

Feasibility analysis of the treatment of rhinitis diseases by subcutaneous injection of phenol in nasal cavity

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Abstract. Rhinitis is a very common disease that can be roughly divided into allergic and non-allergic rhinitis. Treatments for rhinitis include medication, nasal irrigation, and immunotherapy, all of which have been tested by doctors at various times, but none of which reach the target or work quickly enough. After in-depth analysis of the specific advantages and disadvantages of rhinitis and current rhinitis treatment methods, the use of subcutaneous injection of phenol in the treatment of rhinitis is proposed, and its process is preliminarily determined and its feasibility is verified. Subcutaneous injection has the advantages of rapid efficacy, proximity to the lesion, high bioavailability of the drug and stable rate of subcutaneous tissue absorption of the drug. Phenol is a strong-smelling compound that is highly soluble and volatile and is commonly used to relieve inflammation and reduce secretions. The subcutaneous injection of phenol proposed in this research is a combination of subcutaneous injection therapy and the theory of human acupoints of Chinese medicine, and subcutaneous injection of phenol at six points in the nose for a period of time to achieve the effect of treating rhinitis with half the effort and twice the result.

Keywords: Phenol, Subcutaneous injection, Rhinitis.

1. Introduction

Rhinitis is an inflammation of the mucous membrane inside the nasal cavity caused by bacteria, viral infections, or dust allergies, and is usually divided into allergic and non-allergic rhinitis. The incidence of allergic rhinitis is about 23% worldwide, and the self-reported prevalence in central cities in China ranges from 8.7% to 24.1% [1]. Allergic rhinitis is a chronic inflammatory disease of the nasal mucosa, usually caused by the body immune system overreaction to allergens, which begins with the release of IgE mediated mediators and involves a variety of immunoactive cells and cytokines. Allergens in daily life can be divided into inhalation allergens and ingestion allergens. Different individuals will have allergic reactions to different allergens because of their different constitutions. Dust mites are the most common of the inhalant allergens, while the second most common allergen is cat hair. Non-allergic rhinitis is mostly caused by bacterial or viral infections, odor irritation, or temperature changes. Most of these risk factors cause the nasal lining of rhinitis patients to swell, leading to poor breathing, nasal congestion, runny nose and nasal discomfort. Changes in physical health are also associated with non-allergic rhinitis. Chronic conditions such as hypothyroidism or diabetes may also cause rhinitis to appear or worsen.

Allergic rhinitis can be triggered by exposure to external allergens. The above-mentioned external allergens are mainly divided into two types: inhalation allergens and ingestion allergens. Inhalant

allergens mainly include dust mites, pollen, animal dander and fungi. Ingestion allergens mainly include foods with high protein content such as peanuts, tree nuts, fish, eggs, milk, and soybeans. Dust mites mainly live in pillows, quilts, sheets, cushions, plush toys and curtains, to human dander as food, itself, eggs, dander and excrement can cause a more intense allergic reaction. Pollen spreads widely and quickly, generally causing allergic reactions in a large number of people in a specific season, such as spring. Regarding allergic rhinitis, genetics is also a factor that cannot be ignored. As one of the allergic diseases, allergic rhinitis can be passed on from genetically heavy parents to their children. The scientific community has conducted a long-time research on the genetic supergene of allergic rhinitis. Nakamura et al. analyzed the coding genes of chemotactic cytokine receptors CCR1, CCR2, CCR3, CCR5 and CCXCR1, and found 8 SNPS related to Japanese cedar specific hay fever [2]. Through genetic imbalance test and comparison with non-related populations, SNP 64Ile of CCR2 and SNP 51C of CCR3 were associated with Japanese cedar specific hay fever, and the frequency of haplomorph 64Ile/780C/51C was found to be higher in the case group than in the control group.

Rhinitis is a common nasal disease characterized by inflammation of the nasal mucosa. Patients may experience a variety of symptoms [3], including nasal congestion, a runny nose, sneezing, nasal itchiness, decreased sense of smell, headache, and a sore throat or cough. These symptoms may cause inconvenience to the patient's daily life, affecting their social activities and sleep quality. Treatment may include medication, lifestyle adjustments, and in some cases surgery, and the formulation of treatment needs to be guided by clinical trials [3]. The following are the main treatments for rhinitis. Antihistamines can be used to relieve symptoms caused by allergens, such as sneezing and runny nose. However, it may not solve the problem of nasal congestion. Decongestants can quickly relieve nasal congestion, but long-term use can lead to rebound nasal congestion. Glucocorticoid nasal spray is effective in reducing inflammation and swelling, and it is the drug of choice for long-term control of rhinitis symptoms. Using saline to flush out the nasal passages can remove secretions and allergens and reduce symptoms. This is a non-invasive and safe method, but may require continuous use to maintain the effect. Immunotherapy can be used to train the immune system to reduce its response to a specific allergen by gradually increasing the dose of the allergen. Immunotherapy can significantly reduce symptoms and the need for medication, but it can take months to take effect and there is a risk of infection. Lifestyle adjustments can be used to avoid known allergens and irritants such as tobacco smoke and pet dander. Improving the indoor environment, such as using an air purifier, can reduce symptoms, but requires sustained lifestyle changes. Surgical treatment includes nasal polypectomy or septum correction. Surgery can address structural problems, such as nasal polyps or deviated septum, but there are surgical risks and possible recurrence. Chinese medicine treatment include acupuncture and traditional Chinese medicine, may help regulate body functions and reduce inflammation. TCM treatment may be effective for some patients, but more scientific evidence is needed to support its effectiveness. Ultraviolet or laser therapy may help reduce rhinitis symptoms, but these methods are still being studied and may have long-term side effects.

Although these methods can be used to treat rhinitis, they also have their own limitations. In order to provide a new, simple and effective treatment method, this research proposes a treatment strategy of nasal subcutaneous injection of phenol.

2. Subcutaneous injection

Subcutaneous injection is a highly effective form of drug delivery, which makes the drug directly into the blood circulation by injecting it into the fat tissue between the top layer of the skin and the muscle layer. This approach has several significant advantages, such as rapid onset of action, avoidance of first-pass effects of oral drugs, and ease of patient self-management [4]. The principle of subcutaneous injection is that the subcutaneous tissue is rich in blood vessels, and drugs can be quickly absorbed into the blood circulation through these vessels, while avoiding digestion of the gastrointestinal tract and metabolism of the liver, thereby improving the bioavailability of drugs. In addition, another advantage of subcutaneous injection is the stability and predictability of drug absorption. Since the rate of absorption of drugs by subcutaneous tissues is relatively constant, this helps to maintain the effective

concentration of drugs in the body, which is especially important for drugs that require long-term control. In the treatment of diabetes, subcutaneous insulin injection is an important means to control blood sugar level, and its stability and controllability are crucial for the health management of patients [5]. In addition, it can be also used to treat other diseases such as cancer (Figure 1) [6]. However, despite these advantages of subcutaneous injection, medical professionals still need to ensure that the injection technique is correct to avoid adverse reactions at the injection site. Correct injection site selection and injection depth are essential to reduce tissue damage and improve drug absorption efficiency.

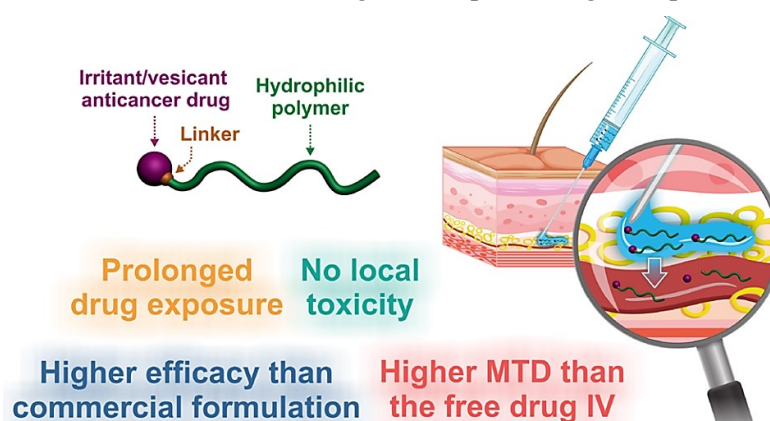


Figure 1. Cancer treatment based on subcutaneous injection [6].

Subcutaneous injections are used in a variety of medical scenarios, including vaccinations, hormone therapy and insulin injections. Subcutaneous injections play an important role in vaccination. Influenza vaccines and hepatitis B vaccines are usually administered by subcutaneous injection to stimulate the body's immune response [7]. Subcutaneous injections are also commonly used in hormone replacement therapy, especially when treating menopausal symptoms and certain endocrine disorders. Subcutaneous injections of estrogen can be effective in relieving menopausal symptoms while reducing the risk of thrombosis. For diabetic patients, subcutaneous injection is the main way of insulin treatment. The subcutaneous injection of insulin can rapidly regulate blood sugar levels and help patients maintain normal blood sugar control [8]. Subcutaneous injections are widely used in local anesthesia, pain management, and the chronic treatment of certain medications. Steroid drugs injected under the skin can be used to treat chronic pain and inflammation [9]. When giving a subcutaneous injection, a medical professional selects the appropriate injection site, usually the subcutaneous tissue in the abdomen, thigh, or upper arm. During the injection process, the medical staff will ensure that the dosage of the drug is accurate and the injection technique is appropriate to reduce the risk of discomfort and complications for the patient. Although subcutaneous injection is a relatively safe procedure, patients still need to pay attention to cleaning and caring for the injection site to avoid infection and other potential problems.

In summary, subcutaneous injection, as an effective drug delivery method, has a wide range of applications in the medical field. From vaccinations to hormone therapy to diabetes management, subcutaneous injections offer patients a quick, effective treatment option.

3. Application of subcutaneous injection for rhinitis treatment

Rhinitis needs a fast and effective treatment, and subcutaneous injection, as an effective drug delivery method, has been widely used in clinical practice. At this time, a hypothesis arose: Can drugs with strong antibacterial properties be injected directly into the nasal cavity through the skin to quickly and effectively treat rhinitis and alleviate its symptoms? After continuous exploration, phenol emerged in front of our eyes. With the deepening of thinking, a new path is opening up for us.

3.1. Phenol

Phenol is an organic compound with strong odor and chemical formula C_6H_5OH . It is an important chemical raw material and pharmaceutical intermediate. It has a wide range of applications in the medical field, especially in disinfection and sterilization [10]. The solubility and volatility of phenol make it a preferred ingredient for the preparation of topical drugs, especially in the treatment of certain skin diseases and infections. In the treatment of rhinitis, phenol can be used as one of the components of topical medication to relieve inflammation and reduce secretions. The antibacterial properties of phenol help to reduce the number of bacteria in the nasal cavity, thereby reducing rhinitis symptoms. However, due to the corrosive and irritating properties of phenol, the dosage and concentration should be strictly controlled to avoid damage to the nasal mucosa. In clinical practice, phenol is often used in combination with other pharmaceutical ingredients to form complex preparations to improve therapeutic efficacy and reduce side effects. Nasal sprays or drops containing phenol can be used to treat acute and chronic rhinitis, helping patients relieve symptoms such as nasal congestion and runny nose [11].

3.2. Treatment process

The procedure of subcutaneous injection of phenol to treat rhinitis is very simple. First, it can select points at both ends of the nostrils, both sides of the midpoint of the nose and the inner edge of the eyebrow; Injection of phenol at these points can make phenol reach the lesion directly, and these points also correspond to the human acupuncture points in the theory of traditional Chinese medicine. Second, 0.1ml phenol with a concentration of 0.067% was injected under the epithelium at the selected site. Third, patients were injected every three days and observed every month.

4. Conclusion

Although there are many limitations and challenges in the treatment of rhinitis by subcutaneous injection of phenol, the progress of science and the development of medical technology provide us with some expectations and prospects. Advances in drug delivery technology may bring a turning point for the use of phenol. By means of nanoparticles, liposomes, or other carrier systems, phenol can be encapsulated and precisely delivered to the rhinitis site, reducing its irritation to surrounding tissues while increasing the concentration and duration of action of the drug. Innovations in drug formulation may reduce the side effects of phenol. Through chemical modification or combination with other drugs, the corrosiveness and irritability of phenol may be effectively controlled while maintaining or enhancing its antibacterial properties. The development of personalized medicine may make phenol treatment more precise. By analyzing a patient's genetic information, immune response, and disease characteristics, a treatment regimen can be tailored to the patient to maximize treatment effectiveness and reduce adverse reactions. In addition, further clinical studies will provide more data on the safety and efficacy of phenol. Through rigorous clinical trials and long-term follow-up studies, it can better understand the mechanism of action and optimal application of phenol in the treatment of rhinitis. In the future, it expects subcutaneous injection of phenol to be a safe and effective treatment for rhinitis. Through continuous scientific research and technological innovation, the potential of phenol will be fully developed and bring new hope to rhinitis patients.

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