

Nursing Care for Thrombotic Thrombocytopenic Purpura: A Report of Six Cases

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ABSTRACT

Context: Thrombotic thrombocytopenic purpura (TTP) is a rare, disseminated microvascular thrombosis-hemorrhagic syndrome with an extremely low incidence, rapid onset, and severe symptoms. The disease progresses rapidly, and if left untreated, it can lead to death. High-quality nursing management is crucial for ensuring patient prognosis during treatment. Currently, the development of nursing management systems for TTP patients has received relatively little attention, and evidence-based experience in TTP nursing interventions is limited.

Aim: To summarize and analyze the nursing management experience of six patients with thrombotic thrombocytopenic purpura (TTP), focusing on key strategies such as emergency care, therapeutic plasma exchange (TPE) coordination, medication monitoring, and psychological support, to provide practical references for improving clinical nursing quality and patient outcomes.

Methods: A retrospective descriptive case series was conducted at Affiliated Hospital of Youjiang Medical University for Nationalities. Baise, Guangxi, China, including six patients with secondary Thrombotic Thrombocytopenic Purpura (TTP) admitted between May and September 2023. Data were obtained from medical records, laboratory reports, treatment documentation, and nursing care notes.

Results: Following therapeutic plasma exchange and pharmacological treatment, combined with comprehensive nursing interventions—including emergency care, TPE-associated nursing management, medication monitoring, and psychological support—five patients showed significant clinical improvement and were successfully discharged, while one patient unfortunately succumbed to the disease.

Conclusion: TTP is a rare, rapidly progressive, and critical thrombotic microangiopathy that requires early diagnosis, standardized treatment, and systematic nursing care. Based on the experience of six cases, the study recommends key strategies for treating TTP, including emergency care, plasma exchange, drug monitoring, and psychological support. The employed nursing approach is highly practical and can serve as a valuable reference for the clinical management and nursing care of similar cases.

Keywords: Case study, nursing management, thrombotic thrombocytopenic purpura

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1. Introduction

Thrombotic thrombocytopenic purpura (TTP) is a rare but life-threatening autoimmune disorder. According to reports in the international literature (Terrell et al., 2005; Scully et al., 2008; Matsumoto et al., 2023; Scully et al., 2023), the annual incidence of TTP is estimated to be 4-11 cases per million population. The disease is characterized by a severe deficiency of the von Willebrand factor-cleaving protease ADAMTS13, leading to microvascular thrombosis and concurrent thrombocytopenia. This abnormal thrombosis may cause serious damage to various organs throughout the body. Without timely and appropriate treatment, TTP can lead to life-threatening

complications, with a reported mortality rate as high as 90% (Vacca, 2019; Okoli et al., 2023).

Clinically, TTP is often treated with a combination of plasma exchange and immunosuppressive medications. These complex and diverse clinical treatments often require comprehensive nursing care from the nursing team. High-quality nursing management is essential for ensuring patient outcomes, particularly during the acute phase (Bradbury & Bell, 2024), including identification, ongoing monitoring, team coordination, and psychological support for patients.

2. Significance of the study

Thrombotic thrombocytopenic purpura (TTP) is a rare disease that can be difficult to identify in its early stages,

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progresses rapidly, and requires complex and diverse treatment options, posing significant challenges to both medical and nursing teams. Numerous case studies and updated clinical treatment guidelines are currently available for TTP, contributing to the gradual improvement of treatment options (Bradbury & Bell, 2024).

However, the development of a care management system for TTP patients has received relatively little attention. Research indicates that only the UK has initially established specialized nurses for TTP (Bradbury & Bell, 2024), and evidence-based experience with TTP nursing interventions is limited in most regions. Furthermore, there is currently no internationally standardized care plan. Therefore, by sharing TTP care experiences from various regions, we can enhance nurses' understanding and practice, optimize the entire TTP care process for greater efficiency, and provide a valuable reference for TTP care, ultimately benefiting patients.

3. Aim of the study

To summarize and analyze the nursing management experience of six patients with thrombotic thrombocytopenic purpura (TTP), focusing on key strategies such as emergency care, therapeutic plasma exchange (TPE) coordination, medication monitoring, and psychological support, to provide practical references for improving clinical nursing quality and patient outcomes.

4. Case presentation

4.1 Nursing Assessment

Table 1 summarizes the six case reports according to the TTP diagnosis. Between May and September 2023, 6 patients with confirmed secondary thrombotic thrombocytopenic purpura (TTP) were admitted to and treated at the hospital. All patients met the established diagnostic criteria for TTP. Among them, there were two males and four females, aged 35 to 59 years. The mean age was 50±9.75 years, and the median age was 52 years. Clinical manifestations were heterogeneous. Patients presented with the classic symptoms: Bleeding, microangiopathic hemolytic anemia (MAHA), neurological and psychiatric abnormalities, and renal impairment.

All patients exhibited varying degrees of neurological or psychiatric abnormalities. Among them, two patients presented with coma, while four exhibited psychiatric disturbances, primarily characterized by apathy and personality changes. Laboratory test results showed the following average values: Hemoglobin 81±10.17 g/L, platelet count 13.66±6.77×10⁹/L, serum creatinine 91.33±26.62 μmol/L, indirect bilirubin 29.90±16.84 μmol/L, and lactate dehydrogenase (LDH) 1110.50±189.39 U/L.

Table (1): Summary of case reports based on the case definition reporting system.

Patients' characteristics	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Personal and medical characteristics						
Sex	M	F	M	F	F	F
Age (years)	59	59	35	48	43	56
Family history	No	No	No	No	No	No
Co-morbidity	None	None	None	None	None	None
Immune system disorders history	No	No	No	No	No	No
Symptoms						
Fever >37.5	-	-	-	-	-	-
Neurological manifestations	+	+	+	+	+	+
Hematuria	-	-	+	-	-	-
Mucosal bleeding	-	-	-	-	+	-
Jaundice	-	-	+	-	-	-
Laboratory test						
Platelet Count (PLT)×10 ⁹ /L	10	27	12	10	9	14
Hemoglobin (Hb)g/L	91	91	71	69	76	88
Lactate Dehydrogenase (LDH)U/L	954	1261	1142	1300	1193	813
Serum Creatinine (Scr) umol/L	105	70	125	114	73	61
Indirect Bilirubin (IBIL)umol/L	20.9	12.3	60	30.3	35.5	20.4
	No	No	No	No	No	No
Head CT or MRI	abnormalities found	abnormalities found	abnormalities found	abnormalities found	abnormalities found	abnormalities found
Therapeutic Intervention						
Treatment Regimen	TPE+ST+CsA + IVIG	TPE+ST+RTX +MMF+ IVIG	TPE+ST+RTX +CTX+ CsA+ IVIG	TPE+ST+CsA + IVIG	TPE+ST+CsA+ IVIG	TPE+ST+RTX + IVIG
Number of Plasma Exchange Courses	4	3	6	3	5	2
Condition	Cure	Cure	Cure	Cure	Cure	Died
Outcome time	13	11	21	7	15	6

*TPE: Therapeutic plasma exchange; ST: steroid (methylprednisolone); CTX: cyclophosphamide; IVIG: intravenous immunoglobulin; RTX: rituximab; MMF: mycophenolate mofetil; CsA: cyclosporine A

All patients had reductions in hemoglobin and platelet levels, varying in degree. Elevated levels of indirect bilirubin and LDH were observed in most patients. Renal dysfunction, evidenced by elevated creatinine levels, was noted in three cases. ADAMTS13 activity and inhibitor assays were abnormal in some patients, further supporting the diagnosis.

4.2. Treatment Process

Given the severity of most patients' conditions, all received a combined treatment regimen of plasma exchange, glucocorticoids, and rituximab. All six patients underwent two to six sessions of therapeutic plasma exchange (TPE), with a cumulative plasma exchange volume of approximately 9,500 mL per patient. For glucocorticoid therapy, methylprednisolone was administered at a dose of 300 to 500 mg/day. When the patient's condition improved significantly, plasma exchange and high-dose glucocorticoids were discontinued, and maintenance therapy was initiated with immunosuppressants combined with low-dose methylprednisolone (0.6 mg/kg/day).

5. Evidence-Based Interventions

5.1. Emergency Nursing Care

Neurological dysfunction is one of the most prominent clinical manifestations of TTP patients. In this study, two patients were in a coma when they were admitted to the hospital, and the emergency department was the first to diagnosis and the key link for treatment. For patients with impaired consciousness, nurses must quickly monitor vital signs, including blood pressure, heart rate, respiratory rate, body temperature, and blood oxygen saturation (Scully et al., 2023).

These interventions comprehensively assess the patient's condition, promptly assess its severity and urgency, and determine whether immediate intervention is needed. Upon admission, the nurses promptly initiated continuous electrocardiographic monitoring and closely observed the patients' vital signs. Airway clearance and oxygen therapy were administered to prevent asphyxia, while intravenous access was established to maintain fluid and electrolyte balance. The nursing team actively assisted physicians in preparing for advanced life-support interventions, including central venous or arterial catheterization and mechanical ventilation (Dutt et al., 2021; Scully et al., 2023). Meanwhile, both patients were rapidly transferred to specialized physicians for further definitive management.

5.2. Nursing Care for Therapeutic Plasma Exchange

Therapeutic plasma exchange (TPE) is currently the first-line standard treatment for patients with TTP (Matsumoto et al., 2023). The therapeutic mechanism involves removing circulating ADAMTS13 inhibitors and inflammatory mediators while replenishing deficient ADAMTS13 enzyme activity, thereby alleviating microvascular thrombosis and improving clinical outcomes (Vacca, 2019).

However, TPE is an invasive, high-risk, and technically demanding procedure, and standardized nursing coordination is essential to ensure procedural safety and therapeutic efficacy. In this study, all patients underwent 2–6 TPE sessions, with an average cumulative plasma volume of approximately 9,500 mL per patient. To ensure safe and effective implementation, the following key nursing measures were emphasized in the clinical workflow:

Preoperative Preparation: Determination of plasma requirements and exchange duration, preparation of fresh frozen plasma and emergency medications; assessment of allergy history and verification of vascular access (Vacca, 2019; Khawar et al., 2025; Ramos-Figueiras et al., 2025).

Intraoperative Monitoring and Aseptic Management: Strict adherence to aseptic techniques and the "three checks and seven verifications" nursing protocol; thorough disinfection of tubing interfaces before connection to prevent catheter-related infections; continuous monitoring of vital signs and vigilance for transfusion-related reactions such as rash, pruritus, dyspnea, or anaphylactic shock (Main, 2017; Ramos-Figueiras et al., 2025).

Post-Procedural Catheter Management: Maintenance of central venous catheter patency to reduce repeated venipuncture; timely removal of the catheter once TPE is no longer required and the patient's condition stabilizes (Frykholm et al., 2014); proper compression to prevent bleeding and hematoma formation.

5.3. Nursing Care in Pharmacological Treatment

The combined use of high-dose glucocorticoids, immunosuppressants, and targeted therapeutic agents can effectively attenuate the inflammatory response, protect organ function, and suppress the production of autoantibodies (Matsumoto, 2017; Matsumoto et al., 2023). In this study, all patients received high-dose methylprednisolone in combination with the monoclonal antibody rituximab, which has been shown to reduce relapse rates and serve as a proactive therapeutic strategy during treatment (Özpolat & Stolla, 2023).

However, these agents are associated with the potential for serious adverse drug reactions. Therefore, pharmacological management plays a vital role in the comprehensive care of patients with TTP. This care includes:

Medication Preparation and Administration: Nurses are responsible for accurately preparing and timely administering essential therapies, such as plasma exchange and immunosuppressive agents (Vacca, 2019).

Monitoring for Drug Reactions: Nurses must closely observe patients for therapeutic responses and potential adverse effects, reporting any untoward events promptly to the clinical team (Alghamdi et al., 2024).

Patient Education: Nurses are also responsible for educating patients and their families about the prescribed medications, including their purpose, dosage, potential side effects, and expected outcomes. Effective nursing management of pharmacotherapy is essential for supporting the healthcare team in delivering high-quality care (Alanazi et al., 2022).

5.4. Psychological Nursing Care

Thrombotic thrombocytopenic purpura (TTP) presents with an abrupt onset and a dangerous progression, making it a typical acute and critical illness. When medical staff inform patients and their families of the diagnosis and explain the urgency of treatment—including the disease's high mortality rate, high treatment costs, and uncertain prognosis—patients and their families experience negative emotions such as fear, anxiety, pessimism, and even helplessness (Sundin & Rhodes, 2025).

Psychological care intervention is crucial at this stage. Through face-to-face communication with patients and their families, caregivers proactively assess their psychological state and emotional responses, understanding their understanding of the disease and their psychological needs (Sundin & Rhodes, 2025). Caregivers provide appropriate counseling and reassurance based on individual emotional responses, paying particular attention to explaining the necessity of treatment, available treatment options, expected efficacy, potential discomfort during treatment, and successful cases. These psychological care measures enhance patients' confidence in treatment, promote a positive attitude toward recovery, and improve treatment compliance and self-management skills (Sundin & Rhodes, 2025).

6. Outcome and Evaluation

During treatment, two patients' conditions worsened, requiring transfer to the intensive care unit (ICU) for life-support treatment, including endotracheal intubation. With proactive intervention and systematic nursing management, five patients experienced significant clinical improvement and were successfully discharged; one patient, unfortunately, died.

7. Discussion

Thrombotic thrombocytopenic purpura (TTP), a specific thrombotic microvascular disease, has received considerable attention in clinical treatment guidelines, but relevant nursing protocols remain lacking. This study emphasizes the importance of patient care through the nursing experience of 6 cases.

Study findings are consistent with current recommendations for TTP nursing management (Vacca, 2019; Sundin & Rhodes, 2025). Specifically, early recognition of neurological symptoms upon admission, prompt initiation of therapeutic plasma exchange (TPE) in the hospital, monitoring of immunosuppressant medications, and psychological support for patients and their families are key components of TTP care.

First and foremost, emergency nursing management of TTP patients is the first line of defense for patient safety. Raising awareness and ongoing professional training are also crucial components for emergency nursing staff (Vacca, 2019; Sundin & Rhodes, 2025). Because TTP often presents with an acute and insidious onset, most patients present with neurological symptoms. Symptoms vary in severity, ranging from mild headaches or dizziness to severe seizures, leading to urgent care in the emergency department (Griffin et al., 2013).

Secondly, prompt initiation of TPE, combined with targeted medications such as corticosteroids and rituximab, is crucial for reducing mortality (Iqbal et al., 2016; Soares Ferreira Junior et al., 2023). Nursing interventions play a crucial role in ensuring the safety and success of these therapies, particularly in preparing for and monitoring TPE and preventing central venous catheter-related complications (Elsayed et al., 2024).

Furthermore, recent nursing research (Sundin & Rhodes, 2025) emphasizes the importance of patient education and psychological support to improve treatment adherence and alleviate anxiety. The current nursing experience strongly supports the current thinking of Sundin and Rhodes (2025) that providing effective psychological counseling to patients and their families as part of nursing care can improve patient compliance and self-management.

Finally, patients with microscopic thrombi that develop within their blood vessels are most susceptible to severe damage to various organs, including the nervous system, kidneys, and blood vessels. Nurses working within a single discipline may struggle to manage the multidisciplinary care tasks that span these areas. Nurses must strengthen interdisciplinary communication and integrate care within a multidisciplinary nursing team. This intervention not only addresses specialized care for each systemic disease but also effectively coordinates multidisciplinary efforts, ensuring that patients receive the most effective care from each specialty (Bradbury & Bell, 2024; Zhu et al., 2025).

However, this study has several limitations. First, the small sample size of only six patients limits the generalizability of our findings. Secondly, as a general tertiary hospital in China, the current TTP treatment plan may not be fully comprehensive, and limited medical resources may have impacted our nursing management research findings.

In summary, building a comprehensive nursing management plan by summarizing the case nursing process and integrating it with current literature is crucial for optimizing the prognosis of TTP patients.

8. Conclusion

TTP is a rare, rapidly progressive, and critical thrombotic microangiopathy that requires early diagnosis, standardized treatment, and systematic nursing care. Based on six case experiences, this article summarizes key strategies for treating TTP, including emergency care, plasma exchange, drug monitoring, and psychological support. The current nursing approach is highly practical and can serve as a valuable reference for the clinical management and nursing care of similar cases.

9. Recommendations

Based on the nursing experience in this case series, the following measures are suggested to improve TTP care quality:

- Early Recognition: Strengthen staff training to enhance the identification of neurological symptoms and suspected TTP in emergency settings, reducing diagnostic delays.
- Standardized TPE Care: Establish unified nursing protocols for TPE, covering preparation, aseptic technique,

intraoperative monitoring, and post-procedural catheter care to improve patient safety.

- Medication Safety: Enhance surveillance and reporting of adverse drug reactions, especially for glucocorticoids and rituximab, to ensure prompt management of complications.
- Psychological Support: Incorporate structured psychological care and communication into routine practice to improve patient adherence, reduce anxiety.

10. Ethical Considerations

The Ethics Committee of Youjiang Medical University for Nationalities reviewed the case report and exempted it from formal ethical approval requirements because the report describes six anonymous clinical cases. Written informed consent was obtained from all patients, allowing the publication of this case report. All personally identifiable information has been removed to protect patient privacy.

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