condition characterized by an identifiable group of signs or symptoms[1].

Pain is a symptom. Some people suggest that persistent chronic pain should be redefined from a symptom to an isolated disease, because its pathology is complex and quite different from acute pain[2]. Others fear a negative effect on patients because of the ominous feeling of the word "disease".[3] It should be carefully considered whether pain is treated as a disease or not.

The problem of definition is found also in a sciatic pain. The definition of a sciatic pain is different among studies, and the inconsistency prevents the evaluation of treatment[4].

Criticism on diagnostic label

There has been a criticism on diagnostic labels. For example, facet joint arthritis was reported to have no relationship with low back pain[5]. According to this report, no form of imaging has proved to be capable of identifying painful facets. The recent study indicates that there is no validated diagnostic test to identify painful facet joints[6].

The label "lumbar degenerative disc disease (DDD)" has also been criticized. The label of DDD, applied with ambiguous definition, might be a cause of overuse of spinal fusion[7].

The label "muscle strain" is criticized because of its ambiguity. Critics insist that the validity of this diagnosis has not been proved and that it is only a guess[8].

Some studies suggest that asymptomatic cases frequently

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show morphological abnormalities, which might lead to overmedication. There, indeed, is no clear relationship between disc degeneration and low back pain. Forty-seven percent of all the subjects who had experienced low back pain had normal magnetic resonance imaging (MRI) findings[9].

The cause of low back pain

Chemical radiculitis was reported to be caused by inflammation of nucleus pulposus[10]. According to the report, the patient had low back pain but no disc herniation. There is a study showing that endplate lesions are associated with disc degeneration and low back pain[11]. Another study suggests that endplate lesions are related to disc herniation[12].

Bacterial infection was also reported as a cause of low back pain, separately from the causes originated from spinal column[13].

Diagnosis should be made considering geographical or cultural differences, and biopsychosocial factors, not only morphological abnormalities, as a cause of low back pain[14-16].

The challenges in diagnosis

Diagnostic error is a failure to establish an accurate and timely explanation of the patient's health problems or communicate that explanation to the patient[17]. According to the study, diagnostic errors account for 6%-17% of hospital adverse events and approximately 10% of patient deaths. It is a serious problem in the medical world, especially in the clinical field of spine. Errors lead to unnecessary or harmful surgery.

Some problems in making diagnosis have been reported recently. One is poor validity of patient's self-reported history when presenting with persistent pain or injury[18]. Another is importance of observing patient's casual behaviors, such as sitting down, standing up, or walking, as well as listening to history[19].

Most physical examinations indicate poor performance when used in isolation, and better performance may be obtained when examinations are combined[20].

Clinical guidelines have been criticized. One study points that diagnostic procedures recommended in guidelines are not proved effective[21]. There is a study showing that red flags identifying serious conditions are not effective except for in the case of vertebral fracture[22-24]. Furthermore, red flags are not informative, and they should not be viewed as an absolute indication for imaging or more specialized examinations[25].

Considering these various problems in diagnosing, physicians should take enough time to be careful in diagnosis[26]. The serious problem is that most physicians do not follow the adequate procedures[27]. All the physicians should take enough time for listening to history and evaluating physical examinations. Skilled and careful assessment is important.

Imaging study

Diagnostic effects of imaging on degenerative diseases are limited according to the recent studies. Practice of imaging or existence of imaging equipment might be a cause of overmedication. The first of "top 5 lists" unnecessary in primary care is imaging within 6 weeks after onset[28].

There have been various studies about imaging. Many advanced imaging have limited effects on treatments[29]. There may be a relationship between inappropriate imaging and rising rates of surgical and injection procedures[30]. Routine imaging for low back pain by X-ray or advanced imaging methods is not associated with a clinically meaningful effect on patient outcomes[31]. These reports show that development of imaging is not related to effective treatments.

Diagnostic value and problems of MRI

It has been proved that MRI has no major benefit for diagnosing low back pain in the patients with degenerative diseases. According to the recent studies, early routine imaging (x-p, CT, and MRI) has no apparent benefits[32]. MRI does not improve outcomes in patients with lumbosacral radiculopathy referred for epidural steroid injections[33]. There is an opposite view that the lack of major benefit should not stop the use of MRI[34]. MRI can find a serious condition.

Researchers have a fear about MRI from a different view. There is a study showing that the physicians who own their own imaging units are more likely to refer patients for a scan[35]. Another study shows that increases in MRI use appear to lead to increases in surgery receipt[36]. And physician's self-referral for imaging is not associated with substantial benefits in treatment duration or cost[37]. These studies indicate that having one's own imaging units is likely to lead to overmedication.

Treatment

Informed consent, a patient consents treatment after informed by a physician, is acknowledged by both patients and physicians. Now informed decision (choice) is recommended for treatment of low back pain. A patient discusses with a physician about treatment selection and decides himself. There is no gold standard in the treatment of low back pain, and treatment should depend on patients.

There are some warnings to physicians about decision making[38,39]. According to them, patients are likely to overestimate benefits of the treatment and underestimate harms. Physicians are likely to be optimists unable to evaluate prognosis clearly. They suggest that physicians should provide the patients with sufficient information about benefits and harms of the treatment and get them clearly understand the risk assessment.

Rest

It has been proved by many studies since 1900s that rest is not a treatment for low back pain. And it is known to everyone. Sitting itself was reported to be a risk for health[40]. And there are many similar studies. One study shows that reduced sitting time is associated with a delay of aging[41].

Another study finds that prolonged sitting increases risk of serious illness and death regardless of exercise[42]. Another says that there is a positive association between sitting time and risk of anxiety[43]. There is a study denying the association between sitting time and mortality risk[44].

All of these studies indicate that rest without any move is a risk for health. Further studies are required to clarify the effects of sitting on health including low back pain.

Pharmacological therapy

Medication is widely used for the treatment of low back pain. There is little evidence, however, supporting its effectiveness for chronic low back pain[45].

Opioid use in Japan has recently started, but it has not been related to improvement in disability or dysfunction[46]. There is an evidence of short-term efficacy (moderate for pain and mild for function) of opioid to treat chronic low back pain compared with placebo[47]. There have been no signs of substantial progress in developing safe and effective medication in these 35 years[48].

Evidence that NSAIDs are superior to other oral analgesics has not been found[49]. Further research is required to identify the best analgesic.

Acetaminophen, which has been recommended as the first-line analgesic, is questioned about its efficacy. There is a study reporting constant recommendation of acetaminophen as the first-line analgesic should be changed[50]. Other studies indicate that acetaminophen has a general blunting effect on individuals' emotional processing[51] and that acetaminophen is not effective in the treatment of low back pain and provides minimal short-term benefit for people with osteoarthritis[52].

There are some studies opposing the above opinions. One study insists that the content of guidelines should not be changed on the basis of a single trial[53]. Another study shows anxiety among older patients who need analgesics[54]. Further sophisticated research is required.

Evidence for combination of different analgesics is limited. According to small literature, combined therapy, including antinociceptive and antineuropathic agents, is more effective than monotherapy in patients with chronic low back pain[55]. Methodological improvements in future translational research efforts are needed to maximize the potential of combination pharmacotherapy for pain[56]. Rates of overdose death among those co-dispensed benzodiazepines and opioid analgesics are 10 times higher than opioid analgesics alone[57]. There is urgent need for guidance about combined classes of medicines to facilitate a better balance between pain relief and overdose risk.

Many studies have been published concerning opioid use for noncancer pain. Opioid is a new light from the view of ensuring various options, but it has a lot of problems.

Older patients may have many drugs for hypertension, hyperlipidemia, and so on. The benefit and harm in combination of these drugs and analgesics have not been reported.

Exercises

The importance of physical activities for maintaining a good health has been recognized[58]. The belief that physical activities have therapeutic effects on chronic low back pain is widely accepted. Long-term efficacy, however, is not clear. And there is no evidence that one type of exercise is more effective than others[59].

The effect of walking has been increasingly published. It is recommended because of a low cost and high adherence[60,61].

Cognitive behavioral treatment

Cognitive behavioral treatment has attracted attention since it was recommended by European guidelines for management of chronic nonspecific low back pain[62]. It has been proved to be effective. The effectiveness sustains long with a low cost[63,64]. Furthermore, it increases prefrontal cortex gray matter and dorsolateral prefrontal volume associated with reduced pain[65]. Mindfulness-based stress reduction is reported to be effective for the treatment of chronic low back pain as well as cognitive behavioral treatment[66].

Physicians should master these techniques as treatment modalities for chronic low back pain.

Surgery

Carefully selected patients who underwent surgery for lumbar disc herniation achieved greater improvement than nonoperatively treated patients[67]. In the systematic review, minimally invasive discectomy, which is the most popular now, was compared with open discectomy to evaluate outcomes of low back pain, duration of hospital stay, quality of life, and so on. Minimally invasive discectomy may be inferior in terms of relief of low back pain although high quality of evidence has not been found[68].

Patients with spinal stenosis improved more with surgery than with nonoperative treatment[69]. Patients with symptomatic spinal stenosis are elderly persons, and benefits of surgery are diminishing[70]. Many different methods of surgery have been reported, and each method has merit and demerit in effectiveness, safety, and reoperation rate[71]. Minimally invasive surgery has conflicting evidences[72]. The evidence supporting superiority of posterior decompression techniques is of low quality[73]. The large cohort study suggests that addition of fusion to decompression is not associated with an improved outcome[74]. Surgery should be limited to the less invasive procedure in elderly patients.

Fusion

Frequency of spinal fusion has rapidly increased since late 1990s, and the cost has drastically risen. Patient outcome, however, has not improved. Effectiveness of spinal fusion is reevaluated now[75,76]. Furthermore, frequency of spinal fusion depends on physician's enthusiasm[77].

Many trials have been made to identify the prognostic patient factors and predictive tests for patient selection, but

there is no consensus[78-80]. Evidence does not support the use of current tests for patient selection[81]. There are some reports that psychological factors are effective indicator of prognosis, or that return to work after surgery is related to psychological factors and psychosocial aspect of work, regardless of MRI or clinical findings, or that fusion should be recommended to the patients without personality disorder[82,83]. These reports suggest that psychological and social factors should be considered before performing fusions. Outcome of fusion is generally not so good, and patients with workers' compensation have worse outcomes[84].

Low back pain was a good indication for fusion, but many contrast studies have indicated that superiority of fusion is not proved compared with exercise or cognitive behavioral treatment. There is no difference in treatment effect between fusion and cognitive behavioral treatments. Therefore, physicians should carefully select patients and explain the patients about prognosis before performing fusion.

Recent topics

Pain and sleep

Recent studies suggest that there is a strong association between low back pain and sleep problems[85]. Sleep disturbance was found in approximately 60% of patients with back pain[86]. Poor sleep reduces pain tolerance[87]. Insomnia treatment and encouragement of social participation are possibly effective in elderly patients with low back pain[88]. Cognitive behavioral treatment is effective in the treatment of insomnia and insomnia with comorbid back pain[89]. These reports suggest that existence of sleep disturbance should be checked when diagnosing low back pain and that physicians need to be trained in cognitive behavioral treatment techniques.

Cost-effectiveness

Spine surgery has become hugely expensive, and it is a serious social problem in the United States. Same trend can be seen in Japan, and spine surgery will be targeted for reduction of healthcare cost in the near future.

The total cost of spine surgery in the United States may exceed $40 billion per year[90]. There is a geographical variation in the prevalence of surgery. Rapid increase of complicated spine surgery has led to serious complications and excessive costs[91]. Physicians providing treatment of low back pain should consider cost-effectiveness when deciding treatment.

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