



RESEARCH ARTICLE



Nursing Care for a Patient with Thromboangiitis Obliterans (TAO) Complicated with AIDS in a High-Altitude Region

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ABSTRACT

Background: In the nursing profession, the most important aspect is patient care. The Acquired Immunodeficiency Syndrome (AIDS) is considered as a fatal disease, and the patient care under defined conditions is of paramount importance.

Objectives: This article summarizes the nursing experience for a patient with AIDS complicated by Thromboangiitis Obliterans (TAO) or clinically known as Buerger's disease in a high-altitude region.

Methodology: Key nursing interventions included: implementing meticulous thrombolytic catheter management to ensure patency and safety; rigorous monitoring for bleeding tendencies during sequential thrombolysis and anticoagulation therapy; strengthening observation of blood circulation in the affected limb to prevent tissue necrosis; applying standardized pain assessment and a multimodal analgesic protocol; dynamic monitoring of infection indicators and implementing targeted prevention and control measures; and providing individualized psychological support while establishing a social support system. The above interventions were used in combinations with pharmacotherapy and surgery. represent the main treatment approach for lower extremity TAO.

Results: Through these comprehensive interventions, the patient's lower limb symptoms significantly improved by postoperative day 7, pain was effectively alleviated, and the patient was discharged for rehabilitation with a good follow-up status.

Conclusion: Alongside the exercised nursing interventions, combined pharmacotherapy and surgery represented the main treatment approach for lower extremity TAO.

INTRODUCTION

Thromboangiitis Obliterans (TAO) is a vascular disease characterized by segmental, non-atherosclerotic inflammation. Common clinical manifestations include coldness and intermittent claudication in the distal limbs, with rest pain, ulcers, and even gangrene possible in advanced stages (Li *et al.* 2021a, b). Its pathogenesis is not fully understood but is generally associated with smoking, cold environmental stimuli, infection, and abnormalities in the autoimmune system. These factors can lead to vascular endothelial injury, subsequently triggering vascular inflammation and thrombotic occlusion.

Acquired Immune Deficiency Syndrome (AIDS) is

caused by the Human Immunodeficiency Virus (HIV) (Fu 2020). HIV infection can lead to severe immune function impairment, making the vascular endothelial structure and function susceptible to damage (Mahajan *et al.* 2025). Meanwhile, high-altitude regions are characterized by hypoxia, low atmospheric pressure, and cold, dry climates, which can lead to slowed blood circulation, vasoconstriction, and reduced vascular elasticity, further exacerbating vascular endothelial dysfunction and inflammatory responses (Wang *et al.* 2023). The confluence of these factors resulted in more complex vascular pathology, posing significant challenges for clinical nursing care, with few related reports documented (Fogante *et al.* 2022). To ensure the dual safety of the patient, we now



share the nursing care of a patient with TAO complicated with AIDS in a high-altitude region who accepted thrombolysis and anticoagulation therapy. The patient has recovered and been discharged from the hospital, and he has developed well during follow-up.

MATERIALS AND METHODS

General information

The patient was a 28-year-old male, weighing 70 kg, admitted on January 25, 2024, “with the complained of numbness and pain in the left lower limb for one month, aggravated for two weeks. The patient reported discovering decreased temperature, swelling, and pain in the fourth toe of his left foot one week prior, accompanied by skin breakdown and gangrene at the medial base of the toe, with intermittent oozing of pale-yellow fluid, for which no measures were taken. The patient had a 10-year smoking history of approximately 20 cigarettes per day and lived in a high-altitude region above 4000 m for five years. There was no history of other chronic diseases or family genetic disorders. One week prior to admission, he was diagnosed with "AIDS" but had not yet initiated treatment.

Admission examination

Body temperature 37.8°C, pulse 106 times/min, respiration 18 times/min, blood pressure 129/80 mm Hg. The fourth toe of the left foot showed decreased skin temperature, swelling, and persistent pain (VAS score 5). Skin breakdown with basal gangrene was present, with visible pale-yellow exudate. The area below the mid-left calf had lower skin temperature and decreased sensation. Posterior tibial and dorsalis pedis artery pulses were weak.

Treatment course

The treatment course is presented as Fig. 1. On the third day of admission, left lower limb venous antegrade angiography and thrombolytic catheter placement were performed under local anaesthesia. Angiography demonstrated the following findings: normal morphology of the left common iliac, external iliac, and internal iliac arteries; patency of the left common femoral artery; and occlusion of the left anterior tibial and posterior tibial arteries. A guidewire was used to pass the occluded segment of the posterior tibial artery, followed by balloon angioplasty. A thrombolytic catheter was then left in place for subsequent thrombolytic therapy. On the third postoperative day, follow-up angiography via the thrombolytic catheter confirmed no significant filling defects in the left superficial femoral artery, with patent blood flow. The anterior tibial artery did not opacity, but the posterior tibial and peroneal arteries opacified well, with visible collateral circulation formation. Subsequently, the thrombolytic catheter and sheath were removed. The puncture

site was sealed with a closure device and pressure bandaged. The patient returned to the ward without discomfort.

The patient was discharged on postoperative day 7 with no special complications and stable condition. Telephone follow-ups at 1-, 3-, and 6-months post-discharge revealed significant reduction in swelling and pain in the left leg below the mid-calf and the left fourth toe. Pain was tolerable, peripheral circulation had recovered, skin temperature was normal, the original ulcer at the toe base had healed and scabbed over without exudate, and dorsalis pedis artery pulsation was good.

Nursing Care

Implementing meticulous thrombolytic catheter management to ensure patency and safety: Post-catheterization thrombolytic therapy is crucial for surgical prognosis, with catheter patency being a key factor. It is imperative for nursing personnel to strictly differentiate between thrombolytic catheter and the vascular sheath, with clear labeling and secure fixation (Vijayakumar *et al.* 2013).

Thrombolysis was performed via continuous micro-pump infusion of urokinase through the thrombolytic catheter, combined with a 72 h micro-pump infusion of heparin sodium through the vascular sheath to achieve localized heparinization of the affected limb. This aimed to prevent catheter-associated mural thrombosis and new thrombus formation, avoiding complications such as subcutaneous or mucosal bleeding that may arise from intramuscular anticoagulant injections (López-Rubio *et al.* 2024). Nurses operated the micro-pump proficiently and instructed the patient to limit movement range of the surgical limb to prevent catheter kinking, folding, displacement, or dislodgement.

Given the higher arterial pressure and increased risk of blood backflow, the pump solutions were changed regularly to prevent clotting and blockage, ensuring a stable drug concentration in the blood. Attention was paid to prevent backflow during solution changes. If backflow occurred, it was promptly flushed back into the vessel with positive pressure maintained, and the syringe was reconnected to the micro-pump for continued infusion. Strict aseptic technique was applied to the thrombolytic catheter interface, covered with a sterile dressing. The three-way connector was changed every three days, and the thrombolytic catheter retention time did not exceed four days.

The patient was assisted with axial turning at regular intervals. Pressure bandage sites were checked regularly, and tubing management was reinforced to prevent catheter displacement or slippage due to limb flexion. Warning signs for catheter slippage and surgical markers were placed at the foot of the bed. Furthermore, we improved the fixation method for the thrombolytic catheter by designing a specialized protective strap for the femoral artery puncture catheter. This strap fully encased the external portion of the catheter to prevent inadvertent removal by the patient during

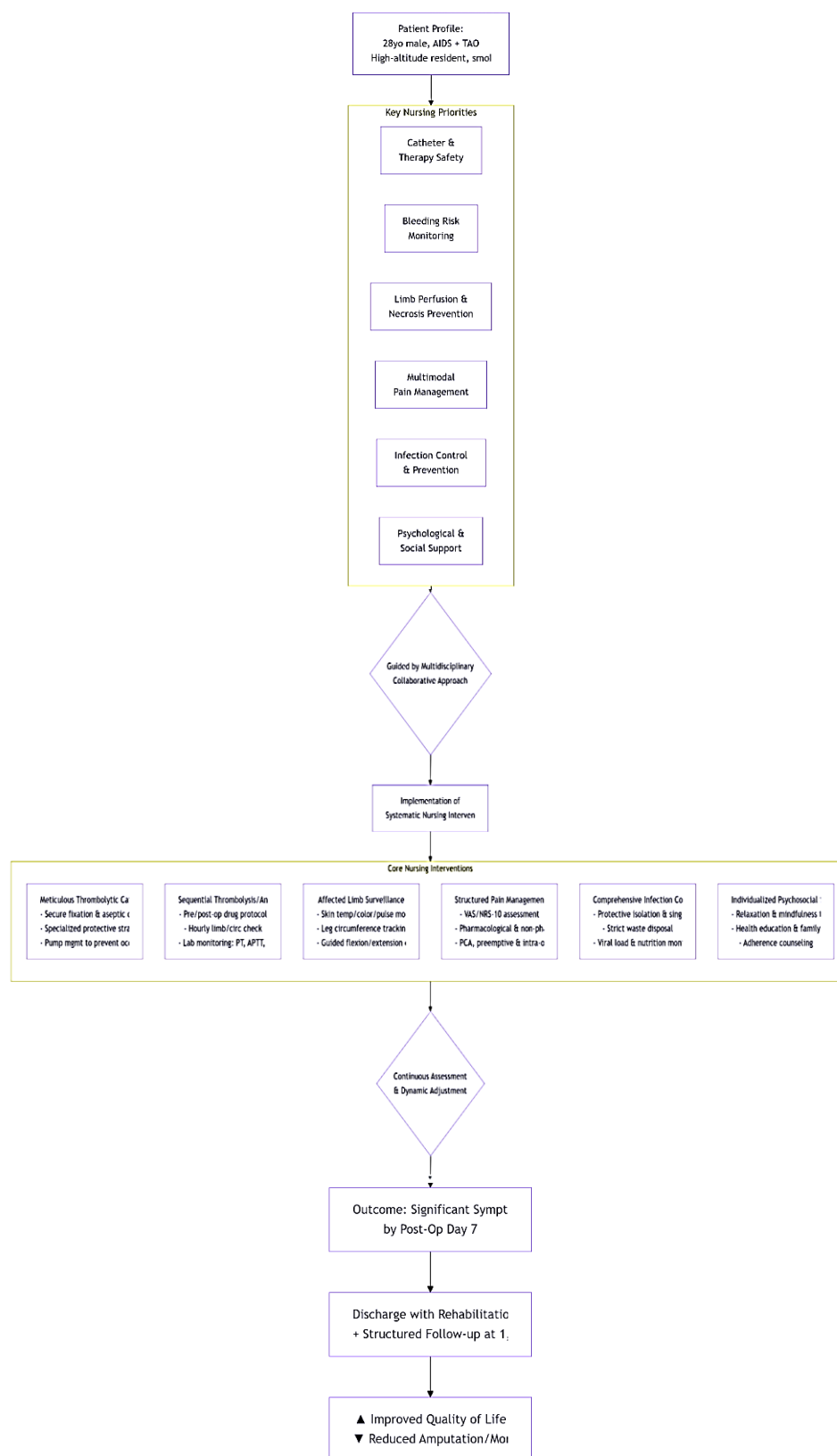


Fig. 1: Coarse of treatment of TAO-AIDS complicated patient

sleep. The catheter was secured within gaps between multiple straps, reducing reliance on medical adhesive and lowering the risk of medical adhesive-related skin injury (MARSI).

Rigorous monitoring for bleeding tendencies during sequential thrombolysis and anticoagulation therapy: To optimize therapeutic efficacy, preoperative medication included papaverine hydrochloride for vasodilation, argatroban for antiplatelet therapy (to improve limb ulcers, rest pain, and cold sensation), cilostazol tablets for microcirculation improvement, and calcium dobesilate capsules for vascular protection. Postoperatively, urokinase and heparin sodium were promptly initiated for thrombolysis and anticoagulation. Continuous micro-pump infusion of 300,000 units of Urokinase for Injection, diluted in 100 mL of 0.9% sodium chloride injection, was administered via the thrombolytic catheter every 12 h. Simultaneously, a heparin sodium solution (12,500 units of unfractionated heparin sodium injection diluted in 500 mL of 0.9% sodium chloride injection) was continuously infused via a micro-pump through the vascular sheath for 72 h. After 20 min priming perfusion, the catheter line was flushed with 500 mL of normal saline.

During treatment, the patient's blood pressure, heart rate, oxygen saturation, respiratory rate, and consciousness were closely monitored. Special attention was paid to observing for bleeding, subcutaneous ecchymosis, or color changes at the wound, puncture sites, and systemic skin and mucous membranes, as well as changes in stool and urine color. Daily laboratory tests included Prothrombin Time (PT), Thrombin Time (TT), Fibrinogen (FIB), Fibrinogen Degradation Products (FDP), Activated Partial Thromboplastin Time (APTT), and D-dimer levels. The affected limb was kept elevated and supported with a U-shaped positioning cushion. Circulation status of the affected limb was checked hourly, and changes in skin temperature were recorded. Following sequential thrombolysis and anticoagulation therapy, a limb elevation test (Buerger's test) was performed: the affected limb was elevated to a 45° angle for 3 min, with no symptoms of numbness, pain, or pallor.

Strengthening observation of blood circulation in the affected limb to prevent tissue necrosis: The primary focus of nursing management for lower extremity arterial thrombolysis intervention lies in preserving sufficient blood perfusion to the affected limb. Postoperatively, the affected limb was kept in a straight, immobilized position for 6 h and maintained elevated. The patient was assisted in adopting an appropriate lateral position. Leg circumference was measured at fixed times daily on the same limb and compared with previous measurements to observe reduction in swelling (Fig. 2).

Therefore, continuous monitoring was maintained for alterations in skin color and temperature of the affected limb. Additionally, the recovery of the dorsalis pedis pulse was carefully palpated and recorded in detail. Simultaneously,

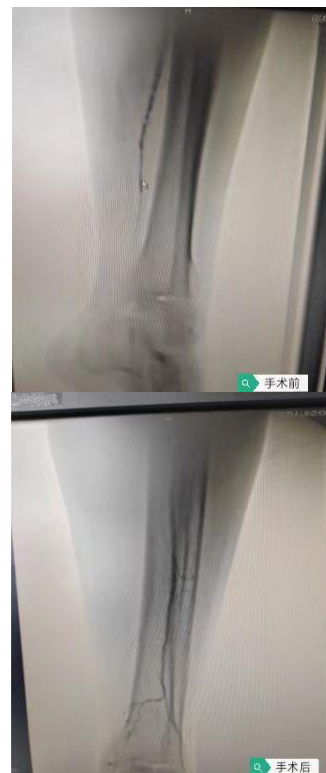


Fig. 2: Circumference of limb before (upper image) and after (lower image) nursing care.

warmth preservation measures were implemented for the affected limb to alleviate vascular spasms.

RESULTS AND DISCUSSION

Applying standardized pain assessment and a multimodal analgesic protocol

Our department abandoned the traditional single-drug analgesic model and adopted a goal-oriented, multimodal pain management strategy (Liu 2020a; Li *et al.* 2021b, c). A pain assessment system was established to develop individualized pre-emptive analgesic plans (Sultan *et al.* 2026). A four-party collaborative pain management system, involving physicians, nurses, the patient, and family was established. The advantage of this system lies in its standardized, process-oriented management with specific, quantifiable criteria, making each nursing intervention more targeted and planned. We developed a standard workflow for patient pain management, making the process more systematic and standardized, thereby improving the quality of pain management (Wang *et al.* 2020).

The Visual Analogue Scale (VAS) was uniformly adopted as the pain assessment tool, with standardized assessment times specified: preoperatively and on postoperative days 1, 3, and 7 (Xie *et al.* 2020). Postoperatively, the Numerical Rating Scale (NRS-10) was

used to assess pain levels. When the NRS-10 score was below 4, non-pharmacological methods such as verbal reassurance, positive suggestion, and abdominal massage were used for pain relief. If the score reached or exceeded 4, physicians were promptly notified for administration of non-steroidal anti-inflammatory drugs (NSAIDs) or opioid analgesics (Yang 2019). Pain level was reassessed one hour after medication. Assessment content included nature, intensity, frequency, and duration of pain, as well as its impact on the patient's rest, sleep, and functional activities. Additionally, attention was paid to the patients' cognitive response to pain, management of related complications, pain control effectiveness, and its reactions (Tang 2019).

For post-interventional breakthrough pain, spasmodic pain, and chronic dull pain, stratified management strategies were implemented (Du and Tin 2020). Preoperatively, diclofenac sodium suppository 50 mg was administered rectally for analgesia. Intraoperatively, a combination of remifentanyl ($5\mu\text{g}\cdot\text{kg}^{-1}\cdot\text{h}^{-1}$) and dexmedetomidine ($0.5\mu\text{g}\cdot\text{kg}^{-1}\cdot\text{h}^{-1}$) was used for awake analgesia intervention (Xue 2020). Postoperatively, parecoxib 40mg was administered at the end of surgery, and patient-controlled analgesia (PCA) with butorphanol 2mg/kg plus azasetron 10 mg, diluted to 200 mL, was provided with a basal rate of 4 mL/h. Intraoperatively, vital signs were closely monitored, and psychological changes were gauged through communication (Hu 2020). Pain was assessed again immediately upon the patient's return to the ward and then every 4 h for two days. A self-made scale was used to evaluate the patient's pain status. During pharmacotherapy, drug dosages were adjusted based on the patient's specific condition. Pain status was timely evaluated, and symptomatic management was promptly initiated for potential PCA pump malfunctions or drug side effects.

Dynamic Monitoring of Infection Indicators and Implementing Targeted Prevention and Control Measures

AIDS patients are prone to psychological burdens and infection risks, necessitating continuous monitoring and effective infection prevention. While the patient had the indwelling thrombolytic catheter postoperatively, strict blood and body fluid isolation measures were enforced during procedures, and protective isolation was implemented to prevent secondary infections. Concurrently, personal hygiene education was strengthened, a single room was arranged, and the patient's infection status was regularly monitored to promptly eliminate potential infection sources. Vital signs were monitored accurately and promptly, important indicators like viral load were regularly rechecked, and any patient discomfort or changes in condition were reported to physicians immediately. An individualized diet plan was formulated to ensure variety and balance, rich in vitamins, protein, and minerals.

Detailed explanations were provided regarding drug names, dosages, administration times, and methods. The

ward environment was kept clean, tidy, and ventilated. Medical and general waste were strictly disposed of according to infectious waste standards with clear labelling (Liu *et al.* 2020; Jiang and Qin 2026).

Providing Individualized Psychological Support and Establishing a Social Support System

Building upon medication and health education, we instructed the patient to practice non-pharmacological interventions such as attention diversion, muscle relaxation training, and meditation training (Niu *et al.* 2016). Psychological support intervention was reinforced to guide the patient in maintaining an optimistic mood. For patients experiencing low mood, depression, or discouragement, psychological counselling was provided, guiding them through self-relaxation exercises such as sitting quietly with eyes closed, full-body relaxation, and gently breathing.

Furthermore, the patient progress was promptly recognized and affirmed to strengthen their confidence and improve treatment adherence. During this process, emerging issues were timely identified and analyzed, and the psychological intervention plan was adjusted to ensure the steady advancement of psychological care. Through the collaborative efforts of healthcare staff and the patient, the aim was to eliminate negative emotions, improve treatment adherence, and thereby better achieve therapeutic goals.

CONCLUSION

For TAO, neither pharmacotherapy nor angiogenesis therapies can achieve complete recanalization of the occluded arteries and satisfactory improvement in blood circulation within a short time frame. Surgical intervention yields superior results in improving blood circulation, yet it only enables recanalization of locally affected arteries. The affected limb may still present with ischemia, and there remains a risk of postoperative arterial restenosis, re-occlusion, and disease progression. The incidence of TAO complicated with AIDS is relatively low, and there are few published reports on effective treatments, thus posing significant challenges to clinicians. Currently, combined pharmacotherapy and surgery represent the main treatment approach for lower extremity TAO. In this case, the patient's symptoms significantly improved after active treatment. Through this case, we recognized the importance of collaborative diagnosis and treatment, particularly regarding key points such as thrombolytic catheter management, critical aspects of thrombolysis and anticoagulation therapy, monitoring of blood supply to the affected limb, multimodal pain management, strengthening social support, infection risk monitoring, and individualized psychological support. Through the comprehensive implementation of interventional therapy and systematic nursing care, not only was lower limb pain effectively alleviated and blood supply improved, but the risk of amputation and mortality were

significantly reduced, enhancing the patient's quality of life and long-term prognosis.

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AUTHOR CONTRIBUTIONS

All authors contributed equally to this work

CONFLICT OF INTEREST

The authors appear to find no conflict of interest

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