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Clinical Characteristics and Treatment Outcomes of Patients Undergoing Autologous Blood Pleurodesis: A Retrospective Observational Study

Uğur Temel[1,a,*]

[1] *Department of Thoracic Surgery, Şişli Hamidiye Etfal Training and Research Hospital, İstanbul, Türkiye*

**Corresponding author*

Research Article

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ABSTRACT

Objective: This retrospective study aimed to evaluate the demographic characteristics, clinical outcomes, and success rates of patients who underwent autologous blood pleurodesis at our institution between 2020 and 2025.

Methods: A total of 66 patients who received autologous blood pleurodesis between January 2020 and May 2025 were included. Data including age, sex, indication for pleurodesis, comorbidities, hospital length of stay, and time to clinical stabilization were collected. Subgroup comparisons of stabilization time were conducted using the Mann–Whitney U test.

Results: The mean age of patients was 56.8 ± 18.7 years, and 75.8% were male. The most common indication was prolonged air leak (34.8%), followed by pleural effusion (30.3%) and postoperative air leak (15.2%). The mean hospital stay was 19.2 ± 12.8 days, and the mean time to clinical stabilization was 5.0 ± 4.3 days. Although patients with chylothorax had a longer stabilization time (9.3 ± 3.1 days) compared to those with pleural effusion, the difference was not statistically significant (p = 0.174).

Conclusion: Autologous blood pleurodesis appears to be a safe, effective, and cost-efficient option for various pleural pathologies, particularly in patients with contraindications to chemical agents or in whom conservative measures have failed.

Keywords: Autologous blood, pleurodesis, prolonged air leak, pleural effusion, chylothorax

Otolog Kan Plöredezisi Uygulanan Hastaların Klinik Özellikleri ve Tedavi Sonuçları: Retrospektif Gözlemsel Bir Çalışma

Araştırma Makalesi

Süreç

Geliş: 07/06/2025
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ÖZ

Amaç: Bu retrospektif çalışmanın amacı, 2020–2025 yılları arasında otolog kan plöredezisi uygulanan hastaların demografik özelliklerini, klinik sonuçlarını ve başarı oranlarını değerlendirmektir.

Gereç ve Yöntem: Ocak 2020 ile Mayıs 2025 tarihleri arasında kliniğimizde otolog kan plöredezisi uygulanan 66 hasta çalışmaya dahil edildi. Hastaların yaş, cinsiyet, plöredezis endikasyonu, komorbiditeleri, hastanede kalış süresi ve plöredezise yanıt süreleri değerlendirildi. Klinik stabilizasyon süresi gruplar arasında Mann–Whitney U testi ile karşılaştırıldı.

Bulgular: Hastaların ortalama yaşı 56,8 ± 18,7 yıl olup, %75,8'i erkekti. En sık plöredezis endikasyonu uzamış hava kaçağıydı (%34,8), bunu plevral efüzyon (%30,3) ve postoperatif hava kaçağı (%15,2) izledi. Ortalama hastanede kalış süresi 19,2 ± 12,8 gün, ortalama klinik stabilizasyon süresi ise 5,0 ± 4,3 gündü. Şilotoraks hastalarında ortalama stabilizasyon süresi 9,3 ± 3,1 gün olup, plevral efüzyon grubuna göre daha uzun bulunmasına rağmen fark istatistiksel olarak anlamlı değildi (p = 0,174).

Sonuç: Otolog kan plöredezisi, uzamış hava kaçağı, malign plevral efüzyon ve şilotoraks gibi farklı endikasyonlarda güvenli, etkili ve düşük maliyetli bir tedavi seçeneği olarak öne çıkmaktadır. Özellikle konservatif tedavilere yanıt alınamayan veya kimyasal ajanlara kontrendikasyonu olan hastalarda değerli bir alternatiftir.

Anahtar Kelimeler: Otolog kan, plöredezis, uzamış hava kaçağı, plevral efüzyon, şilotoraks

[a] *drugurtemel@hotmail.com* *0000-0002-8856-338X*

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Introduction

Pleural effusion, prolonged air leak following pneumothorax, and chylothorax are common clinical conditions encountered in thoracic surgery practice, often leading to significant morbidity and prolonged hospital stays. Among these, prolonged air leaks are of particular concern due to their association with extended hospitalization and an increased risk of infection.[1-3] Pleural effusion, characterized by fluid accumulation in the pleural space, may arise from various benign or malignant causes. Malignant pleural effusion (MPE) frequently complicates advanced-stage malignancies and often necessitates palliative treatment. Dyspnea is the most commonly reported symptom in these patients, and the primary therapeutic goals are symptom relief and prevention of fluid reaccumulation. In the management of these conditions, pleurodesis—a procedure designed to obliterate the pleural space—is widely employed.[4] Talc remains the most commonly used sclerosing agent in pleurodesis; however, its association with systemic inflammatory responses and rare but severe complications such as acute respiratory distress syndrome (ARDS) underscores the need for safer alternatives.[5] Autologous blood, being natural, readily available, and cost-effective, with minimal side effects, has emerged as a promising alternative in this context.[6] This retrospective study aims to evaluate the demographic characteristics, clinical outcomes, and success rates of patients who underwent autologous blood pleurodesis for various indications at our institution between 2020 and 2025.

Methods

This retrospective observational study was conducted to evaluate patients who underwent autologous blood pleurodesis at our thoracic surgery clinic between January 2020 and May 2025. The study included patients treated for various indications, including pleural effusion, prolonged air leak, and chylothorax. Data were obtained from hospital medical records and comprised demographic characteristics (age, sex), indication for pleurodesis, comorbidities, length of hospital stay, and time to clinical resolution following the procedure. Age was categorized into predefined groups, and comorbidity burden was quantified numerically according to institutional classification.

Autologous blood pleurodesis was performed by instilling 100–150 mL of freshly collected autologous venous blood into the pleural space via an indwelling chest tube under sterile conditions. After instillation, the chest tube was clamped for 1–2 hours and subsequently returned to water seal drainage. Technical success was defined as the absence of complications during instillation, whereas overall success was evaluated based on clinical and radiological criteria recorded at discharge. Hospital length of stay (days) and time to stabilization after pleurodesis were also documented. Procedural success was defined as the absence of a need for further pleural intervention during the same hospitalization. In some cases, pleurodesis was repeated, and the rate and frequency of repeated procedures were recorded and included in the analyses. All procedures were performed using autologous whole blood administered intrapleurally through the existing chest drain. The decision to perform autologous blood pleurodesis was made by the attending thoracic surgeon based on clinical judgment and failure of conservative measures. This study was approved by the institutional ethics committee (No: 4606), and all data were anonymized to ensure patient confidentiality.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the study population. Continuous variables such as age and length of hospital stay were presented as mean ± standard deviation or median with interquartile range, depending on the distribution of the data. Categorical variables, including sex, indication for pleurodesis. In addition, comorbidity status was expressed as frequencies and percentages. The normality of continuous variables was assessed using the Shapiro–Wilk test. For comparisons between groups, an independent samples t-test or Mann–Whitney U test was used depending on the distribution characteristics. A p-value of <0.05 was considered statistically significant.

Results

A total of 66 patients who underwent autologous blood pleurodesis between 2020 and 2025 were included in the study. The mean age was 56.8 ± 18.7 years, and most patients were male (n = 50, 75.8%). The leading indication for pleurodesis was prolonged air leak (n = 23, 34.8%), followed by pleural effusion (n = 20, 30.3%) and postoperative air leak (n = 10, 15.2%), while less frequent indications included chylothorax and other rare causes (Figure 1). The mean length of hospital stay was 19.2 ± 12.8 days. The overall mean time to clinical stabilization was 5.0 ± 4.3 days, with subgroup means of 4.8 ± 5.1 days for prolonged air leak, 4.4 ± 3.2 days for malignant pleural effusion, 5.3 ± 4.4 days for postoperative air leak, and 9.3 ± 3.1 days for chylothorax (Figure 2). Subgroup analysis using the Mann–Whitney U test indicated a longer stabilization time in patients with chylothorax (mean: 9.3 ± 3.1 days) compared to those with pleural effusion (mean: 4.0 ± 1.7 days), although this difference did not reach statistical significance ($U = 45.0$, $p = 0.174$). The Shapiro–Wilk test demonstrated that the distribution of clinical stabilization times deviated from normality ($W = 0.89$, $p < 0.001$); therefore, non-parametric methods were applied in subgroup comparisons. Pleurodesis was successful after a single application in 20 patients (30.3%), while 46 patients (69.7%) required two or more

procedures. All patients achieved successful pleurodesis after a maximum of two applications.

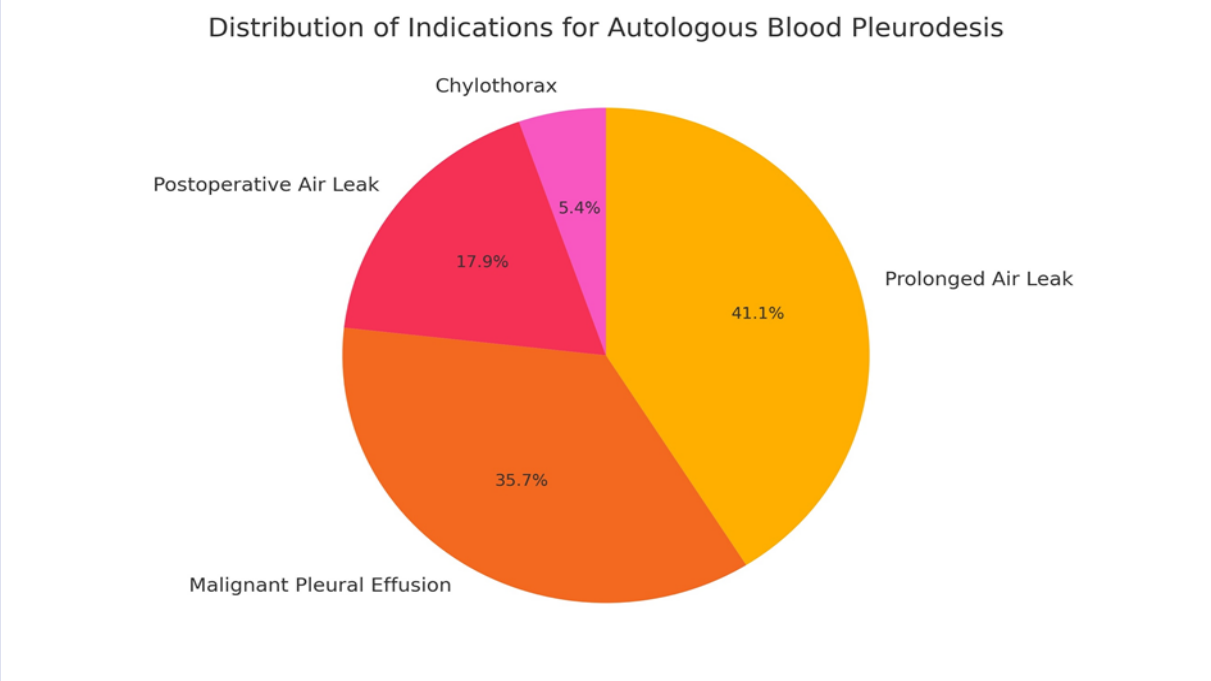

Figure 1. Distribution of indications for autologous blood pleurodesis

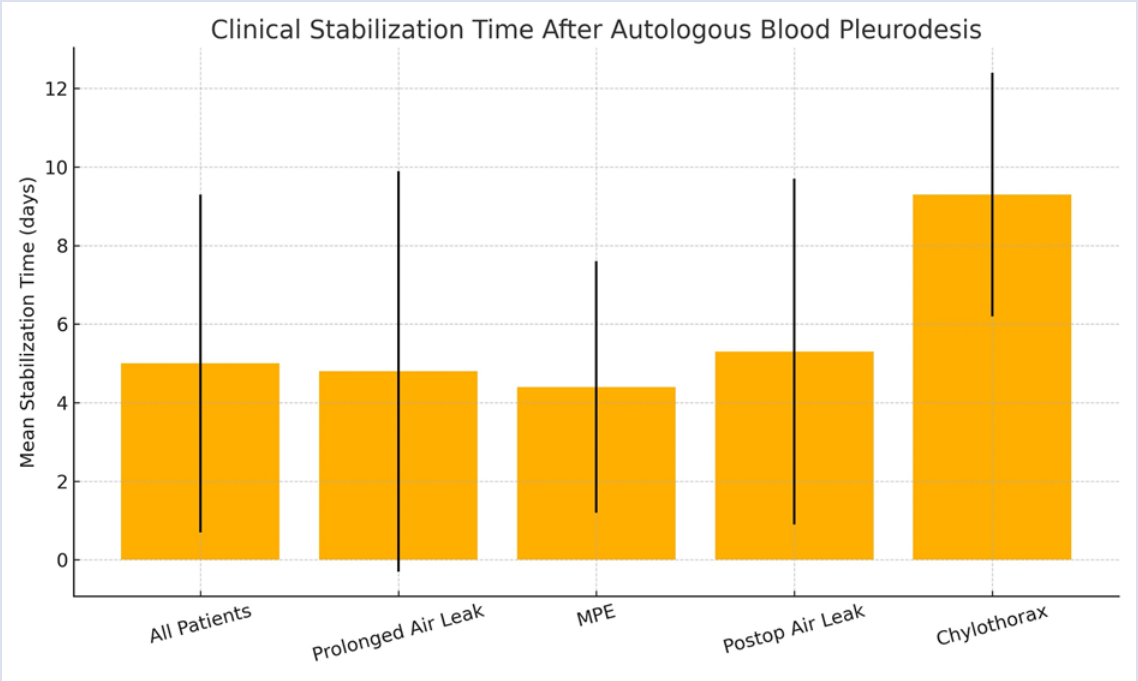

Figure 2. Mean clinical stabilization time after autologous blood pleurodesis across different patient subgroups

Discussion

This retrospective study aimed to evaluate the clinical outcomes and characteristics of patients who underwent autologous blood pleurodesis for various indications, including prolonged air leak, pleural effusion. In addition, chylothorax. Our findings suggest that autologous blood pleurodesis is a safe and effective intervention with acceptable clinical outcomes across diverse patient groups.

Prolonged air leak was the most common indication for pleurodesis in our cohort, consistent with existing literature highlighting its frequency in postoperative and spontaneous pneumothorax patients.[7,8] The mean time to clinical stabilization in this group was 4.8 ± 5.1 days, comparable to or slightly shorter than reports from

studies using talc or chemical agents.[9-11] This suggests that autologous blood may be equally effective in resolving air leaks, with the added benefit of a favorable safety profile. Autologous blood pleurodesis offers several theoretical and practical advantages in the management of prolonged air leak. First, the mechanism of action is primarily mechanical and inflammatory: the blood forms a fibrin clot that can directly seal the air leak. In addition, also induces localized inflammation that promotes pleural symphysis. Unlike chemical agents that rely solely on inducing inflammation and fibrosis, the blood patch technique provides an immediate physical barrier, This may accelerate leak closure in appropriately selected patients.[1,12] Moreover, autologous blood is readily available and inexpensive. In addition, does not require specialized preparation or handling, making it particularly attractive in resource-limited settings or in cases where chemical agents are contraindicated. The risk of systemic inflammatory response or severe complications, such as acute respiratory distress syndrome (ARDS), is minimal with autologous blood, especially when compared to talc. This favorable safety profile is particularly relevant in elderly patients, those with significant comorbidities, or patients with limited pulmonary reserve, for whom minimizing procedure-related risks is essential.[11,12] Another practical advantage is that autologous blood pleurodesis can be repeated with minimal adverse effects, offering a safe option for cases where initial attempts do not achieve complete resolution. Furthermore, since the patient's own blood is used, the risk of allergic reaction or foreign body reaction is virtually eliminated.[13]

In patients with malignant pleural effusion (MPE), the mean stabilization time was 4.4 ± 3.2 days. While talc remains the gold standard in MPE management due to its high efficacy in achieving pleural symphysis, its potential to trigger systemic inflammation and rare but serious complications such as acute respiratory distress syndrome (ARDS) has prompted growing interest in alternative agents.[5,9] In this context, autologous blood pleurodesis has emerged as a promising option, particularly in patients who are frail, have poor performance status, or present contraindications to chemical sclerosing agents. Several studies have investigated the role of autologous blood in the management of MPE. In a prospective randomized study by Keeratichananont et al., autologous blood was compared to tetracycline in patients with symptomatic malignant pleural effusion. The pleurodesis success rate was similar between the two groups (83.4% for blood vs. 87.5% for tetracycline; p = 0.36), but patients receiving autologous blood experienced significantly fewer side effects such as fever and chest pain. In addition, required markedly less analgesia post-procedure.[14] In a subsequent study comparing autologous blood and talc, the efficacy remained comparable, but again, adverse effects were significantly lower in the blood group, further supporting its safety profile.[15] These findings, indicate that autologous blood pleurodesis is not only effective in achieving fluid control in MPE but also well tolerated, with reduced rates of post-procedural complications such as fever and pain. In addition, empyema.

These characteristics make autologous blood an attractive alternative, especially in patients with advanced disease stages or those who are at higher risk for adverse reactions to talc or tetracycline-based pleurodesis. Taken together, our results align with this growing body of evidence and support the feasibility and safety of autologous blood pleurodesis as a viable option for MPE. It's low cost, ease of availability, and minimal invasiveness. In addition, a favorable tolerability profile makes it a rational choice in selected patients, particularly when symptom palliation is prioritized and treatment-related morbidity must be minimized.

Interestingly, the subgroup of patients with chylothorax exhibited the longest mean time to clinical stabilization (9.3 ± 3.1 days). This prolonged duration is likely attributable to the complex pathophysiology of chylous effusions and the persistent nature of lymphatic leakage. Chylothorax often results from traumatic, neoplastic, or congenital disruption of the thoracic duct and poses significant management challenges. While surgical thoracic duct ligation remains the definitive treatment in refractory or high-output cases, it may not be feasible in all patients due to comorbidities, surgical risks, or anatomical complexity.[16] In recent years, autologous blood pleurodesis has been reported as a potential adjunct or alternative in such cases, particularly when conservative measures fail. For example, Demirdaş et al. reported successful resolution of chylothorax in a Behçet's disease patient after administration of autologous venous blood into the pleural cavity, following unsuccessful conservative and talc pleurodesis attempts.[17] Similarly, Rützel et al. described a newborn with trisomy 21 and congenital lymphatic malformation, in whom severe chylothorax and chylous ascites were effectively managed using autologous whole blood pleurodesis after failure of conventional approaches.[18] These case reports suggest that autologous blood may promote mechanical sealing and localized inflammatory response, aiding in the cessation of lymphatic leakage without the systemic side effects associated with chemical agents.

Our study demonstrates that autologous blood pleurodesis is a safe, effective. In addition, practical intervention for a range of pleural pathologies, including prolonged air leak, malignant pleural effusion. In addition, chylothorax. Across all indications, the procedure showed acceptable clinical success rates and favorable safety outcomes, with no major complications observed. The mean time to clinical stabilization and hospital stay were within reasonable limits. In addition, the procedure's minimally invasive nature and cost-effectiveness further support its role in thoracic practice, particularly in resource-constrained settings. Autologous blood appears especially advantageous in patients with poor performance status or contraindications to chemical agents, offering comparable efficacy with reduced procedural morbidity. Additionally, case-based evidence supports its use in selected cases of chylothorax where surgical options are limited or

conservative measures have failed. Given these findings, autologous blood pleurodesis should be considered a viable alternative or adjunct to conventional pleurodesis agents in appropriately selected patients.

Our findings further suggest that autologous blood pleurodesis may be particularly advantageous in specific patient groups. In elderly patients with multiple comorbidities and increased operative risks, the favorable safety profile of autologous blood minimizes the likelihood of severe complications compared to chemical agents. Similarly, in patients with significant comorbid conditions such as chronic obstructive pulmonary disease (COPD), cardiovascular disease, or poor performance status, the lower incidence of procedure-related adverse effects represents an important clinical advantage. Moreover, in individuals with contraindications to chemical sclerosing agents—including those with hypersensitivity, intolerance, or heightened risk of systemic inflammatory responses—autologous blood provides a safe and effective alternative. These characteristics highlight its role as a valuable therapeutic option in carefully selected, high-risk populations.

Limitations of our study include its retrospective nature and the relatively small sample size, This may limit the generalizability of the findings. Additionally, long-term outcomes such as recurrence rates and post-discharge complications were not assessed. Future prospective studies with standardized follow-up protocols are warranted to further validate these findings and compare autologous blood with other pleurodesis agents.

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