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Analysis of the Prevention and Treatment of Cerebral Small Vessel Disease Based on the Idea of Prevention Theory in Prevention and Treatment

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Abstract: Cerebral small-vessel disease is a common type of disease with insidious onset and slow progression, mainly affecting the elderly. The main cause of cerebrovascular disease is internal injury, and the main pathogenesis of cerebrovascular disease is phlegm stasis and deficiency of spleen and kidney. At present, the prevention and treatment of cerebrovascular disease is mainly achieved by improving vascular risk factors, and patients with cerebrovascular disease are treated with traditional Chinese medicine combined with modern medicine such as antihypertensive, antiplatelet and statin drugs. The unique advantages of TCM treatment can effectively prevent and treat the symptoms of functional loss caused by cerebrovascular disease to improve the quality of life of patients.

1. Introduction

Cerebral small-vessel disease is a series of clinical, imaging, and pathological syndromes caused by various etiologies affecting small vessels in the brain, including small arteries, microarteries, capillaries, microvenules, small veins, and vascular structures in the brain parenchyma and subarachnoid space 2-5 mm around the above small vessels [1]. The diagnosis of cerebral small vessel disease currently relies on magnetic resonance imaging (MRI) of the head, including recent small subcortical infarcts, cerebral white matter high signal, cerebral microhemorrhage, perivascular gap enlargement, and cerebral atrophy. The acute onset of cerebral small vessel disease may have stroke-like clinical manifestations such as speech impairment, sensory deficits, and motor system dysfunction, but most may be asymptomatic. Depending on the site of involvement of small vessels, the lesions may lead to cognitive dysfunction, mood disorders, gait disturbances, and urinary incontinence [2]. Studies have shown that 25% of strokes are attributable to cerebral small vessel disease and that 45% of dementia cases are caused by it [3]. The prevalence of cerebral small vessel disease increases with age, affecting approximately 5% of people aged 50 years and nearly 100% of people aged 90 years and older [3]. The disease starts insidiously and is not easy to attract attention. As the disease progresses, symptoms of different degrees of neurological deficits may appear,

bringing a heavy burden to society and, most importantly, seriously endangering the physical and mental health of middle-aged and elderly people. Under the guidance of the idea of Prevention Theory in Prevention and Treatment, early identification of pathological features through imaging and prevention before the appearance of symptoms have significant effects on interrupting the development of disease, preventing neurological damage and improving the prognosis of patients, which is an important part of effective prevention and treatment of cerebral small vessel disease. This paper discusses and analyzes the prevention and treatment of cerebral small-vessel disease with the idea of Prevention Theory in Prevention and Treatment to provide new ideas for the later treatment of the disease and its complications, and to improve the quality of life of the patients themselves.

2. Chinese medicine's understanding of cerebral small vessel disease and its etiology and pathogenesis

The theory of Chinese medicine does not cover "cerebral small-vessel disease". According to the clinical symptoms and signs, it can be classified as "stroke", "stroke-like", "dementia" and "depression" [4]. The acute phase of the disease can be divided into acute and non-acute phases. The acute phase of the disease is characterized by skin insensitivity, numbness of the hands and feet, withered limbs, unfavorable speech, headache and dizziness; the non-acute phase of the disease is characterized by silence, memory loss, trance and indifference. The brain is the house of the primordial spirit and is the master of life activities [5]. According to Chinese medicine, the main location of cerebral small vessel disease is in the brain, which is closely related to the heart, spleen, and kidney. As the elderly age, the function of the organs decreases, coupled with the imbalance of qi and blood, they are a good candidate for this disease. The main causes of this disease are over-hungry and overfed, partiality, smoking and alcoholism, and fatigue. However, the complex pathogenesis of cerebral small vessel disease has not been clearly. Ji and others [6] considered spleen deficiency and phlegm stasis as one of the basic pathogenesis of the disease. Liu and others [7] proposed Qi deficiency and blood stasis as one of the basic pathological mechanisms. Professor Huo [8] believed that the disease was caused by deficiency of kidney essence. The pathogenesis of this disease overlaps with that of "stroke" and "dementia" and has many of the same pathogenic features. "Dementia" is a further progression of cerebral small vessel disease. Fan and others [9] considered phlegm, stasis, turbidity and toxicity blocking the meridians and deficiency of kidney essence as the main pathogenesis of cognitive dysfunction in cerebral small vessel disease. Combined with the relevant literature, the main pathogenesis of this disease is phlegm and stasis blocking the ligaments and deficiency of spleen and kidney. Organized as follows:

2.1. Phlegm and stagnant blood vessels are the key to the pathogenesis of cerebral small vessel disease

Wang Gui of the Yuan Dynasty believed that "phlegm is the mother of all diseases". Ming dynasty medical doctor Li Zhongzi in the Medicine must read ·phlegm drink also recorded: "All diseases have phlegm as the sublime". The formation of phlegm is related to the deficiency of spleen and kidney, "spleen is the source of phlegm", the spleen is not healthy, water and dampness are not transported, then fluid accumulation and retention, phlegm and dampness are generated;Insufficient kidney yang, water cannot be evaporated, followed by phlegm. Phlegm causes widespread disease, easily obscures the clear orifices and disturbs the mind, resulting in a series of symptoms of mental abnormalities. The formation of stasis is related to deficiency of qi and blood, and obstruction of the collateral vessel. Because of its ability to instill qi and blood, the collateral vessel is characterized by easy stagnation and stasis, easy entry but difficult exit, and easy accumulation and formation, which is basically consistent with the modern medical concept of small vessels and microvessels. According

to the Medical forest correction, "If the vital energy is deficient, it will not reach the blood vessels, and if the blood vessels have no energy, it will stay and stasis", and the formation of blood stasis is related to the sluggishness of blood running in the veins caused by the deficiency of energy. If the disease enters the ligaments for a long time, stagnant blood will block the brain collateral vessel, resulting in numbness of the limbs, unfavorable flexion and extension, and even paraplegia. Secondly, cerebral small vessel disease shows microhemorrhage in imaging, and over time, too much blood from the meridians accumulates in the brain, which then becomes stasis and stagnates in the brain, resulting in loss of nourishment for the brain marrow and memory loss and cognitive dysfunction. As the shanghan shuoyi said: "Yang Ming bowel disease, where there is a long time stasis of blood, it is good forgetfulness …… to the strong memory of people do not forget, the essence of Tibetan and Yang secret also, stasis of blood obstruction, Shen Qi shall not be dormant, the heart floats and good forgetfulness. "Phlegm stasis is the pathological product of cerebral small vessel disease, and it can also act on the body again and become the causative factor of this disease, and phlegm stagnation and blood stasis blocking the meridians is the key to this disease.

2.2. Deficiency of spleen and kidney is the root of the development of cerebral small vessel disease

Yi Bian says: "The brain is the sea of marrow, the essence of the kidney, in the lower for the kidney, in the upper for the brain, deficiency is all deficiency, this evidence of the kidney deficiency, believe it. "The brain is not only formed by the convergence of the medulla, but also has a close relationship with the medulla of the whole body. Therefore, there is Plain question ·generation of five internal organs: "All the marrow belongs to the brain. " The kidney is the master of the bone marrow of the whole body, which is closely related to the function of the brain. The kidney is the master of the bone marrow of the body and is closely related to the function of the brain. Patients with cerebral small-vessel disease are predominantly elderly, with old age and physical weakness and prolonged illness, which in turn leads to a decline in kidney essence. Yi Bian says: "The memory of man is in his head. "ling shu jing ·Ben Shen also mentions, "The kidney collects essence, and the essence sheds the will. "Kidney essence produces marrow to nourish the brain and maintain human memory. If the kidney is deficient in essence, the marrow will be reduced and the brain will be depleted, resulting in forgetfulness, slow reaction and reduced intelligence. The spleen is responsible for raising the clear, the source of Qi and blood biochemistry. The Nei Jing mentions that "Insufficient upper qi makes the brain dissatisfied. "If the spleen is deficient, the qi of the clear yang cannot reach the brain, resulting in the loss of nourishment in the brain, then dizziness and dullness, dullness of thinking, forgetfulness and others. And qi failure is less blood, if the blood in the pulse is less, the pulse is dry and astringent, the meridians are not smooth and fluent. Qi and blood are transmitted through various meridians and veins and infused into the orifices in the brain. The Medical forest correction says: "Brain anemia, its brain blood deficiency, and brain congestion disease is the opposite of the …… Westerners say that the blood in the brain is less and cannot support the brain, so the brain loses its function of perception and movement. "Some studies have shown that lower cerebral blood flow is associated with cerebral small vessel disease and predicts a higher risk of future dementia [10]. In terms of the relationship between the kidney and the spleen, the two complement each other and nourish each other to maintain the normal physiological activities of the body;In terms of the attribution of the kidney and the spleen, they belong to the five viscera, and there are many deficiencies in the viscera, coupled with old age and physical weakness, and long term illness, so the spleen and kidney are prone to deficiency. In conclusion, deficiency of the spleen and kidney is the root cause of the disease.

Although cerebral small vessel disease has not been clearly documented, through the ancient medical knowledge of the brain system and modern scholars' investigation of the pathogenesis of this disease, it is concluded that phlegm stasis blocking the ligaments and spleen and kidney deficiency are the main pathogenesis of this disease.

3. Application of the idea of "prevention of established diseases and changes" in the prevention and treatment of cerebral small vessel disease

The idea of Prevention Theory in Prevention and Treatment is one of the theories of preventive treatment. The theory of preventive treatment was first proposed in huangdi neijing, which says: "Therefore, the sage does not treat the untreated disease, and does not treat the untreated chaos, which is also called. "It fully reflects the ancient thinking of the healers to prevent the slightest problem and to be prepared for danger, and also emphasizes the importance of preventive treatment. The idea of Prevention Theory in Prevention and Treatment can be found in Zhang Zhongjing's Treatise on Cold-Attack, which says: "When you see the disease of the liver, you know that the liver transmits the spleen, so you should first strengthen the spleen. "Ding Jin of the Qing Dynasty evaluated Zhong Jing's method as: "The so-called treatment of the undiseased, see the liver disease, the liver when the transmission of the spleen, so the first real its spleen qi, without making the evil of the liver also. "The "prevention of established diseases and changes" is a proactive treatment model that combines prevention and treatment. Medical origin theory said: "good doctor, know the prevalence of disease and must be transmitted, the precautions for the prevention, not to make the knot, not to make the flood, not to make the merger, this upper work to treat the last disease said also. "The key to the diagnosis and treatment of cerebral small-vessel disease is to use the idea of "prevention of established diseases and changes", focusing on the treatment of complications and sequelae of the disease, and highlighting the advantages of combined Chinese and Western medicine. Liu and others [11], under the guidance of the theory of "prevention of disease and change", gave corresponding treatments for different severity of active ulcerative colitis (UC) to increase the effectiveness and reduce toxicity and shorten the course of treatment, so as to take advantage of TCM. Professor Tian [12] proposed a four-pronged treatment model based on the "prevention and treatment of postoperative recurrence and metastasis of triple-negative breast cancer", which is of great significance for the prevention and treatment of recurrence and metastasis. By using this idea to guide various diseases, modern healers have more advantages than purely Western medical treatment.

3.1. Overview of modern medical research on the pathogenesis and treatment of cerebral small vessel disease

The pathogenesis of cerebral small vessel disease is not fully understood, and the known pathogenesis includes atherosclerosis and amyloid angiopathy. It has also been suggested that blood-brain barrier (BBB) dysfunction, endothelial dysfunction, hypoperfusion, and chronic ischemia are closely related to the development of this disease, where endothelial dysfunction may be the main cause of cerebral small vessel disease, but may also be the first step in the superposition of other conditions [13]. Hypertension is a known risk factor for cerebral small vessel disease, which induces vascular lesions and subsequent thrombotic occlusion, ultimately leading to lacunar stroke [14-15]. In addition, higher levels of homocysteine (Hcy) are potentially associated with cerebral microhemorrhage and are also a risk factor for cerebral small vessel disease [16-17]. Risk factors such as diabetes, hyperlipidemia, and smoking are also associated with the development of cerebral small vessel disease. Therefore, vascular risk factors are the main target for the prevention and treatment of cerebral small vessel disease, and Western medicine currently takes interventions based on antihypertensive, antiplatelet and statin drugs [18], mainly to improve blood composition and protect the vascular endothelium. Because of the prolonged course of cerebral small vessel disease, long-term medication is required, but prolonged application of antiplatelet therapy may increase the risk of bleeding, and some studies have also shown that patients treated with statins are at risk of liver function impairment. To seek safer and more effective therapeutic measures, the combination of Chinese and Western medicine is one of the clinical treatment options in recent years, which may be a new idea to improve the clinical symptoms and prognosis of cerebral small vessel disease.

3.2. Combination of Chinese and Western medicine for cerebral small-vessel disease

In recent years, Chinese medicine has shown remarkable efficacy in the treatment of cerebral small vessel disease. Under the guidance of the holistic concept of Chinese medicine, the combined use with secondary prevention can, to a certain extent, make up for the shortcomings of Western medicine, increase the effect of drugs, and the therapeutic effect is better than that of Western medicine alone. In a clinical study, Huang and others [19] observed the efficacy of Removing blood stasis and clearing ligaments Tang in the treatment of 60 cases of cognitive dysfunction caused by cerebral small vessel disease, in which the control group was given antihypertensive, anticoagulant and antiplatelet, symptomatic treatment, acupuncture and modern functional rehabilitation, and the treatment group was given Huayu Tongluo Tang in addition to the control group, and the Simple Intelligence Mental State Examination Scale (MMSE) scores, Montreal Cognitive Assessment Scale (MoCA) scores were observed after 3 months of treatment. The results showed that Huayu Tongluo Tang could improve the changes of MMSE scores and MocA scores in the subjects, and the statistical differences were statistically significant when compared with the control group ($P < 0.05$). The efficacy results of Jiang and others [20] using NaoLuoTong combined with aspirin in the treatment of cerebral small vessel disease showed that the MMSE score, MoCA score, and Barthel score were significantly higher in the test group (NaoLuoTong and aspirin) on day 180 of treatment compared with day 0 and were higher than those in the control group (aspirin), with statistically significant differences ($P < 0.05$, $P < 0.01$). Chen and others [21] showed that the clinical efficacy results of patients with cognitive impairment due to cerebral small-vessel disease using modified rehmanniae cold decoction showed that the MMSE score and MoCA score were higher in the observation group than in the control group after treatment ($P < 0.05$), the levels of matrix metalloproteinase 9 (MMP-9), β-amyloid 1-40 (Aβ1-40), super-sensitive C-reactive protein (hs- CRP) levels were lower than those in the control group, and brain-derived nerve growth factor (BDNF) and superoxide dismutase (SOD) levels were higher than those in the control group ($P<0.05$), which could effectively reduce clinical symptoms, inflammatory response and oxidative stress in patients with cognitive impairment due to CSVD, and improve cognitive and neurological functions of patients with a higher safety profile. In a study by Gao and others [22], 90 patients with cognitive impairment due to cerebral small-vessel disease were treated with acupuncture and moxibustion. After one course of treatment, the MMSE score and prostacyclin 2 (PGI2) level in the observation group were significantly higher than those in the control group ($P < 0.05$), and the thromboxane A2 (TXA2), endothelin (ET) and Hcy levels were significantly lower than those in the control group ($P < 0.05$). In the treatment of mild cognitive dysfunction in cerebral small vessel disease with qi deficiency and blood stasis by Ding and others [23], 60 patients who met the criteria for mild cognitive dysfunction in cerebral small-vessel disease (qi deficiency and blood stasis type) were randomly divided into 30 patients in the treatment group and 30 patients in the control group, and both groups were given conventional treatments such as control of blood pressure, blood glucose, blood lipids, anti-platelet aggregation, and other drugs that improve cognitive function were prohibited. The patients in both groups were treated with blood pressure, blood glucose, blood lipid, anti-platelet aggregation and other drugs to improve cognitive function. The duration of treatment was 8 weeks in both groups. There were no significant differences compared with nimodipine, and it could improve the TCM symptoms of cognitive dysfunction in cerebral small vessel disease, regulate the dynamic balance of NO and ET-1, reduce the level of Hcy and hs-CRP, and improve the blood rheology index. The effect was more obvious when the treatment course was prolonged, and it was better than nimodipine in improving the TCM symptoms.

Some pharmacological studies have shown that some herbs have antiplatelet, circulation improving, blood pressure lowering and neuroprotective effects, which coincide with the purpose of antihypertensive, antiplatelet and statin therapy in secondary prevention in modern medicine. A large amount of literature shows that the combination of Chinese and Western medicine has significant effects in the treatment of cerebral small vessel disease and is more advantageous in improving clinical symptoms. Since many patients may have multiple symptoms in clinical practice, the

advantage of combining Chinese and Western medicine is that Chinese herbal tonics can be used to adjust the dosage and increase or decrease the amount of medication in response to different symptoms and changes in disease mechanisms, thus making up for the lack of fixed components of Western medicine and making the treatment plan for cerebrovascular disease more comprehensive and systematic, thus avoiding further disease progression and improving the prognosis of patients, which is also widely accepted by patients. It is also widely recognized by patients. As clinical and scientific researchers continue to study the pathogenesis and combined treatment of cerebral small vessel disease, the possibility of treating this disease and its complications has gradually increased.

4. Conclusion

Cerebral small vessel disease is a group of age-related, small vessel lesions in the brain caused by various etiologies, which in turn lead to a series of clinical, imaging, and pathological syndromes. Neuroimaging is currently an important measure to effectively assess the type of lesions involved and to diagnose the disease. As the population ages, cerebral small vessel disease requires more attention and targeted research to better understand the pathogenesis of cerebral small vessel disease and to determine the clinical progression, prognosis of the disease, and therefore effective preventive and therapeutic measures are needed to reduce some of the symptoms of functional loss and the burden of life of patients caused by cerebral small vessel disease. A global survey conducted by WHO in the 1990s showed that lifestyle and behavior account for 60% of the factors affecting human health and longevity, and that a healthy lifestyle is a positive guide to disease prevention and prognosis for recovery. Internal injury factors are the focus of prevention and treatment, including diet, regulation of emotions, and combination of labor and rest, of which, diet is the most important part of all causes of prevention. Therefore, it is necessary to have a regular diet and to develop good eating habits. As the Suwen ·Shengqi Tongtian of the says: "is therefore careful and five flavors, the bone is correct tendons soft, qi and blood to flow, coupled with dense". Secondly, the seven emotions affect the qi of the internal organs, making the qi of the internal organs out of order, qi and blood rebellion. the Suwen·Tiangqi Tongtian said: "Great anger is the form of gas is extinguished, and the blood is on the top, so that people thin convulsions. "The Lingshu·Benzang said: "the will and the spirit is concentrated straight, the soul is not scattered, regret and anger, the five organs are not subject to evil". It points out the importance of regulating the emotions, avoiding excessive emotions and delusional depletion of essence, keeping a happy mood, "being calm and void, keeping the spirit inside", and establishing confidence in overcoming diseases, all of which are good medicines to prevent and treat diseases. Finally, sports such as jogging, taijiquan and baduanjin help the circulation of qi and blood and enhance physical fitness. The physiological activities of the human body are compatible with the changing laws of nature, and conform to nature so that various physiological activities are in harmony with the rhythms of nature. The qi of the organs is calm, and the essence of the five organs can be continued, so as to achieve the purpose of holding the qi of the innate one element. Therefore, both disease prevention and treatment should pay attention to diet, work and rest, and spiritual regimen, so that the form and spirit are in a harmonious and unified life process.

The idea of Prevention Theory in Prevention and Treatment is a high summary of modern preventive thinking, under the guidance of the holistic concept and evidence-based treatment, using the unique dialectical thinking of Chinese medicine, combining traditional Chinese medicine theory with modern medicine, so as to give full play to the unique advantages of Chinese medicine treatment. In recent years, certain research progress has been made in the treatment of cerebral small vessel disease, and the proper application of the theory of "prevention of disease and change" to suppress the occurrence and development of cerebral small-vessel disease is of great significance to guide its prevention and treatment.

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