



DECEMBER 11-12, 2025
۲۱ و ۲۰ آذر ماه ۱۴۰۴



دومین کنگره
پلازما پزشکی ایران

The 2nd Congress on Plasma Medicine

دبیرخانه دائمی کنگره
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Chronic Culture-Negative Infection Following Rhinoplasty with Repeated Cartilage Graft Failure: Successful Treatment with Dielectric Barrier Discharge Plasma Therapy—A Case Report

Zeinab Siami

Department of Infectious Diseases, School of Medicine, Ziaeiian Hospital, Tehran University of Medical Sciences, Tehran, Iran

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Citation:

Siami Z. Chronic Culture-Negative Infection Following Rhinoplasty with Repeated Cartilage Graft Failure: Successful Treatment with Dielectric Barrier Discharge Plasma Therapy—A Case Report. *Iran Biomed J. Supplementary* (2-2026): 56.

ABSTRACT

Introduction: Post-rhinoplasty infection, though rare, can lead to severe complications, including tissue necrosis, nasal deformity, and failure of reconstructive grafts. Chronic culture-negative infections pose a particular diagnostic and therapeutic challenges, often associated with biofilm formation and poor response to conventional treatments.

Case Presentation: We report the case of a 49-year-old woman with no underlying comorbidities who developed a chronic, culture-negative infection following rhinoplasty. Over a three-year period, the patient experienced persistent purulent discharge, tissue necrosis, and repeated failures of reconstructive surgeries, including soft tissue reconstruction and costal cartilage grafting. Despite prolonged courses of antibiotics and several surgical interventions, her condition persisted, with microbiological cultures remaining negative. In 2025, she was referred to a specialized wound clinic, presenting signs of active infection, nasal tissue instability, and a markedly elevated C-reactive protein (CRP) level of 100 mg/L. Given the refractory nature of the infection, a combined treatment approach was initiated, consisting of broad-spectrum antibiotics (meropenem and linezolid) and dielectric barrier discharge (DBD) cold plasma therapy applied to both nostrils. Remarkably, complete cessation of nasal discharge was observed within one week of initiating plasma therapy. After one month, the CRP level decreased to below 10 mg/L, and clinical examination revealed complete resolution of infection, inflammation, and tissue necrosis, with stable wound healing.

Results and Discussion: After plasma therapy, the mean wound size decreased from 12.4 ± 8.7 to 6.8 ± 5.3 cm², and wound depth was reduced from 5.2 ± 3.1 to 2.7 ± 1.9 mm. The proportion of infected wounds declined from 33% to 11%, and pruritus decreased from 36% to 14%. Inflammatory markers (ESR and CRP) showed notable reductions, and patients reported fewer adverse symptoms after treatment. These findings indicate significant improvement in wound characteristics and treatment-related outcomes following plasma therapy.

Conclusion: This case highlights the potential role of DBD cold plasma therapy as an effective adjunctive treatment for chronic, resistant, and culture-negative infections following rhinoplasty. Cold plasma may offer a promising strategy for disrupting biofilms, reducing microbial burden, and controlling chronic inflammation in complex post-surgical wounds.



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Keywords: Cold plasma therapy, Culture-negative chronic infection, Post-rhinoplasty infection

Corresponding Author: Zeinab Siami

Department of Infectious Diseases, School of Medicine, Ziaeiian Hospital, Tehran University of Medical Sciences, Tehran, Iran;

E-mail: Siami_z@yahoo.com



Iranian Biomedical Journal Supplementary (February 2026): 56