

Original Article



Case Report of Incontinence after Immunocell Therapy in Hematological Patients Cared for by Transanal Placement of Tracheal Cannulae

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Abstract:

This article presents a practical and effective solution for managing fecal incontinence and perianal skin complications in acute myeloid leukemia (AML) patients by transanal tracheal cannula placement offers. A middle-aged male patient with AML who underwent chimeric antigen receptor immunocell therapy developed severe watery stool incontinence, leading to perianal dermatitis, sacrococcygeal skin breakdown, and worsening infection. The bedside nurse implemented an innovative method by inserting a tracheal intubation with a fecal collector through the patient's anus. This intervention effectively minimized fecal skin contact, significantly reduced the risk of perianal infection, and promoted skin healing while easing the burden of nursing care. The innovative use of transanal tracheal cannula placement offers a practical and effective solution for managing fecal incontinence and perianal skin complications in AML patients.

Keywords: acute myeloid leukaemia, immunocell therapy, incontinence, tracheal cannula, case report

1. Introduction

Acute myeloid leukemia (AML) is a malignant hematologic disorder arising from bone marrow hematopoietic stem cells. It is characterized by rapid disease progression and high mortality. In recent years, the incidence of AML has been rising, severely impacting patients' quality of life and survival outcomes.^[1] Patients with AML often experience profound myelosuppression, extreme immunodeficiency, and a significantly increased risk of infection due to both the disease itself and treatment-related complications, particularly following radiotherapy and immunotherapy (e.g., chimeric antigen receptor T-cell (CAR-T) therapy). CAR-T therapy is an advanced cancer treatment that genetically

modifies T cells to specifically recognize and attack leukemia cells.

With CAR-T therapy, gene editing technology overcomes the insufficient precision and specificity of cell-based therapy and the lack of sustained killing effect in vivo, thus enabling the wide usage of cell therapy.^[2] While CAR-T cell therapy has demonstrated promising outcomes in AML patients, it is frequently accompanied by complex adverse reactions and complications, posing substantial challenges for nursing care.

Patients who are bedridden for extended periods are at a high risk for incontinence-associated dermatitis, pressure injuries, and impaired venous

return in the lower extremities. The presence of frequent watery stool incontinence further exacerbates skin barrier disruption, leading to severe infections that are difficult to manage.^[3] Traditional nursing care for incontinence-related skin complications involves frequent cleansing, the application of antimicrobial dressings, and the use of skin protectants. However, these approaches have limited efficacy in cases of severe incontinence. The continuous exposure of perianal skin to fecal matter leads to persistent irritation, increasing the risk of secondary infections and prolonging the healing process. Additionally, frequent nursing interventions place a substantial burden on healthcare providers. Therefore, finding an effective method to isolate fecal matter and reduce the frequency of nursing procedures is essential for improving patient outcomes.

To address these challenges, an innovative nursing technique of inserting transanally a tracheal cannula connected to a stool collection system. This approach effectively diverted the fecal matter away from the perianal skin, thus reducing irritation and the risk of perianal and vulvar infections. By minimizing fecal contact, this method reduced the pain in patients, promoted perianal skin healing, and improved their quality of life and comfort. Because the need for frequent cleansing and dressing changes was minimized, the workload of nursing staff was reduced, which allowed them to allocate their time more efficiently. Therefore, an in-depth study of the application effect of this innovative solution for managing incontinence-related skin complications. Further research and clinical trials are warranted to evaluate the broader applicability.

Case Review:

The case patient was a 55-year-old man who was diagnosed with AML for >7 years. After >9 months of central relapse and a month of CAR-T treatment, he was pushed into the ward in a

wheelchair on November 21, 2024. On examination, the patient exhibited loss of muscle strength and severe swelling in both lower limbs, dry and flaky skin all over the body, and a 0.5 x 0.5-cm broken ulcer at the scrotum that had crusted over.

1. Present Medical History:

From 21 November to 9 December, the patient suffered from persistent bone marrow suppression, with a white blood cell count of $0.24-0.63 \times 10^9/L$ and a severe lack of absolute neutrophils: $0.06-0.14 \times 10^9/L$. The patient complained of occasional chills and recurrent high fever of up to $40.3^\circ C$ and has been reported to be seriously ill. From 26 November to 9 December, the patient suffered from persistent diarrhea, with intermittent discharge of yellow watery stools, dozens of times a day, and the number of bowel movements was particularly high at night. The doctor's symptomatic medication proved ineffective. The patient had scattered skin breaks in the sacrococcygeal area, with a small amount of exudate, perianal incontinence dermatitis, and scattered skin breaks visible in the left groin, with a small amount of exudate visible. Anal incontinence led to vulvar infection, and a culture of perianal secretions revealed *Klebsiella aerogenes* and heavy scrotal edema with small amounts of exudate with putrefying flesh and yellow discharge. The patient's caregivers had a heavy and tedious nursing workload and stayed up late for a long time to change stool-contaminated clothing and nursing pads, clean the perianal area, and wipe the body to keep the patient clean; nurses, in addition to completing basic and specialized nursing care actively adopted pharmacological and non-pharmacological methods to promote the patient's wound healing, albeit the results were not good. The patient complained of extreme discomfort and a serious decline in his quality of life.

The nurse-in-charge placed a tracheal cannula through the anus,^[4] which was securely tied at the

end to a disposable, flush-mouth, non-leakage plastic bag, which was designed to collect feces and prevent it from spilling out and fouling the patient's surrounding and skin. The patient's watery stools no longer reached the nursing pads and contaminated the clothing and the patient's body, and the patient's skin was better than before: the affected areas of sacrococcygeal skin were crusted, the perianal incontinence dermatitis was no longer progressing, and the scrotum was moderately edematous and free of the yellow oozing fluid and putrefying flesh. The caregivers' and nurses' burden of care was subsequently reduced, the nursing workload also decreased, and the patient's self-perceived comfort increased.

2. Procedure for Transanal Tracheal Cannula Placement

Listed below are steps of the procedure for inserting and managing a transanal tracheal cannula for effective fecal containment and infection prevention in bedridden patients with severe incontinence.

(1) Before the operation is started, the nurse prepares a disposable tracheal tube (size 7-8), a 10mL disposable syringe, a pair of sterile gloves, paraffin oil for lubrication, and a disposable, airtight plastic bag. The nurse carefully inspects the tracheal tube's airbag for leaks and ensures its integrity and proper functioning. The inner cannula is carefully removed, and the outer cannula is securely attached to a disposable, flush-mouth, airtight plastic bag to collect fecal matter. The front end of the cannula is lubricated with paraffin oil to minimize intestinal mucosal damage during intubation and facilitate smooth insertion.

(2) **Patient Preparation:** The patient's perianal area is cleaned thoroughly. The patient is then positioned laterally for easier access and comfort.

(3) **Insertion of the Tracheal Tube through the Anus:** The tube is gently inserted into the anus with the concave side facing upward. The nurse

closely monitors the patient's response and proceeds with slow, careful movements to avoid discomfort or injury. Once the stool is discharged, the tube is advanced an additional 3-5cm to ensure stability of the cannula and effective drainage. The balloon is inflated with 10-15mL of air. The inflation volume should be moderate. Either too much or too little may affect the effect.. The tube is then gently pulled outward until resistance is experienced, ensuring that the trocar is placed securely and dislodgement is prevented.

(4) **Post-Intubation Care:** The airbag of the indwelling trocar should be deflated 1-2 times daily for 10-15min each time to prevent prolonged compression of the intestinal wall, which may cause ischemia or necrosis of the intestinal wall. The perianal skin is cleaned with warm water twice a day. Any stool leakage should be promptly cleaned with warm water, and the area should be treated with gentamycin or erythromycin ointment to prevent infection. The stool collection plastic bag must be replaced regularly to maintain hygiene and prevent odor buildup.

(5) **Monitoring and Maintenance:** Nursing staff must check the airbags regularly for any leaks and replace the cannula if necessary to ensure effective sealing and fixation. The patient's perianal skin should be closely monitored for signs of moisture, itching, irritation, or breakdown.

Discussion:

This article discusses the case of a middle-aged male AML patient who not only experienced a central relapse and underwent CAR-T therapy but also developed multiple severe complications, including myelosuppression, fever, and extensive skin breakdown. Incontinence suffered by the patient had no direct relationship with the CAR-T therapy after examination. It is more considered to be related to the loss of sacral spinal cord (S2-S4) or cauda equina nerve function caused by

spinal cord injury. Regrettably, the patient is in the terminal stage. The patient and his/her family had signed a waiver of the examination and related treatment for the loss of sacral spinal cord (S2-S4) or cauda equina nerve function caused by spinal cord injury. This report only discussed the feasibility of transanal placement of tracheal cannulae for incontinence.

1. Feasibility of Transanal Tracheal Cannula Placement

From an anatomical perspective,^[5] the structure of the human rectum supports the feasibility of transanal tracheal cannula placement. The rectum, measuring approximately 12-15cm in length, connects to the anal canal and has an enlarged segment (the rectal ampulla) that can accommodate a tracheal tube. Under normal conditions, the rectum serves as a fecal reservoir and is sensitive to defecation stimuli. Properly placed, a tracheal tube gently inserted 15-20cm into the rectum will remain in the ampulla without interfering with normal peristalsis or bowel function. The rectal mucosa is elastic and resilient, and silicone-based tracheal tubes are well-tolerated with minimal irritation. Research suggests that when performed correctly, transanal tracheal cannula placement does not cause long-term damage to the rectal structure or function.^[6] These findings establish the anatomical viability of this method.

2. Effectiveness of Nursing Intervention

The transanal tracheal cannula technique offers several advantages in nursing care.^[3, 6] This method effectively addresses perianal skin infections caused by fecal incontinence and frequent watery stools in AML patients. Conventional methods, such as frequent cleaning and applying barrier creams, often fail to maintain perianal skin integrity. The tracheal cannula redirects stool into the collection system, preventing direct contact with the skin and significantly reducing the risk of bacterial

overgrowth and infection. By preventing stool leakage and irritation, this approach reduces perianal discomfort, pain, and secondary infections, ultimately improving the patient's well-being. The procedure is simple and can be performed efficiently by trained nursing staff. Routine maintenance involves checking cannula placement, ensuring patency, monitoring the airbag pressure, and replacing the stool collector as needed in a timely manner. This streamlined process is relatively clear and straightforward, reduces the physical burden on nurses, and ensures improved patient outcomes in clinical care.

3. Infection Control Benefits

From an infection control perspective,^[7] transanal tracheal cannula placement significantly reduces exposure to stool, a primary source of bacterial contamination, and thus decreases the risk of infection. Watery stool contains high concentrations of bacteria and digestive enzymes, which can erode the skin barrier and facilitate infection. By isolating stool from the perianal skin, this technique minimizes bacterial contact and growth, thereby lowering infection rates. This approach aligns with core infection prevention principles, which emphasize reducing pathogen transmission through effective containment strategies.

Conclusion

The innovative use of transanal tracheal cannula placement offers a practical and effective solution for managing fecal incontinence and perianal skin complications in AML patients. Preventing stool exposure reduces infection risks, promotes perianal skin healing, and enhances overall patient comfort. Additionally, this method simplifies nursing care, reducing workload while improving patient outcomes. Future studies should explore its broader applications and long-term effectiveness in clinical settings.

Abbreviations

Acute myeloid leukemia, AML; Chimeric antigen receptor T-cell, CAR-T.

Author Contributions

Implementation of nursing measures: Y-Q X

Material analysis: L C and H H

Manuscript writing: Y-Q X and H H

Writing-review & editing: J-H M

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Manuscripts Conflicts of Interest

The authors have no conflict of interest to declare.

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Availability of data and materials

The data set and statistical code will be obtained from the corresponding author with the reasonable request.

Ethics Approval and Patient Consent for Publication

Ethical approval was not applicable for this case report. Written informed consent was obtained from the family of the patient for publication of the case report.

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