Nursing Experience of a Case of PICC-Induced Allergic Dermatitis After Chemotherapy for Osteosarcoma

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Abstract

This article summarizes the nursing experience of a case of PICC-related allergic dermatitis induced by methotrexate chemotherapy, managed with topical application of halometasone cream and wrapping with gauze dressing. Through nursing assessment, syndrome differentiation analysis, and nursing diagnosis, a reasonable nursing care plan was formulated. After treatment, the patient's symptoms improved, preventing severe consequences such as PICC catheter infection and dislodgement. This alleviated the patient's suffering and financial burden.

Full Text

Nursing Experience in Managing PICC-Related Allergic Dermatitis Following Chemotherapy for Osteosarcoma: A Case Report

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This paper summarizes the nursing experience of managing PICC-related allergic dermatitis following methotrexate chemotherapy in one patient, using halometasone cream application and gauze dressing wrapping for local care. Through comprehensive nursing assessment, syndrome differentiation analysis, and nursing diagnosis, we developed a rational nursing plan that resulted in symptom improvement, prevention of serious complications such as PICC

catheter infection and dislodgement, and reduction of both patient suffering and economic burden.

Keywords: Chemotherapy; PICC; Allergic dermatitis; Halometasone cream

PICC catheterization has become an important clinical approach for intravenous infusion therapy due to its simple operation, safety, and effectiveness. However, with prolonged catheterization duration, patients often develop various complications, among which allergic dermatitis is relatively common. Allergic dermatitis not only increases patient suffering but may also trigger serious consequences such as infection and catheter dislodgement. Therefore, analyzing and treating allergic dermatitis occurring after chemotherapy holds significant clinical importance.

1.1 Case Presentation

The patient was a 16-year-old male who presented on September 10, 2024, with lower limb pain that worsened with activity. After undergoing relevant examinations at a local hospital, a distal left tibial mass was identified, with malignancy not yet excluded. The patient was advised to seek further diagnosis and treatment at a higher-level hospital. On October 22, 2024, he presented to Jishuitan Hospital, where relevant examinations suggested distal left tibial osteosarcoma. On October 23, 2024, he underwent distal left tibial lesion biopsy at our hospital, which revealed low-grade osteosarcoma. After receiving two cycles of neoadjuvant chemotherapy at our hospital, he underwent distal left tibial segmental resection and prosthetic joint replacement at Beijing Jishuitan Hospital on December 12, 2024. The patient was admitted to our department at 10:14 on January 16, 2025, for scheduled postoperative chemotherapy. He had previously been healthy, with no history of food or drug allergies, and had received vaccinations according to the local schedule.

1.2 Physical Examination

Upon admission, the patient's vital signs were as follows: temperature 36.5°C, pulse 80 beats/min, respiration 20 breaths/min, and blood pressure 122/82 mmHg. Weight: 96 kg. The patient was conscious and alert, with fair mental status. Tongue appearance was pale, with a thin white coating, and pulse was deep and weak. A longitudinal surgical incision approximately 20 cm long was observed from the middle-lower segment of the left calf to the dorsum of the foot, with good healing and sutures already removed. The left foot was swollen, but distal sensation and circulation were good. A small amount of exudate was present at the PICC puncture site, with skin breakdown observed at the catheter indentation site.

1.3 Diagnosis

Traditional Chinese Medicine Diagnosis: Bone tumor; Syndrome pattern: Qi and blood deficiency syndrome.

Western Medicine Diagnosis: 1. Postoperative chemotherapy for distal left tibial osteosarcoma; 2. Post-chemotherapy myelosuppression.

TCM Syndrome Differentiation Basis: The patient exhibited constitutional weakness and organ deficiency. Insufficiency of the kidney meridian leads to marrow deficiency and bone weakness, resulting in inability to resist pathogenic factors. Additionally, improper dietary habits injure the spleen and stomach, causing qi stagnation and internal generation of phlegm turbidity, which flows into the bones and tendons, corroding bones and eroding collaterals, accumulating to form tumors that lodge in the bones. The prolonged disease course consumes qi, damages blood, and injures essence, leading to severe spleen and kidney deficiency. The spleen and kidney represent the source of qi and blood production. The disease location is in the bones, closely related to the spleen and kidneys, with a generally fair prognosis. Comprehensive analysis of the four diagnostic methods identified the disease as "bone tumor" and the syndrome pattern as qi and blood deficiency.

Western Medicine Differential Diagnosis: The diagnosis was confirmed based on a combination of clinical manifestations, imaging studies, and pathological examinations.

1.4 Treatment

On January 22, 2025, the patient received methotrexate chemotherapy as prescribed. Following chemotherapy, a small amount of light red rash was observed around the PICC dressing, with mild itching, suggesting an allergic reaction. The patient was prescribed oral loratadine, topical halometasone cream, and calamine lotion. On January 23, 2025, dark red patchy erythema was found under the PICC dressing, accompanied by obvious itching and increased exudate at the puncture site, leading to a diagnosis of PICC-related allergic dermatitis. Immediate management included cleaning the affected skin with normal saline, followed by iodophor disinfection. After the disinfectant dried completely, halometasone cream was applied to the rash, covered with four layers of sterile gauze, and secured with bandage dressing with appropriate tightness. Dressings were changed every 24 hours to prevent PICC catheter dislodgement. After five days of treatment, the rash resolved. Considering the fragility of the affected skin and to avoid repeated removal of adhesive dressings that could cause skin damage, daily gauze dressing was continued until the patient's discharge on February 9, 2025.

2.1 Nursing Assessment

2.1.1 Assessment of PICC Contact Dermatitis: Typical manifestations include erythema, vesicles, and pruritus in the dermatitis area, with duration lasting up to one week. This represents a cell-mediated immune reaction with a scope corresponding to and/or extending beyond the exposure area [1].

2.1.2 Assessment of PICC Puncture Site Exudate: Since catheter insertion in 2024, the patient has experienced intermittent exudate at the puncture site. The amber-colored fluid is typically considered normal (though it may be associated with infection or lymphatic involvement during insertion) [1]. The exudate increased during the allergic reaction period because the local tissue developed a hypersensitivity reaction, with local skin rash accompanied by itching or vesicles that could lead to exudate from tissues surrounding the PICC puncture site.

2.1.3 Condition Assessment: Allergic dermatitis is a common complication during PICC catheterization in cancer patients [2]. Tumor patients receiving chemotherapy experience gastrointestinal reactions, insomnia, excessive fatigue, and myelosuppression, resulting in internal environment imbalance, decreased immunity, and physical weakness. The skin, as the body's largest organ, has its defense system compromised when systemic resistance declines, making the skin relatively sensitive [3]. At this time, even minor stimulation may cause dermatitis occurrence or exacerbation.

2.1.4 Medication Assessment: Methotrexate is a chemotherapeutic agent that may cause allergic dermatitis reactions during use.

2.3 Nursing Plan

The nursing plan included: Implementing skin care to reduce rash and erythema, promote skin healing, and prevent infection and catheter dislodgement risks; Performing timely dressing changes with strict aseptic technique; Strengthening PICC fixation to prevent catheter dislodgement; and Alleviating patient suffering.

2.4.1 Contact Dermatitis Nursing Care

Halometasone cream is effective for non-infectious inflammatory skin diseases treatable with corticosteroids, such as seborrheic dermatitis, contact dermatitis, and atopic dermatitis. The treatment protocol involved first cleaning the rash area with normal saline, then performing iodophor disinfection. After the disinfectant dried completely, halometasone cream was applied to the rash, covered with four layers of sterile gauze, and secured with bandage dressing with appropriate tightness. Dressings were changed every 24 hours to prevent PICC catheter dislodgement [4].

2.4.2 Puncture Site Exudate Nursing Care

Dietary Nursing: Enhanced dietary guidance was provided, with high-protein, high-calorie, high-vitamin, low-fat diet prescribed according to the patient's condition to increase protein and other nutrient intake, improve patient immunity, accelerate repair of damaged tissue, promote puncture site healing, and reduce exudate. **Psychological Nursing:** While actively implementing symptomatic measures, the patient was comforted with kind language through

increased communication, allowing the patient to vent negative emotions accumulated psychologically. The possible causes of PICC exudate were explained, and successful cases of PICC puncture site exudate resolution were shared to build confidence in overcoming difficulties and obtain support and cooperation from the patient and family.

2.4.3 Infection Nursing Care

Dressings were changed timely according to their condition, with routine changes every 24 hours. During gauze dressing changes, strict aseptic technique must be observed, including wearing gloves and using sterile instruments. Gauze dressings should fully cover the puncture site and surrounding skin to ensure a sterile area. Appropriate pressure should be applied during fixation to prevent dressing movement from looseness that could expose the sterile area.

2.4.4 Catheter Dislodgement Nursing Care

First Fixation Point: Sterile tape was used to secure the wing-shaped portion of the catheter connector, avoiding the catheter itself to ensure stable fixation without affecting catheter function. **Second Fixation Point:** After covering the puncture site with sterile gauze, gauze bandage dressing was used for wrapping and fixation, applying moderate pressure during fixation to avoid excessive tightness that could cause circulatory impairment. **Third Fixation Point:** The external catheter segment was coiled into an S-shaped curve and secured with tape, reserving sufficient activity allowance to accommodate the patient's daily activities.

2.4.5 Basic Nursing Care

Health Education: Patients and families were instructed to maintain local cleanliness and dryness. If the patient experienced skin itching, scratching was prohibited; gentle patting was permitted. Close observation of gauze dressing condition was emphasized, and patients were advised to avoid vigorous exercise. Any dressing curling or displacement should be immediately reported to nursing staff for management to prevent infection and catheter dislodgement.

Psychological Care: Relevant knowledge about PICC contact dermatitis was explained to patients and families. Attention was diverted through games, music, and other methods to reduce anxiety and fear.

On day 1, halometasone cream was applied. After one day of treatment, the patient's erythema scope decreased, with color changing from dark red to red. After five days of treatment, the erythema resolved. The treatment efficacy is shown in the figure below.

PICC-induced allergic dermatitis refers to inflammatory reactions caused by long-term stimulation from dressings, sweat, and blood, or due to prolonged PICC catheterization in patients receiving long-term chemotherapy, combined with frequent dressing changes and excessive removal of dressings and ethanol

wiping that damages the skin stratum corneum, reducing epidermal protective capacity. Mild cases present with skin flushing and itching, while severe cases develop miliary rash, vesicles, and even skin erosion, requiring sufficient attention. Halometasone cream is a topical corticosteroid medication that can suppress overactive immune responses and reduce inflammatory substances causing redness, swelling, itching, and pain [5]. Gauze dressing is non-adhesive and does not damage the skin stratum corneum upon removal, ensuring high patient comfort during treatment.

In summary, for patients with allergic dermatitis at PICC catheterization sites, local nursing care using halometasone cream application and gauze dressing wrapping, combined with high-quality nursing services, can significantly shorten healing time, reduce treatment costs, and decrease infection risk, demonstrating valuable clinical application potential.

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