

Beyond Conventional Therapy: A Clinical Journey Through Fractionated Anti-CD19 CAR-T Cell Therapy in Relapsed / Refractory DLBCL

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Abstract: Background: Diffuse Large B-Cell Lymphoma (DLBCL) is an aggressive B-cell malignancy that may relapse or become refractory despite conventional treatment. Chimeric Antigen Receptor T-cell (CAR-T) therapy represents an advanced cellular immunotherapy approach for selected patients with relapsed/refractory B-cell malignancies. Case Presentation: A 47-year-old male with relapsed/refractory DLBCL, Germinal Center B-cell (GCB) subtype, with a history of autologous hematopoietic stem cell transplantation and subsequent disease relapse, was admitted on 03/06/2026 for planned Anti-CD19 CAR-T cell therapy. The CAR-T product, Qartemi – Varnimcabtogene Autoleucel, was administered using a fractionated dosing schedule. Intervention: Ten percent of the total CAR-T cell dose was administered on Day 0, followed by 30% on Day +3 and 60% on Day +7. The patient underwent daily neurological assessment and ICE scoring, daily CBC monitoring, and alternate-day CRP, LFT, RFT, and serum ferritin monitoring. Clinical Course: The patient tolerated all three CAR-T cell infusions without immediate infusion-related reactions. Throughout the monitoring period, he remained afebrile, hemodynamically stable, alert, oriented, and neurologically intact. No clinical features of Cytokine Release Syndrome (CRS) or Immune Effector Cell-Associated Neurotoxicity Syndrome (ICANS) were observed, and ICE scores remained within normal limits. Outcome: No tocilizumab, corticosteroids, vasopressors, antibiotics, or intensive care interventions were required. The patient maintained adequate oral intake, hydration, mobility, and activities of daily living. He was discharged in stable condition on 15/06/2026 with post-CAR-T monitoring and infection-prevention instructions. Conclusion: This case highlights the importance of structured clinical surveillance, neurological assessment, laboratory monitoring, patient and family education, early recognition of CAR-T-related toxicities, and coordinated multidisciplinary nursing care during fractionated CAR-T cell therapy.

Keywords: DLBCL, Germinal Center B-cell subtype, CAR-T cell therapy, Anti-CD19, cellular therapy, CRS, ICANS, ICE score, nursing care

1. Introduction

Diffuse Large B-Cell Lymphoma (DLBCL) is an aggressive B-cell non-Hodgkin lymphoma characterized by rapid proliferation of abnormal B lymphocytes. It is a heterogeneous disease with variation in biological characteristics, clinical presentation, treatment response, and outcomes.

The **cell-of-origin classification** broadly identifies DLBCL into Germinal Center B-cell-like (GCB) and Activated B-cell-like (ABC) subtypes. The GCB subtype represents lymphoma cells demonstrating characteristics of normal germinal-center B cells.

Although many patients respond to initial treatment, some develop **relapsed or refractory disease**. Relapsed disease refers to lymphoma returning after a previous response, whereas refractory disease refers to disease that does not respond adequately to treatment. Management becomes increasingly challenging following multiple lines of therapy or relapse after autologous hematopoietic stem cell transplantation.

Chimeric Antigen Receptor T-cell (CAR-T) therapy is an advanced cellular immunotherapy in which a patient's T lymphocytes are genetically modified to express a chimeric antigen receptor. This receptor enables the modified T cells to recognize a specific antigen on malignant cells and initiate an immune-mediated cytotoxic response.

In **Anti-CD19 CAR-T therapy**, engineered T cells recognize the CD19 antigen expressed on B lymphocytes and many B-cell malignancies. Following infusion, these modified T cells can exert targeted anti-tumor activity.

CAR-T therapy requires close monitoring because immune-mediated toxicities may occur. **Cytokine Release Syndrome (CRS)** may present with fever, hypotension, hypoxia, and organ dysfunction. **Immune Effector Cell-Associated Neurotoxicity Syndrome (ICANS)** may present with neurological manifestations such as altered mental status, confusion, language disturbance, tremors, or seizures.

Nursing care is an important component of CAR-T treatment. Continuous assessment of vital signs, neurological status, ICE scoring, laboratory parameters, hydration, infection-related symptoms, and general clinical condition supports early recognition and escalation of potential complications.

The present case describes the clinical journey of a 47-year-old male with relapsed/refractory DLBCL, GCB subtype, following previous autologous hematopoietic stem cell transplantation and subsequent disease relapse. The patient received fractionated Anti-CD19 CAR-T cell therapy and underwent close clinical monitoring throughout hospitalization.

2. Case Presentation

A 47-year-old male diagnosed with **relapsed/refractory Diffuse Large B-Cell Lymphoma, Germinal Center B-cell subtype**, with a history of autologous hematopoietic stem cell transplantation followed by subsequent disease relapse, was admitted on **03/06/2026** for planned Anti-CD19 CAR-T cell therapy.

Following admission, baseline clinical evaluation and laboratory investigations were performed. The patient was

assessed and considered clinically fit to proceed with CAR-T therapy.

The planned CAR-T product was **Qartemi – Varnimcabtagene Autoleucel**. The product was administered in a fractionated manner according to the prescribed treatment protocol.

Table 1: Patient Profile

Parameter	Details
Age/Sex	47-year-old male
Diagnosis	Relapsed/Refractory DLBCL
Subtype	Germinal Center B-cell (GCB)
Previous treatment	Autologous hematopoietic stem cell transplantation
Current therapy	Anti-CD19 CAR-T cell therapy
CAR-T product	Qartemi – Varnimcabtagene Autoleucel
Admission	03-06-2026
Monitoring period	03/06/2026–15/06/2026
Discharge	15-06-2026

3. CAR-T Cell Therapy

The patient received the CAR-T cell product in three fractionated doses.

Day 0 – 03/06/2026

The first fraction consisted of **10% of the total CAR-T cell dose, equivalent to 36.25×10^6 cells**.

The patient tolerated the infusion well. No immediate infusion-related reaction or adverse event was observed, and vital signs remained stable during and following the infusion.

Day +3 – 06/06/2026

The second fraction consisted of **30%, equivalent to 108.75×10^6 cells**.

The infusion was completed uneventfully. The patient remained hemodynamically stable without evidence of infusion-related toxicity or hypersensitivity reaction.

Day +7 – 10/06/2026

The remaining **60%, equivalent to 217.5×10^6 cells**, was administered.

The patient tolerated the final fraction without complications. Continuous clinical observation was maintained following administration.

Table 2: Fractionated CAR-T Dosing Schedule

Treatment Day	Date	Fraction	Cell Dose	Response
Day 0	03-06-2026	10%	36.25×10^6	Tolerated well
Day +3	06-06-2026	30%	108.75×10^6	Uneventful
Day +7	10-06-2026	60%	217.5×10^6	Tolerated well
Total		100%	362.5×10^6	Completed

4. Clinical Course and Monitoring

The patient was monitored from **03/06/2026 through 15/06/2026** for treatment-related complications.

Daily neurological examinations and **ICE scoring** were performed. The patient remained alert, oriented, and neurologically intact throughout the monitoring period, with ICE scores remaining within normal limits.

CBC was monitored daily, while **CRP, LFT, RFT, and serum ferritin** were monitored on alternate days. Laboratory parameters remained stable without significant abnormalities suggestive of inflammatory toxicity, infection, hepatic dysfunction, renal impairment, or other treatment-related complications.

CRS Monitoring

No clinical features suggestive of Cytokine Release Syndrome were observed. The patient did not develop:

- Fever
- Hypotension
- Hypoxia
- Organ dysfunction

ICANS Monitoring

No neurological features suggestive of ICANS were observed. There was no:

- Confusion
- Altered sensorium
- Aphasia
- Tremor
- Seizure
- Focal neurological deficit

The patient remained **afebrile and hemodynamically stable**. He maintained adequate oral intake and hydration, remained ambulatory, and continued activities of daily living.

No antipyretics, antibiotics, corticosteroids, tocilizumab, vasopressors, or intensive care interventions were required during hospitalization. No infectious complications, bleeding episodes, transfusion requirements, or other treatment-related adverse events were documented.

On **15/06/2026**, corresponding to Day +12 from the initial CAR-T infusion, the patient was clinically stable and discharged with post-CAR-T monitoring and infection-prevention instructions.

Table 3: Clinical Monitoring and Outcome

Monitoring Parameter	Outcome
Temperature	Afebrile
Hemodynamic status	Stable
Neurological status	Alert and oriented
ICE score	Within normal limits
CRS	No clinical evidence
ICANS	No clinical evidence
CBC	Daily monitoring; stable
CRP/LFT/RFT/Ferritin	Alternate-day monitoring; stable
Oral intake	Adequate
Hydration	Adequate
Mobility	Ambulatory
Infection	No documented complication
ICU care	Not required
Tocilizumab	Not required
Corticosteroids	Not required
Vasopressors	Not required
Discharge	15-06-2026
Outcome	Clinically stable

5. Nursing Perspective and Management

Nursing management is an essential component of CAR-T cell therapy. Nurses play a key role in continuous patient assessment, infusion monitoring, neurological surveillance, laboratory monitoring, early recognition of CRS and ICANS, supportive care, documentation, education, and multidisciplinary communication.

In this case, nursing care focused on maintaining patient safety and identifying any early clinical changes following each fractionated CAR-T infusion.

Table 4: Nursing Management During CAR-T Therapy

Nursing Domain	Nursing Management
Initial assessment	Baseline clinical and neurological assessment; verification of treatment readiness
CAR-T infusion care	Verification of prescribed product, dose and schedule; close observation during infusion
Vital-sign monitoring	Monitoring for fever, hypotension, hypoxia and hemodynamic changes
CRS surveillance	Early identification of fever, hypotension, hypoxia and organ dysfunction
Neurological monitoring	Daily neurological assessment and observation for neurological changes
ICE assessment	Daily ICE scoring and documentation
ICANS surveillance	Monitoring for confusion, altered sensorium, aphasia, tremors, seizures and focal deficits
Laboratory monitoring	Daily CBC; alternate-day CRP, LFT, RFT and ferritin
Infection prevention	Infection surveillance and reinforcement of infection-prevention practices
Hydration and nutrition	Monitoring oral intake, hydration and nutritional status
Patient safety	Safe mobilization, fall prevention and monitoring for deterioration
Documentation	Recording vital signs, neurological findings, ICE scores, laboratory results and interventions
Patient education	Treatment process, adverse effects, warning symptoms, infection precautions and follow-up
Multidisciplinary coordination	Timely communication and escalation of clinical changes
Discharge planning	Reinforcement of post-CAR-T precautions, follow-up and warning symptoms

The nursing team maintained close observation throughout the treatment and monitoring period. Any change in temperature, hemodynamic status, respiratory status, neurological condition, or laboratory parameters was assessed as part of the CAR-T surveillance pathway.

6. Patient and Family Education (PFE)

Patient and family education was provided throughout the CAR-T treatment journey. The patient and family were educated regarding:

- 1) **CAR-T therapy:** Purpose, treatment process, fractionated administration, and importance of monitoring.
- 2) **CRS warning signs:** Fever, hypotension, breathing difficulty, hypoxia, dizziness, and other acute changes.

- 3) **ICANS warning signs:** Confusion, altered behavior, difficulty speaking, tremors, seizures, or other neurological changes.
- 4) **Infection prevention:** Hand hygiene, personal hygiene, avoidance of infection exposure, and prompt reporting of symptoms.
- 5) **Hydration and nutrition:** Importance of adequate oral fluid and nutritional intake.
- 6) **Medication adherence:** Compliance with prescribed medications and treatment instructions.
- 7) **Follow-up:** Importance of scheduled clinical and laboratory follow-up after CAR-T therapy.
- 8) **Discharge precautions:** Need to immediately seek medical attention for fever, breathing difficulty, altered consciousness, neurological symptoms, or other concerning changes.

Before discharge, education was reinforced regarding post-CAR-T monitoring, infection precautions, warning symptoms, and follow-up requirements.

7. Discussion

CAR-T cell therapy represents an important cellular immunotherapy approach for selected patients with relapsed/refractory B-cell malignancies. Anti-CD19 CAR-T therapy uses genetically modified T lymphocytes capable of recognizing CD19-expressing malignant B cells.

The present case describes a 47-year-old male with relapsed/refractory DLBCL of the GCB subtype who had previously undergone autologous hematopoietic stem cell transplantation and subsequently developed disease relapse.

The patient received a **fractionated Anti-CD19 CAR-T cell regimen of 10%, 30%, and 60% on Days 0, +3, and +7**, respectively, with a total administered dose of 362.5×10^6 cells.

A major component of CAR-T therapy is monitoring for CRS and ICANS. In this case, structured clinical surveillance included daily neurological examination and ICE scoring, daily CBC monitoring, and alternate-day CRP, LFT, RFT, and serum ferritin monitoring.

The patient remained clinically stable throughout the observation period. No clinical evidence of CRS or ICANS was observed. ICE scores remained within normal limits, and the patient did not develop fever, hypotension, hypoxia, neurological deterioration, or organ dysfunction related to CAR-T therapy.

From a nursing perspective, continuous observation and systematic assessment were central to safe patient management. Nursing responsibilities included infusion monitoring, vital-sign assessment, neurological assessment, ICE scoring, laboratory surveillance, infection prevention, hydration and nutritional support, documentation, patient education, and timely communication with the multidisciplinary team. Patient and family education was another important component of care. The patient was supported with information regarding potential warning symptoms, infection precautions, hydration, medication

adherence, follow-up, and when to seek immediate medical attention. The uncomplicated clinical course in this patient emphasizes the importance of a **structured CAR-T monitoring pathway and coordinated multidisciplinary nursing care.**

8. Conclusion

This case highlights the clinical journey of a 47-year-old male with **relapsed/refractory GCB-DLBCL** who underwent fractionated Anti-CD19 CAR-T cell therapy following previous autologous hematopoietic stem cell transplantation.

The patient successfully completed the planned **10%, 30%, and 60% CAR-T cell doses**, totaling 362.5×10^6 cells, without immediate infusion-related complications.

Throughout hospitalization, systematic monitoring included vital signs, daily neurological assessment, ICE scoring, daily CBC, and alternate-day CRP, LFT, RFT, and serum ferritin assessment. No clinical evidence of CRS or ICANS was observed.

The patient remained clinically stable, maintained adequate oral intake and mobility, and was discharged on **15/06/2026** with post-CAR-T monitoring and infection-prevention instructions.

This case emphasizes the important role of **specialized nursing care, continuous vigilance, early recognition of complications, accurate documentation, patient and family education, and multidisciplinary coordination** in the safe management of patients undergoing CAR-T cell therapy.

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