

Primary Sinonasal Tuberculosis Mimicking Nasal Polyps: A Diagnostic Challenge and Management Approach, Case report

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Abstract

Introduction: Primary sinonasal tuberculosis is an extremely rare form of extrapulmonary tuberculosis, often misdiagnosed due to its nonspecific clinical presentation that mimics other sinonasal conditions, such as chronic rhinosinusitis or nasal polyps. We present a case of primary sinonasal tuberculosis in a patient with persistent nasal obstruction and rhinorrhea, initially diagnosed as chronic rhinosinusitis.

Case Report: A 34-year-old female presented with a 5-month history of nasal obstruction and rhinorrhea, later complicated by anosmia. Initial clinical examination revealed bilateral nasal polyps, while imaging demonstrated extensive sinonasal involvement, including maxillary sinus obliteration and bony erosion. Biopsy results showed granulomatous inflammation, and GeneXpert PCR confirmed *Mycobacterium tuberculosis*, leading to the final diagnosis of primary sinonasal tuberculosis. The patient underwent endonasal endoscopic surgery to excise the mass, followed by a standard 6-month regimen of antitubercular therapy.

Discussion: Sinonasal tuberculosis presents a significant diagnostic challenge, often mimicking other chronic nasal conditions. Histopathological findings, including granulomatous inflammation, are essential for diagnosis, while GeneXpert PCR offers rapid and accurate confirmation. Treatment involves a combination of medical therapy and surgical intervention, particularly in cases with extensive sinus involvement.

Conclusion: Primary sinonasal tuberculosis, though rare, should be considered in the differential diagnosis of chronic sinonasal conditions, particularly in patients who fail to respond to standard treatments. Early diagnosis and treatment with antitubercular therapy and surgical excision can lead to favorable outcomes and prevent complications.

Keywords: Sinonasaltuberculosis; Primarytuberculosis; Nasal Polyps; Chronicrhinosinusitis; Granulomatous Inflammation; Genexpert PCR; Endonasalendoscopiesurgery; Antituberculartherapy; Bonyerosion; Diagnostic Challenge

1. Introduction

Sinonasal tuberculosis (TB) is a rare but significant form of extrapulmonary tuberculosis, representing a diagnostic challenge due to its nonspecific symptoms and clinical overlap with more common sinonasal conditions such as chronic rhinosinusitis and fungal infections. While pulmonary tuberculosis is well recognized, primary sinonasal TB accounts for less than 1% of all cases of tuberculosis and is often misdiagnosed as other chronic nasal disorders, especially in areas with low incidence of tuberculosis [1]. The nasal and paranasal regions are relatively resistant to *Mycobacterium*

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tuberculosis due to natural barriers such as mucociliary clearance and bactericidal nasal secretions, making the infection in these areas rare, yet not impossible, especially in immunocompromised individuals [2].

The clinical presentation of sinonasal tuberculosis includes nasal obstruction, rhinorrhea, and anosmia, which are often indistinguishable from those seen in other sinonasal conditions, making diagnosis difficult. A key diagnostic challenge is distinguishing between tuberculosis, neoplasms, and fungal infections, which share similar clinical and radiological features [3]. Moreover, while histopathology revealing granulomatous inflammation with caseating necrosis is a crucial step in confirming the diagnosis, it is complemented by molecular diagnostic tools such as GeneXpert PCR, which allow for rapid and sensitive detection of *Mycobacterium tuberculosis* DNA from tissue samples [4,5].

This article presents a case report of primary sinonasal tuberculosis in a patient whose diagnostic challenge was the fact that the nasal masses presented in a manner similar to nasal polyps, which initially led to misdiagnosis as chronic rhinosinusitis. The similarity to nasal polyps created confusion, but with further histopathological examination and GeneXpert PCR, the diagnosis of tuberculosis was confirmed. The case underscores the need for high clinical suspicion in cases of chronic rhinosinusitis, especially when typical treatments fail.

2. Case presentation

A 34-year-old female with no significant past medical history presented 2 years ago with a 5-month history of intermittent, progressing to permanent nasal obstruction and rhinorrhea. Additionally, she reported the onset of anosmia for the past two months. There was no history of epistaxis or other associated ENT symptoms, and the patient did not report any ophthalmologic or neurological signs.

Over the course of five months, her symptoms gradually worsened, culminating in constant bilateral nasal obstruction. The patient also noted mild, unexplained weight loss, though this was not quantified. Importantly, she had remained afebrile throughout this period, with no systemic signs of infection or accompanying fever.

The patient had no known allergies or history of chronic sinusitis, and she was not taking any regular medications. She denied recent travel to endemic areas, exposure to tuberculosis, or contact with individuals known to have infectious diseases. Family history was unremarkable for similar conditions.

Upon clinical examination, bilateral nasal polyps were found, which completely obstructed the nasal cavities, extending all the way to the nasal vestibule. These polyps had a translucent, friable appearance, resembling grape-like clusters. They were bleeding on contact, which further suggested the presence of an aggressive or inflammatory process within the nasal passages– (Figure 1).



Figure 1 Rhinoscopy Findings — Nasal Polyps. The figure shows the right nasal cavity, with the nasal septum (NS), polyps (T), and inferior turbinate (IT) clearly depicted. The polyps appear as translucent, friable masses

A CT scan of the paranasal sinuses revealed bilateral nasal masses that completely filled the nasal cavities, resulting in the total obliteration of all nasal sinuses. The imaging showed expansive tumor-like growth within the nasal cavity, sphenoidal sinus, ethmoidal sinus, and maxillary sinuses. Additionally, there was bony remodeling and thickening of the sinus walls, with anterointernal parietal erosions of the right orbit and anteroinferior and external erosions of the right maxillary sinus. These findings were highly suggestive of an aggressive mass process, raising concern for malignant or infectious etiology, particularly tuberculosis (Figure 2).

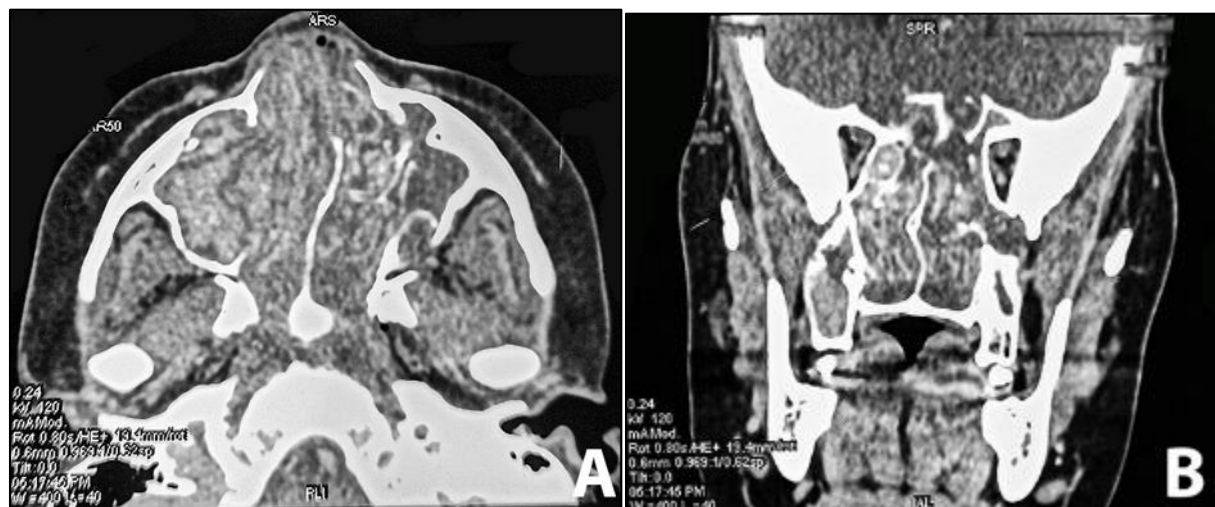


Figure 2 Facial CT scan with A: Axial Cuts showing the extent of the masses within the nasal cavity and sinuses. And B: Coronal Cuts highlighting the involvement of the maxillary, ethmoidal, and sphenoidal sinuses, as well as the bony remodeling and erosions

The first biopsy of the nasal masses showed granulomatous inflammation, which can be indicative of a variety of conditions, including tuberculosis, fungal infections, and sarcoidosis. Given the patient's symptoms and imaging findings, a second biopsy was performed to refine the diagnosis.

The second biopsy results were consistent with tuberculosis, with the GeneXpert PCR test showing positive for *Mycobacterium tuberculosis*. This confirmed the diagnosis of sinonasal tuberculosis.

The patient underwent endonasal endoscopic mass excision under general anesthesia. Initial exploration revealed a polypoid mass that completely filled the nasal cavity. The procedure began with the excision of the right endonasal component, followed by identification of the right choana and a middle meatotomy. Exploration of the right maxillary sinus showed mass invasion, accompanied by the presence of multiple fungal balls. The mass tissue was completely excised, while the fungal balls were irrigated with saline and aspirated. A posterior and anterior ethmoidectomy along with a sphenoidectomy were then performed. The frontal sinuses were free of any mass involvement.

The same procedure was carried out on the left side.

Upon post-surgical assessment, it was confirmed that all mass tissue had been removed. The maxillary sinus showed the presence of polypoid mucosa, and ethmoid bone lysis at the planum ethmoidale was noted, with periorbital integrity maintained (Figure 4).

Postoperatively, the patient was closely monitored with regular follow-up visits. At one month, there was significant improvement in her symptoms, including reduced nasal obstruction and rhinorrhea. Endoscopic examinations confirmed the absence of any residual mass. The patient was started on a 4-drug antitubercular regimen (isoniazid, rifampin, pyrazinamide, and ethambutol) for the first two months, followed by a continuation phase with isoniazid and rifampin for an additional four months, in line with the standard treatment protocol for active tuberculosis.

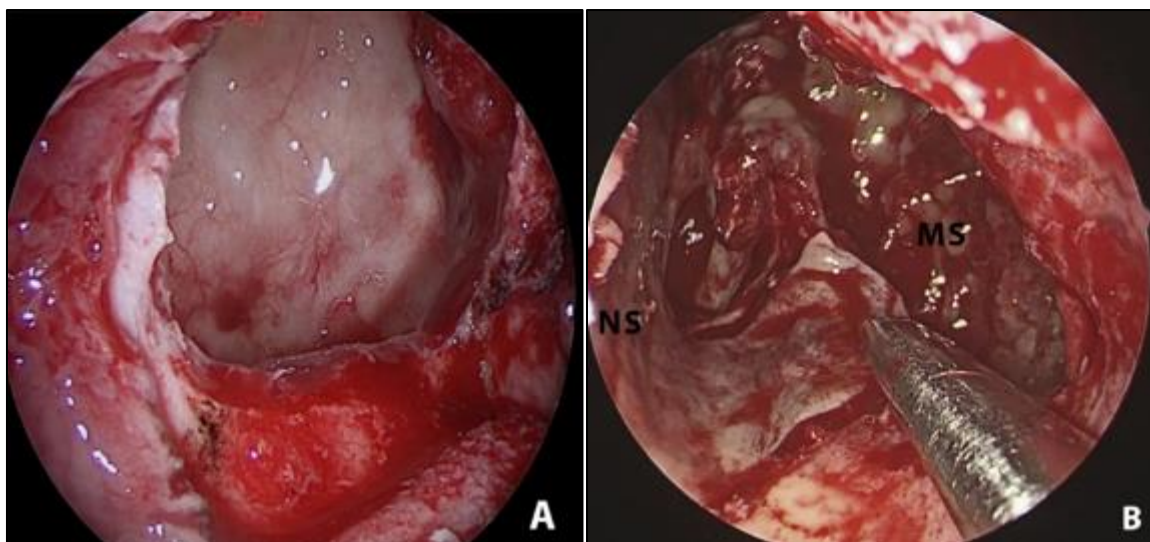


Figure 3 Intraoperative Images; A: Right Maxillary Sinus after mass removal, showing the cleared sinus.; B: Left Maxillary Sinus demonstrating the extent of mass invasion. MS: Maxillary Sinus, NS: Nasal Septum

The postoperative histological examination of the excised mass tissue revealed granulomatous inflammation with caseating necrosis, a finding strongly suggestive of tuberculosis. The presence of epithelioid granulomas and Langhans giant cells further supported this diagnosis.

To confirm the diagnosis, GeneXpert PCR testing was performed on the tissue samples, and the results were positive for *Mycobacterium tuberculosis*, which confirmed the initial diagnosis of sinonasal tuberculosis.

At 6 months follow-up, a control MRI was performed, which revealed reactionary filling of the left maxillary sinus (likely as a result of healing and scarring), but no signs of recurrence or residual disease were detected (Figure 4). The patient remained symptom-free, with no recurrence of nasal obstruction or other ENT complaints. CT scans continued to show complete resolution of the sinus masses, and the patient's anosmia had nearly resolved. She is now continuing on a maintenance phase of her antitubercular therapy.

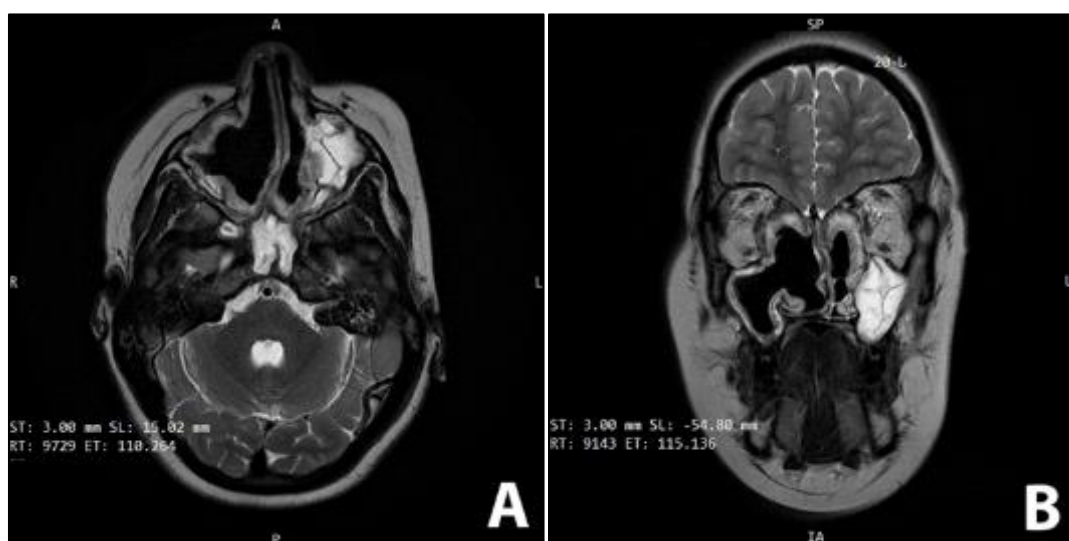


Figure 4 MRI 6-Month Control; A: Axial Cuts showing post-surgical status with no signs of recurrence.; B: Coronal Cuts highlighting the resolution of the mass and the condition of the surrounding structures

3. Discussion

Sinonasal tuberculosis is an exceedingly rare manifestation of extrapulmonary tuberculosis, particularly in the upper respiratory tract, which is typically resistant to infection due to natural defense mechanisms like mucociliary clearance and bactericidal nasal secretions. The primary involvement of the nasal cavity and paranasal sinuses is uncommon, but can occur in individuals with risk factors such as immunosuppression, HIV infection, or prior tuberculous infection [1,2]. This is supported by a study that showed that sinonasal tuberculosis is more frequently seen in patients with HIV, emphasizing the role of immunocompromised states in increasing susceptibility to opportunistic infections like tuberculosis [3].

The clinical presentation of sinonasal tuberculosis is typically nonspecific, which makes the diagnosis challenging. Patients often present with nasal obstruction, rhinorrhea, and anosmia, which can easily be mistaken for more common conditions such as chronic rhinosinusitis, allergic rhinitis, or fungal sinusitis. In more advanced cases, symptoms may include epistaxis, crusting, and facial swelling, particularly if there is extension into adjacent structures such as the orbit or skull base [2]. Exophthalmos and neurological deficits are seen in rare cases where the disease spreads beyond the sinuses. This highlights the importance of early and accurate diagnosis, as misdiagnosis may delay appropriate treatment and lead to complications [1,2].

One of the critical challenges in diagnosing sinonasal tuberculosis is the radiological overlap with other diseases, such as malignancies, fungal infections, or granulomatosis with polyangiitis (Wegener's granulomatosis). Imaging modalities such as CT or MRI can demonstrate sinus opacification, bony erosion, and soft tissue masses typical of the disease, but these findings are not specific to tuberculosis. CT scans typically reveal expansive soft tissue masses in the sinuses with evidence of bony destruction or sinus obliteration [4]. Similarly, MRI can provide detailed imaging, showing soft tissue involvement and the extent of the disease but cannot definitively differentiate tuberculosis from other conditions. Therefore, while imaging is valuable in determining the extent of the disease, a histopathological diagnosis remains the gold standard [5,6].

The histopathological hallmark of tuberculosis is granulomatous inflammation with caseating necrosis. The presence of epithelioid granulomas and Langhans giant cells is characteristic of tuberculosis, though these findings can also be seen in other granulomatous diseases, such as sarcoidosis or fungal infections. GeneXpert PCR, which detects the DNA of *Mycobacterium tuberculosis*, is an invaluable diagnostic tool, especially when dealing with extrapulmonary tuberculosis where traditional cultures may be time-consuming and less sensitive [5,6]. In the current case, GeneXpert PCR confirmed the presence of *Mycobacterium tuberculosis*, which allowed for a definitive diagnosis. The sensitivity and specificity of PCR-based tests such as GeneXpert have significantly improved the accuracy and speed of diagnosing tuberculosis in non-respiratory specimens, making it a critical tool in managing sinonasal tuberculosis.

Given the extent of sinonasal involvement, the management of sinonasal tuberculosis is multifaceted, combining medical therapy with surgical intervention. The primary treatment for tuberculosis remains antitubercular therapy (ATT), which typically includes a 4-drug regimen (isoniazid, rifampin, pyrazinamide, and ethambutol) for the initial two-month intensive phase, followed by a continuation phase of isoniazid and rifampin for four months [1]. The duration of treatment is typically 6 months, depending on the severity and extent of disease. The combination of these drugs ensures the eradication of the mycobacteria while minimizing the risk of drug resistance.

Surgical intervention plays a crucial role in the management of sinonasal tuberculosis, particularly in cases with extensive masses, obstructed sinuses, or complications such as bony erosion or fungal ball formation. In our patient, endonasal endoscopic surgery was performed to debulk the mass, restore sinus function, and facilitate the penetration of antitubercular drugs. Endoscopic sinus surgery (ESS) has become the standard approach for managing sinonasal tuberculosis, as it allows for direct visualization of the sinuses and ensures thorough removal of infected tissue, which can improve drainage and reduce disease recurrence. The advantage of endoscopic surgery over traditional open approaches is its minimally invasive nature, which reduces recovery time and minimizes complications [6,7].

In terms of prognosis, patients with sinonasal tuberculosis typically have a favorable outcome if diagnosed early and treated appropriately. However, long-term follow-up is necessary to monitor for recurrence, particularly in cases with significant sinus destruction or immunocompromised states. Follow-up imaging, such as MRI, can help detect residual disease or complications, as seen in the current case, where control MRI showed reactionary changes in the maxillary sinus but no evidence of recurrence [8]. Additionally, close monitoring for side effects of ATT, such as hepatotoxicity or optic neuropathy, is essential, particularly in patients receiving long-term therapy.

Overall, while sinonasal tuberculosis remains a rare entity, its consideration is crucial in the differential diagnosis of chronic nasal obstruction and sinusitis in endemic areas or immunocompromised individuals. With appropriate use of molecular diagnostics, imaging, and medical and surgical therapy, most patients can achieve a good outcome with minimal long-term morbidity.

4. Conclusion

Primary sinonasal tuberculosis is a rare but important condition to consider in patients with chronic nasal obstruction and rhinorrhea that do not respond to conventional treatments. As demonstrated in this case, the clinical and radiological features of sinonasal tuberculosis can often mimic more common conditions like chronic rhinosinusitis or nasal polyps, leading to diagnostic delays. The use of histopathological examination and molecular diagnostics such as GeneXpert PCR is crucial for accurate and timely diagnosis. Early recognition of sinonasal tuberculosis and initiation of appropriate antitubercular therapy can lead to excellent outcomes and prevent further complications. Surgical intervention may be necessary in cases with significant sinus obstruction or complications, and endonasal endoscopic surgery proves to be an effective approach for both diagnosis and management. This case emphasizes the importance of maintaining a high index of suspicion for tuberculosis in the differential diagnosis of chronic sinonasal conditions, especially in regions where tuberculosis remains endemic or in immunocompromised patients.

Compliance with ethical standards

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Disclosure of conflict of interest

The authorsdeclare that they have no conflicts of interest to disclose.

Statement of ethical approval

If studies involve use of animal/human subject, authors must give appropriate statement of ethical approval. If not applicable then mention 'The present research work does not contain any studies performed on animals/humans subjects by any of the authors'.

Statement of informed consent

Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

Research involving human participants

This case report was conducted in accordance with the principles outlined in the Declaration of Helsinki. In line with institutional policy, ethical committee approval was not required as this report involves a retrospective description of a single clinical case with no identifiable personal information and no experimental intervention.

Consent for Publication

Consent for publication of the case details and figures was obtained from the patient's legal guardian.

Availability of Data and Materials

All data generated or analysed during this study are included in this published article. Further information isavailable from the corresponding author upon reasonable request.

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Authors' Contributions

AH performed the surgery, led the clinical management, and prepared the manuscript. LY, OO, and MC contributed to case documentation, imaging interpretation, and literature review. YR and AR supervised the clinical management and critically revised the manuscript. All authors reviewed and approved the final version of the manuscript.

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