

Nursing Care of a Patient with Acute Severe Myocarditis and Suspected Pituitary Crisis

Authors: Wanbo, Liu Yunyun, Wang Yuanyuan, Zhang Huiping, Yinxue Zhang, Wang Xinglei

Date: 2025-07-26T00:00:00+00:00

Abstract

This article summarizes the nursing experience of a patient with suspected pituitary crisis complicated by acute severe myocarditis. Upon admission, the patient exhibited severe cardiovascular dysfunction and suspected endocrine system disorder, presenting a complex and critical condition. The nursing priorities included: (1) circulatory system support and continuous monitoring; (2) early identification of pituitary crisis and standardized medication nursing care; (3) prevention and intervention of multi-system complications; (4) early cardiac rehabilitation guidance. Following 21 days of intensive treatment and nursing care, the patient's cardiac function gradually improved, symptoms associated with suspected pituitary crisis were effectively controlled, and the patient was successfully discharged. One-month follow-up demonstrated favorable recovery and significant improvement in quality of life.

Full Text

Nursing Care of a Patient with Acute Fulminant Myocarditis Suspected of Pituitary Crisis

Bo Wan¹, Yunyun Liu², Yuanyuan Wang³, Huiping Zhang⁴, Yinxue Zhang⁵, Xinglei Wang*

Abstract

This article summarizes the nursing experience of a patient with acute fulminant myocarditis suspected of pituitary crisis. Upon admission, the patient presented with severe cardiovascular dysfunction and suspected endocrine system disorders, representing a complex and critical condition. The key nursing interventions included: (1) circulatory system support and continuous monitoring; (2) early identification of pituitary crisis and standardized medication

nursing; (3) prevention and management of multi-system complications; and (4) early cardiac rehabilitation guidance. After 21 days of intensive treatment and meticulous nursing care, the patient's cardiac function gradually improved, symptoms related to suspected pituitary crisis were effectively controlled, and the patient was discharged in stable condition. One-month follow-up revealed good recovery and significantly improved quality of life.

Keywords: Acute fulminant myocarditis; Pituitary crisis; Nursing; Cardiac rehabilitation

Acute fulminant myocarditis (AFM), also known as fulminant myocarditis, is characterized by sudden onset, severe condition, rapid progression, and high short-term mortality [1]. It represents the most severe and special form of myocarditis, with insidious early onset that often fails to attract attention. The disease progresses extremely rapidly, with patients quickly developing hemodynamic abnormalities (pump failure and circulatory failure), severe arrhythmias, cardiogenic shock, and even sudden death [2]. The early mortality rate reaches as high as 50%-70% [3]. Pituitary crisis can cause deficiency of multiple hormones (cortisol, ACTH, TSH, thyroid hormone), with severe cases presenting critical signs such as hypotension, shock, coma, and metabolic disorders. Hypovolemia and low cardiac output are common in pituitary crisis and can be life-threatening without timely diagnosis and treatment [4]. When patients with severe myocarditis concurrently present with suspected pituitary crisis manifestations, they may develop altered consciousness, making the condition more complex and demanding higher-level, more challenging nursing care. In October 2024, our hospital admitted a patient with acute fulminant myocarditis suspected of pituitary crisis. The patient's condition progressed rapidly, requiring multiple multidisciplinary consultations to establish a definitive diagnosis. Through meticulous medical treatment and nursing care, the patient improved and was discharged. This case report follows.

1. Case Report

1.1 General Information

The patient was a 40-year-old female who developed chest tightness, shortness of breath, and dizziness one day prior to admission, which she ignored. Subsequently, she experienced three episodes of syncope with loss of consciousness lasting several seconds to dozens of seconds without obvious triggers. Approximately four hours before admission, she had another transient loss of consciousness, regaining awareness after about 20 seconds, prompting emergency transport to our hospital via "120." Emergency cardiac panel revealed: creatine kinase-MB mass (CK-MB) 14.00 ng/mL; myoglobin 48.00 ng/mL; troponin I (cTnI) 1.70 ng/mL; N-terminal pro-B-type natriuretic peptide (NT-proBNP) 1670.00 ng/L; D-dimer 0.27 mg/L. Rapid biochemical panel showed: glucose 11.29 mmol/L; albumin 38.9 g/L. Electrocardiogram demonstrated non-paroxysmal ventricular tachycardia with T-wave changes. The patient had ex-

perienced worsening diarrhea for one week during the previous month and had recurrent oral ulcers, with no history of allergies. After cardiology consultation, she was admitted with a diagnosis of “acute myocarditis.”

Physical examination on admission: temperature 36°C, pulse 71 beats/min, respiration 18 breaths/min, blood pressure 120/80 mmHg. The patient was alert and oriented, with clear responses. No jaundice of skin or sclerae. Pupils were equal and round, 3 mm in diameter, with sensitive light reflexes. No cyanosis of lips or jugular venous distension. Chest was symmetrical without deformity, with consistent bilateral respiratory movement. Lung auscultation revealed clear breath sounds. No abnormal precordial prominence. Apical impulse was not diffuse. Heart sounds were strong and regular, with no pathological murmurs heard in any valve areas. Peripheral vascular signs were negative. No edema in lower extremities.

1.2 Diagnosis and Outcome

Following myocarditis diagnosis, high-dose steroid pulse therapy and intravenous immunoglobulin may be administered to suppress the inflammatory storm, with circulatory support provided for hemodynamically unstable patients [5]. The main treatment plan for this patient included: Pacemaker-assisted therapy to maintain adequate sinus rhythm; Steroid pulse therapy with methylprednisolone 200 mg IV daily, tapered gradually after three days; Immunomodulatory therapy with intravenous immunoglobulin, halved after one week; Antiviral therapy with acyclovir and ceftriaxone for positive Coxsackie virus IgG and elevated IL-6.

Two hours after admission, the patient suddenly lost consciousness with dilated pupils and sluggish light reflexes. Cardiac monitoring revealed accelerated idioventricular rhythm, with blood pressure dropping to 64/30 mmHg. Immediate intravenous infusion of norepinephrine and dopamine hydrochloride was initiated for blood pressure support, along with isoproterenol to maintain rapid ventricular rate, after which vital signs stabilized.

Three hours post-admission, the patient became restless with significant precordial pain. Cardiac enzymes continued to rise (see Table 1). Emergency coronary angiography, left ventriculography, and temporary pacemaker implantation were performed, all showing no significant abnormalities, strongly suggesting acute myocarditis. Post-procedure, vital signs were closely monitored, and intensive care was provided.

Table 1 shows changes in five myocardial markers during hospitalization. Note: D-Dimer=D-dimer, cTnI=troponin I, CK-MB=creatin kinase-MB mass, MYO=myoglobin, NT-proBNP=N-terminal pro-B-type natriuretic peptide.

On day 2, the patient exhibited apathy. Repeat cardiac markers showed elevation (see Table 1). The diagnosis of “severe myocarditis” was considered, and treatment with steroids combined with immunoglobulin was initiated, supple-

mented with vitamin C, coenzyme Q10, myocardial nutrition, anti-shock, and antiviral therapy. Gastrointestinal symptoms worsened due to dopamine use for blood pressure support, but improved after gastroenterology consultation and treatment with intestinal flora modulation and pinaverium bromide for spasm relief.

On day 4, the patient experienced chest pain and shortness of breath, unable to lie flat. Blood pressure was 74/40 mmHg, with ventricular rate approximately 70 beats/min in accelerated idioventricular rhythm. Dopamine and isoproterenol infusions were immediately administered, and morphine 5 mg IV was given for chest pain. Emergency CT scans of head, chest, and abdomen showed no organic lesions. Cardiac enzymes continued to rise (see Table 1), and ECG showed alternating non-paroxysmal ventricular tachycardia and sinus rhythm. Critical care consultation confirmed the diagnosis of severe myocarditis.

On day 5, the patient's mental status improved, cardiac markers began to decrease (see Table 1), and D-dimer was 4.6 mg/L. Low molecular weight heparin calcium injection was administered subcutaneously. On day 7, the patient again appeared apathetic. Comprehensive metabolic panel showed sodium 133.3 mmol/L, potassium 3.22 mmol/L, calcium 1.94 mmol/L. Pituitary panel revealed T3 0.82 nmol/L and cortisol 0.66 g/dL, suggesting pituitary crisis. MR imaging of pituitary and parasellar structures showed no abnormalities. Multi-disciplinary consultation considered that high-dose steroid use might mask the condition, recommending stepwise methylprednisolone reduction to expose the underlying disease, with hormone levels to be rechecked after tapering to hydrocortisone 100 mg. On day 10, the patient was in good spirits, and intensive care was discontinued. On day 15, repeat pituitary panel was normal, serum sodium and potassium levels had increased, and mental and general condition improved, ruling out pituitary crisis. On day 21, after comprehensive treatment with cardiac markers as shown in Table 1, the patient was discharged in stable condition, with instructions to continue nutritional enhancement and regular follow-up.

2. Nursing Care

2.1 Circulatory Support and Hemodynamic Stability

Patients with severe myocarditis rapidly develop hemodynamic abnormalities, which indicate critical illness severity [6] and can trigger a series of serious complications; extremely unstable cases are immediately life-threatening. In this patient, early blood pressure and heart rate were highly unstable. Cardiac monitoring revealed that blood pressure dropped when sinus rate decreased, while elevated sinus rate suppressed ventricular rhythm and maintained stable blood pressure. Therefore, maintaining an adequate sinus rate was crucial for hemodynamic stability. Mechanical assistance and pharmacological support were provided to sustain circulation with close monitoring.

2.1.1 Temporary Pacemaker Implantation Studies have shown that timely implantation of temporary or permanent pacemakers plays a crucial role in improving prognosis for myocarditis patients [7]. This patient experienced loss of consciousness within 2 hours of admission, with blood pressure dropping to 64/30 mmHg and alternating ventricular-sinus rhythm. Emergency pacemaker implantation was performed to maintain normal sinus rhythm and improve cardiac function and perfusion. Postoperatively, the pacemaker functioned properly at 60 beats/min, with a dry puncture site without bleeding or subcutaneous hematoma. On day 2 post-implantation, the patient's heart rate and blood pressure stabilized, with cardiac monitoring showing sinus rhythm. The temporary pacemaker was subsequently removed at bedside under sterile technique with physician assistance.

2.1.2 Standardized Medication Administration Hemodynamically unstable patients should receive vasoactive agents promptly to effectively correct hypotension and improve cardiac function by enhancing vascular function and microcirculatory perfusion. Vasoactive drugs are high-risk medications, and improper administration can cause hemodynamic fluctuations, drug extravasation, phlebitis, and severe tissue necrosis [8]. This patient received intravenous infusion of dopamine hydrochloride, norepinephrine, and isoproterenol after admission. Specific safety measures included: Rational selection of infusion pathway: Vasoactive drugs should be infused separately through large-caliber, high-flow vessels to reduce vascular wall irritation. This patient initially received peripheral venous infusion for 2 hours, then switched to deep venous sheath infusion. On day 4, the deep venous sheath was removed and a PICC line was inserted for continued infusion, with no related complications occurring during treatment. Precise control of rate and concentration: Due to their unique pharmacological properties, even minute dose changes in vasoactive drugs can cause blood pressure and heart rate fluctuations [9], leading to hemodynamic alterations. Precision infusion pumps were used for continuous delivery without interruption, with checks every 30 minutes to ensure constant infusion rates. Based on heart rate (52-128 beats/min) and blood pressure (70-113/41-66 mmHg) changes, the primary physician was promptly notified to adjust infusion rates: dopamine hydrochloride (2-10 g/min/kg), norepinephrine (3-10 ml/h). Isoproterenol was started at 0.5 ml/h, but after 1 hour, the patient experienced palpitations with heart rate fluctuating around 102 beats/min; symptoms resolved after discontinuation per physician order. Close monitoring for adverse reactions: Vital signs were monitored every 30 minutes, with intervals appropriately extended when blood pressure and heart rate were stable. The patient's complexion and extremities were carefully observed to promptly identify dizziness, palpitations, chest tightness, shortness of breath, facial flushing, nausea, or vomiting. The puncture site was checked hourly to ensure no redness, swelling, or drug extravasation. Standardized catheter care: Infusion pumps and tubing were securely fixed to prevent displacement-induced drug extravasation. Ten milliliters of normal saline were used to flush the catheter before and after infusion. After

discontinuation, an empty syringe was used to aspirate until blood return was observed before sealing the catheter [8]. Proper tubing labels were applied, indicating drug name, concentration, rate, and infusion start time, with handover between shifts.

2.1.3 Continuous Multi-parameter Monitoring Accurate vital sign monitoring in myocarditis patients with hemodynamic instability enables timely assessment and rapid formulation or adjustment of treatment plans. Nursing records were completed hourly, with additional documentation as needed during condition changes, as shown in Table 2 .

2.2 Pituitary Crisis Management

Patients may present with decreased consciousness and other symptoms, requiring immediate high-dose glucocorticoid pulse therapy upon admission. Multi-disciplinary collaboration was established to determine the treatment protocol, with stepwise methylprednisolone reduction to expose the underlying disease nature, with hormone levels to be rechecked after tapering to hydrocortisone 100 mg. Specific measures included: Hormone management: Methylprednisolone was initiated at 200 mg IV daily, tapered to 100 mg on day 4, then 50 mg on day 6, switched to hydrocortisone 150 mg on day 8, then 100 mg on day 10, followed by methylprednisolone tablets 16 mg orally daily on day 12, and prednisone acetate tablets 20 mg on day 15. When steroids were tapered to hydrocortisone 100 mg, repeat testing showed cortisol 1.30 g/dL and T3 1.09 nmol/L. The patient exhibited no psychiatric abnormalities such as excitation or irritability during treatment. Early identification of pituitary crisis: The following conditions warranted vigilance for pituitary crisis: potassium ≤ 3.5 mmol/L or ≤ 5.5 mmol/L, sodium ≤ 135 mmol/L indicating electrolyte imbalance; systolic blood pressure < 100 mmHg or decrease > 20 mmHg; glucose ≤ 3.9 mmol/L; and presence of nausea, vomiting, diarrhea, temperature $\leq 38^{\circ}\text{C}$, or altered consciousness [11]. On day 3, sodium was 129.5 mmol/L with apathy, prompting immediate infusion of concentrated sodium chloride 50 ml at 12.5 ml/h. On day 13, potassium was 3.09 mmol/L, treated with 0.9% NaCl 35 ml + potassium chloride 1.5 g infused at 25 ml/h. Timely and effective steroid pulse therapy combined with sodium and potassium supplementation effectively prevented pituitary crisis.

2.3 Complication Prevention

2.3.1 Catheter Professional Maintenance and Management The patient retained arterial and venous sheaths, which were removed on day 4 and replaced with a PICC line. Strict handover procedures and related nursing care were implemented to maintain vascular access and ensure treatment efficacy. Specific measures included: Secure fixation: The puncture site was fixed with transparent, tension-free dressing, with the catheter secured to elastic bandages in a figure-eight cross pattern [12]. Patients and families were informed

of precautions, and rounds were intensified. Maintaining patency: The patient was instructed to avoid excessive flexion of the operated limb to prevent catheter kinking. After stopping infusion, the catheter was flushed with normal saline using pulsatile positive pressure every 4 hours to confirm patency.

Proper external labeling: Different colors were used to mark arterial and venous sheaths, with labels indicating name, time, and length applied to the distal end.

Ensuring infusion safety: When infusing dopamine hydrochloride, three-way connectors were ensured to be tightly connected, with regular observation for dislodgement at fixation sites and connectors to prevent detachment due to limb movement.

2.3.2 Individualized Anticoagulation and Thrombosis Prevention

This patient had both a pacemaker and PICC line, with persistently elevated D-dimer levels. High-dose steroid pulse therapy and limited mobility are all risk factors for thrombosis. Studies indicate that deep vein thrombosis is most commonly caused by central venous catheters, cancer, or pacemaker leads [13], with bed rest and lead placement being risk factors for deep vein thrombosis formation [14]. Additionally, research shows that anticoagulation therapy is necessary for thrombosis prevention, but excessive anticoagulation can lead to bleeding complications [15]. This patient had both high-risk factors for deep vein thrombosis and decreased hemoglobin, as shown in Figure 1 [Figure 1: see original paper], making anticoagulation management and bleeding risk assessment critically important during treatment. Limb activity was guided to avoid catheter displacement. On day 5, low molecular weight heparin calcium injection 0.4 ml was administered subcutaneously twice daily (morning and evening). After one week, D-dimer decreased to 0.81 mg/L.

Figure 1 shows changes in D-dimer values and hemoglobin levels during hospitalization.

Bleeding risk assessment included: Regular laboratory monitoring: Complete blood count, APTT, INR, and D-dimer were monitored, with D-dimer gradually decreasing by day 9. Vigilance for bleeding tendency: Skin, oral cavity, and stool color were closely observed, particularly at puncture sites. On day 3 of low molecular weight heparin injection, small ecchymoses and petechiae appeared at injection sites without coalescence. Minimal oozing occurred at right femoral arterial/venous sheath and PICC puncture sites on the day of placement, which resolved after sterile dressing change. Avoiding exacerbation of bleeding: Invasive procedures were minimized. Venipuncture sites were compressed for 4 minutes, with no persistent oozing or subcutaneous hematoma after compression.

2.3.3 Multi-dimensional Infection Control Strategy This patient developed hypoalbuminemia while undergoing multiple invasive procedures including angiography and PICC placement. Related studies report a PICC-associated infection rate of 11.9% [16], making aggressive infection control critically impor-

tant. Antiviral therapy with acyclovir, ceftriaxone sodium, and immunoglobulin was administered. Nursing strategies included: Condition monitoring: Vital signs were monitored every 4 hours, with normal temperature-to-heart rate ratio.

Proper medication administration: Antiviral drugs were administered strictly according to half-life schedules. Acyclovir for injection 0.5 g in 0.9% NaCl 50 ml was infused at 50 ml/h with no adverse reactions. Catheter maintenance: All catheter puncture site dressings were kept clean and dry, with strict standardized maintenance by the intravenous therapy team. Local conditions were closely observed and recorded in the catheter maintenance log with handover between shifts. Environmental management: The ward was kept clean and well-ventilated at 22°C temperature and 60% humidity. Daily 40-minute ultraviolet disinfection was performed, with bedside tables and headboards wiped morning and evening using quaternary ammonium disinfectant wipes. Visitor numbers were restricted to prevent cross-infection.

3. Interdisciplinary Team and Early Cardiac Rehabilitation

Early cardiac rehabilitation is crucial for patients with severe myocarditis, effectively reducing readmission rates [17], preventing complications through multiple dimensions, and thereby improving quality of life. Cardiac rehabilitation requires multidisciplinary participation to develop individualized protocols, with strategies formulated based on the patient's condition focusing on four main aspects: exercise, nutrition, psychology, and monitoring.

3.1 Exercise Therapy Intervention

Exercise assessment: Exercise selection and “dosage” must be personalized like medications to maximize benefits and minimize risks [18]. Hemodynamics and cardiopulmonary function were assessed before and after exercise. Activity tolerance was evaluated using the Activities of Daily Living (ADL) assessment and Morse Fall Risk Assessment. Exercise prescription formulation: Early stage focused on bed rest with activities that would not cause catheter displacement [14], including ankle pumps and muscle pumps. Gradual progression to bedside standing and short indoor walking was implemented, with exercise intensity maintaining heart rate increase within 20 beats/min, following the principle of early ambulation [6]. Walking distance was measured using the 6-minute walk test along a flat corridor with dedicated 30-meter distance markers. Exercise monitoring and adjustment: Heart rate, respiration, and blood pressure were monitored in real-time during activity. Exercise was immediately stopped if chest pain, dyspnea, dizziness, or other discomfort occurred, with exercise volume adjusted based on patient response. Pressure ulcer prevention: A turning schedule was established with repositioning every 2 hours. Catheter fixation and skin condition were checked before and after turning to ensure no pressure marks or changes.

3.2 Nutritional Support Implementation

Nutritional assessment: A 24-hour dietary recall was used to comprehensively understand the patient's eating habits and nutritional intake, with timely attention to relevant laboratory indicators. Dietary plan formulation: During the acute phase, intravenous fluid supplementation was primary, with light and easily digestible foods. Due to low serum albumin, high-quality protein intake was increased during recovery, including 2 eggs daily, moderate fish and legumes, and at least 2 types of fruits or vegetables daily to maintain bowel regularity.

Nutritional monitoring: Weight, serum protein, hemoglobin, and lipid panel (total cholesterol, triglycerides, LDL-C, HDL-C) were measured regularly.

3.3 Psychological Adjustment Rehabilitation

Due to the sudden onset and emergency transport via "120," coupled with initial diagnostic difficulties, both patient and family experienced significant psychological impact. Throughout diagnosis and treatment, healthcare staff provided detailed condition explanations to help the patient understand the disease and accept the treatment plan. Nursing procedures were patiently explained beforehand to alleviate anxiety. During the stable phase, 10-15 minute daily communication sessions were conducted to assess psychological changes. Disease education was provided using accessible methods such as brochures and videos to reduce disease-related fear. Patients were encouraged to express their feelings, and deep breathing relaxation training (5-10 minutes per session, 2-3 times daily) was guided when discomfort such as palpitations occurred. Family members were instructed to participate throughout the rehabilitation process, assisting with exercises to enhance patient confidence.

3.4 Regular Health Monitoring

Self-monitoring: Attention was paid to symptoms during daily activities such as chest tightness, chest pain, dyspnea, fatigue, and dizziness, with duration and potential triggers recorded. Blood tests: Regular re-examination was scheduled based on myocardial marker results, with intervals appropriately extended when indicators were normal. Ancillary examinations: ECG and echocardiogram were performed promptly based on symptoms, at least twice yearly.

4. Summary

This case involved a patient with suspected pituitary crisis complicated by acute fulminant myocarditis, representing a complex and critical condition. Through comprehensive assessment, the nursing team accurately identified nursing problems and implemented individualized care plans, focusing on: maintaining hemodynamic stability, preventing pituitary crisis, initiating early cardiac rehabilitation, and comprehensive nursing interventions. Early cardiac rehabilitation served as a core nursing measure, effectively promoting cardiac function recovery through progressive cardiopulmonary training. The nursing process fully

leveraged professional expertise, closely monitored condition changes, timely adjusted rehabilitation protocols, and emphasized multidisciplinary collaboration to provide high-quality patient care. This case highlights the critical role of professional nursing in critically ill patient recovery and demonstrates that early cardiac rehabilitation is particularly important for improving patient prognosis.

- [1] Yuan Jing. Early recognition and emergency treatment for fulminant myocarditis[J]. *Journal of Clinical Cardiovascular Diseases*, 2021, 37(02): 97-100.
- [2] Chinese Expert Consensus on the Diagnosis and Treatment of Adult Fulminant Myocarditis[J]. *Journal of Critical Care in Internal Medicine*, 2017, 23(06): 443-453.
- [3] Daowen W, Sheng L, Jiangan J, et al. Chinese society of cardiology expert consensus statement on the diagnosis and treatment of adult fulminant myocarditis.[J]. *Science China. Life sciences*, 2019, 62(2): 187-202.
- [4] Lu L, Jin-Bo L, Fu-Qin C, et al. Refractory hypotension induced by Sheehan syndrome with pituitary crisis: A case report.[J]. *Experimental and therapeutic medicine*, 2017, 13(5): 2097-2101.
- [5] Qiu Luhong, Liu Yingxian, Xu Xiqi. Nonnegligible Myocarditis: Insights from 2021 ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure[J]. *Medical Journal of Peking Union Medical College Hospital*, 2022, 13(04): 530-534.
- [6] Hu Dayi, He Xifei. Expert consensus on nursing of fulminant myocarditis in adults[J]. *Journal of Nursing Science*, 2021, 36(01): 1-6.
- [7] Chunhong H, Lishu Z, Chengzhi Z, et al. Pacemakers and methyprednisolone pulse therapy in immune-related myocarditis concomitant with complete heart block[J]. *Open Medicine*, 2022, 17(1): 2109-2116.
- [8] Wang Fang, Zhang Shuzeng, Nie Anliu, et al. Summary of the best evidence for vasoactive drug infusion in adult patients[J]. *Chinese Journal of Emergency and Critical Care Nursing*, 2024, 5(03): 275-282.
- [9] Jia Xiaona, Chen Wenxiu, Qiu Haiyan, et al. Application of Swiss cheese model plus mind map to ensure administration of intravenous vasoactive drugs[J]. *Journal of Nursing Science*, 2018, 33(22): 61-63.
- [10] Li L, Li Y, Gao Y, et al. Cardiogenic Shock Induced by Anterior Pituitary Hypofunction and Thyrotoxicosis[J]. *Cureus Journal of Medicine Science*, 2020, 12(12): e12347.
- [11] Zeng Lirong, Zhang Xing, Chen Haoying. Nursing care of a case of Sheehan syndrome with infection and combined with diabetic ketoacidosis[J]. *Chinese Journal of Nursing*, 2024, 59(07): 854-858.
- [12] Yin Yuanyuan, Ge Jingping. Expert consensus on technical specifications for interventional nursing of peripheral vascular diseases[J]. *Journal of Interventional Radiology*, 2024, 33(06): 581-592.

- [13] Xu Caiyan, Qian Jin' e, Yan Jiadong, et al. Pacemaker-associated upper extremity venous thrombosis: a case report and literature review[J]. *Anhui Medical and Pharmaceutical Journal*, 2024, 28(05): 981-986+1066.
- [14] Liu Huafen, Zhou Jiali, Huang Zheng, et al. Expert consensus on limb management of patients with transvenous temporary cardiac pacing[J]. *Chinese Journal of Nursing*, 2024, 59(13): 1581-1583.
- [15] Zheng Jing, Fang Zhenhong, Zhang Liping. Nursing of a patient with fulminant myocarditis complicated with heparin-induced thrombocytopenia[J]. *Chinese Nursing Research*, 2022, 36(17): 3189-3192.
- [16] Cánovas S M, Torralba G E, Boluda B N, et al. Thrombosis and infections associated with PICC in onco-hematological patients, what is their relevance?[J]. *Clinical & translational oncology: official publication of the Federation of Spanish Oncology Societies and of the National Cancer Institute of Mexico*, 2024, 26(12): 3226-3235.
- [17] Xu Jingjing, Li Ping. Cardiac rehabilitation for cardiovascular disease[J]. *Chinese Circulation Journal*, 2013, 28(08): 635-637.
- [18] Zhong You, Dun Yaoshan, Wei Wenzhe, et al. Cardiovascular Medicine of Sport and Exercise Guidelines[J]. *Chinese Circulation Journal*, 2024, 39(10): 937-955.

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

Source: ChinaXiv –Machine translation. Verify with original.