

# Treatment of Tourette's Syndrome in Children Based on the Theory of "Xuanfu-collaterals"

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**Abstract:** *Tourette Syndrome belongs to the category of Chronic Convulsion in Traditional Chinese Medicine (TCM). The pathology is based on deficiency of internal organs, with wind, fire, phlegm and stagnation as the symptoms. Xuanfu and collaterals are important organs that regulate the circulation of qi, blood and fluid around the body, it is a tiny structure, but its role should not be underestimated, and it is also the key position for the production of dampness, phlegm and blood stasis. Based on the theory of "Xuanfu-collaterals" in traditional Chinese medicine, it is proposed that the pathogenesis of this disease is obstruction of Xuanfu, liver wind internal movement and blockage of collaterals by phlegm and blood stasis. External infection, internal injury and other factors can cause the five viscera Xuanfu depression and closure, opening and closing disorder, then attract internal wind and become the beginning of Tourette's syndrome. Chronic Disease Transform to Collaterals. Long-term disease into the complex, Dampness, phlegm, blood stasis, or external evils stagnate in and damage the collaterals, makes the disease worsen day by day and prolonging the course of the disease. Collaterals depletion and stagnation further aggravate obstruction of Xuanfu, so that the cycle repeats itself, resulting in repeated and difficult to cure diseases. The clinical use of wind medicine and insect medicine to "opening xuanfu and dredging collaterals" has been very effective, which provides a new way of thinking for the understanding and treatment of Tourette's syndrome from the level of the microstructure of traditional Chinese medicine.*

**Keywords:** Children, Tourette Syndrome, Xuanfu (pores), Collaterals, Wind medicine, Insect medicine, Opening xuanfu and dredging collaterals.

## 1. Introduction

Tourette Syndrome (TS) is a chronic neurological disorder with onset in childhood, characterized by multiple motor tics with or without vocal tics and a duration of more than 1 year [1]. TS is often accompanied by co-morbidities such as Attention Deficit Hyperactivity Disorder (ADHD), Obsessive Compulsive Disorder (OCD), anxiety disorder, depressive disorder, rage episodes, and self-injurious behaviors, and co-morbidities often persist throughout the patient's lifespan [2]. Early diagnosis and timely intervention can help to improve academic level and the quality of life. According to relevant studies in China, the prevalence of this disease ranges from 1.04% to 2.98% [3] [4]. In recent years, there has been a significant increase in the incidence of TS. TS and related complications have become a difficult and hot issue in the field of pediatric medicine. Western medications are mainly neurotransmitter-modulating drugs such as dopamine receptor antagonist, which can cause side effects such as gastrointestinal and extrapyramidal symptoms [5]. Its treatment is rather homogeneous and the disease tends to recur after stopping the medication. In contrast, the efficacy of TCM in this disease is precise, which can significantly reduce or completely control the episodes of TS, improve the co-morbidities, reduce the recurrence rate, and have less side effects. In recent years, the theory of "Xuanfu-collaterals" has been widely used to guide the treatment of chronic internal injuries, but its research in the treatment of Tourette's syndrome is less.

## 2. Overview of the "Xuanfu - Collateral Vessels" Theory

### 2.1 Xuanfu

The concept of Xuanfu can be divided into broad sense and narrow sense. In the narrow sense, the name of "Xuanfu" was first recorded in the Yellow Emperor's Internal Classic, in which recorded that "the Xuanfu is impassable, and the Defensive Qi cannot be discharged". It also recorded "the Xuanfu is empty of sweat", which means to publicize the sweat of Defensive Qi. It can be seen that the understanding of Xuanfu is relatively single at this time. Liu Wansu of the Jin Dynasty extended its connotation, and put forward a new concept in Su Wen Xuan Ji Yuan Bing Shi -- "Xuan Wei Fu Lun", which interpreted Xuan Fu as the pore orifice and channel structure of "Zhouji the whole body, extremely fine and delicate" [6]. After continuous research by later generations of physicians, it is pointed out that the "Xuanfu" is not only the structure of the body, but also the micro channel for the operation of Qi machine, body fluid distribution, essence and blood infusion, and divine machine [7]. Since then, the theory of Xuanfu has developed rapidly. Wang Jieming summarized Liu Wansu's discussion and analyzed that Xuanfu has the characteristics of wide distribution and fine structure in physiology, and it has the characteristics of valuing opening and avoiding closing in function. Chang Fuye et al [8] believed that Xuanfu lesion was the most basic pathogenesis of Chinese medicine, and the lesions of Qi, blood, fluid, essence and spirit could be attributed to Xuanfu lesion.

### 2.2 Collaterals

The theory of collateral is also first published in the Yellow Emperor's Internal Classic, which stated that "the meridians are internal, and those that are branched and horizontal are collaterals". And it also said that "the floating and common veins are all collaterals" "the meridian is the one that governs Yin and Yang, nourishes the muscles and bones, and benefits

the joints". It pointed out that the collaterals are separated from the meridians, small in structure, shallow in position, and have the functions of mutual infiltration of essence and blood, perfusion of Qi and blood, communication of external and internal meridians, reconciliation of Ying and Wei Qi and blood, and circulation of meridians [9]. Ye Tianshi, a physician in the Qing Dynasty, further developed the theory of collateral diseases, and put forward the view that "for a long time, qi stagnation is in the meridians, blood injury enters the collateral", which laid a theoretical foundation for the treatment of chronic diseases from the theory of collateral diseases. Academician Wuyiling, on this basis, combined with the understanding of modern biology, creatively raised the meridian theory to the height of "three-dimensional network system" [10], and combined with clinical practice experience, summarized the pathogenesis of collaterals as "stagnation of collaterals, shortness and urgency of collaterals, stasis and obstruction of collaterals, accumulation of collaterals and breath, and lack of honor of collaterals" [11], established the "eight essentials of syndrome differentiation" of collaterals, and proposed the treatment principle of "dredging collaterals for use" [12].

### 2.3 Xuanfu - Collaterals

Xuanfu and collaterals are the same ultramicroscopic structures spreading over the upper and lower parts of the organism and the inner and outer parts of the body, but their structural characteristics are not the same. Xuanfu is the "director of opening and closing, showing the characteristics of "gateway", and collaterals is the "infiltration and irrigation of all joints, reflecting the characteristics of "channel" [13]. Structurally, the two complement each other, which constitute the microstructure of the organism with Xuanfu-collaterals system [14]. Functionally, the two are complementary to each other, sharing the duties of circulation of qi and fluids, infiltration of qi and blood, and operation of the Shen Ji [15]. The realization of the many functions of collaterals depends on the smoothness of the Xuanfu. On the other side, collaterals can nourish the Xuanfu by infiltrating essence and blood which ensure the normal opening and closing of the Xuanfu. If Xuanfu is closed, the circulation of qi and blood in collaterals is blocked, and if collaterals are blocked, the Xuanfu is closed even more, so that the cycle repeats itself. It will eventually lead to both Xuanfu and collaterals disease [16].

### 3. The Correlation between "Xuanfu - Collateral Vessels" and Tourette Syndrome

It is now generally recognized that Tourette Syndrome in Children are located in the liver and heart, often involving the lungs, spleen, and kidneys. In the early stage of the disease, solid symptoms are excess, and in the long term, deficiency symptoms such as liver and kidney yin deficiency appear. The causes of the disease are mainly related to weak constitution, trauma, external evils, improper diet, emotional disorders [17]. Wind, fire, phlegm and stasis are its main pathological factors [18]. Children's muscular folds are not dense and are susceptible to external aggression. And because the children are the body of pure yang, the external evils turn into heat and fire, which causes internal movement of liver wind and develops into twitching. Clinically, symptoms such as

convulsions and shaking of the head, face, and body can be seen. "Yang-heat is easy to become stagnation", stagnation of qi, then the fluid stops and transforms into dampness, gathering and generating phlegm, blood coagulation into stasis, resulting in phlegm, dampness, stasis and other pathologic products. At the same time, multiple pathological factors wrestle with each other which leads to recurring and difficult to heal. In the pathogenesis of Tourette Syndrome, Wind, Fire, Phlegm, Dampness and stagnation circulate and interact with each other, which are closely related to the Xuan Fu - Collaterals.

### 3.1 Stagnation and Closure of Xuanfu - The Initial Link

Xuanfu is densely covered with the human body's muscle surface and organs. The six exogenous factors, seven emotional factors, improper diet, and overstrain can all affect the opening and closing functions of Xuanfu, leading to its stagnation. Pediatric multiple tic disorders belong to the category of mental and emotional disorders. The internal injuries of the seven emotions are closely related to the liver's function of regulating and releasing qi, and the heart's function of controlling mental activities, although each has its own internal organs. Influenced by modern society, children are often in a bad mood and excessive mental pressure, emotions can not be normal catharsis. If the seven emotions are pent-up, disrupting the normal liver - governed dispersing and discharging function, it may lead to the occlusion of the micro - orifices of the liver and heart. Consequently, the body's orifices and cavity passages become obstructed. Qi stagnation gives rise to fire, which in turn stirs up liver wind. The interaction of wind and fire intensifies, ultimately resulting in tics. Moreover, when there is excessive fire in the heart and liver disturbing the mind, manifestations such as inattentiveness, impulsivity, capriciousness, restlessness, and irritability may occur. The lungs are located in the body. They promote the circulation of qi on the muscle surface, regulate the opening and closing of pores, and play a key role in defending against external pathogens. Children's physical Qi is not full, the body is weak, and their Xuanfu is unstable. They are more vulnerable to external evil Qi. The wind is the first of the six evils which guest in the Xuanfu, then the rise and fall of the lung Xuanfu are out of balance, the Qi is closed and the evil stays. The wind evil seizes the opportunity to attack the Yang position, and the guest is in the head and face, then the head and face twitch, tremble and other symptoms occur. Spleen is in charge of sending up essential substance, transporting and dissolving water and dampness. Children often have insufficient spleen. Irregular consumption of milk and food, or a preference for raw and cold foods, can easily damage the spleen and stomach, leading to spleen dysfunction, phlegm dampness generation, and blockage of the Xuanfu. In addition, the spleen and stomach are weak, the qi and blood biochemistry are lacking, the Xuanfu is lacking in nourishment, the opening and closing are weak, and the phlegm and dampness are even worse. Phlegm and dampness block the meridians causes twitching of the trunk and limbs. It moves with qi, and phlegm-qi obstruction in the throat often leads to abnormal vocal tics [19]. The kidney is the foundation of sealing and stores the essence. It affects the metabolism of fluid. Kidney Xuan Fu is the path for the transportation of qi and liquid. When the opening and closing is proper, the flow of qi and liquid will flow [20]. On the contrary, when the

kidney fails to perform its duties, the essence seeps out of the veins, the water does not nourish the wood, the tendons are not moistened, and Tourette symptoms appear.

### 3.2 Phlegm and Blood Stasis Obstructing the Collaterals - The Cause of Difficulty in Recovery

Phlegm is a pathological product formed by the obstruction and stagnation of fluid in the human body. Stasis, also known as blood stasis, is a pathological product formed by slow blood flow and stagnant blood in the human body. Phlegm and stagnation belong to the same Yin nature and come from the same source. They are interfering with each other, so the clinical manifestations of the disease are extensive, complex, bizarre and difficult to be cured repeatedly. Combined with the strangeness and long course of TS, this disease is very much in line with the characteristic of “prolonged illnesses are characterized by more stasis, and strange illnesses are characterized by more phlegm” [18]. The network of collaterals throughout the body is both a channel for the operation of qi and blood, as well as a channel for the transmission of evil [21]. Various pathogenic factors can affect the collaterals, leads to the abnormal transportation of qi, blood and fluid. Condensation of fluid becomes phlegm, stagnation of blood becomes stagnation, phlegm and stagnation blocks and damages collaterals. Phlegm and blood stasis are intertwined, which hinders and disturb the Qi mechanism. They wander around, disturbing the viscera and jumping out of the limbs, causing twitching symptoms throughout the body. In addition the collaterals are connected to the Xuan Fu. Evil blocks the collaterals, and the essence seeps out of the veins, aggravates the blockage of the Xuanfu. Damage to the collaterals and loss of moistening of the Xuan Fu further affects the function of opening and closing of the Xuan Fu. The vicious circle formed over time is the reason why TS is difficult to cure.

## 4. Treatment of Tourette Syndrome

In the development of TS, The Xuanfu-Collaterals are closely related to it. Obstruction of Xuanfu is the starting link, and blockage of collaterals by phlegm and blood stasis is the cause of difficult healing. Based on this and clinical experience, the basic treatment principle of “extinguishing liver-wind, opening xuanfu and dredging collaterals” was established. Clinical formulas use “pungent wind medicine” to open the basilica and open xuanfu and dredge collaterals, and because of the long duration of TS, the clinic often combines “insect medicine”. The wind medicine rises and disperses to the surface, the insect medicine searches and picks at the interior, and the synergy of the two is very fruitful [22]. Restore the function of Xuan Fu and collaterals by both Benefiting and Attacking Principles. With the opening of the Xuan Fu, the Collaterals will be opened, heat will be dispersed, phlegm-dampness will be removed, blood stasis will be dissolved, and internal wind will be extinguished.

### 4.1 Wind Medicines

Firstly, wind medicines are mostly pungent and dispersive. As professor yandexin said, “the so-called wind medicine refers to the product with pungent taste and light nature”. It has been found in clinical practice that wind medicine can dredge

muscle surface with its pungent and aromatic properties, so that all kinds of evils can be dissolved from the surface. It can also facilitate the organs and tissues of the Xuanfu, so that the qi and fluid flow. “The Luo is drained by pungency”, so the use of pungent wind medicine can achieve the effect of opening Xuanfu and dredging collaterals. In addition, wind medicine dispels wind and removes dampness, has the effect of elevating clearness and lowering turbidity, strengthening the spleen and stomach, and dredging liver qi. The phlegm, dampness, and blood stasis can be transported, the evil can be removed and the positive can be rested.

### 4.2 Insect Drugs

Insect drugs were first recorded in the “Shennong Bencao Jing”. Due to their migratory nature, insect drugs have the characteristics of “no small entry, no firm rupture”. Insect medicines fly away quickly, can open the Xuanfu of internal organs and pass through the meridians; in addition, as a blood and flesh sentient product, it can nourish the kidneys and solidify the foundation, enrich and nourish the collaterals, and maintain the normal function of the Xuanfu [23]. Multiple Tourette Syndrome has a long course of illness, with phlegm and blood stasis obstructing the meridians and difficult to treat blockages. It is also an area that ordinary “medicines cannot match”. Only by using insect drugs to penetrate and search through the meridians can the lesion be deeply penetrated and the pathogenic nodules be cleared. Therefore, while applying wind medicine, insect medicine can be used to strengthen the function of opening the Xuanfu, dredging the tendons and clearing the collaterals. Commonly used insect medicines in the treatment of Tourette’s syndrome include scorpion, Scolopendra, Bombyx Batryticatus, Periostracum Cicadae, and Pheretima. Professor Chang Ke [24] believes that the combination of Bombyx Batryticatus and Cicada Slough is a light clearing and ascending powder, which can be used externally to relieve lung and wind heat, and internally to clear the liver, phlegm, and calm the wind. And scorpion and Scolopendra have a strong and powerful nature. The combination of the two drugs have a more significant effect on searching and clearing meridians, as well as relieving wind and spasms. For those with severe tic symptoms, adding insect drugs can quickly relieve the symptoms. Professor Wang Sumei [25] believes that the treatment of this disease cannot be separated from wind dispelling drugs, especially insect wind dispelling drugs, to eliminate residual evil winds in the body. Professor Hu Tiancheng [26] is skilled in using insect drugs to search for wind and unblock meridians in clinical practice. He has self - formulated a modified Xiehuang Tang, which adds whole scorpion, centipede, silkworm, and cicada molt on the basis of Xiehuang San and combines with peony bark, Campanula grandiflorum, and Fructus Aurantii immaturus. This formula can calm the liver, eliminate wind, stop spasms, clear the spleen and stomach, regulate qi, and has significant clinical efficacy. Meanwhile, modern pharmacological research has found that most insect drugs can regulate central nervous system function, inhibit allergic reactions, and are rich in trace elements such as zinc, calcium, and iron, which have the effect of improving immune function [27].

## 5. Summary

The incidence of TS is on the rise year by year, and the disease is long, complex and difficult to treat, which seriously affects the children's learning and life. Traditional Chinese medicine believes that the pathogenesis is mainly internal movement of liver wind, and it is closely related to pathological products such as phlegm and blood stasis. Xuanfu is densely spread on the surface of the body's muscles and inside the internal organs. If there is a slight loss of control, the external pathogens are easy to enter, especially the wind pathogens, which will lead to wind disease and are easy to repeat. Collaterals are the tiny contact channels of the body. In case of dampness, phlegm and blood stasis, it will hinder the movement of qi and blood, and also cause internal wind agitation, and see the internal wind syndrome of convulsion. Children, in particular, have their own physiopathological characteristics that make them more prone to the above conditions. This is why Tourette's syndrome is prone to recurrence and long duration and why it is difficult to treat. Clinical research should focus on this and seek the best methods of treatment.

## References

- [1] The Subspecialty Group of Neurology, the Society of Pediatrics, Chinese Medical Association. Experts consensus of treatment and diagnosis of tic disorders in children (2017 practical version) [J]. Chinese Journal of Applied Clinical Pediatrics, 2017, 32(15):1137-1140.
- [2] C. Groth, N. M. Debes, C. U. Rask, et al. Course of Tourette syndrome and comorbidities in a large prospective clinical study [J]. European Journal of Paediatric Neurology, 2017, 21:e22-e22.
- [3] Zheng Ronghua, Jin Rong, Xu Huiqin, et al. Study on the prevalence of tic disorders in schoolchildren aged 7-16 years old in Wenzhou [J]. Chinese Journal of Epidemiology, 2004, 25(9):745-747.
- [4] Liu Ling, Jiang Zhigui, Li Wei, et al. Epidemiological investigation of tic disorders among pupils in the Shunde Longjiang area, and their relationship to trace elements [J]. Chinese Journal of Contemporary Pediatrics, 2013, 15(8):657-660.
- [5] Liu Maochang, Liu Zhisheng. Current research status on pharmacological treatments for children with tic disorders [J]. Chinese Journal of Applied Clinical Pediatrics, 2020, 35(12):948-951.
- [6] Ye Ruping, Hu Jingqing, Fang Rui, et al. Discussion on Xuanfu [J]. China Journal of Traditional Chinese Medicine and Pharmacy, 2017, 32(4):1465-1468.
- [7] Luo Zaiqiong, Huang Wenqiang, Yng Jiuyi, et al. "Xuanfu": the microstructure of Zang Xiang theory [J]. Journal of Traditional Chinese Medicine, 2011, 52(16):1354-1356.
- [8] Chang Fuye, Wang Yingyan, et al. Annotation of Illness of Sweat Pore [J]. Study Journal of Traditional Chinese Medicine, 2005, 23(8):1389-1392.
- [9] Zang Ningzi, Pang Lijian, et al. Historical Development of Luo Disease Theory [J]. Journal of Liaoning University of Traditional Chinese Medicine, 2014, 16(10):66-69.
- [10] Wu Yiling. Collateral-Disease Theory of TCM and Three-Dimensional Network System [J]. Journal of Traditional Chinese Medicine, 2003, 44(6):407-409
- [11] Wu Yiling, Wei Cong, Jia Zhenhua, et al. A Summary of Vessels-Networks Theory and Its Application [J]. Journal of Traditional Chinese Medicine, 2014, 55(3):181-184.
- [12] Wu Yiling. Establishment of collateral disease theory system [J]. Chinese Journal of Difficult and Complicated Cases, 2005, 4(6):349-350.
- [13] Lu Peng, You Fengming, et al. Introduction to the Xuan Fu-Collaterals System [J]. Journal of Basic Chinese Medicine, 2017, 23(1):29-3092.
- [14] Lu Peng, Ren Fengyan, et al. Lung Xuanfu collaterals (TCM) and air-blood barrier [J]. Journal of Traditional Chinese Medicine, 2016, 57(16):1433-1435.
- [15] Zhang Yixin, Zhang Xiaoke. Treatment of diabetic peripheral neuropathy based on "Xuanfu-collateral" theory [J]. Journal of Beijing University of Traditional Chinese Medicine, 2021, 44(11):1034-1038.
- [16] Lu Peng, Liu Lixiang, Pan Di, et al. On the Kidney Xuanfu Collaterals and Glomerular Filtration Barrier [J]. Journal of Traditional Chinese Medicine, 2016, 57(21):1888-1890.
- [17] Liu Xiaofang, Wei li, et al. Professor WANG Sumei 's experience on treating Tourette syndrome in children [J]. Modern Chinese Clinical Medicine, 2016, 23(3):38-41.
- [18] Xue Xiaona, Wei Li, Liu Yi, et al. Treating Tourette Syndrome in Children from the Perspective of Phlegm and Stasis [J]. Global Traditional Chinese Medicine, 2019, 12(5):739-742.
- [19] Zhao Qiang, Wu Ling, et al. Hu Tiancheng's experience in treating Tourette Syndrome with ADHD from the perspective of wind, phlegm, and fire [J]. Hunan Journal of Traditional Chinese Medicine, 2022, 38(8):60-63.
- [20] Zhu Qin, Wang Hongyu. Kidney Xuanfu Theory and Application of Pungent-flavor Wind-related Herbs in Treatment of Kidney Diseases [J]. Journal of Traditional Chinese Medicine, 2018, 59(4):281-284.
- [21] Wu Yiling. Etiological investigation of collateral disease [J]. Chinese Journal of Difficult and Complicated Cases, 2004, 3(4):215-217.
- [22] Huang Xu, Li Xianting, et al. Clinical study of Tianchong Dingxuan pill in the treatment of vertebrobasilar insufficiency vertigo of phlegm and blood stasis type [J]. Journal of Chinese Medicinal Materials, 2022, 45(1):225-229.
- [23] Wang Mingjie, Huang Shufen, et al. A NEW UNDERSTANDING OF WIND MEDICINE [J]. Journal of Luzhou Medical College, 2011, 34(5):570-572.
- [24] Guo Junjun, Wang Ya. Experience of Changke in Treating Tourette's syndrome in Children [J]. Inner Mongolia Journal of Traditional Chinese Medicine, 2019, 38(3):38-39.
- [25] Wang Xuemei. Professor Wang Sumei's Experience in Treating Tourette Syndrome in Children [J]. Global Traditional Chinese Medicine, 2018, 11(9):1386-1389.
- [26] YANG Cuiling, ZHANG Xiaojin, ZHAO Qiong, et al. Clinical observation on 60 cases of Tourette syndrome in children with heat accumulation in spleen and stomach syndrome treated by Jiawei Xiehuang San [J]. Journal of Pediatrics of Traditional Chinese Medicine, 2020, 16(5):71-75.
- [27] MAI Xiujing, XU Ke, HAN Xinmin. Mechanism of insect drugs in the treatment of Tourette's syndrome [J].

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Chinese Pediatrics of Integrated Traditional and Western  
Medicine, 2019, 11(2):129-132.