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Case series of idiopathic obliterative bronchiolitis in adults: Insights into a rare condition

Ștefania-Florina Oprea[1,2,*], Ștefan Dumitrache-Rujinski[1,2], Ionela Belaconi[1,2], Diana Leonte[1,2], Alina-Valentina Dobrotă[3], Claudia-Lucia Toma[1,2]

[1]*Marius Nasta Institute of Pulmonology, Bucharest, Romania*
[2]*Carol Davila University of Medicine and Pharmacy, Bucharest, Romania*
[3]*Clinical Emergency Hospital of Bucharest, Bucharest, Romania*

Abstract

English:

Obliterative bronchiolitis is a rare and complex obstructive pulmonary disorder involving inflammatory and fibroproliferative changes of the small airways. We report three adult cases of idiopathic bronchiolitis obliterans diagnosed at the "Marius Nasta" Institute of Pulmonology, Bucharest, between 2016 and 2025. The patients, aged 30–68 years, presented with exertional dyspnoea and fatigue, and all exhibited severe obstructive ventilatory impairment with significant oxygen desaturation during the 6-min walk test. Diagnosis was confirmed by high-resolution inspiratory–expiratory computed tomography in two cases and by lung biopsy in one case. Treatment consisted of systemic and inhaled corticosteroids, with one patient also receiving long-term intermittent azithromycin therapy. Outcomes varied: two patients achieved relative clinical stability, while one experienced progressive respiratory decline leading to death. These cases illustrate the diagnostic and therapeutic challenges of idiopathic bronchiolitis obliterans and highlight its unpredictable course. Early recognition and individualised management are essential, but further research is needed to establish effective treatment strategies and improve prognosis.

Keywords

idiopathic obliterative bronchiolitis • rare disease • obliterative bronchiolitis • Lichen planus

Serie de cazuri de bronșiolită obliterantă idiopatică la adulți: perspective asupra unei afecțiuni rare

Rezumat

Romanian:

Bronşiolita obliterantă este o afecțiune pulmonară obstructivă rară şi complexă, caracterizată de procese inflamatorii şi fibroproliferative care afectează căile aeriene mici. Vor fi prezentate trei cazuri de bronşiolită obliterantă idiopatică diagnosticate în Institutul de Pneumoftiziologie „Marius Nasta" din București, în perioada 2016–2025. Pacienții, cu vârste între 30 și 68 de ani, s-au prezentat cu dispnee de efort și fatigabilitate, iar explorările funcționale respiratorii au evidențiat disfuncție respiratorie obstructivă severa, însoțită de desaturare semnificativă la testul de mers de șase minute. Diagnosticul a fost confirmat prin tomografie computerizată inspir-expir de înaltă rezoluție în două cazuri, respectiv prin biopsie pulmonară în cel de-al treilea caz. Tratamentul a inclus corticosteroizi sistemici și inhalatori, iar la un pacient s-a administrat Azitromicină intermitent pe termen lung, cu efect imunomodulator. Evoluția a fost variabilă: doi pacienți au prezentat stabilizare clinică relativă, în timp ce al treilea a avut o agravare progresivă a funcției pulmonare, soldată cu exitus. Aceste cazuri ilustrează dificultățile diagnostice și terapeutice ale bronşiolitei obliterante idiopatice şi evidențiază caracterul imprevizibil al evoluției sale. Recunoașterea precoce și abordarea individualizată sunt esențiale, însă sunt necesare studii suplimentare pentru stabilirea unor strategii terapeutice eficiente.

Cuvinte-cheie

Bronșiolită obliterantă idiopatică • Boală rară • Linchen plan • Bronșiolită obliterantă

*Corresponding author: Stefania Florina Oprea
E-mail: stefania-florina.oprea@drd.umfcd.ro

Introduction

Obliterative bronchiolitis is a rare and often progressive pulmonary disorder affecting the small airways. It is characterised by fibrotic and inflammatory changes of the subepithelial tissue, which gradually lead to airway narrowing and obstruction (1). The condition has diverse aetiologies, most frequently following lung transplantation (2), allogeneic hematopoietic stem cell transplantation, or exposure to inhaled toxic agents and may also occur as a pulmonary manifestation of rheumatoid arthritis (3). In a subset of cases, no identifiable cause is found, and the disease is considered idiopathic.

Clinically, patients present with progressive dyspnoea and, occasionally, a dry cough with an onset of several weeks or months. Pulmonary function tests reveal severe obstructive ventilatory impairment, while high-resolution chest computed tomography (HRCT) demonstrates a mosaic attenuation pattern and expiratory air-trapping (4).

Histopathologic examination shows concentric fibrotic and inflammatory changes involving the bronchiolar wall, with minimal or no involvement of the adjacent pulmonary parenchyma (5). Because surgical lung biopsies are rarely performed, diagnosis usually relies on integrating clinical, functional and imaging data.

Case series

We present three cases of idiopathic obliterative bronchiolitis with similar clinical features, including severe obstructive ventilatory defect and significant oxygen desaturation on the six-minute walk test (6MWT), but differing in diagnostic approach and clinical evolution. Key findings are summarised in Tables 1 and 2.

Case 1

A 68-year-old woman, a former smoker with no occupational exposure, presented with a 1-year history of progressive

Table 1. Main characteristics of the 3 patients

	Patient 1	Patient 2	Patient 3
Age/ sex	68 / F	33 / M	30 / M
Smoking	Former smoker 20 PY	No	No
Exposure	No	No	No
Associated disease	Hypertension, Dyslipidemia	Lichen planus	No
Clinical	Dyspnea Dry cough	Dyspnea intermittent productive cough.	Dyspnea
Spirometry/FEV 1 (l/%)	Severe obstruction/ 0,74 (40%)	Severe fixed obstruction/ 0,58 (14,1%)	Severe obstruction/ 1,8 (42%)
FEV1/FVC (%)	45%	32,89%	58,13%
FVC (l/%)	1,64 (74%)	1,64 (33,5%)	3,12 (61%)
TLC(l/%)	MD	8,85 (128,3%)	8,11 (114%)
RV(l/%)	MD	7,12 (398,2%)	4,98 (281%)
DLCO (%)	65%	32,4%	77%
6MWT	significant oxygen desaturation – final SpO2 90%	significant oxygen desaturation - final SpO2 88% after 2 minutes	significant oxygen desaturation - final SpO2 88%

F - feminine, M – masculine, PY – pack-year, FEV1 – Forced expiratory volume at one second, l -liters, FVC – forced vital capacity, TLC – total lung capacity, MD- missing data, RV – Residual volume, DLCO – diffusion lung capacity, 6MWT – 6-minute walking test.

Table 2. Summary of diagnostic investigations.

	Patient 1	Patient 2	Patient 3
HR-CT	Mosaic attenuation Air trapping	Mosaic attenuation Air trapping	Increased lucency, predominantly in the basal regions
BAL	Macrophages – 58,85% Lymphocytes – 29,3% Granulocytes – 11,6% Neutrophil – 11,1% Eosinophils – 0,5% Epithelial cells – 29% Tumor cells – No	No	No
Lung Biopsy	No	No	Yes

HR-CT – high-resolution computer tomography, BAL - Bronchoalveolar lavage.

dyspnoea and dry cough. Her medical history included hypertension and dyslipidaemia under treatment. Physical examination revealed bilateral basal crackles. She denied recent viral infection or exposure to respiratory irritants. The patient had no history of rheumatologic disease.

Pulmonary function tests showed a severe obstructive ventilatory defect, with marked oxygen desaturation during the 6MWT. Bronchoalveolar lavage (BAL) revealed increased neutrophils, with no tumoral cells. High-resolution chest computer tomography (CT) demonstrated a mosaic attenuation pattern, and inspiratory–expiratory imaging confirmed extensive air trapping (Figure 1).

A diagnosis of idiopathic obliterative bronchiolitis was established. The patient was started on systemic corticosteroids (methylprednisolone equivalent to 0.5 mg/kg/day prednisone, tapered over 3 months) combined with triple inhaled therapy (LABA, ICS, LAMA). After 1 month, she reported symptomatic improvement, with increased 6-min walk distance and no significant desaturation (Table 3). Oral and inhaled corticosteroid therapy were continued, with follow-up scheduled at 3 months.

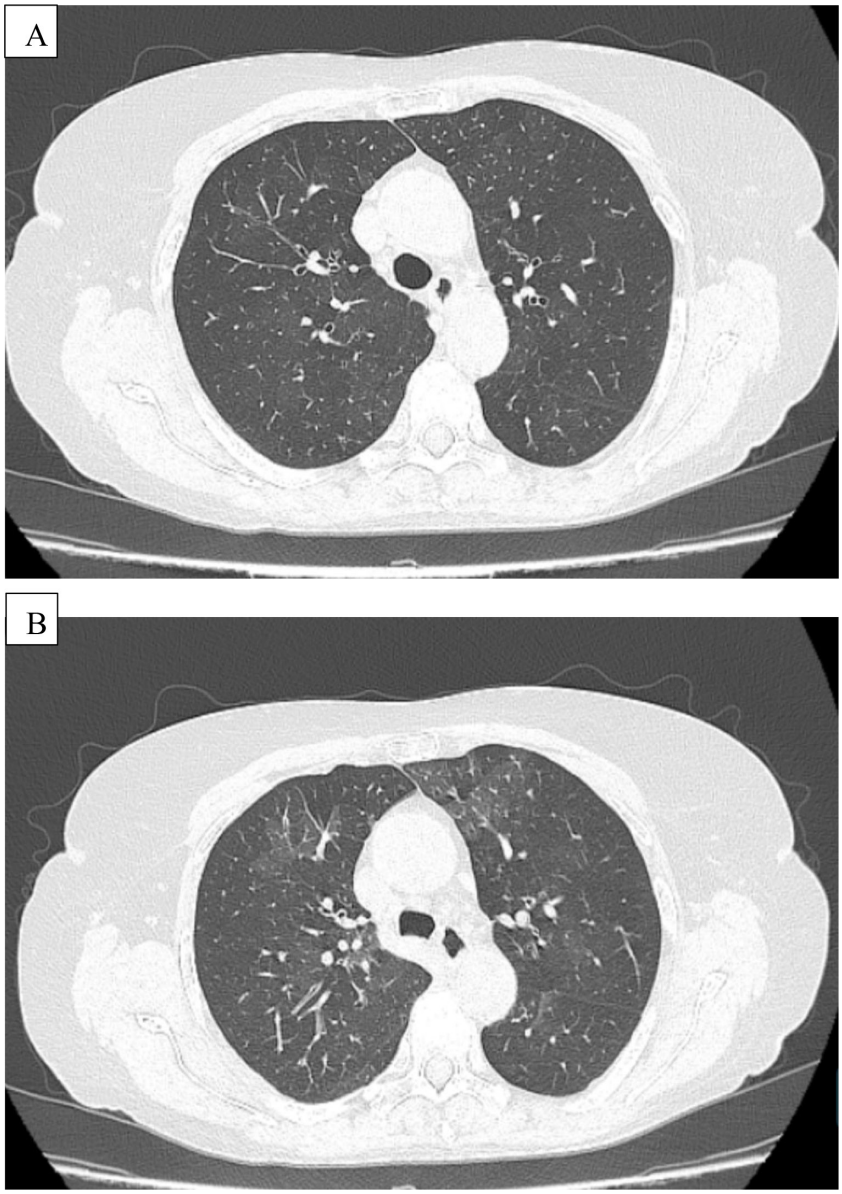

Figure 1. HRCT - Bilateral diffused mosaic attenuation patterns representing air trapping and normal parenchyma more pronounced on expiration **(B)** than on inspiration **(A)**.

Case 2

A 33-year-old male, non-smoker with no occupational exposure, presented with progressive dyspnoea and fatigue over 6 months. His medical history included lichen planus, diagnosed by a biopsy of the lower lip. Physical examination was unremarkable, except for lichen planus lesions at the level of the lower lip. He denied recent viral infection or exposure to respiratory toxins.

Pulmonary function tests indicated a severe obstructive ventilatory defect, with no significant response to bronchodilator administration (ml, %). Additionally, he exhibits hyperinflation and decreased diffusing capacity. The 6MWT was stopped after 4 min and 150 m due to significant dyspnoea. High-resolution chest CT showed a mosaic attenuation pattern and air-trapping (Figure 2).

Considering the imaging findings, the results of pulmonary function tests, and the fact that there is no clear information in the literature regarding a link between lichen planus and bronchiolitis, we considered this case to be bronchiolitis of unknown etiology. Treatment with systemic corticosteroids (methylprednisolone equivalent to 0.5 mg/kg/day prednisone, tapered over 3 months) plus inhaled LABA and ICS was initiated. At the 1-month follow-up, the patient reported worsening symptoms, with a 6-min walk distance reduced to 50 m, early interruption after 2 min, and marked oxygen desaturation to 88% (Table 3). Due to persistent cough, intermittent azithromycin (500 mg, 3 days/week) was added. Despite therapy, the patient's condition progressively deteriorated, and he died before the 3-month follow-up.

Case 3

A 30-year-old male, non-smoker with no occupational exposure, presented with progressive dyspnoea over the previous 3 months. He had no significant past medical history and denied any recent respiratory infection or exposure to inhaled toxins. Physical examination was unremarkable. Pulmonary function tests revealed severe obstructive ventilatory dysfunction, hyperinflation, and the 6MWT showed significant oxygen desaturation to 88%. Chest CT demonstrated bilateral areas of increased lucency, predominantly in the basal regions (Figure 3A).

Although the indication for biopsy was not strictly necessary, together with the patient and their family, a decision was made to perform a pulmonary biopsy to confirm the diagnosis. Thus, the histopathological examination confirmed the diagnosis of bronchiolitis. (Figure 3B). Treatment was initiated with systemic corticosteroids (methylprednisolone equivalent to 0.5 mg/kg/day prednisone for 3 months), followed by maintenance therapy with 8 mg methylprednisolone daily for 3 years, in combination with open triple inhaled therapy regiment (LABA, ICS, and LAMA). The patient showed a favourable long-term outcome, with no need for systemic corticosteroids for approximately 5 years, although mild exertional dyspnoea and dependence on inhaled therapy persisted (Table 3).

Discussion

The diagnosis and management of idiopathic bronchiolitis obliterans are particularly challenging, as the disease often

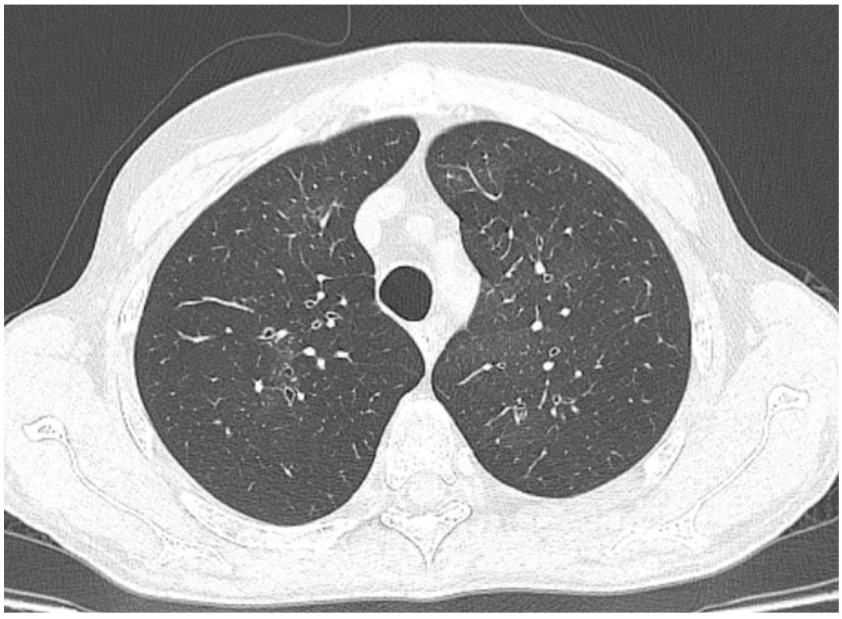

Figure 2. HRCT - Bilateral diffused mosaic attenuation patterns representing air trapping and bronchiectasis.

Table 3. Evolution of the symptoms, respiratory function and 6MWT after one month of treatment

	Patient 1- after 1 month	Patient 2 – after 2 months	Patient 3 – after one year
Clinical	Improvement of exercitional dyspnea, Cough remission	Dyspnea intermittent productive cough.	Improvement of exercitional dyspnea
Spirometry/FEV1 (l)	Improved 0,85l	No improvement 0,55l	No improvement 1,51
FEV1/FVC (%)	No improvement 42,9%	No improvement 29,94%	No improvement 50,38%
FVC (l)	Improved 1,97	No improvement 1,64	No improvement 2,99
TLC(l)	MD	Improved 7,91	No improvement 8
RV(l)	MD	Improved 5,53l	No improvement 5
DLCO (%)	Improved 71%	No improvement 30,2%	No improvement 75%
TM6M	Improved – no desaturation	Worse	Improved – important desaturation but with final SpO2>90%

FEV1 – Forced expiratory volume at one second, l -liters, FVC – forced vital capacity, TLC – total lung capacity, MD- missing data, RV – Residual volume, DLCO – diffusion lung capacity, 6MWT – 6-minute walking test.

presents with subtle and non-specific symptoms. The patients present with dyspnea and cough that usually develop in weeks or months. In this study, all the patients have severe dyspnoea, and two of them also reported cough. Pulmonary function tests revealed an obstructive ventilatory defect with low DLCO in all three patients, and important hyperinflation, where the body plethysmography was available. Spirometry with bronchodilator testing was available only in the case of the second patient; for the other two patients, at the time of presentation to the clinic, bronchodilator treatment had already been administered on the recommendation of the local physician. Additionally, all patients experienced significant desaturation during the 6-minute walk test.

Diagnosis relies on the integration of clinical presentation with paraclinical investigations, including spirometry, body plethysmography, DLCO measurement, the 6MWT and imaging studies. High-resolution computed tomography (HRCT) of the chest typically demonstrates a mosaic attenuation pattern due to areas of decreased lung density associated with small-calibre vessels, bronchiectasis, bronchial wall thickening or ground-glass opacities.

A lung biopsy is typically not necessary if the imaging findings, pulmonary function tests, and clinical symptoms are suggestive of bronchiolitis obliterans. The bronchoalveolar lavage is often used to exclude other causes of obliterative bronchiolitis, like infections, but also to exclude other causes of airflow obstruction (6). Typical BAL findings include increased neutrophil counts and elevated levels of neutrophil-associated mediators, such as interleukin-8. These mediators are significantly higher in lung transplant recipients with obliterative bronchiolitis syndrome (7).

The heterogeneous evolution observed in our patients underscores the unpredictable nature of the disease and the limitations of current therapies. Two patients experienced a favorable clinical course, whereas one showed progressive deterioration despite therapy.

It should be noted that the second patient, whose clinical course was unfavourable despite treatment, also had lichen planus. Associations between lichen planus, such as lesions and obliterative bronchiolitis, have been described in the literature; however, only a single case of a direct association between lichen planus and obliterative bronchiolitis has been reported (8). Similar to our patient, that case also had a poor outcome, with death occurring within the first 3 months after initiation of topical, systemic and inhaled corticosteroid therapy. The exact mechanisms linking the two conditions remain unclear; therefore, the aetiology of obliterative bronchiolitis in our patient was considered uncertain.

Corticosteroids remain the mainstay of treatment, yet responses are inconsistent. Also, the inhaled corticosteroids may help in the stabilisation of the obstructive syndrome (8). Although azithromycin therapy has been investigated in clinical trials involving patients with post–lung transplant obliterative bronchiolitis, demonstrating significant improvement in FEV_1 (10, 11), we considered its use appropriate in our second patient as well. Given the symptomatic and functional decline despite corticosteroid therapy, azithromycin was introduced at an immunomodulatory dose of 500 mg 3 times/week. In our opinion, intermittent azithromycin administration may represent a therapeutic option, particularly in patients showing marked neutrophilia on bronchoalveolar lavage.

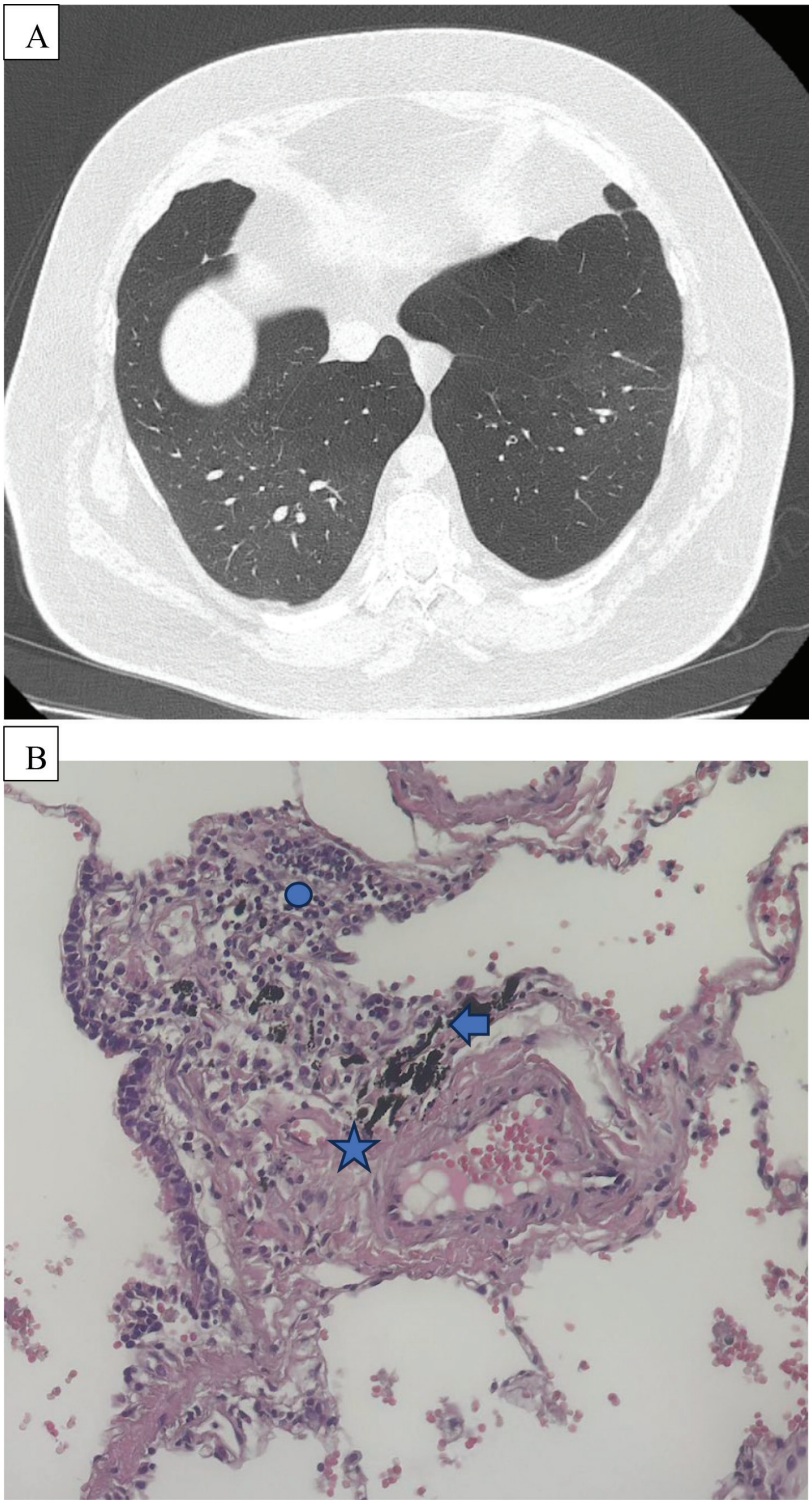

Figure 3. (A) High-resolution chest CT demonstrated bilateral areas of increased lucency, predominantly in the basal regions. **(B)** Lung-biopsy specimens of a bronchiole (haematoxylin–eosin staining) - bronchiolar wall is thickened by fibrosis (★), lymphocytic inflammation (●) and anthracitic pigment deposits (⬅). CT, computer tomography.

Conclusion

This rare and frequently underdiagnosed condition requires a multidisciplinary approach and close monitoring. Early identification and tailored therapeutic strategies may improve prognosis.
This case series highlights the heterogeneity of idiopathic obliterative bronchiolitis and underscores the need for individualized diagnostic and therapeutic approaches.
However, further studies are needed to establish evidence-based treatment protocols and optimise long-term outcomes.

Authors contributions

1. First author: Ștefania-Florina Oprea.
2. Corresponding author: Ștefania-Florina Oprea.
3. Coordinating author: Claudia-Lucia Toma.
4. Others: Ionela Belaconi, Ștefan Dumitrache-Rujinski, Diana Leonte, Alina-Valentina Dobrotă.

Disclaimer

This study underwent final editing with the assistance of ChatGPT as a tool to improve the writing style and structure. However, the final version and all content of this paper are entirely human-made and represent the original authors' ideas and comments.

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Institutional review board statement

The study was conducted in accordance with the Declaration of Helsinki's guidelines.

Informed consent statement

No informed consent was necessary

Data availability statement

Data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of interest

The authors declare no conflict of interest.

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