Post-print of Case Nursing Care for Contrast Agent-Induced Phlebitis

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Abstract

CT and MRI imaging examinations constitute common clinical procedures, particularly for oncological patients, among whom their utilization is especially widespread. To facilitate contrast enhancement of the target anatomical region, contrast agents are administered via intravenous injection prior to performing CT or MRI enhanced scans. Owing to inter-individual variability, certain patients may experience various adverse reactions, including but not limited to allergic reactions, gastrointestinal manifestations, neurotoxicity, vascular toxicity, and nephrotoxicity. Phlebitis also represents a recognized complication of contrast agent administration. The present case report discusses the therapeutic outcomes observed in a patient who developed phlebitis following peripheral intravenous infusion of contrast agent, treated with topical application of traditional Chinese medicine formulations for heat-clearing, detoxification, swelling reduction, and analgesic purposes, thereby summarizing relevant clinical practice experience.

Full Text

Preamble

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Case Nursing Care for Phlebitis Induced by Contrast Agent
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Abstract

CT and MRI imaging examinations are common clinical procedures, particularly prevalent among cancer patients. To enhance visualization of the examined area, contrast agents are injected intravenously before enhanced CT or MRI scans. Due to individual differences, some patients experience adverse reactions such as allergic responses, gastrointestinal reactions, neurotoxicity, vascular toxicity, and nephrotoxicity. Phlebitis is also a recognized complication of contrast agents. This case report discusses a patient who developed phlebitis following peripheral intravenous administration of contrast agent, managed with local application of Chinese herbal medicine for clearing heat, detoxifying, reducing swelling, and relieving pain. We summarize the relevant clinical experience and present this case report.

Keywords: Contrast agent; Phlebitis; Chinese herbal compress

1 Clinical Case

Patient Fan, female, [age missing]. In [year], chest CT revealed a right pulmonary nodule, and she underwent right pulmonary nodule resection. Postoperative pathology diagnosed "granulomatous lymphadenitis." In [year], follow-up CT showed a new left pulmonary nodule. No other treatment was administered, only symptomatic treatment with Chinese medicine. She was admitted for pulmonary infection and interstitial lung disease to our hospital' s respiratory department, where symptoms improved after symptomatic treatment. She was admitted to our department for planned cryoablation. At admission, the patient presented with: fatigue, occasional cough with sputum, accompanied by itchy throat. The sputum was white, sticky, and scanty, without blood streaks, no chest pain, and she usually felt heat intolerant. Occasionally she experienced bitter taste in the morning, had normal appetite, poor sleep, and normal bowel movements and urination. No significant recent weight change. The patient was allergic to cephalosporins and fluoroquinolones, but denied other drug or food allergies.

After admission, comprehensive examinations were completed, including enhanced CT. On [date], enhanced CT examination was performed. Following contrast agent injection, the injection site on the arm appeared slightly red. The radiology department did not provide special treatment. After the examination, the patient returned to the ward, and the ward medical staff were advised to monitor the patient. The patient' s arm gradually swelled. On the next day' s rounds, comparison of both arms revealed obvious differences: the left arm was significantly thicker with altered skin color (redness). The patient reported pain, and the temperature upon palpation was markedly higher than the non-swollen area [FIGURE]. The attending physician measured both arms: the healthy arm elbow circumference was [measurement missing] cm, while the affected arm elbow circumference was [measurement missing] cm.

The diagnosis was phlebitis, with a Traditional Chinese Medicine (TCM) pat-

tern identification of heat-toxicity accumulation, blood stasis, and qi stagnation. Heat-toxicity accumulated at the lesion site, causing local redness, swelling, and elevated skin temperature. Qi stagnation obstructed flow, and where there is obstruction, there is pain. Treatment was administered to clear heat, detoxify, reduce swelling, and relieve pain at the phlebitis site using Chinese herbal compress.

The Chinese herbal compress application method was as follows: The heat-clearing, detoxifying, swelling-reducing, and pain-relieving herbal granules were poured into a treatment bowl. Boiling water and Vaseline were added and mixed evenly into a paste. The ratio of herbal medicine:boiling water:Vaseline was [ratio missing]. Three rolls of bandage were immersed in the prepared herbal paste. The end of the bandage was reversed and rolled, applying medicine while rolling. After rolling, it was gently wrung out until it stopped dripping. The medicated bandage was then wrapped circumferentially around the affected area. The first circle was wrapped slightly obliquely, with the angled corner of the first loop pressed into the circular wrap for secure fixation. Subsequent loops were wrapped circularly. The tightness should be sufficient to not constrict the affected area nor slip off. The compression area should exceed the lesion by [measurement missing] cm. The dressing was covered with plastic wrap on the outside. Application time was [duration missing] hours, with frequency [frequency missing] times daily, adjustable according to actual conditions [FIGURE].

In addition to local medication care, patients who develop contrast-induced phlebitis often experience anxiety and psychological distress, and may harbor misunderstandings about medical care. Although communication occurs before contrast administration, once adverse events occur, patients' psychological state inevitably changes significantly, which can affect treatment compliance and recovery from the abnormal condition. Therefore, when such events occur, it is essential to address patients' psychological responses, provide health education to patients and their families, demonstrate active concern, and thoroughly explain the causes of phlebitis and treatment plans to ensure active cooperation and eliminate anxiety and fear. In this case, psychological counseling was comprehensive, with enhanced physician rounds and nurse monitoring. We closely observed the resolution of local redness, swelling, heat, and pain from phlebitis, promptly informed the patient of treatment efficacy evaluations and subsequent treatment arrangements, which obtained excellent patient cooperation.

3 Therapeutic Observation

Day [number missing]: The patient' s affected arm pain decreased, skin temperature was slightly elevated, and swelling remained obvious. Local Chinese herbal compress was continued.

Day [number missing]: The patient' s affected arm pain essentially disappeared, with no obvious redness or swelling, normal skin temperature, and affected arm

elbow circumference measured at [measurement missing] cm. Considering the phlebitis was improving, local Chinese herbal compress was continued.

Day [number missing]: The patient' s affected arm pain completely resolved, with no redness or swelling, normal skin temperature, and no obvious difference between both arms. The phlebitis was completely resolved [FIGURE].

Contrast extravasation refers to the overflow of contrast agent into subcutaneous tissue and vascular spaces during or after injection due to various causes. Extravasation injury is primarily related to physical and toxicological effects following extravasation] . From a Western medicine perspective, long-term chemotherapy, contrast agent injection rates exceeding mL/s, and puncture location at the volar forearm vein are all important risk factors for contrast extravasation during enhanced CT examinations] . From a TCM perspective, the main cause is blood stasis obstruction that blocks circulation, causing counterflow obstruction of nutrient blood and extravasation of fluid, leading to limb swelling, pain, and pale skin] . Therefore, the treatment principle should be clearing heat, detoxifying, transforming stasis, and unblocking collaterals.

The main clinical manifestations include: mild cases present with local wheal-like swelling, while severe cases may cause swelling of entire upper limb soft tissues with skin irritation and possible blister formation] . In this patient, contrast injection caused local limb swelling. On the next day's rounds, comparison of both arms revealed obvious differences, with the left arm significantly thicker, altered skin color (redness), reported pain, and markedly elevated temperature upon palpation compared to the non-swollen area. According to the Infusion Nurses Society (INS) criteria] , this corresponded to grade phlebitis manifestations: local pain with redness and swelling. For treatment, Chinese herbal compress was applied to the affected area. Chinese herbal compress is a traditional TCM therapy that produces synergistic effects through the combined action of heat and medicine on the body: temperature serves as an effective stimulus affecting skin, muscles, and circulatory systems; warmth can reduce nerve sensitivity to produce analgesic effects; warmth also enhances immunity to achieve anti-inflammatory, swelling-reduction, and spasm-relief effects] . Additionally, this method wraps plastic film outside the gauze to form a relatively closed hydrated microsystem, preventing medicinal liquid evaporation, increasing skin humidity, and further enhancing skin absorption of medicine and therapeutic efficacy.

The prescribed formula included Red Peony (赤芍) for clearing heat, cooling blood, dispersing stasis, and relieving pain, applicable for carbuncles, swellings, and stasis pain] ; Phellodendron (黄柏) for clearing heat, detoxifying, drying dampness, draining fire, reducing swelling, and eliminating necrotic tissue] ; Indigo Naturalis (青黛) with salty flavor and cold nature, entering liver, lung, and stomach meridians, with effects of clearing heat, cooling blood, and detoxifying] ; as recorded in the *Dictionary of Chinese Materia Medica*: "Mirabilite (芒硝) has bitter and salty flavors, bitter can drain heat, salty can soften hardness; its nature is good at dispersing, entering blood aspect, thus good at dissipating

blood stasis, able to transform and unblock all stasis"] ; Aconite (川乌) for dispelling wind-dampness, warming meridians, and relieving pain] . These medicines work in concert to clear heat, detoxify, transform stasis, and relieve pain.

TCM categorizes phlebitis under "evil vessels," "blood impediment," "vessel impediment," and "sinew impediment." Traditional contrast extravasation often uses magnesium sulfate dilution for external application, but therapeutic effects are not ideal] . While Chinese herbal compress demonstrates significant efficacy in treating various local diseases, reports on treating contrast extravasation-induced phlebitis are scarce. Our department' s adoption of Chinese herbal compress for phlebitis fully leverages the warming effects of Chinese medicine and the advantage of direct medication delivery to the lesion site, while maintaining the medicinal liquid in a relatively closed environment, resulting in longer medicinal retention time, higher permeability, and enhanced skin absorption. Since TCM external therapy acts directly on the lesion, is simple to operate, works rapidly, causes minimal gastrointestinal irritation, and is well-accepted by patients, it possesses distinct advantages and characteristics] and deserves clinical promotion. However, this therapy lacks large sample sizes and requires further data collection.

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Note: Figure translations are in progress. See original paper for figures.