

New concept for backache: biopsychosocial pain syndrome

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Abstract Recently a new concept for explaining backache, “biopsychosocial pain syndrome,” has been suggested. Psychosocial factors play an important role in the development and persistence of backache from an early stage. Diagnosis and treatment of backache should be based on the new concept. A good relationship between doctors and patients influences treatment outcome and patient satisfaction. Treatment should be decided by patients themselves, after being informed of the natural history of the disease and the merit and demerit of the treatment.

Keywords Backache · Etiology · Biopsychosocial pain syndrome

Introduction

Introduction of evidence-based medicine (EBM) and recent research have given us a new concept for backache. This paper will present a new concept for backache with a review of recent research.

Psychosocial factors

Recently a new concept for backache has been suggested. It is indicated that psychosocial factors play an important role in the development and persistence of backache from a much earlier stage than previously believed. The concept

of a backache is changing from “spinal disorder” to “biopsychosocial pain syndrome,” from “morphological abnormality” to “mechanical, functional disorder.”

In the study comparing patients with symptomatic disc herniation requiring a discectomy and asymptomatic volunteers matched for work-related risk factors, disc herniation was found in 76% of asymptomatic volunteers [7]. There were significant differences between the two groups regarding the presence of nerve root compromise, work perception (occupational stress, intensity of concentration, satisfaction, job loss) and psychosocial factors (anxiety, depression, self-control, marital status). Two of these three risk factors are functional, not morphological. Another study reports one educational program has changed patients’ beliefs and dramatically reduced long-term disability and recurrence [35]. There is another report that physical and sexual abuse in childhood highly influenced patients with chronic pain [46]. It is associated with higher level of psychological distress, lower work retention, and higher rate of post-rehabilitation operation.

Psychosocial factors and pain

Psychosocial factor involvement in pain is also seen in cancer patients. The patients who do not complain about pain at home can complain of severe pain at hospital [43]. This fact suggests that even terminal cancer pain is not caused only by physical factors. There is a study showing that development and persistence of backache is associated with psychological distress, unlike hip pain [4]. Another study reports backache is triggered by psychological problems such as distress, poor health or excessive fear for illness [13]. There are many studies showing deep involvement of psychosocial factors in backache. One

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study reports psychological stress at work increases spinal loading and injury risk [19], and another study shows that the main predictors of serious backache are psychosocial factors [16]. Psychosocial factors are reported to influence work disability and absence in another study [34]. Our cross-sectional survey revealed discrepancy between disability and the severity of backache [61]. The patients with a high level of disability despite only mild pain were older, felt more stress, more depressed, worked more overtime and less satisfied with their job, income, working condition and relationship with coworkers. For such patients, treatment should consider psychosocial factors.

Pain and brain

Recently there have been many studies concerning stress. Stress has a great influence on diseases and medical care. For example, one study reports that optimism enhances immune status and that doctors should talk to patients positively [56]. According to other studies, patient's stress, depression or hostility reduces pharmacological treatment effects [50]; higher depression and lower social participation increases mortality of cardiac diseases [38]; and stress exists in patients with disc herniation [53].

Pain research extends to higher brain function. Many studies show that pain should be examined throughout the neuroaxis, including the brain's response. Contrary to the previous belief, serious injury does not necessarily cause severe pain; there is a great individual variation. The experience and regulation of social and physical pain share a common neuroanatomical basis in the brain [20]. Social pain is a form of pain experienced when one is socially isolated. Expectation of pain is reported to influence the intensity of pain [44]. According to another study, the cerebral cortex that controls perception is involved in perception of pain and also in its modulation [39]. It is partly mediated by GABA. Another study reports that the cerebral cortex is activated by not only experienced pain but also by expected pain or empathy for a loved one's pain [57]. Among recent research studies of the brain concerning pain, there are surprising reports. A cross-sectional study indicates that long-term chronic pain might wear out brain circuitry and lead to loss of brain tissues, gray matter [2]. Another study reports that chronic backache is associated with increased sensitivity to pain and altered brain processing [26]. These reports support the hypothesis that chronic backache might lead to brain atrophy or that gray matter cells might die from abnormal pain-related response. There is another study showing that the intensity of damage to the body is not always correlated with the intensity of patient pain perception [33]. There are many other new findings concerning pain and brain. Patients who

display abnormal pain behavior may have a distinctive pattern of brain activity (abnormal cortical pain processing), in response to backache and other painful stimuli [22]. Chronic backache influences the structure and function not only of the spine but also of the spinal cord and brain [48]. These studies strongly suggest that brain response should be considered in the assessment of backache.

Educational campaigns

The importance of an educational campaign is presented by a few studies. In Australia, a media campaign was shown to reduce backache disability [9, 10]. The campaign focused on several simple messages, such as "Stay active," "Exercise," "Don't rest for prolonged periods," and "Remain at work." There was a significant improvement in population beliefs about back pain. The number of claims for back problems was decreased and medical expenditures were reduced significantly. A similar campaign in Scotland was successful [73].

Reassessing the traditional injury model

Reexamination of the association between backache and injury is required. The traditional "injury model" that backache is caused by injury is doubted now. Backache is not always triggered by injury. A new "biopsychosocial pain syndrome" model should replace the "injury model." Some critics against diagnostic labels of backache are skeptical about the validity of the "injury model." A USA guideline published in 1994 first pointed out these criticisms [1]. It showed uncertain connection between diagnoses and symptoms. Many studies have followed. A great difference was found in the frequency of reporting injury as a cause of backache between patients with and without financial interests [31]. It pointed out that there was no evidence about the quality and implication of particular labels [6]. Other studies report that traditional recognition of the "injury model" may encourage intractable backache [30] and that minor trauma does not cause serious backache [17].

These problems are also presented in imaging studies. The guidelines indicate the high incidence of morphological abnormality in asymptomatic subjects and warn of the risk for over-treatment. There are reports that healthy subjects with disc extrusion on MRI have no backache, nor sciatic pain in 5 or 7 years [5, 7]. Another study reports that backache is not always related to disc degeneration [54]. Forty-seven percent of those who experienced backache are reported to show normal MRI. There are some reports reexamining disc degeneration and mechanical loading. Disc degeneration is reported to start in the first half of the second

decade of life [8]. Another study reports physical loading at work or in sports has a barely perceptible impact on disc degeneration and that routine or repetitive loading may actually have a beneficial effect on the disc, delaying the disc desiccation associated with aging [69]. Development of MRI has produced expectation of visualizing pain. But it is disappointing. The diagnostic value of high intensity zone (HIZ) is low [58]. The monozygotic twin cohort study shows that MRI's sensitivity to disc height or annular disruption is low and that clinical diagnostic value for pain is low [68]. Discography in asymptomatic subjects indicates that discography induced pain is not associated with future backache [15]. Psychological stress and preexisting chronic pain processes are stronger predictors of backache.

Recently many new findings have been reported concerning the intervertebral disc, which were considered as a main cause of pain. The latest research studies clarify the pathophysiology of intervertebral disc degeneration. In the painful disc, nerves extend into the inner third of the annulus fibrosus and into the nucleus pulposus [24]. The frequency of nerve ingrowth is different between the painful level and the non-painful level being 57% in the former and 25% in the latter. Nerve fibers growing into the painful disc express NGF [25]. High levels of proinflammatory mediators are reported to be in disc tissues from patients undergoing fusion [11]. It is also reported that repeated disc injury causes persistent inflammation [67].

Bacterial infection as a factor

Factors responsible for backache other than disc degeneration are reported, such as low-grade bacterial infection. Low-grade bacterial infection (*Propionibacterium acnes*) might play a role in sciatica [59, 60]. It is reported that antibiotics improve backaches and disabilities [21]. Attribution of arteriosclerosis [42, 63] or aging-related loss of muscle volume and degeneration of muscle [62, 70] have also been reported as causes of back pain.

New findings are reported concerning the natural history of backache, which is the key in determining treatment. Most patients are improved within a week or two without any treatment, although mild discomfort may continue for a longer period [71]. Most patients experience recurrences, but recurrences are normal and do not mean reinjury or worsened condition. About one in four patients still has backache 1-year later.

Discussion

Recently, the importance of a new concept for chronic backache has been suggested. Chronic backache should not

be regarded as an isolated spinal disease. Two-thirds of subjects with chronic backache have another chronic pain condition and about a third have a diagnosable mental disorder [72]. About one-third of the association between chronic spinal pain and disability can be explained by comorbid conditions. These reports suggest that comorbidities have a strong influence on the consequences of backache. Another study indicates that severe disabling backache is usually associated with numerous other pain, bodily complaints, disorders, and indicators of psychological distress and that chronic backache should be considered as a part of poor health condition [49]. A multidimensional and multidisciplinary management approach is therefore needed. Other studies report that patients with wide-spread pain are heavy utilizers of health care [40] and that chronic pain increases the risk of cancer and premature death [45]. Another study suggests that persisting chronic backache should be defined as a disease, not as a symptom, and that the use of opioids should be deregulated [36, 37].

Summarizing the above-mentioned studies suggests the concept of backache at the primary care level should be shifted, from “spinal injury” to “biopsychosocial pain syndrome”, from “morphological abnormality” to “mechanical, functional disorder”, and from “self-limiting and good prognosis” to “repeated recurrences.” We should recognize that psychosocial factors are deeply involved in the development and persistence of backache from an earlier stage than previously believed. Lastly, an educational campaign among patients, citizens and doctors is important for prevention and treatment of backache.

The new “biopsychosocial pain syndrome model” is not without problems. Firstly, there is no screening instrument. There is no simple way to assess psychosocial problems. Secondly, there is no simple treatment for patients with deeply involved psychosocial problems. Doctors should recognize the importance of “care” as well as “cure.” Lastly, the approach based on this new concept depends on each doctor's good will and not on financial reward.

The standard of treatment outcome evaluation is also changing. The patient's view is starting to be involved. Four changes have been presented. Firstly, the shift from “objective” to “subjective.” Secondly, from “only doctor's evaluation” to “including patient's evaluation.” Thirdly, change of doctor's belief of “trust medicine” based on doctor–patient relationship to “contract medicine” based on patient's consent. Lastly, assessment of cost-effectiveness in which treatment with higher cost-effectiveness is preferred. The requirements for the new standard of treatment outcome evaluation emphasize on patient QOL, satisfaction, and respect for patient autonomy in the choice of treatment. Pain relief is not a goal but just a means of removing disorder. Doctors should recognize that

patient satisfaction is not clearly related to meeting pre-surgical goals [14]. Patients with the same condition may choose different treatment by their own preference. “Informed consent” should be changed to “informed decision.” Doctors should offer some treatments and inform patients of the merit and demerit, and then patients should choose one treatment themselves. Doctors and patients should cooperate in the choice of treatment.

It has been pointed out that the doctor’s attitude is a key factor for improvement in treatment outcome and patient satisfaction. These reports have been increasing. According to these reports, the doctor’s positive consultation including education, sympathy and encouragement, improves treatment outcome [64, 66] and the doctor’s attitude influences patient satisfaction [12, 18]. Some other studies report that patients are more satisfied with doctors spending more time chatting about nonmedical topics [29]. Patient compliance (adherence to the treatment plan and receipt of preventive care) depends on doctor’s attitude [3], and communication with doctors influences patient’s choice of treatment [32]. One-third of patients who had liaison psychiatric consultation in our department had lost their trust in medical service [51]. A good relationship between doctors and patients influences treatment outcome and patient satisfaction.

Medical care with the new above-mentioned concept is a combination of EBM based on science and narrative-based medicine (NBM) based on art. Recent clinical epidemiological studies indicate that inappropriate medical care is often performed [28, 55]. In the USA, 30–40% patients receive ineffective and unnecessary care and 25% patients receive detrimental care. These facts indicate that doctors should provide standard and convincing medical care. The new concept is based on EBM. EBM is also changing to focus on patients rather than on data. The process before and after applying evidence is emphasized. EBM adopts knowledge of others, but clinical practice before and after applying evidence is performed by each doctor himself; and that cannot be replaced. Human relationship with patients is important and doctors should consider patients’ individual and social background. For adequate practice, both of EBM and NBM are important.

NBM is medical care-based on the doctor–patient relationship [27]. The area and problems which cannot be expressed in numbers can be expressed in language. So dialogues with patients are emphasized. As EBM is widely accepted, many people have started to wonder why only science is not sufficient for medical care. They feel NBM is also important and this concept is starting to be widely accepted. Not all the factors in medical care can be proved by science. People wonder whether they will be proved in the future or some factors will never be explained by science. The importance of “art” established by forefathers

and the psychological effect of doctor’s personality should be recognized.

Recently giving placebos have been recognized as one of the most effective therapies. The effects of placebos are reported to be seen in 50% of internal medicine patients and 70% of surgical patients [23]. Placebo effects develop slowly and last for long. Placebo plays powerful roles especially in pain treatment [65]. It is reported that placebo effects are stronger in patients who have a good relationship with doctors and are very positive about their treatment [47]. It is proved that clinical practice itself enhances placebo effects [41]. Recent development in brain science indicates that placebo stimulates brain and activates pain relief processes and that anticipation of pain relief stimulates brain activity [74]. Placebo induces activation of chemical substance in the brain (endogenous opioid) [77]. Another study reports that mortality is decreased by placebo in patients who comply with treatment [76]. Placebo effects cannot be ignored. And placebo may enhance the treatment effects through patient’s expectation and reliance on doctors.

The latest research studies are changing current backache treatment. Clinical epidemiology has changed the recognition of the natural history of backache. Various genetic studies and molecular biological studies have been published. These new studies have a great possibility to completely change backache treatment.

Recent epidemiological studies show the great geographic variation in spine surgery rate. There was nearly an eightfold variation in regional rates of lumbar discectomy and laminectomy and nearly a 20-fold range in fusion, among Medicare enrollees in 2002 and 2003 [75]. Rates of spine surgery in the elderly have increased dramatically over the past decade and the most dramatic increase is noted for lumbar fusion. Lumbar fusion accounted for 14% of total spending for spine surgery in 1992 and 47% by 2003. These facts show that scientific evidence for spine surgery is not sufficient and that cost-effectiveness has not been clearly assessed. There may be problems in decision making for surgery.

The artificial disc has received the most attention. Whether it is a miracle treatment or just another fad depends on strict examination of its advantages and problems. The available evidence is not adequate to conclude that the artificial disc is reasonable and necessary. The use of the artificial disc remains controversial.

In our retrospective study to examine the influence of psychiatric problems on surgical outcome in the patients undergoing surgery for degenerative lumbar spine diseases, 33% of the failed back patients had psychiatric problems before surgery [52]. It was, therefore, concluded that the surgical outcome for degenerative lumbar spine disease was influenced by preoperative psychiatric problems. The

mental state of patients should be evaluated before performing surgery as a means of preventing failed back.

Conclusion

The studies mentioned above show a deep association between backache and psychosocial factors. Diagnosis and treatment of backache should be based on the new concept, “biopsychosocial pain syndrome” model. A good relationship between doctors and patients influences treatment outcome and patient satisfaction. Treatment should be decided with informed decision. The choice of treatment should be made by patients themselves after being informed of the natural history of the disease and the merit and demerit of the treatment. Both functional disorder as well as mechanical disorder, should be targeted in the treatment.

Conflict of interest statement None of the authors has any potential conflict of interest.

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