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CASE REPORT

Nursing care in a patient with ischemic stroke undergoing endovascular thrombectomy: A case report

Sandra Estrada (RN)[a], **Pedro Lopes (RN, MSc)**[b], **Alice Ruivo (RN, MSc, PhD)**[c,d], **Maria José Catalão (RN, MSc)**[e,f,*]

[a] *Local Health Unit of Central Alentejo – ULSAC, EPE, Évora 7000-811, Portugal*
[b] *Santa Maria Local Health Unit – ULS de Santa Maria, Lisboa 1649-035, Portugal*
[c] *Department of Nursing, School of Health, Setúbal Polytechnic University, Campus IPS, Estefanilha, Setúbal 2910-765, Portugal*
[d] *CIEQV – Life Quality Research Center, Santarém Polytechnic University, Complexo Andaluz, Apartado 279, Santarém 2001-964, Portugal*
[e] *Department of Health Sciences and Technologies, School of Health, Portalegre Polytechnic University, Campus Politécnico 10, Portalegre 7300-555, Portugal*
[f] *CARE—Research Center on Health and Social Sciences, Portalegre Polytechnic University, Portalegre 7300-555, Portugal*

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Abstract
Assessment: Ischemic stroke is a major neurological emergency. Endovascular thrombectomy has emerged as an effective treatment for patients with large-vessel occlusion. Nursing care plays a decisive role in ensuring patient safety and optimizing outcomes. This case is about a 77-year-old male with a history of vascular risk factors presented with aphasia and right hemiparesis. Stroke protocol was activated. Imaging revealed an M2 segment occlusion of the left MCA. Endovascular thrombectomy was performed under general anesthesia. The nursing assessment was guided by Patricia Benner's Theory of Clinical Wisdom and operationalized through the ABCDE (Airway, Breathing, Circulation, Disability, Exposure) method and validated scales such as NIHSS (NIH Stroke Scale), GCS (Glasgow Coma Scale), ASPECTS (Alberta Stroke Program Early CT Score), and MRC (Medical Research Council) strength grading. Alterations were identified in airway management, mobility, communication, and hemodynamic stability.
Diagnoses: Using the NANDA-I (North American Nursing Diagnosis Association International) taxonomy, nursing diagnoses were formulated and linked to Nursing Outcomes Classification (NOC) indicators and Nursing Interventions Classification (NIC) activities. Diagnoses included ineffective cerebral perfusion, risk of increased intracranial pressure, arrhythmia, risk of aspiration, acute pain, and anxiety, among others.
Planning: Nursing interventions were structured across three phases: pre-procedure (e.g., neurological stabilization, technical preparation), intra-procedure (e.g., hemodynamic monitoring, airway support), and post-procedure (e.g., neurovascular assessment, structured communication using ISBAR).

* Corresponding author.
E-mail address: maria.catalao@ipportalegre.pt (M.J. Catalão).

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Discussion: Person-centered, evidence-based nursing care supported procedural safety and early recovery. The systematic application of clinical tools and interprofessional collaboration were essential to preventing complications. The patient showed a favorable outcome with no neurological deficits at 48 h. Structured and theory-based nursing care across procedural phases is essential for ensuring safety, minimizing complications, and supporting recovery in patients undergoing thrombectomy for acute ischemic stroke.

PALABRAS CLAVE
Ictus;
Isquémico;
Trombectomía;
Procedimientos endovasculares;
Atención de enfermería;
Enfermería de cuidados críticos

Cuidados de enfermería en un paciente con ictus isquémico sometido a trombectomía endovascular: un caso clínico

Resumen
Valoración: El ictus isquémico es una urgencia neurológica de gran relevancia. La trombectomía endovascular se ha consolidado como un tratamiento eficaz en pacientes con oclusión de gran vaso. Los cuidados de enfermería desempeñan un papel decisivo para garantizar la seguridad del paciente y optimizar los resultados. Este caso trata de un varón de 77 años con antecedentes de factores de riesgo vascular se presentó con afasia y hemiparesia derecha. Se activó el protocolo de accidente cerebrovascular. La imagenología reveló una oclusión del segmento M2 de la arteria cerebral media izquierda. Se realizó trombectomía endovascular bajo anestesia general. La valoración de enfermería se orientó según la Teoría de la Sabiduría Clínica de Patricia Benner y se operacionalizó mediante el método ABCDE y escalas validadas como el NIHSS, la Escala de Coma de Glasgow (GCS), el ASPECTS y la escala MRC. Se identificaron alteraciones en el manejo de la vía aérea, la movilidad, la comunicación y la estabilidad hemodinámica.
Diagnósticos: Utilizando la taxonomía NANDA-I, se formularon diagnósticos de enfermería que fueron vinculados a indicadores de la Clasificación de Resultados de Enfermería (NOC) y actividades de la Clasificación de Intervenciones de Enfermería (NIC). Los diagnósticos incluyeron perfusión cerebral ineficaz, riesgo de aumento de la presión intracraneal, arritmia, riesgo de aspiración, dolor agudo y ansiedad, entre otros.
Planificación: Las intervenciones de enfermería se estructuraron en tres fases: preprocedimiento (por ejemplo, estabilización neurológica, preparación técnica), intraprocedimiento (por ejemplo, monitorización hemodinámica, soporte de la vía aérea) y posprocedimiento (por ejemplo, valoración neurovascular, comunicación estructurada utilizando ISBAR).
Discusión: La atención de enfermería, centrada en la persona y basada en la evidencia, respaldó la seguridad del procedimiento y una recuperación temprana. La aplicación sistemática de herramientas clínicas y la colaboración interprofesional fueron esenciales para prevenir complicaciones. El paciente presentó una evolución favorable sin déficits neurológicos a las 48 horas. La atención de enfermería estructurada y basada en teorías a lo largo de todas las fases del procedimiento es esencial para garantizar la seguridad, minimizar las complicaciones y apoyar la recuperación de los pacientes sometidos a trombectomía por ictus isquémico agudo.

Introduction

Ischemic stroke is a neurological emergency associated with high mortality and morbidity, remaining one of the leading causes of disability worldwide. Mechanical thrombectomy has been shown to be an effective intervention for improving cerebral reperfusion and functional outcomes in selected patients with large vessel occlusions.[1] In this context, nursing plays a crucial role at all stages of the procedure, from patient preparation and intraoperative monitoring to post-procedural surveillance.

Ischemic stroke results from an acute interruption of cerebral blood flow, often due to thromboembolism, and demands prompt diagnosis and treatment. Standardized assessment tools such as the NIH Stroke Scale (NIHSS), the Glasgow Coma Scale (GCS), and the Alberta Stroke Program Early CT Score (ASPECTS) are routinely used to evaluate neurological status, predict prognosis, and guide treatment decisions.

In selected patients with large-vessel occlusion, mechanical thrombectomy has become a first-line intervention. Patient selection typically considers clinical severity (e.g.,

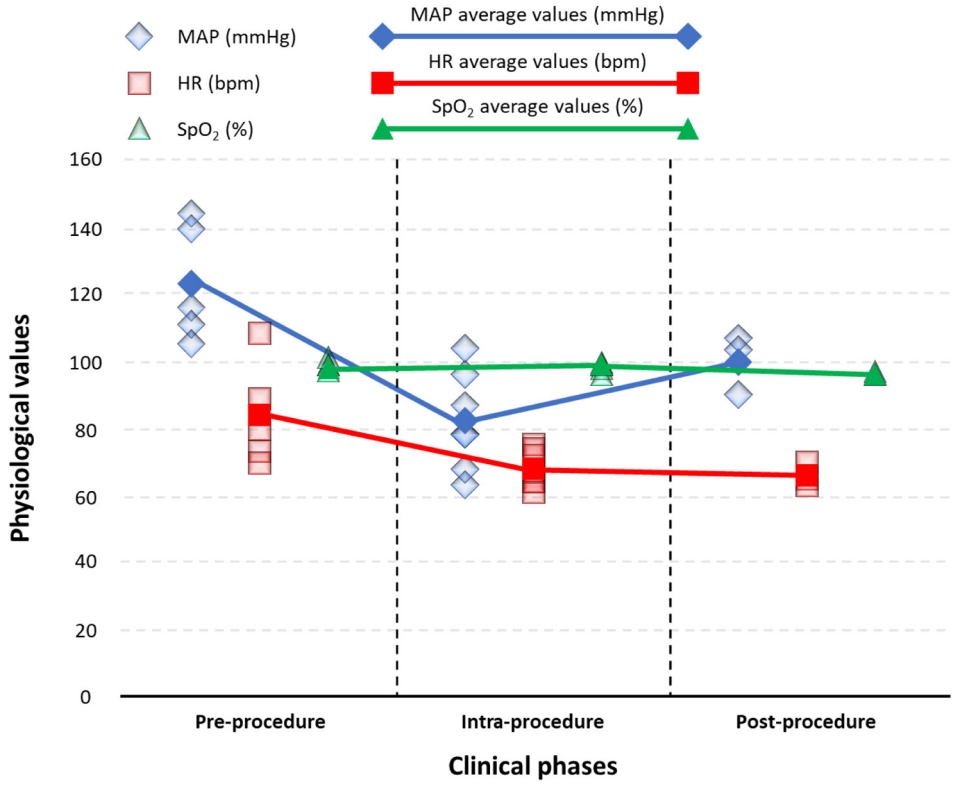

Figure 1 Evolution of mean arterial pressure (MAP), heart rate (HR), and peripheral oxygen saturation (SpO_2) across the three clinical phases of care. Serial measurements were obtained during the pre-procedural phase (approximately 2 h from admission to induction of anesthesia), the intra-procedural phase (approximately 90 min, from anesthetic induction to reperfusion), and the post-procedural phase (0–48 h following thrombectomy), illustrating the patient's hemodynamic and respiratory evolution over time.

NIHSS $\geq$ 6), imaging findings (ASPECTS $\geq$ 6), and time since symptom onset. While the procedure improves functional outcomes, it carries procedural risks, including hemorrhage, vessel dissection, and reperfusion injury.

Nursing care in this context is guided by a structured process and conceptual framework. In this case, the Nursing Care Process was applied systematically, encompassing assessment, diagnosis, planning, implementation, and evaluation, and was anchored in Patricia Benner's Theory of Clinical Wisdom, which supports situational judgment and reflective practice in critical care.

The objective of this case report is to describe the specialized nursing care provided to a critically ill patient undergoing endovascular thrombectomy.

Description of the case

The procedure was performed in an angiography unit integrated within the intensive care area, staffed by nurses with specific training in neurointervention. The case occurred in a public hospital in southern Portugal, with care protocols aligned with the Portuguese Directorate-General of Health (*Direção-Geral da Saúde*) and the Angels Initiative.

The patient was a 77-year-old male with a history of hypertension, type 2 diabetes mellitus, dyslipidemia, previous stroke, and ischemic heart disease. He was found to be aphasic with right hemiparesis after a nocturnal fall. The NIHSS was used to assess the initial neurological deficit, the ASPECTS was used to estimate early ischemic damage, and the bispectral index (BIS) index to monitor depth of anesthesia. These clinical scales were applied by the nursing team in coordination with anesthesiology and neurology. The stroke code was activated: cranial computed tomography (CT) showed an ASPECTS score of 10, and CT angiography (CTA) revealed an occlusion of the insular segment (M2) of the left middle cerebral artery (MCA). Neurological status was assessed using the NIHSS, with a score of 14 indicating moderate to severe impairment. An ASPECTS of 10 suggested minimal early ischemic damage. Following thrombectomy, a Thrombolysis in Cerebral Infarction (TICI) grade 2b reperfusion was achieved, indicating successful recanalization of over 50% of the affected vascular territory. All diagnostic and therapeutic interventions followed institutional protocols consistent with the guidelines of the Portuguese Directorate-General of Health[2] and the quality standards promoted by the Angels Initiative.[3]

The patient was not eligible for intravenous thrombolysis because the therapeutic window had been exceeded. Thrombectomy was performed under general anesthesia. The evolution of the patient's hemodynamic and respiratory parameters throughout the three clinical phases is summarized in Fig. 1, highlighting the intra-procedural instability

Table 1 Clinical evolution, treatment, and assessment scales across procedural phases.

Phase	Clinical status and key parameters	Treatment	Assessment scales (purpose, timing, and scores)
Pre-procedure	Acute neurological deficit; initial respiratory stability; hemodynamic risk	Oxygen therapy, blood pressure control, preparation for general anesthesia; venous access; arterial line	NIHSS (neurological severity) on admission: 14, GCS (level of consciousness) on admission: 13, ASPECTS (ischemic extent) – CT scan: 10
Intra-procedure	Mechanical ventilation; episodes of hemodynamic instability; supraventricular arrhythmia	Propofol and remifentanil (TCI), rocuronium, orotracheal intubation norepinephrine; blood pressure and temperature control	BIS (depth of anesthesia) maintained between 40–60, continuous ECG monitoring, TICI (revascularization level) post-recanalization: 2b
Post-procedure	Progressive hemodynamic stabilization; neurological recovery; risk of complications; transfer of care	Gradual withdrawal of vasopressors, analgesia, neurovascular surveillance	GCS (neurological recovery) 1 h post-procedure: 15, NIHSS (functional evolution) 24 h: 2, MRC (muscle strength) 24 h: 4/5 right side, Braden Scale (pressure injury risk) ICU admission: 18

and the need for continuous monitoring and therapeutic adjustments, which are typical for critically ill patients. These physiological parameters were recorded at regular intervals in accordance with institutional monitoring protocols, allowing for the visualization of the patient's hemodynamic evolution across procedural phases (Fig. 1). The postoperative course was favorable, with no significant neurological deficits after 48 h.

Patient assessment

The assessment was structured using a systematic clinical approach based on the patient's needs, addressing neurological, hemodynamic, respiratory, emotional, and safety parameters. Several alterations were identified, including respiration (airway management during anesthesia), elimination (use of invasive devices), mobility (right hemiparesis), communication (expressive aphasia), and safety (risk of bleeding, infection, hypertension, and increased intracranial pressure). In addition, the patient was at risk of hypothermia due to temperature instability and reported increased pain associated with the invasive procedure. The assessment approach was also informed by Patricia Benner's theoretical framework, which advocates situational awareness and adaptive decision-making in complex care environments. This conceptual orientation was operationalized through the use of structured tools and validated scales, including the ABCDE (Airway, Breathing, Circulation, Disability, Exposure) assessment method, the NIHSS, the GCS, the Medical Research Council (MRC) strength grading, and the ASPECTS to ensure a comprehensive and evidence-based evaluation. The assessment scales were applied at predefined time points according to the clinical phase and patient stability, allowing longitudinal evaluation of neurological and hemodynamic evolution. The timing, frequency of application, and scores obtained are summarized in Table 1.

Nursing diagnoses

The nursing diagnoses (Table 2) were formulated using the NANDA-I (North American Nursing Diagnosis Association International) taxonomy to ensure consistency with the Nursing Outcomes Classification (NOC) and the Nursing Interventions Classification (NIC), as recommended by Moorhead et al.[4] These diagnosis were developed based on a comprehensive clinical assessment of the patient, considering hemodynamic evolution, the therapies administered, and the results of the scales applied during the different phases of the procedure (Fig. 1 and Table 1). Interdependent problems such as arrhythmia, risk for bleeding, and infection were identified as collaborative issues managed jointly with the medical and interventional teams. These conditions were included in the nursing care plan due to their clinical relevance and the role of nursing in continuous monitoring and intervention support.

This taxonomy-based framework promotes standardization, clinical applicability, and evidence-based nursing care. The diagnoses identified included: ineffective cerebral perfusion; risk of increased intracranial pressure; supraventricular tachycardia (arrhythmia); risk of aspiration; risk of bleeding; risk of infection; acute pain; anxiety; risk of perioperative hypothermia; and risk of pressure-related corneal ulcer.

Care planning

Nursing interventions were organized into three phases:

Pre-procedure: Preparation of the technical environment (monitor, ventilator, angiography materials), verification of large-bore venous access, neurological assessment (NIHSS, Glasgow Coma Scale), eye protection, marking of pedal pulses, review of chronic medication and antiplatelet therapy with clopidogrel, and assessment of anesthetic risk.

Table 2 Nursing diagnoses, outcomes, and interventions across care phases.

Nursing diagnosis	Expected outcome (NOC)	Nursing interventions (NIC with activities)
Pre-procedure phase		
Ineffective cerebral perfusion related to M2 segment occlusion as evidenced by altered consciousness and right-sided hemiparesis	Stabilized neurological status by 24 h. Indicators: Level of consciousness (GCS $\geq$ 13), NIHSS $\leq$ 6, right-side motor strength $\geq$ 3/5.	Neurologic monitoring (2620): Monitor GCS and NIHSS every hour, report changes. Blood Pressure Control (6680): Maintain SBP < 180 mmHg; adjust vasoactive drugs, record every 30 min.
Risk for increased intracranial pressure related to post-ischemia cerebraledema as evidenced by pupillary changes and hypertension	Controlled intracranial pressure. Indicators: GCS, pupil reactivity, BP < 140/90 mmHg.	Environmental control (6486): Head of bed 30°; minimize stimuli. Vital signs monitoring (6680): Monitor ICP signs and vitals every 30–60 min.
Intra-procedure phase		
Arrhythmia (supraventricular tachycardia) related to autonomic instability as evidenced by HR > 150 bpm	Cardiac rhythm stabilized within 4 h. Indicators: HR < 100 bpm, absence of SVT episodes.	Continuous ECG monitoring (4090): Real-time rhythm tracking. Antiarrhythmic administration (2300): Administer medications as prescribed, monitor side effects.
Risk for aspiration related to general anesthesia and decreased protective reflexes	No signs of aspiration. Indicators: Clear lung auscultation, $SpO_2 \geq 94$, no cough during intake.	Airway management (3140): Ensure artificial airway patency; suction as needed. Positioning (0840): Maintain semi-Fowler's post-procedure.
Risk for perioperative hypothermia related to operating room environment and anesthesia	Normothermia maintained. Indicators: Core temperature > 36 °C, absence of shivering.	Temperature management (3900): Use warming blankets and forced air warmers. Temperature monitoring (3740): Monitor hourly until stable.
Post-procedure phase		
Risk for bleeding related to invasive vascular procedure	Absence of active bleeding. Indicators: Hemostasis at puncture site, hemoglobin stable $\pm$ 10%.	Bleeding precautions (4010): Apply pressure post-device removal; review anticoagulant use. Puncture site monitoring (4010): Inspect site every hour for hematoma.
Risk for infection related to vascular catherization and anesthesia	Free from infection. Indicators: Afebrile, WBC** with normal range, no erythema or induration at access sites.	Infection control precautions (6540): Perform hand hygiene and use aseptic technique. Surveillance (6550): Monitor temperature, CBC, access sites every 4–6 h.
Acute pain related to arterial puncture and endovascular procedure as evidenced by verbal report and face grimacing	Pain reduced to VAS* $\leq$ 3 within 2 h. Indicators: VAS score $\leq$ 3, stable vital signs, relaxed facial expression.	Analgesic administration (2210): Administer analgesics per protocol; monitor for effects. Pain assessment (1400): Evaluate and document every 30 min post-op.
Risk for pressure-induced corneal ulcer related to loss of protective reflexes under anesthesia	Eye integrity maintained. Indicators: No corneal abrasions on exam, patient blinking or eye closure.	Eye protection (1650): Apply lubricant and cover eyes during anesthesia. Eye assessment (1650): Inspect corneas after extubation.
Risk for ineffective peripheral perfusion related to arterial access and potential hematoma	Adequate distal perfusion. Indicators: Warm limb, palpable dorsalis/pedis pulses, capillary refill $\leq$ 3 s.	Neurovascular assessment (4070): Assess pulses, color, temperature hourly. Affected limb Surveillance (4070): Elevate limb, inspect access site every hour.
Anxiety related to unfamiliar critical care environment and impaired communication as evidenced by restlessness, facial tension, and elevated heart rate	Reduced anxiety within 24–48 h. Indicators: Calm facial expression, heart rate and blood pressure normalized, decreased distress cues	Anxiety reduction (5820): Provide simple explanations; create calm environment. Emotional support (5270): Offer reassurance and presence. Family involvement promotion (7170): Facilitate supportive family contact.

Intra-procedure: Continuous hemodynamic monitoring (invasive blood pressure, electrocardiogram (ECG), peripheral oxygen saturation (SpO_2), temperature, glycemic control, anesthetic induction with lidocaine followed by infusion of remifentanil and propofol (target controlled infusion, TCI), neuromuscular blockade with rocuronium, placement of an arterial line for invasive monitoring, noradrenaline infusion to maintain target blood pressure, monitoring of the BIS and indirect neurological status, detection and management of episodes of supraventricular tachycardia, and handling of materials required by the neuroradiologist.

Post-procedure: Assessment of the femoral puncture site, monitoring for signs of peripheral neurovascular compromise, prevention of hemorrhagic complications, reversal of neuromuscular blockade with sugammadex, monitoring of target blood pressure (120–160 mmHg in cases of TICI grades 2b and 3 recanalization), assessment of consciousness and ocular function, structured communication using the ISBAR tool (Introduction, Situation, Background, Assessment, Recommendation) to the post-anesthesia recovery unit, and continuation of the individualized care plan. This tool was employed as a structured interprofessional communication strategy aligned with institutional patient safety protocols, ensuring the accurate and timely transfer of critical information between care teams.

Discussion

Intensive care nursing plays a decisive role in ensuring the safety and effectiveness of endovascular thrombectomy. According to Powers et al., [1] early intervention in stroke improves functional outcomes, with time being a critical factor. In this case, nursing surveillance enabled the early detection of signs of hemodynamic instability (supraventricular tachycardia, hypertension), enabling immediate intervention in collaboration with anesthesiology and preventing major complications. The literature emphasizes that blood pressure should be maintained within controlled levels before and after reperfusion to optimize cerebral perfusion without increasing the risk of intracranial hemorrhage.[5,6] Turc et al.[7] and Sandset et al.[8] emphasize the importance of individualized blood pressure management according to the degree of recanalization achieved (TICI), and the contribution of nursing staff in adjusting parameters in real time. The use of scales such as NIHSS, ASPECTS, and BIS enhances the quality of neurological assessment and safety during sedation, and their application by nurses is crucial.[2,3] Person-centered interventions, the use of evidence-based protocols, and structured communication (ISBAR) are consistent with best practices recommended by European guidelines and the Angels Initiative.[9]

In addition, the effective management of the surgical environment, equipment, and patient requires advanced technical knowledge from nursing professionals. This case also underscores the need for specific training in neurointervention and perioperative stroke care for nurses working in intensive care units and angiography suites. Anticipatory care planning, combined with clinical judgment and experience, was decisive for the patient's favorable neurological outcome, with no significant deficits at 48 hours.

A comprehensive, process-wide approach to care planning was fundamental to this case. Each phase (pre-procedure, intra-procedure, and post-procedure) presented specific risks that required proactive nursing responses. Pre-procedurally, care focused on neurological stabilization and preparation for anesthesia. Intra-procedurally, efforts prioritized maintaining airway patency, hemodynamic stability, and thermal balance. Post-procedural care involved close monitoring for complications such as bleeding, infection, and inadequate perfusion, along with the management of pain and anxiety. This phased strategy ensured continuity, minimized risk, and exemplified the critical role of intensive care nursing throughout the therapeutic process.

Despite the positive outcome, challenges persist in real-time monitoring and specialized training, which may limit the broader applicability of these nursing interventions.

Conclusion

Endovascular thrombectomy is an effective treatment for acute ischemic stroke. In this case, specialized nursing care structured across pre-, intra-, and post-procedural phases was key to ensuring safety and promoting recovery. Guided by Benner's Theory of Clinical Wisdom, the nursing team applied clinical judgment and individualized, patient-centered interventions. Multidisciplinary coordination further supported a favorable outcome, reinforcing the critical role of nursing in neurovascular care.

CRediT authorship contribution statement

Sandra Estrada: Writing – review & editing, Writing – original draft, Visualization, Supervision, Resources, Methodology, Formal analysis, Data curation, Conceptualization. Pedro Lopes: Visualization, Resources, Data curation. Alice Ruivo: Writing – review & editing, Writing – original draft, Visualization, Supervision, Resources, Data curation. Maria José Catalão: Writing – review & editing, Writing – original draft, Visualization, Supervision, Resources, Methodology, Formal analysis, Data curation, Conceptualization.

Ethical considerations

This case report was prepared in accordance with the publication ethics of this journal and in compliance with the principles of the Declaration of Helsinki. The data for this clinical case were processed in accordance with the applicable regulations, including the General Data Protection Regulation.

Institutional review board statement

Not applicable.

Informed consent

Written informed consent was obtained from the patient (or their legal representative) for publication of this case

report, with assurances of anonymity and confidentiality. A signed copy of the consent is kept on file and is available for editorial review upon request.

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Conflict of interest

The authors declare no conflicts of interest.

Data availability statement

The data presented in this study are available in this article.

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