Nasal Septal Perforation: Iatrogenic, Autoimmune or Infective? A Diagnostic Challenge

https://doi.org/10.47210/bjohns.2025.v33i1.217

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ABSTRACT

Introduction

Nasal septal perforation is a rare but significant clinical condition that may present with symptoms such as nasal discharge, crusting, bleeding, and deformity. Its etiology can be diverse ranging from trauma and infection to autoimmune diseases. We report a diagnostically challenging case of nasal septal perforation following COVID-19-related hospitalization.

Case Report

A 48-year-old female with chronic kidney disease, on regular dialysis, presented with foul-smelling nasal discharge, black crusts, and a saddle nose deformity one-year post-COVID-19 ICU admission involving nasal intubation. Initial examination revealed a large septal perforation with extensive crusting and greenish discharge. Preliminary diagnosis was atrophic rhinitis with secondary bacterial infection (E. coli), but symptoms persisted despite treatment. Subsequent biopsy revealed invasive fungal infection with Aspergillus fumigatus. Antifungal therapy with voriconazole was initiated, with initial clinical improvement. However, the patient was later lost to follow-up and subsequently reported deceased due to unknown complications.

Discussion

This case illustrates the diagnostic complexity of nasal septal perforation, especially in immunocompromised patients with multiple possible etiologies such as iatrogenic trauma, fungal infection, and vasculitis. A multidisciplinary diagnostic approach is essential for accurate diagnosis and effective management.

Keywords

Nasal Septal Perforation; Aspergillus Fumigatus; Atrophic Rhinitis; COVID-19; Chronic Kidney Disease; Iatrogenic Nasal Trauma

Nasal septal perforation is a full-thickness defect of the nasal septum and is among the few conditions in otolaryngology that pose a challenge for treating surgeons. It may be asymptomatic or present with aesthetic and functional issues. "The overall incidence of nasal septal perforation is around 1%,[1] with the cartilaginous portion affected in about 34% of cases."[2] Common causes include self-inflicted trauma (e.g., nose picking), facial injuries, ischemic damage to the mucoperichondrium, nasal surgeries, nasal intubation, and nasogastric tube placement. Bacterial or fungal infections, vasculitis, and irritant inhalation are also implicated. Additionally, septal perforation may be a presenting feature of AIDS.

In this report, we present a case of a patient who attended the ENT OPD with foul-smelling nasal discharge and extensive crusting, initially suggestive of atrophic rhinitis. However, further evaluation revealed the true underlying etiology.

Case Report

A 48-year-old female from a lower socioeconomic background presented to the ENT OPD with a one-year history of foul-smelling nasal discharge, blackish crusting, and saddle nose deformity. She had previously been admitted to a healthcare facility for COVID-19-related pneumonia and managed in the ICU with nasal intubation and a facial oxygen mask. According to the patient, the saddle nose deformity appeared approximately one week after removal of the nasal tube and mask. She was unable to provide detailed records of her prior treatment.

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On external examination, there was evident collapse of the nasal bridge. Nasal endoscopy revealed a large septal perforation involving both the cartilaginous and bony parts of the nasal septum, with thick greenish discharge, extensive crusting, mucosal congestion, and bleeding upon crust removal. The initial impression was suggestive of a granulomatous lesion. She was also a known case of chronic kidney disease, on dialysis for the past 2–3 years.

In view of possible granulomatous disease, investigations were initiated, including KOH mount, fungal culture, and gram stain with culture and sensitivity of nasal swab. Fungal culture was negative; however, gram staining revealed gram-negative bacilli, and culture showed growth of *E. coli*. A provisional diagnosis of atrophic rhinitis with secondary infection by unusual bacteria was made. She was started on a broad-spectrum antibiotic based on sensitivity results, considering her renal status, along with nasal douching using bicarbonate and saline.

After one month, due to lack of improvement, a biopsy of the necrotic septal tissue was performed under monitored anesthesia. Apart from deranged renal function, routine investigations were normal. Histopathological examination showed necrotic tissue with fungal hyphae and spores of *Aspergillus fumigatus* (figure 1.3). No granulomas or acid-fast bacilli were seen. Voriconazole 200 mg once daily was initiated, and initial follow-up showed clinical improvement. However, the patient was lost to follow-up, and it was later reported by her husband that she had expired due to unspecified complications. Relevant clinical photographs are included for documentation.

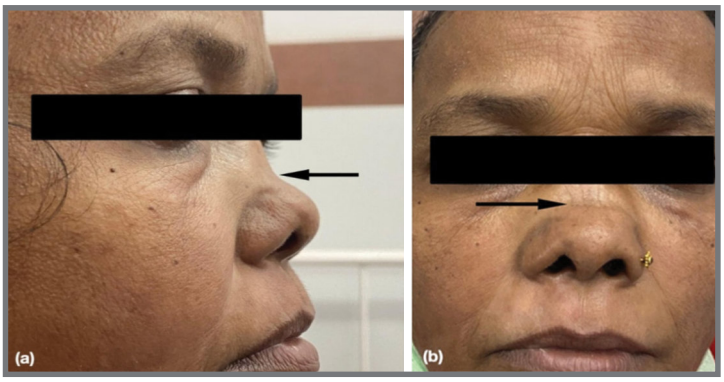

Fig. 1.1. Shows the saddle nose deformity (a) Side view (b) Front view

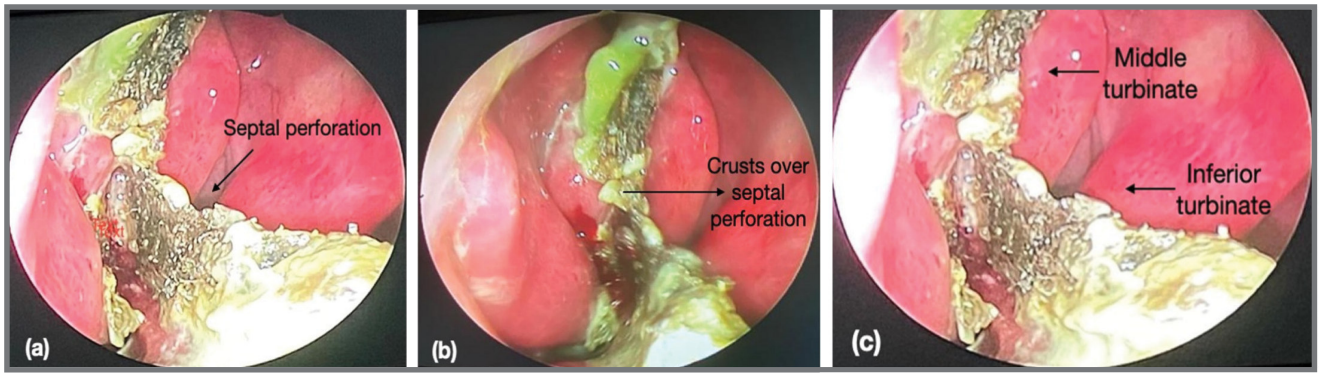

Fig. 1.2. (a, b) Nasal endoscopic images seen from the right nasal cavity showing the septal perforation with crusting over the perforation, (c) The left inferior and middle turbinates seen through the septal perforation.

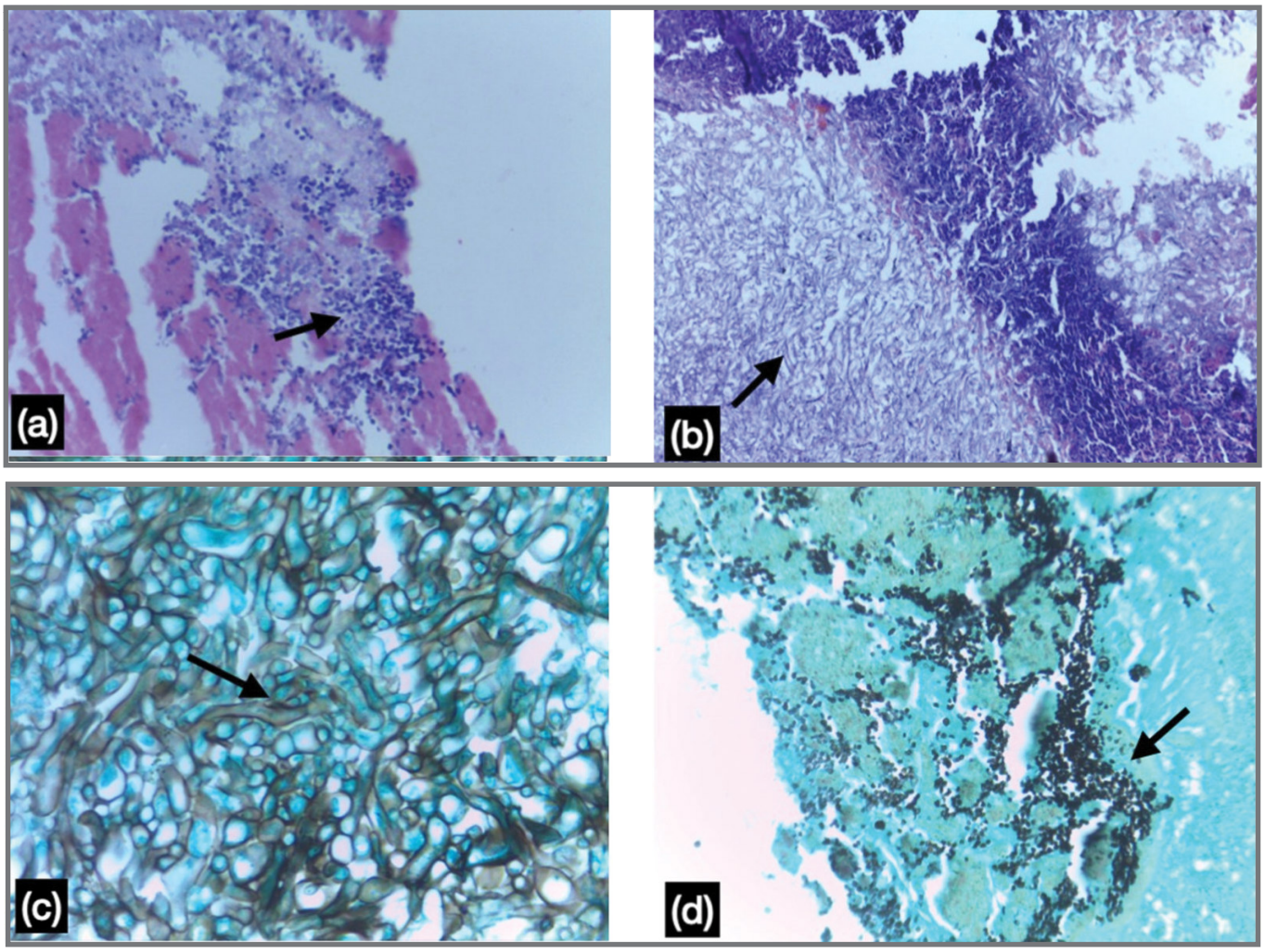

Fig. 1.3. (a) HPE with Hematoxylin and Eosin staining showing Fungal spores surrounded by caseous necrosis at (4x) (b) Hematoxylin and Eosin staining showing Fungal hyphae at (10x) (c) Gomori methanamine silver staining showing Septate, branched fungal hyphae at (40x) (d) Gomori methanamine silver staining showing Fungal spores at (4x).

Nasal septal perforation has an incidence of around 1%.[1] Many patients are asymptomatic, with symptom severity depending on perforation size and location.[3] Larger perforations often cause scabbing, bleeding, foul-smelling discharge, rhinorrhea, nasal pain, and cacosmia.[3] Common causes include trauma (especially iatrogenic), foreign bodies, malignancy, infections (e.g., tuberculosis, syphilis), granulomatous diseases (e.g., Wegener's granulomatosis, sarcoidosis), fungal infections, and virus-associated vasculopathies. [2,4,5]

Atrophic rhinitis (AR), also known as coryza foetida, is a chronic bacterial nasal infection. It is classified into primary and secondary types and diagnosed clinically, supported by CT and microbiological tests. Symptoms include nasal crusting, congestion, facial pressure, epistaxis, anosmia, and crust aspiration. Findings include mucosal dryness, turbinate atrophy, and sometimes septal perforation with saddle nose deformity. Common pathogens are *Pseudomonas aeruginosa*, *Klebsiella*

spp., *Staphylococcus aureus*, *Proteus mirabilis*, and *E. coli*.[6] Our patient's *E. coli* culture supported AR, but poor response to treatment warranted further work-up.

Fungal sinus infections like those from *Aspergillus spp.* and *Fusarium solani* are more common in immunocompromised patients, such as those with AIDS, diabetes, CKD, or recent COVID-19 infection.[2] Our patient, with CKD and recent COVID-19 pneumonia, had biopsy-confirmed *Aspergillus fumigatus*, justifying antifungal treatment.

SARS-CoV-2 may also contribute to septal damage. Wee C et al. (2021) reported septal perforation post-rhinoplasty in a COVID-19 patient, possibly due to ACE2-mediated endothelial damage or cytokine-driven vasculitis.[4] Our patient, after ICU care and nasal intubation for COVID-19, developed saddle nose deformity, indicating a potential link.

Vasculitis, though rare, can cause nasal septal perforation. It includes large (e.g., Takayasu arteritis), medium (e.g., polyarteritis nodosa), and small vessel types (e.g., Wegener's, Churg-Strauss).[7] TB-related vasculitis is a rare cause of large vessel involvement. Although our patient's biopsy lacked granuloma or AFB, and ANCA/ACE tests weren't done, vasculitis couldn't be ruled out.

Ischemic septal damage can result from loss of mucoperichondrium integrity, due to trauma, surgery, cautery, radiotherapy, nasal packing, or prolonged intubation.[3] Our patient had nasal intubation and prolonged mask ventilation during ICU stay, suggesting ischemia as a contributing factor.

Conclusion

Nasal septal perforation can result from a wide range of causes, including trauma, vasculitis, and infections. Establishing the correct diagnosis requires careful exclusion of other possibilities, especially when multiple potential causes coexist, making diagnosis clinically challenging.

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