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Schwannoma of the Nasal Septum: A Case Report and Literature Review

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Abstract

Schwannoma is a benign tumor originating from Schwann cells in the peripheral nerve sheath, first described by Virchow in 1908. These tumors typically grow slowly and rarely undergo malignant transformation. Schwannomas can occur throughout the body, with the head and neck being the most common sites (accounting for approximately 25% - 45%). However, primary schwannomas originating in the nasal cavity and paranasal sinuses are relatively uncommon, representing less than 4% of head and neck schwannomas. Schwannomas located in the nasal septum are particularly rare. This report describes a 23-year-old female patient admitted for recurrent left-sided epistaxis with nasal obstruction. Imaging studies revealed a well-defined soft tissue mass within the left nasal cavity, considered benign, with differential diagnoses including nasal polyps and inverted papilloma. The patient underwent endoscopic sinus surgery for complete tumor resection. Postoperative pathology confirmed a schwannoma. The patient has recovered well and is undergoing long-term follow-up. Due to the rarity and lack of specific clinical manifestations of this condition, preoperative diagnosis is challenging and may be misinterpreted as other benign nasal tumors. This case report enhances clinical awareness of the diverse presentations of nasal septal schwannomas and underscores the importance of preoperative differential diagnosis.

Keywords

Schwannoma, Nasal Septum, Nasal Tumor, Misdiagnosis, Imaging Diagnosis and Differential Diagnosis

1. Introduction

Schwannomas, while common among peripheral nerve sheath tumors, are rarely found in the nasal cavity and paranasal sinuses, with the ethmoid and maxillary

sinuses being the more frequently involved sites [1]. The presentation of this tumor in the nasal septum, as in the current case, is even more uncommon. Previous studies indicate that sinonasal schwannomas often arise from the vestibular nerve or nerves supplying the nasal mucosa and septal vasculature, particularly associated with the ophthalmic or maxillary branches of the trigeminal nerve or autonomic nerves, typically without causing significant neurological deficits in the affected nerves [2]. The clinical manifestations are non-specific; schwannomas located in the nasal septum commonly present with symptoms such as nasal obstruction, epistaxis, nasal deformity, and headache [3]. There is no significant predilection regarding age or gender. The findings on nasal endoscopy and CT/MRI imaging are also non-specific, making preoperative distinction from other common nasal space-occupying lesions difficult. This article, through the discussion of a representative case, focuses on the clinical characteristics, endoscopic and radiological features, and key diagnostic points of nasal septal schwannoma, aiming to improve clinical awareness and diagnostic accuracy for this rare entity.

2. Clinical Data

A 23-year-old female was admitted to the hospital due to "recurrent left-sided nasal bleeding accompanied by nasal obstruction for 1 year, aggravated for 2 days". One year prior, the patient began experiencing intermittent left-sided nasal bleeding without an obvious cause, manifesting as blood-streaked sputum, with an estimated volume of about 1 mL per episode, occurring at a frequency of 2 - 3 times per month, and capable of resolving spontaneously. This was accompanied by left-sided nasal obstruction, which was intermittent, worsening during sleep and improving after physical activity. Associated symptoms included clear rhinorrhea, postnasal drip, occasional purulent nasal discharge, nasal itching, sneezing, and hyponasal voice. The patient did not seek medical attention initially. Two days before admission, she experienced another episode of left-sided nasal bleeding, characterized by continuous anterior nasal dripping, with an estimated volume of about 10 mL, which ceased spontaneously after approximately 2 minutes.

Specialist examination revealed no external nasal deformity, with the nasal septum slightly deviated to the right. The nasal mucosa appeared pale, and bilateral inferior turbinates were hypertrophic. A neoplasm approximately the size of a peanut was observed in the left middle meatus, appearing light red in color, with a smooth surface, a fleshy, lychee-like consistency, and rich capillaries. No significant secretions were noted in the bilateral middle meatus or common nasal passage (**Figure 1**).

3. Imaging Findings

Preoperative non-contrast paranasal sinus CT scans (**Figure 2(A)-(D)**) revealed a well-defined, oval-shaped soft tissue density lesion within the left nasal cavity and meatus. The lesion measured approximately 2.5 × 1.6 cm with a CT value of about 33 Hounsfield Units. It caused a mass effect, displacing the nasal septum to the right and resulting in pressure erosion/remodeling of the adjacent bony struc-

tures, leading to obstruction of the left nasal passage.

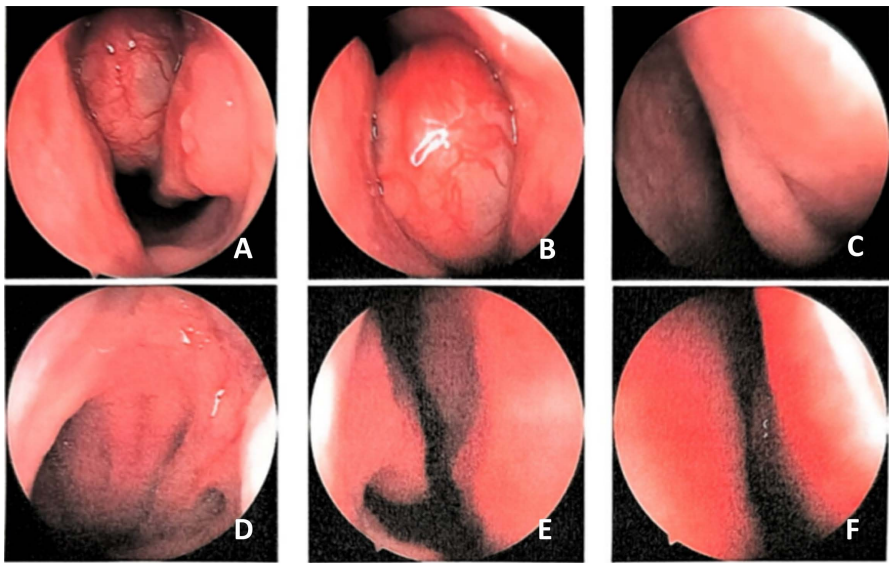

Figure 1. The nasal septum deviates to the right. Mucosal congestion is mildly present in both nasal cavities. The inferior turbinates are not enlarged bilaterally. A neoplasm with rich surface vascularity is noted in the left middle meatus. No purulent secretions are observed in either nasal cavity. The posterior wall mucosa of the nasopharynx is smooth. The eustachian tube orifices are patent. The bilateral mastoid processes are symmetrical, with no neoplasms detected. (A: Left nasal cavity; B, C: Left middle nasal meatus; D: Left nasopharynx; E: Right nasal cavity; F: Right middle nasal meatus).

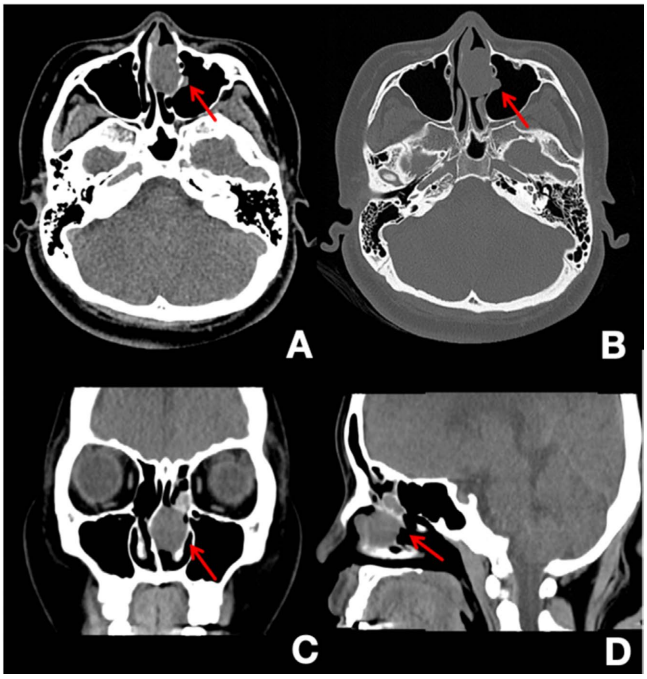

Figure 2. Soft tissue plain scan axial, coronal, and sagittal views (A, C, D): A well-defined, roughly circular soft tissue-density lesion (1.6 cm × 2.5 cm × 2.0 cm) is noted adjacent to the left nasal septum. Bone window axial view (D): The adjacent bone appears compressed and thinned, with slight rightward displacement of the nasal septum.

MRI of the nose, performed both without and with contrast enhancement, demonstrated a nodular abnormal signal focus in the left middle meatus, measuring approximately 1.6 × 2.5 × 2.0 cm. On T1-weighted images (T1WI), the lesion appeared isointense to slightly hypointense (**Figure 3(A)**). On T2-weighted images (T2WI), it exhibited a slightly hyperintense and heterogeneous signal intensity (**Figure 3(B)**, **Figure 3(D)**, **Figure 3(E)**). Post-contrast images showed mild, heterogeneous enhancement of the lesion (**Figure 3(C)**, **Figure 3(F)**).

The preoperative imaging diagnosis was a space-occupying lesion in the left middle meatus, favoring a benign process, with differential considerations including nasal polyp and inverted papilloma.

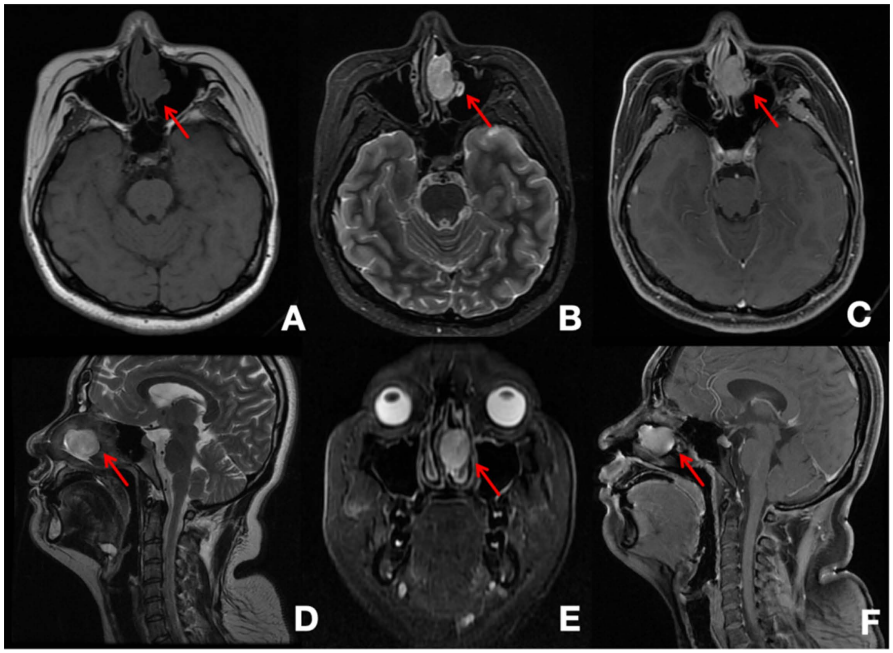

Figure 3. MR plain scan axial, sagittal, and coronal views (A, B, D, E): A round-shaped abnormal signal lesion (1.6 cm × 2.5 cm × 2.0 cm) is noted in the left nasal cavity with well-defined borders. It demonstrates isointense to slightly hypointense signal on T1-weighted images (T1WI) and slightly hyperintense signal on T2-weighted images (T2WI), with heterogeneous signal intensity. Contrast-enhanced axial and sagittal views (C, F): The lesion demonstrates mildly heterogeneous enhancement.

4. Treatment and Pathology

Following completion of preoperative preparations, the patient underwent "endoscopic left nasal septal mass resection with septal deviation correction" under general anesthesia. During the procedure, the mass with its pedicle located in the middle of the nasal septum was completely dissected and removed, with the mucosa at the pedicle site also extensively excised. Postoperative pathological examination revealed: gross appearance of grayish-white tissue; cut surface grayish-yellow with moderate consistency and hemorrhage (**Figure 4(A)**); under the microscope, spindle-shaped cells are observed arranged in bundles and whirlpool-like patterns (**Figures 4(B)-(D)**). Immunohistochemistry results are not only used for

diagnosis but also play a crucial role in differential diagnosis: The definitive evidence supporting the diagnosis of schwannoma is diffuse, strongly positive staining for S-100 (**Figure 4(E)**) and SOX-10 (**Figure 4(F)**); CD31 and CD34 showed positive vascular staining, confirming abundant intralesional vasculature consistent with gross findings of hemorrhagic foci; the Ki-67 proliferation index of approximately 3% indicates low tumor proliferative activity, consistent with benign behavior; cytoplasmic positivity for β-catenin effectively ruled out nuclear-positive tumors such as solitary fibrous tumors. Negative or only weakly positive results for SMA, Desmin, ALK, SATA6, AR, and other markers systematically excluded various other spindle cell tumors, including leiomyoma, inflammatory myofibroblastic tumor, and meningioma. The final pathological diagnosis was (left nasal cavity) consistent with schwannoma.

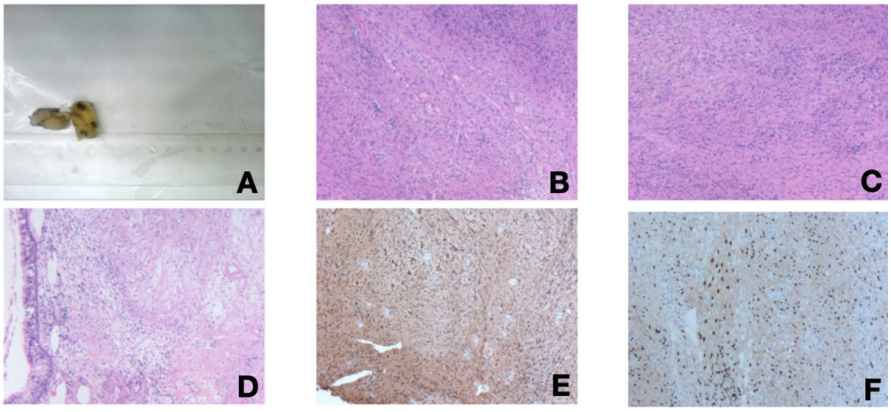

Figure 4. A: A grayish-white tissue mass (2.5 × 2.2 × 1.2 cm), with a grayish-yellow, solid, moderately firm cut surface showing areas of hemorrhage. B - D: Microscopically (HE stain), spindle cells arranged in bundles and interwoven patterns are observed. The cytoplasm is abundant with indistinct borders, forming palisading structures in some areas. E: S-100 immunohistochemistry shows strong nuclear positivity for S-100. F: SOX-10 immunohistochemistry demonstrates strong nuclear positivity for SOX-10.

5. Discussion

Nasal septal schwannomas are typically solitary, benign tumors with an extremely low risk of malignant transformation [4]. They generally exhibit slow growth due to the available space within the nasal cavity. While these tumors can occur in individuals of any age or gender, some reports indicate a predilection for adults aged 30 - 60 years, with a slight female predominance [5]. Our patient, a young female, aligns with this epidemiological profile.

The clinical presentation of nasal space-occupying lesions is often similar, commonly featuring unilateral nasal obstruction, recurrent epistaxis, and abnormal discharge. Our patient presented with a one-year history of recurrent epistaxis and nasal obstruction, which had acutely worsened. This underscores the necessity of considering a broad range of etiologies in the differential diagnosis of recurrent epistaxis. For instance, massive or superficially eroded polyps can bleed; hemangiomas and nasopharyngeal angiofibromas, composed of non-contractile

vascular sinusoids, are prone to significant, recurrent hemorrhage; and inverted papillomas, being fragile and highly vascular, often bleed spontaneously or upon contact. Malignancies such as squamous cell carcinoma and lymphoma may cause bleeding due to tissue infiltration and vascular invasion. In contrast, epistaxis in nasal septal schwannomas is often secondary to the tumor's slow submucosal growth, which compresses superficial vessels, leading to local mucosal ischemia, thinning, erosion, and subsequent bleeding [6]. Therefore, in evaluating recurrent epistaxis, alongside common causes, rare entities like schwannoma should be considered to minimize diagnostic errors.

Although the literature describes nasal septal schwannomas as presenting endoscopically as solitary, roughly circular, smooth-surfaced masses with potentially observable "arbor-like" feeding vessels, palpation reveals a firm consistency with good mobility [7]. However, these features are actually atypical manifestations and often overlap with common pathologies. The "lychee-like" neoplasm observed in this case further demonstrates its diverse presentation. The key distinguishing feature from the most common nasal polyps is that schwannomas typically lack the characteristic appearance of peeled lychee flesh—translucent and extremely soft in texture—that is typical of polyps. Schwannomas are soft to the touch, painless, and do not bleed easily [8]. In contrast, inverted papillomas more commonly present as unilateral, easily bleeding, firm masses [9]. Therefore, when confronted with such endoscopically non-specific lesions, it is imperative to move beyond mere morphological observation and rely on imaging studies and definitive pathological examination for precise differential diagnosis.

Imaging plays a crucial role in preoperative localization, characterization, and determining the extent of the lesion. On CT, nasal septal schwannomas typically appear as well-defined, round, expansile soft tissue masses with isodense or slightly hypodense attenuation. Some cases may show cystic change or, rarely, calcification. Adjacent bone often demonstrates pressure absorption or thinning, with osteogenesis being uncommon [10]. This pattern of bony change is distinctly different from the moth-eaten, invasive destruction characteristic of malignancies [11]. Contrast-enhanced CT usually shows mild to moderate heterogeneous enhancement. On MRI, schwannomas are typically isointense or hypointense on T1-weighted images (T1WI), with cystic areas appearing even darker. On T2-weighted images (T2WI), they are markedly hyperintense due to their rich myxoid matrix, with cystic regions showing even higher signal. Some lesions may exhibit a "target sign" (a central area of lower signal representing fibrous collagen tissue surrounded by a periphery of high-signal myxoid tissue). Enhancement is often heterogeneous, sometimes described as "honeycomb-like", and dynamic contrast-enhanced MRI may reveal a progressive filling-in pattern [12]. The preoperative imaging findings in this case were atypical, posing a significant challenge to diagnosis. The MRI scan lacked the characteristic long T1 and long T2 signals and cystic features commonly seen in schwannomas, and the typical "target sign" was not observed on T2-weighted imaging. However, the absence of imaging hall-

marks represented only one aspect of the challenge. Another factor was the inherent cognitive biases in clinical diagnosis, such as the "anchoring effect" and "availability heuristic". These biases predisposed the reader to force-fit the atypical presentation into the framework of common conditions (e.g., inverted papilloma, polyps), thereby overlooking the possibility of rare lesions like schwannoma. To mitigate such biases, clinicians should proactively cultivate critical thinking. When encountering "non-standard" imaging findings, consciously pause and ask: "What rare pathology could mimic this presentation?" Systematically reviewing anatomical structures and expanding the differential diagnosis list is crucial. Furthermore, strengthening multidisciplinary collaboration between radiology and clinical departments—integrating imaging findings with patient history and endoscopic features for comprehensive evaluation rather than interpreting images in isolation—is an effective approach to break fixed thinking patterns and enhance preoperative diagnostic accuracy.

6. Key Imaging Differential Diagnoses

1) Nasal Polyp: Often bilateral and multiple, with soft consistency, homogeneous density/signal, very high T2WI signal (high water content), and typically shows peripheral mucosal enhancement on post-contrast images with non-enhancing contents. 2) Inverted Papilloma: Predilection for the lateral nasal wall in the middle meatus; contrast-enhanced MRI may show characteristic "cerebriform" or "columnar" enhancement patterns; adjacent bone is more likely to show remodelling rather than simple pressure erosion. 3) Vascular Tumors (e.g., Hemangioma, Angiofibroma): Typically demonstrate intense enhancement, significantly greater than that of schwannomas. CT may show phleboliths; MRI may reveal flow voids. 4) Malignancies (e.g., Squamous Cell Carcinoma, Olfactory Neuroblastoma, Lymphoma): Sinonasal carcinomas are more common in the elderly, show infiltrative growth with frank bone destruction. Olfactory neuroblastoma originates from the olfactory epithelium in the cribriform plate, classically presenting as a "dumbbell-shaped" mass with intracranial extension. Lymphoma often appears as a diffuse soft tissue mass, homogeneous in density/signal, showing mild-moderate enhancement, and demonstrates marked diffusion restriction on DWI [13]-[16].

Despite the valuable role of imaging in lesion localization, extent assessment, and narrowing the differential diagnosis, histopathological examination remains the gold standard for definitive diagnosis. Grossly, nasal septal schwannomas are often oval, round, or spindle-shaped, with a greyish-yellow, solid, glistening cut surface. Microscopically, they display the characteristic biphasic pattern of Antoni A areas (cellular, organized) and Antoni B areas (hypocellular, myxoid). Immunohistochemically, strong and diffuse positivity for S-100 protein and SOX10 is a cornerstone for diagnosis [17]. The pathological findings in our case fulfilled these criteria. The Ki-67 proliferation index in benign schwannomas is usually below 5%; the index of approximately 3% in our case is consistent with benign biological behavior, whereas a significantly elevated index would raise concern

for malignant potential [18]. The pathological findings in our case fulfilled these criteria. The Ki-67 proliferation index in benign schwannomas is usually below 5%; the index of approximately 3% in our case is consistent with benign biological behavior, whereas a significantly elevated index would raise concern for malignant potential [19].

Sinonasal schwannomas are generally resistant to both radiotherapy and chemotherapy. Complete surgical excision is the established primary and only curative treatment. A case reported by Liu *et al*. involving a large malignant schwannoma showed poor response to rAd-p53 gene therapy combined with radiotherapy [20], underscoring the inadequacy of non-surgical modalities. Histologically, as these tumors often arise from autonomic nerve fibers lacking a complete perineural cell sheath, they frequently lack a true capsule. This allows for endoscopic removal using techniques like suction debridement or piecemeal resection. It is important to note that the absence of a capsule in nasal septal schwannomas does not indicate malignancy, as the vast majority remain benign. Endoscopic techniques provide excellent exposure and a minimally invasive approach for this region. Patient prognosis is typically excellent, with recurrence and malignant transformation being rare, although regular postoperative follow-up is still recommended. Among 12 cases reported by Tang, 11 underwent endoscopic resection without recurrence [17]. Our patient underwent endoscopic resection of the nasal septal schwannoma with a good recovery. Follow-up at two months post-operation showed no signs of recurrence or metastasis, consistent with the favorable clinical outcomes reported in the literature.

7. Conclusion

Although nasal septal schwannomas are rare and lack absolutely specific signs, the following clinical features should prompt consideration of this differential diagnosis: For patients presenting with unilateral, progressive nasal obstruction accompanied by recurrent, minor epistaxis, if imaging studies (CT/MRI) further reveal a well-defined, solid mass with uniform density/signal intensity within the nasal cavity showing mild to moderate enhancement—even in the absence of a typical "target sign" or cystic changes—clinicians should move beyond common differential diagnoses and prioritize schwannoma as a primary consideration. Definitive diagnosis ultimately relies on histopathological examination, where diffuse, strongly positive expression of S-100 and SOX10 serves as the gold standard. Therapeutically, complete endoscopic surgical resection offers a favorable prognosis and remains the preferred approach for achieving curative intent. Looking ahead, advancing multidisciplinary collaboration models and applying precision medicine principles hold promise for further optimizing diagnostic pathways and treatment outcomes for patients with this rare tumor.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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