

# Application of Ji Desheng Snake Pills Combined with Hypertonic Glucose External Application in Treating Drug-Induced Superficial Phlebitis Caused by Parenteral Nutrition

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## Abstract

**Objective:** The efficacy of Ji Desheng snake pills combined with hypertonic glucose external application in treating drug-induced superficial phlebitis caused by parenteral nutrition (PN) is observed. **Methods:** Fifty-two cases of drug-induced superficial phlebitis after peripheral parenteral nutrition (PPN) were selected, which were randomly divided into experimental group and control group in accordance with the phlebitis grading. In the experimental group, Ji Desheng snake pills were crushed to make a paste with 50% glucose solution, which was then applied to the affected area of phlebitis, the surface was covered with clean gauze, and properly fixed with tape or bandage. The drug was replaced once a day. In the control group, the gauze soaked with 50% magnesium sulfate solution was used, which was applied to the affected part three times a day in wet, and the efficacy was observed respectively on the 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup> and 7<sup>th</sup> days after applying the drug. **Results:** On the 1<sup>st</sup> and 3<sup>rd</sup> days after treatment, the observed effective rate of the experimental group was higher than that of the control group (42.31% vs. 15.38% and 76.92% vs. 46.15%, respectively). The difference was statistically significant ( $p < 0.05$ ). In terms of the effective rate observed on the 5<sup>th</sup> and 7<sup>th</sup> days after treatment, there was no statistical significance with respect to the efficacy between the experimental group and the control group ( $p > 0.05$ ). **Conclusion:** The significant efficacy could be found in early stage after drug-induced superficial phlebitis was treated by Ji Desheng snake pills combined with hypertonic glucose external application, which was superior to that of the traditional treatment of wet application by using gauze soaked in 50% magnesium sulfate solution.

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## Keywords

Ji Desheng Snake Pills, Hypertonic Glucose, Parenteral Nutrition, Drug-Induced Superficial Phlebitis

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## 1. Introduction

Peripheral parenteral nutrition (PPN) is an important means of nutritional support to be suitable for patients who are expected to need short-term (<2 weeks) parenteral nutrition support, and it is widely used in clinical practice [1]. However, the long-term PPN may cause a significant increase in the incidence of drug-induced superficial phlebitis. There are many methods for treating drug-induced superficial phlebitis in clinical practice, but the overall effect is unsatisfactory. Our department used the external application of Ji Desheng snake pills combined with the hypertonic glucose for the treatment of drug-induced superficial phlebitis, and achieved satisfactory results. The report is conducted as follows:

## 2. Method Part

### 2.1. General Data

Among the patients hospitalized in gastrointestinal surgery at the First Affiliated Hospital of Yangtze University during the period from January 2014 to September 2015, 52 cases of drug-induced superficial phlebitis after PPN were selected. According to the judgment criteria of the United States INS phlebitis level [2], there were 26 cases of level 1 phlebitis, 18 cases of level 2 phlebitis, 6 cases of level 3 phlebitis, and 2 cases of level 4 phlebitis. There were 28 male cases and 24 female cases, aged between 44 and 73, with an average age of 56. PPN time was 3 - 10 days, with an average time of 5.3 days. Domestically produced closedvein detained needle of model 22G × 1.00IN, 0.9 × 25 mm, 33 ml/Min from Linhwa Company were used in uniform.

### 2.2. Inclusion and Exclusion Criteria

1) Inclusion criteria: a) Patients with peripheral parenteral nutrition (PPN); b) Patients whose local skin is without any phlebitis symptoms prior to the parenteral nutrition, but those patients are with phlebitis according to the judgement criteria of the United States INS phlebitis level [2]; c) Patients are voluntarily in participating in this clinical study.

2) Exclusion criteria: a) Patients whose local skin is with ulcers, rashes, breakage, and phlebitis; b) Patients that withdrew from this clinical study due to various reasons.

### 2.3. Judgement Criteria of Phlebitis

In accordance with the judgement criteria of the United States INS phlebitis level

[2], it can be divided into 0 - 4 levels according to the severity. Level 0: no inflamed area at the infusion site; Level 1: Redness or edemas appear at the infusion site, with or without pain; Level 2: Pains appear at the infusion site accompanied with redness and (or) edemas; Level 3: Pains appear at the infusion site accompanied with redness and (or) edemas; cord-like substance is formed and cord-like veins can be touched; Level 4: Severe pains appear at the infusion site accompanied with redness and (or) edemas; cord-like substance is formed and cord-like veins >1 inch can be touched, with pus exudation.

#### 2.4. Grouping Method

52 cases of drug-induced superficial phlebitis after PPN, selected during the period from January 2014 to September 2015, were randomly divided into experimental group and control group according to the phlebitis grading above mentioned. There were 26 cases in each group, including 13 cases of phlebitis at level 1, 9 cases of phlebitis at level 2, 3 cases of phlebitis at level 3, and 1 cases of phlebitis at level 4. Experimental group included 15 males and 11 females; with the average age of  $(53.21 \pm 6.13)$  years; and the average time of PPN was  $(6.54 \pm 1.27)$  days. Control group included 13 males and 13 females; with the average age of  $(52.03 \pm 7.19)$  years; and the average time of PPN was  $(5.74 \pm 1.36)$  days. There was no statistical difference ( $p > 0.05$ ) in general data between the two groups of cases. In the experimental group, 20 tablets of Ji Desheng snake pills were taken to be crushed, and made into paste by adding a little of 50% glucose solution, which was then evenly applied to the affected area along the vein at the puncture point with the cosmetic tips. The area was more than 2 cm from the red edge with the thickness of 1 - 2 mm, and the surface was covered with the clean gauze, which was then fixed with a tape or bandage. The affected area skin was washed with clean water before replacing drug everyday, and the drug only needs to be replaced once a day. In the control group, the gauze soaked in 50% magnesium sulfate solution was used to apply to the affected area in wet three times every day. The efficacy was observed respectively on the 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup> and 7<sup>th</sup> days after treatment. Efficacy evaluation methods [3]: the local inflamed and pain symptoms were significantly reduced or disappeared, vein wall recovered elasticity, blocked blood vessels were unobstructed, which was the effective treatment; if the above symptoms were not significantly improved, the treatment was invalid.

#### 2.5. Statistical Method

SPSS19.0 software was used for statistical analysis,  $\chi^2$  test was adopted for count data,  $p < 0.05$  indicates that the differences were statistically significant.

### 3. Results

The comparison of the efficacy between the two groups is shown in **Table 1**. The efficient rate on the 1<sup>st</sup> and 3<sup>rd</sup> days after treatment in the experimental group

**Table 1.** Comparison of the efficacy between the two treatment methods.

Group	Number of cases	Effective number of cases and effective rate after treatment (%)			
		1d	3d	5d	7d
Experimental group	26	11 (42.31)	20 (76.92)	23 (88.46)	26 (100)
Control group	26	4 (15.38)	12 (46.15)	19 (73.08)	22 (84.62)
$\chi^2$		4.591	5.200	1.981	2.438
p		0.032	0.023	0.159	0.118

was higher than that in the control group, and the difference was with the statistical significance ( $p < 0.05$ ). On the 5<sup>th</sup> and 7<sup>th</sup> days after treatment, there was no statistical difference of the efficient rate between the experimental group and the control group ( $p > 0.05$ ).

#### 4. Discussion

Parenteral nutrition (PN) refers to the way of providing the patients who cannot ingest and use the nutrients through the gastrointestinal tract with the complete and sufficient nutrients through intravenous route in order to achieve the purpose of maintaining the need of the body's metabolism. Establishing an effective intravenous access is an important condition for PN. There are mainly two kinds of central intravenous access and peripheral intravenous access for the infusion of PN solution, which can be chosen according to the length of the patient's treatment time and the content of the input PN solution. In general, patients for long-term use of hypertonic glucose as the main heat require the infusion through the central vein, while patients with intravenous nutrition support no more than 2 weeks by using carbohydrate and fat emulsion as mixed heat can be infused through the peripheral vein. Compared with the central vein, PPN has the advantages of simple operation, high safety, and few complications [1]. However, due to the high concentration and large irritant of drugs injected, plus fine puncture veins, longer medication time or repeated punctures at the same site and other factors that easily result in occurrence of drug-induced superficial phlebitis, and it has been reported in the literature that its incidence is of 37.5% [4]. In response to the irritant or over-concentration and other characteristics of the injected drugs, the American Intravenous Nurses Society (INS) proposed in the *Infusion Therapy Care Practice Standard* prepared and published by it that more than 10% glucose and 5% amino acid injection solution, solution with pH <5 or >9 (drugs), and solution or drugs with an osmotic pressure greater than 500 mOsm/L are best not conducted the peripheral infusion [2]. Drug-induced superficial phlebitis easily occurs in the limbs, which mainly manifests as redness, pain, subcutaneous red line, cord-like changes, and nodules and other symptoms along the direction of the puncture vein. It can affect normal clinical

treatment to varying degrees, and prolong the hospital stay, which often adds physical pain and economic burden to the patients.

Ji Desheng snake pills, also known as Nantong snake medicine, is developed by the snake health expert Ji Desheng and mainly used for bites of various poisonous insects and snakes. Its main ingredients are Aesculus, toad skin, *Scolopendra subspinipes*, herbal Euphorbia and other traditional Chinese herbal medicines. Among them, the herbal Euphorbia has effects of detoxification, blood block and circulation, and dampness, etc. The *Scolopendra subspinipes* has effects of removing arthrolithiasis, stopping phlegm, detoxifying and dissolving knots, depressorization and pain relief; etc. [5]. According to a recent study, the drug also has effects of anti-inflammatory, sterilization, removing rot and myogenic, improvement of the microcirculation, and regulating the body immunity and others, especially significant efficacy for viral infections and bacterial infections [6]. Therefore, the drug is not only widely used in snake bites, but also used in other cases such as traumatic infection caused by redness and pain, herpes zoster and post herpetic neuralgia in AIDS patients, etc. [7]. The significant local therapeutic effect of Ji Desheng snake pills may be related to its local anti-inflammatory, reduction of the vascular permeability exudation, and antagonizing edema and other mechanisms. In addition, the drug can be applied to the affected part locally to absorb and penetrate through the skin and act on the affected part directly. Therefore, the effect is rapid with exact efficacy. However, Ji Desheng snake pills are in solid form and are not easily attached directly to the affected area. Prior to use, the pills must be blended into a paste by adding liquid ingredients to facilitate application. 50% glucose solution often used in clinical treatment and it is a hypertonic solution that dehydrates tissue cells. For external application of drug-induced superficial phlebitis, it can make the tissue dehydration of the affected area, thereby reducing inflammation, exudation, relieving tissue swelling, while forming a protective film, which is conducive to the wound healing. 50% hypertonic glucose used to blend in Ji Desheng snake pills is not only easy to use but also can combine the therapeutic properties of both drugs. The research results also confirmed that in the early stage of drug-induced superficial phlebitis after PPN, 50% hypertonic glucose used to blend in Ji Desheng snake pills to be applied externally to the affected area can receive efficacy in a short time, thereby improving the curative rate, the effect is significantly better than traditional method of wet application with 50% magnesium sulfate solution. However, with the extension of treatment time, it's found that there's no significant difference in the efficacy between the two treatments, which may be related to the sample size of the selected cases, the corresponding causes need to be confirmed by further studies.

## 5. Conclusion

In summary, the clinical studies have shown that drug-induced superficial phlebitis is rapidly treated with 50% hypertonic glucose blended in Ji Desheng snake

pills. This method is simple, inexpensive, safe without any adverse reaction, and it is worth of promotion. Nevertheless, the specific mechanism remains to be further studied.

### Declaration of Conflicting Interests

The authors declare that there are no conflicts of interest.

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