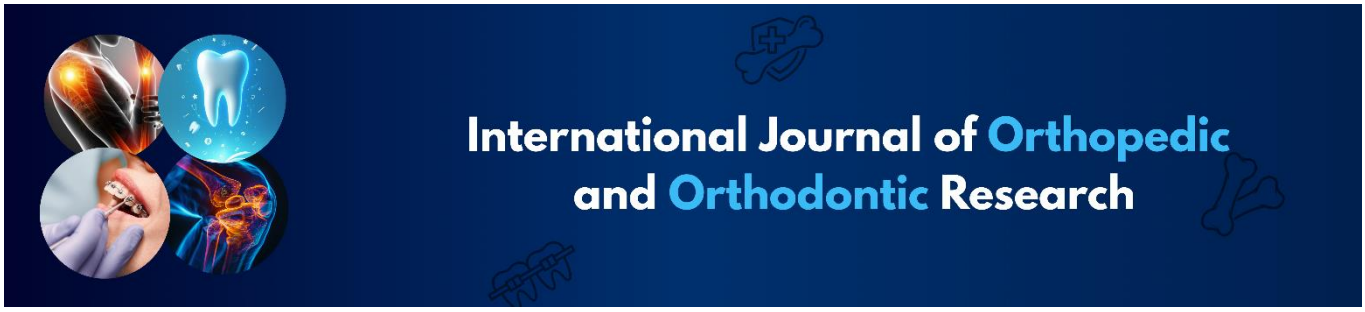

Research Progress on the Prevention of Chemical Phlebitis by Mirabilite

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Abstract
Intravenous infusion is the main approach for clinical treatment and emergency care. Phlebitis is the most common complication of intravenous infusion. The occurrence of phlebitis not only increases the patient's pain and prolongs the hospital stay, but may also develop into severe complications such as deep vein thrombosis and sepsis. From the perspective of clinical nursing practice, combined with relevant medical nursing research literature and materials, this article reviews the symptoms, judgment criteria, and current methods of prevention and treatment of chemical phlebitis.

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1. Introduction

Intravenous infusion is the main method for clinical treatment and emergency care. Phlebitis is the most common complication of intravenous infusion [1]. The occurrence of phlebitis not only increases the patient's pain and prolongs the hospital stay, but may even develop into severe complications such as deep vein thrombosis and sepsis. In recent years, the use of traditional Chinese medicine external treatment methods to prevent and treat chemical phlebitis has achieved good therapeutic effects. The following is a summary of the traditional Chinese medicine external treatment measures (talcum powder) for the prevention and treatment of chemical phlebitis.

2. Diagnostic criteria for chemical phlebitis

According to the judgment criteria for phlebitis set by the American Society for Parenteral and Enteral Nutrition (INS), it can be classified into three grades [2]. Grade I: Pain, redness, and swelling at the puncture site, no cord-like changes in the vein, and no hard nodules felt; Grade II: Pain, redness, swelling, and cord-like changes in the vein at the puncture site, no hard nodules felt; Grade III: Pain, redness, swelling, and cord-like changes in the vein at the puncture site, and hard nodules felt.

3. Chemical phlebitis risk factors - Physical factors

Environmental temperature, the hazards of insoluble particles in the solution, the volume, speed, duration, pressure, material composition and length of the catheter, etc. are all risk factors for chemical phlebitis. Among them, the material and model of the catheter play a major role in the occurrence of phlebitis. For example, about 50% of phlebitis occurs when using polytetrafluoroethylene catheters, while the incidence of phlebitis with polyurethane catheters due to good biocompatibility is 30%. The speed of fluid infusion is also very important. Rapid infusion of irritating fluids can reduce the incidence of phlebitis. Certain insoluble particles present in the infusion, such as rubber, chemicals, small glass fragments, etc., improper operation procedures and operating environments can bring these particles into the liquid. The insoluble particles enter the bloodstream through intravenous infusion, stimulate and cause damage to the inner wall of the blood vessel, resulting in vascular embolism, changes in the blood vessel wall, and the aggregation of red blood cells on the particles forming a thrombus and phlebitis [3].

4. Chemical phlebitis risk factors - Drug factors

Mainly include factors such as the pH value of the drug, osmotic pressure, and the toxicity of the drug itself. The occurrence of phlebitis is related to the pH value of the drug. Studies have shown that when the pH value of the solution and the infusion time lead to phlebitis, solutions with a pH value of 4.5 can cause 100% severe peripheral phlebitis; while when the pH value is 6.5, even if the infusion time is increased, no phlebitis occurs. Common drugs that because phlebitis include hypertonic drugs, chemotherapy drugs, etc. Chemotherapy drugs have a strong stimulating effect on venous vessels. The longer the drug remains in the blood vessel during infusion, the higher the probability of chemical phlebitis. The higher the drug's osmotic pressure, the greater the stimulation to the blood vessels.

5. Chemical phlebitis risk factors - Mechanical injury

The factors causing mechanical injury to blood vessels include: ① continuous intravenous infusion for more than 24 hours or an infusion rate greater than the internal blood flow rate in the vessel; ② incorrect needle withdrawal method, as the cutting force generated by the needle tip and the pressure during needle withdrawal causes mechanical injury to the blood vessel; ③ unbalanced speed and pressure of drug injection; ④ prolonged placement of silicone tubes or intravenous indwelling needles in the vein, causing continuous stimulation of the vessel wall by the drug solution; ⑤ multiple venipunctures in the same vein, especially when the first attempt fails and the needle is repeatedly withdrawn, resulting in damage to the inner lining of the blood vessel wall and the surrounding tissues, thereby increasing the chance of phlebitis; ⑥ There is a trend suggesting that small veins, such as those on the back of the hand, are more prone to phlebitis, but this view is still controversial at present.

6. Chemical phlebitis risk factors - contamination factors

Common contamination factors in clinical practice include: ① Environmental factors, such as unqualified air culture in the dispensing room and abnormal environmental temperature; ② The medication solution is not used immediately after preparation; ③ Contamination of infusion sets, needles, and tubes. Long dispensing time, contamination, and particles entering the blood vessels can directly cause vascular embolism, resulting in insufficient blood supply and vascular damage; ④ Inadequate disinfection of the puncture site is also an important factor in triggering phlebitis.

7. Chemical phlebitis risk factors - Patient factors

The poor elasticity of blood vessels in elderly patients increases the incidence of phlebitis; a low immune system is another important factor for the occurrence of phlebitis. Studies have shown that the occurrence of phlebitis is related to age and gender. Patients under the age of 7 and over 65 have a higher incidence of phlebitis than other age groups, and the incidence of phlebitis in women is higher than that in men.

8. The Foundation of Traditional Chinese Medicine Treatment for Chemical Phlebitis

The traditional Chinese medicine application method of external application of drugs is a common nursing technique in traditional Chinese medicine [4]. The main method involves applying the drugs to the affected area or acupoints to achieve the effects of unblocking meridians, clearing heat and detoxifying, promoting blood circulation and dissolving blood stasis, reducing swelling and relieving pain, eliminating blood stasis and promoting new growth, etc. It belongs to the external treatment methods of traditional Chinese medicine. Phlebitis falls under the category of "evil meridians" or "blisters" in traditional Chinese medicine. The "Emergency Thousand Gold Essentials" states, "For evil meridians, suddenly there are red blood vessels appearing like worms in the body, and the skin suddenly swells and becomes narrow and red, causing pain. This is called 'bli'. " That is, during the infusion process, due to drug stimulation or puncture injury, the blood circulation in the local meridians becomes blocked, blood stasis accumulates, and when blocked, pain occurs; the blood circulation is not smooth, muscle masses accumulate, and the distribution of body fluids is blocked, resulting in swelling; accumulated blood stasis, prolonged accumulation leads to heat formation, causing local heat; damage to the meridians, bleeding of the muscle block or heat accumulation within the body leads to local redness. The pathogenesis lies in the accumulation of blood stasis and qi stagnation in the meridians, causing poor blood circulation in the local meridians. The prevention and treatment should focus on clearing damp heat, dissolving blood stasis, dispersing knots in the meridians, and reducing swelling and relieving pain.

9. Mirabilite prevents chemical phlebitis

Mirabilite is prepared through the extraction method using radishes. Radishes have the properties of being sweet and warm, which can moderate the salty and cold nature of mirabilite and alleviate its purgative effect. They also possess the functions of eliminating and promoting the release of qi, enhancing the abilities to clear heat, reduce swelling, moisten dryness, and soften hardness. Moreover, they have a low stimulating effect. Studies have reported that applying mirabilite mixed with borneol externally to treat mechanical phlebitis caused by peripherally inserted central catheters (PICC) shows definite clinical efficacy. Take 200g of mirabilite and 10g of borneol, mix them well and put them in a bag. Place them along the upper side of the puncture point and in the direction of the PICC catheter, changing the dressing once a day. The area should be more than 5 cm beyond the affected area. This method can effectively reduce the need for catheter removal due to phlebitis and prolong the duration of PICC catheter placement. The method is simple and economical.

10. Conclusion

Phlebitis is one of the most common complications of intravenous infusion. The occurrence of chemical phlebitis is closely related to the mechanical and chemical effects of the infused liquid. To prevent or reduce the occurrence of

phlebitis, it is necessary to be vigilant about drug-related factors and promptly assess the impact of non-drug factors, and promptly change the nursing strategy. In conclusion, phlebitis is the result of the combined effect of multiple factors. The combined effect of these factors still needs further research. If early prevention and standardized nursing can be achieved, the incidence of phlebitis can be effectively reduced. For patients who have already developed phlebitis, timely measures should be taken. Practice has shown that the research on the prevention and treatment of phlebitis using traditional Chinese medicine has achieved good clinical results. It is convenient to obtain materials, the method is simple, and patients are easy to accept, highlighting the characteristics of traditional medicine of "simplicity, convenience, effectiveness, and low cost". However, traditional Chinese medicine treatment for phlebitis mostly adopts external treatment with drugs such as clearing heat and detoxifying, promoting blood circulation and relieving pain, and eliminating dampness and unblocking meridians. Although the clinical efficacy is certain, there are few experimental studies, and there are more clinical studies. The mechanism of drug action is not elaborated thoroughly enough, and further research is still needed.

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