

Mechanism of Acupuncture at "Sphenopalatine Point" in the Treatment of Allergic Rhinitis

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Abstract

Objective: To review the mechanism of allergic rhinitis treatment by acupuncture at the "butterfly palate point".

Methods: Searched PubMed; Microsoft Academic; Science Citation Index; Google Scholar; Scopus; Semantic Scholar; Citation; Academic Keys; Dimensions; EuroPub By searching more than 10 kinds of databases such as Conference Proceedings Citation, we analyzed the effect of inflammatory reflex on the development of allergic rhinitis (AR), the effect of neurological dysfunction on AR, the study of the substance of the pterygopalatine point, the understanding of the therapeutic mechanism of acupuncture pterygopalatine point, and so on. The mechanism of the treatment of allergic rhinitis by acupuncture at the "pterygopalatine point" was analyzed.

Results: The research progress in recent years in different countries is reviewed.

Conclusion: The treatment of AR by acupuncture at the "butterfly-palate acupoint" can exert therapeutic effects in various ways.

Keywords: Allergic rhinitis; Acupuncture; Butterfly-palate acupoint; Inflammatory; Mechanism research.

Introduction

Allergic rhinitis (AR) is a disease mainly caused by IgE-mediated nasal mucosal inflammation, with a prevalence of 10%-40% worldwide. Due to the complex pathogenesis and numerous inducing factors, AR is

clinically manifested as prolonged disease duration and frequent onset, which affects the health and quality of life of patients. Has become a global health problem. At present, about 400 million people worldwide suffer from AR [1]. For this reason, the World Health Organization (WHO) proposed a

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standardized treatment for allergic diseases-"four in one" treatment model, that is, avoidance of allergen exposure, effective symptomatic treatment, standardized immunotherapy and health education, thus greatly improving the clinical efficacy [2]. However, seeking complementary and alternative medicine (CAM) has become the focus of the world medical community due to the clinical efficacy and side effects of treatment [3]. Acupuncture is a kind of CAM, which is derived from traditional Chinese medicine. Acupuncture has been used in the treatment of nasal diseases for a long time and has achieved good curative effect, especially its significant therapeutic effect in the treatment of AR, which has been recognized worldwide [4]. Acupuncture therapy was recommended in the 2015 American AR clinical practice guidelines [5]. "Sphenopalatine acupoint" is an effective acupoint for the treatment of AR that has attracted recent attention [6]. It has only been applied in clinical practice for 40 years. In recent years, it has been paid attention to, and has been extensively studied, and some phased achievements have been achieved. Therefore, this paper mainly summarizes and analyzes the clinical effect and scientific significance of acupuncture at sphenopalatine point in the treatment of AR from the perspective of the pathogenesis of the disease.

The effect of inflammatory reflex on the pathogenesis of AR

AR is a chronic inflammatory lesion of the nasal mucosa mediated by IgE. Initiate the hyperreflexia mechanism of the nasal mucosa and nasal nerve dysfunction play an indispensable role in the pathogenesis of AR

[7]. When an allergen induces an immune response, crosstalk occurs between the nervous system and the immune system of the body. They engage in "communication and dialogue". Once the "communication" is abnormal, the inflammatory reaction of the mucosa will be aggravated [8]. Inflammation is a defense response of living tissues to injurious agents. The body must precisely regulate inflammation, response too low or too high, will lead to disease, even life-threatening. Tracey proposed the concept of "inflammatory reflex" [9], emphasizing the influence of the nervous system on immune function. The nervous system regulates inflammatory reactions in real time just like controlling heart rate and other vital signs. Inflammation reflected contains nerve center perception of local inflammation, and central nervous efferent fibers of the regulation of the inflammatory response, or suppressed, local inflammation release inflammatory mediators can be made of afferent nerve perception, or through the fluid system, the inflammation of the information transmitted to the central nervous system, in the hypothalamus, secreted by efferent fibers.

Neurotransmitters that act on immune cells, affect cytokine synthesis, and regulate local inflammatory responses. Anti-inflammatory therapy can be accomplished by central reflex inhibition of innate immune system. Cholinergic anti-inflammatory pathway is a mucosal inflammatory response pathway bidirectional regulation by macrophages and vagus nerve. Vagus nerve is a complex and widely distributed cranial nerve, and macrophages are a part of innate immunity. Electrical stimulation of vagus nerve can inhibit macrophage activity and reduce cytokine synthesis and secretion. Decreased

cytokine synthesis and secretion can reduce local inflammatory response; Macrophages have the function of antigen presentation. Down-regulation of Th2 function reduces specific IgE production by B lymphocytes, thereby reducing allergic reactions [10]. Mucosa allergic inflammation in multiple level, in the cytological level, immune cells and cells involved in the structure, Howarth cell response to [11] proposed AR such as sequence and way of structure of immune cells and cell activation, interstitial inflammatory cells invasion, the interaction between blood vessels and nerves, glands, produce an allergic reaction and clinical symptoms. At the molecular level, inflammatory mediators, cytokines and neuropeptide have complex crosstalk. Histamine is an important inflammatory mediator, but not the only one [11]. Proinflammatory neuropeptide and neurotrophins also play a role in promoting the disease. If upstream proinflammatory factors are intervened in anti-inflammatory treatment, Th2 dominance is changed, proinflammatory neuropeptide and neurotrophins are downregulated, and hyperreactive state is reduced, allergic and inflammatory reactions can be reduced, and clinical morbidity can be reduced [12].

Effects of neurological disorders on AR

The nasal cavity is the gateway of the respiratory tract, and it has its own defense function. The nasal epithelium is innervated by the trigeminal ganglion and sphenopalatine ganglion. The trigeminal nerve manages the sensation of the nasal mucosa and is distributed around the epithelium, blood vessels and glands. The pterygovascular nerve (autonomic nerve) is

responsible for the regulation of vascular and glandular functions of the nasal mucosa. Parasympathetic efferent impulse of the parasympathetic nerve causes glandular secretion, while sympathetic nerve excitation causes vasoconstriction. The number of parasympathetic post-ganglionic fibers of the autonomic nerve is more than that of the sympathetic fibers, and the nasal mucosa is often in a parasympathetic dominance state [13]. Under normal conditions, nasal ventilation function can be optimized by regulating nasal mucosal blood flow in sinuses, or by mucus secretion.

The physiological function of nasal mucosa is completed by means of vasodilation and sneezing [14]. When the external environment changes dramatically, or various endogenous humoral factors change, and the afferent nerve impulse is in a state of high reactivity caused by inflammatory mediators, the efferent nerve fiber impulse response is strong, so you should choose amplification reaction (Submerged), and clinical symptoms of premature and excessive strength will occur, leading to the disease [5]. The earliest response of nasal mucosa to external stimulation is neuronal axonal reflex, leading to vasodilatation, plasma extravasation, and recruitment of inflammatory cells, known as neurogenic inflammation. Persistent mucosal inflammation reduces the threshold of clinical response, produces priming effect on the stimulation of low-concentration allergens, and shows frequent and severe rhinitis symptoms. At the same time, the body is in a sensitive state, showing hyper-reactivity to non-specific stimuli in the environment (such as temperature difference changes or odor stimuli, etc.) [15], which becomes an important inducement of clinical

onset. AR is an inflammatory disease of the nasal mucosa. The clinical symptoms come from the interaction and effect between inflammatory mediators, cytokines and neuropeptide and the nerve, blood vessel and glandular structure of the nasal mucosa. Sneezing and rhinorrhea are mainly the result of nerve action, while nasal obstruction is caused by vascular reaction, which is also innervated by nerves. Therefore, nerve factors play an important role in the occurrence and development of AR [11].

Parenchyma study of sphenopalatine point

The acupoint is a special part of the blood transfusion in and out of the viscera and meridians of the human body. It is the reaction point of diseases and the stimulation point of clinical acupuncture. Acupuncture and moxibustion acupoint selection are carried out according to the theory of meridians and collaterals, the so-called "meridians are connected, indications are reached". The nose is the Yang in the Yang, which is the intersection of Qingyang, and the meridians running along the nose and around the nose are mostly Yang meridians [16]. Modern theories put forward the theory of trigger points [17], that is, the surface sensitive areas of the body, whether traditional acupoints or trigger points, are mostly densely packed areas with dense nerve endings or thick nerve fibers [18], or the cells at the level of fascia and periosteum or inside the fascia. Including fibroblasts, macrophages, mast cells, plasma cells and adipocyte. Neurons, macrophages, and mast cells are the basic building blocks of inflammatory response [17]. Pterygopalatine fossa is the space between the maxilla,

pterygopalatine process and palatine bone, containing sphenopalatine ganglion [19], this ganglion is located in the upper part of the pterygopalatine fosse, close to the sphenopalatine foramen, only about 1-2 mm below the mucosa. The maxillary nerve and autonomic nerve of the trigeminal nerve are the pterygopalatine nerve [6]. The sphenopalatine ganglion is a parasympathetic ganglion, which affects the vasomotor and glandular secretion of the nasal mucosa. The trigeminal nerve manages the sensation of the nasal cavity and is the injection point of local anesthesia in the nose. Researchers reported that acupuncture at this point was used to treat AR [20]. According to the needle entering from the acupoint, the needle can reach the space enclosed by the sphenoid bone and the palatine bone, which is named "sphenopalatine point", which is the key point for the treatment of nasal diseases [19].

The body surface of the sphenopalatine point is clearly marked. Under the zygomatic arch, between the coronoid process and the condyle of the mandibular bone, the acupuncture direction is posteromedial, the distance between the puncture point and the horizontal line is 33mm, the distance between the puncture point and the vertical line of the outer canthus is 42mm, the depth is 46.9mm, and the depth of the insertion is about 50mm [17]. Anatomy of human specimens showed that the needle could enter the pterygopalatine fossa, but the probability of direct contact with the sphenopalatine ganglion was not high when the needle was inserted blindly through the infratemporal fossa. We speculate that not only sphenopalatine ganglion, but also trigeminal nerve may play a therapeutic role in the

treatment of AR by acupuncture at sphenopalatine point [21].

Understanding of treatment mechanism of sphenopalatine acupuncture

Acupuncture and moxibustion is a kind of body surface stimulation therapy. Modern studies have confirmed that acupuncture and moxibustion have anti-inflammatory effects. Electroacupuncture stimulation of vagus nerve can inhibit macrophage activity and reduce the synthesis and release of proinflammatory cytokines (such as TNF- α , IL-1 β , IL-6 and IL-18, etc.), which can inhibit local inflammatory reactions. And this nerve stimulation point is equivalent to the acupoint [8].

Sphenopalatine acupoints contain vagal nerve components. Although acupuncture instruments may not touch sphenopalatine ganglion, they may exert generalized cholinergic anti-inflammatory effect through diffuse noxious inhibitory control. In the acupuncture point stimulation intensity and anti-inflammatory effect there is a relationship between dose and effect, or heat source to stimulate the acupuncture stimulation on acupuncture parts produce acute diffuse damage, was considered is "stimulus" antagonism or endogenous morphine neuropeptide or single amine neurotransmitter mediating, olefinic acetone morphine is a central and peripheral morphine receptor antagonist, have the reverse effect [8]. Scientists reported that healthy volunteers were treated with sphenopalatine acupuncture [22]. Verses, objective examination such as nasal airway resistance and nasal cavity volume, nose breath nitric oxide, and nerve peptide

including nasal secretions of substance P, vasoactive intestinal peptide and neuropeptide Y, the results showed that the beneficial changes, healthy volunteers by acupuncture butterfly palate ganglion, can increase the sympathetic nerve excitability, help to improve the nasal ventilation. Mi such as butterfly palatal point acupuncture therapy in patients with persistent AR, and pseudo acupuncture contrast, confirmed that the curative effect of acupuncture group is better than that of pseudo really acupuncture group, think acupuncture butterfly palatal hole can affect the wing a variety of nerve of palatal socket, impulse stimulation can reduce nasal sensory nerve sensitivity, prompting autonomic balance and lower central nerve sensitization, etc. [6]. When the nerve is stimulated, the stimulation impulse biphasic conduction, on the one hand to the peripheral nerve endings conduction, acting on the target organs of the blood vessels and glands, nasal mucosal epithelium of the same effector by the autonomic nerve double innervation, peripheral effect and the function of the effector state at that time; On the other hand, impulses are transmitted to the nerve center and integrated in the hypothalamus to modify the degree of central sensitization, change the neurological function, and play the regulatory role of the nervous system on AR [23].

Subtotal

To sum up, acupuncture and moxibustion has been widely used in clinical practice for the treatment of AR, but there is still a long way to go before the research on the effect of acupuncture and moxibustion is fully integrated into the modern molecular medicine system [24]. Acupuncture at sphenopalatine point has achieved certain

clinical efficacy in the treatment of AR, and its mechanism still needs to be further studied. Acupuncture at sphenopalatine acupoint affects sphenopalatine ganglion, trigeminal nerve, and pterygoid nerve, etc. It exerts its effect through cholinergic anti-inflammatory pathway and local stimulation of sensory and autonomic nerves in the nose and modulate or regulation of nerve function. Rather than denervation, or neurotomy. At present, the clinical reports of acupuncture at sphenopalatine point in the treatment of AR are increasing. However, in the evaluation of the efficacy, attention should be paid to the evaluation of objective indicators, and the selection of appropriate biomarker as the judgment indicators of the changes of autonomic nerve tone and the decline of inflammatory factors is one of the keys to further improve the clinical research.

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Result

The pterygopalatine ganglion (also known as the pterygopalatine ganglion Meckel's ganglion) is a parasympathetic ganglion of the pterygopalatine fossa, located in the upper part of the pterygopalatine fossa. The pterygopalatine ganglion is the intersection of the nerve fibers innervating the nasal mucosa and contains not only the sensory branch of the trigeminal nerve (maxillary branch), but also the sympathetic and parasympathetic branches of the pterygopalatine nerve. The treatment of allergic rhinitis by acupuncture at the "pterygopalatine point" has the advantages of precise efficacy and simplicity, which have been confirmed by clinical practice in various countries around the world.

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