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Benign Sinonasal Tumors: A 17-Year Single Center Experience

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Abstract

Objective: This study evaluated demographic characteristics, histopathological distribution, surgical approaches, residual disease, complications, and recurrence patterns in patients surgically treated for benign sinonasal tumors.

Methods: Medical records of patients who underwent surgery for benign sinonasal tumors at a single tertiary center between January 2007 and December 2024 were retrospectively reviewed. Patients with less than three months of follow-up were excluded. Demographic, histological, surgical, complication, residual disease, follow-up, and recurrence data were analyzed according to tumor type.

Results: A total of 368 patients were included. The median age was 42.5 years, and 260 patients (70.7%) were male. The most common histological groups were sinonasal papilloma (34.2%), osseous lesions (22.6%), and juvenile nasopharyngeal angiofibroma (19.0%). Surgical approach differed significantly by tumor type ($p<0.001$), with endoscopic surgery used most frequently overall (74.5%). Residual disease also differed significantly among tumor types ($p=0.011$) and was most common in osseous lesions. Complications occurred in 17.4% of patients; complication types varied significantly across tumor groups ($p=0.035$). Recurrence data were available for 326 patients, and recurrence occurred in 40 patients (12.3%), most frequently in juvenile nasopharyngeal angiofibroma (23.4%; $p=0.010$).

Conclusion: Histological subtype was associated with surgical approach, residual disease, complication pattern, and recurrence. These findings support individualized surgical planning and histology-specific follow-up in benign sinonasal tumors.

Keywords: Sinonasal neoplasms, sinonasal papilloma, juvenile nasopharyngeal angiofibroma, osteoma, endoscopic surgery, recurrence

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Introduction

Benign sinonasal tumors represent a clinically diverse group of lesions, including epithelial, vascular, fibro-osseous, and other histopathological entities with markedly different biological behavior (1). Although these tumors are benign, their management can be challenging because of tumor-related factors such as local aggressiveness, vascularity, proximity to the orbit and skull base, and the potential for residual or recurrent disease.

Among sinonasal tumors, sinonasal papilloma, juvenile nasopharyngeal angiofibroma (JNA), and osseous tumors constitute key histological subgroups with distinct management considerations. Sinonasal papilloma is notable for its potential of recurrence and its recognized risk of malignant transformation (2). JNA is a highly vascular tumor affecting predominantly adolescent males, in which bleeding control and recurrence prevention remain central concerns (3). Osseous lesions, including osteoma, fibrous dysplasia and ossifying fibroma, differ substantially in clinical behavior and treatment goals, ranging from observation to complete excision (4).

Advances in endoscopic surgery have transformed the treatment of benign sinonasal tumors, allowing effective resection with reduced morbidity in many cases (5,6). However, open and combined approaches remain necessary in selected cases depending on histopathological subtype and anatomical extension (4,7). Although many studies have focused on individual benign sinonasal tumor entities (4,8-10), studies evaluating different tumor subtypes within a large cohort remain limited. Therefore, this study aimed to evaluate a large single-center surgical cohort of benign sinonasal tumors and to compare demographic features, surgical approaches, complications, residual disease, and recurrent disease status across tumor subtypes.

Methods

A single-center retrospective cohort study was conducted and approved by the İstanbul University, İstanbul Faculty of Medicine Clinical Research Ethics Committee (approval no: 08, date: 18.04.2025). Written informed consent for surgery and for the use of anonymized clinical data for scientific purposes was obtained as part of the institutional general surgical consent process. The requirement for additional study-specific informed consent was waived due to the retrospective design of the study. Medical records of patients diagnosed with benign sinonasal tumors who underwent endoscopic, open, or combined surgical procedures between January 2007 and December 2024 were reviewed (n=403). Patients with less than three months of follow-up were excluded from the study (n=35).

Data on demographics (gender and age at surgery), histological tumor type, surgical approach, primary versus revision surgery status, presence of residual disease after surgery, perioperative and postoperative complications, follow-up duration, and recurrence were extracted from patients' electronic medical records.

JNAs were staged according to the Radkowski classification (11), and inverted papillomas were staged according to the Krouse classification (12).

The primary objectives of this study were as follows: (i) to perform a descriptive analysis of all collected variables, (ii) to compare surgical approach, residual disease, complication, and recurrence rates across different histological tumor types, and (iii) to compare complication and recurrence rates between primary and revision cases.

Statistical Analysis

Descriptive analyses were performed for all variables. Q-Q plots were used to assess the normality of continuous variables. Continuous variables are presented as mean (standard deviation) or median [interquartile range (IQR)] according to their distribution. Categorical variables are reported as counts (percentages). The Kruskal-Wallis test was applied for between-group comparisons. Associations between categorical variables were evaluated using chi-square tests; however, Fisher's exact test was performed when more than 25% of cells had an expected count of fewer than five.

Data analyses were conducted using SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY). A p-value of <0.05 was considered statistically significant for all analyses.

This study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology guidelines (13).

Use of Artificial Intelligence-Assisted Technologies

AI-assisted tools were used solely for grammar, spelling, and language editing. No AI-assisted technology was used for data collection, statistical analysis, interpretation of results, or generation of scientific conclusions. The authors reviewed and approved the final manuscript and take full responsibility for its content.

Results

Demographics

A total of 368 patients with benign sinonasal tumors were included in the study. The age distribution of patients at the time of surgery exhibited a bimodal pattern, with peaks observed in late adolescence to early adulthood and in the fifth to sixth decades of life (Figure 1). The median age was 42.5 years (IQR: 18-56), with a range of 0 to 84 years. Of the 368 patients, 108 (29.3%) were female and 260 (70.7%) were male. The mean follow-up duration was 42.8 ± 40.6 months (range: 3-209 months).

Histological Tumor Types

Sinonasal papilloma was diagnosed in 126 cases (34.2%), osseous lesions in 83 cases (22.6%), and JNA in 70 cases (19.0%). The remaining 89 cases (24.2%) were classified as

other benign sinonasal tumors. The histological subtypes are detailed in Table 1. The age distribution of patients differed significantly across tumor types (p<0.001). Patients with JNA were the youngest, with a median age of 16 years (IQR: 14-19), whereas patients with sinonasal papilloma had the highest median age of 55.5 years (IQR: 49-64). Patients with osseous lesions had a median age of 30 years (IQR: 18-43), and patients in the "other" category had a median age of 44 years (IQR: 32-59). Post-hoc pairwise comparisons confirmed statistically significant differences between all groups after Bonferroni correction (adjusted p<0.05 for all comparisons). A significant association was observed between gender and tumor type (χ^2=59.57, df=3, p<0.001). JNA showed a male predominance (95.7% male), while sinonasal papilloma also occurred more frequently in males (82.5% male). In contrast, osseous lesions and tumors classified as other displayed a more balanced gender distribution (male: 53.0% and 50.6%, respectively). The detailed histopathological distribution of the 89 tumors in the other benign sinonasal tumor category is presented in Table 2.

Staging data were available for all 70 patients with JNA and all 106 patients with inverted papilloma. According to the Radkowski classification (11), stage IIA was the most frequent JNA stage (23/70, 32.9%), followed by stage IIIA (14/70, 20.0%). According to the Krouse classification (12), T3 was the most frequent inverted papilloma stage (47/106, 44.3%), followed by T2 (41/106, 38.7%) (Table 3).

A significant association was found between surgical approach and tumor type (χ^2=52.41, df=6, p<0.001). The endoscopic approach was the most frequently employed technique overall (74.5%), particularly in sinonasal papilloma (88.1%), JNA (75.7%), and other tumors (78.7%). In contrast, osseous lesions had a higher proportion of open surgery (37.3%) compared with other groups. Combined approaches were less common overall (9.8%) but were used across all tumor types (Table 4).

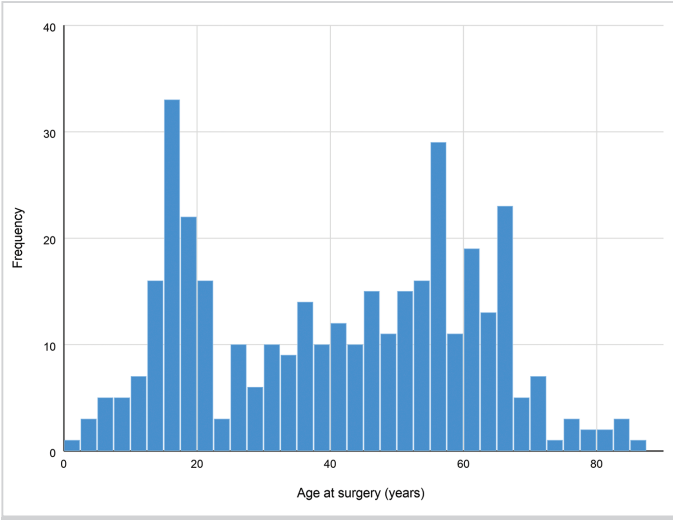

Figure 1. Age distribution of patients at the time of surgery

There was no significant difference in the distribution of primary versus revision surgeries across tumor types (p=0.129). Revision surgeries constituted 16.6% of the total cases.

A statistically significant difference was observed in the rate of residual disease left during surgery among tumor types (χ^2=16.64, df=6, p=0.011). Residual disease was most frequent in osseous lesions (21.7%), whereas it was less common in sinonasal papilloma (6.3%), JNA (8.6%), and other tumors (13.5%). Overall, 85.6% of all cases were reported to have no residual disease at the end of surgery. Among 43 patients with documented residual disease, 23 patients (53.5%) were managed with observation alone, 14 patients (32.6%) underwent additional surgery, and 6 patients (14.0%) had no documented follow-up data regarding residual management. By tumor type, surgery rates were 22.2% in osseous lesions (4/18), 71.4% in sinonasal papilloma (5/7), 50.0% in JNA (3/6), and 16.7% in other tumors (2/12) (p=0.102). Within the osseous group, residual disease was present in 6 of 39 osteomas (15.4%), 6 of 24 fibrous dysplasia cases (25.0%), 5 of 15 ossifying fibromas (33.3%), and 1 of 5 aneurysmal bone cysts (20.0%) (Table 5).

Perioperative or postoperative complications occurred in 17.4% (n=64) of patients, with no statistically significant difference in complication rates between tumor types (p=0.108). The most frequent complication was epistaxis requiring intervention (53.1%), followed by cerebrospinal fluid (CSF) leak (15.6%), orbital penetration (6.3%), orbital hematoma (3.1%), and oroantral fistula (3.1%) (Figure 2). Subgroup analysis of complication types showed a statistically significant variation

Table 1. Histological distribution of benign sinonasal tumors

Histological group/subtype	No.	%
Osseous lesions	83	22.6
Osteoma	39	47.0
Fibrous dysplasia	24	28.9
Ossifying fibroma	15	18.1
Aneurysmal bone cyst	5	6.0
Sinonasal papilloma	126	34.2
Inverted papilloma	106	84.1
Oncocytic papilloma	17	13.5
Exophytic papilloma	2	1.6
Mixed papilloma	1	0.8
Juvenile nasopharyngeal angiofibroma	70	19.0
Other benign sinonasal tumors	89	24.2
Total	368	100.0

Percentages for major histological groups are calculated among the total cohort (n=368); percentages for indented subtypes are calculated within the respective histological group

across tumor groups (p=0.035) driven primarily by the high frequency of epistaxis in JNA patients (47.1% of all epistaxis cases). CSF leaks were predominantly observed in osseous lesions (40%) and sinonasal papilloma (40%). Further details of complication distribution by tumor type are presented in Figure 3. Complication rates were 16.9% (n=51) in primary surgeries and 21.3% (n=13) in revision surgeries, with no statistically significant difference (χ^2=0.665, p=0.415).

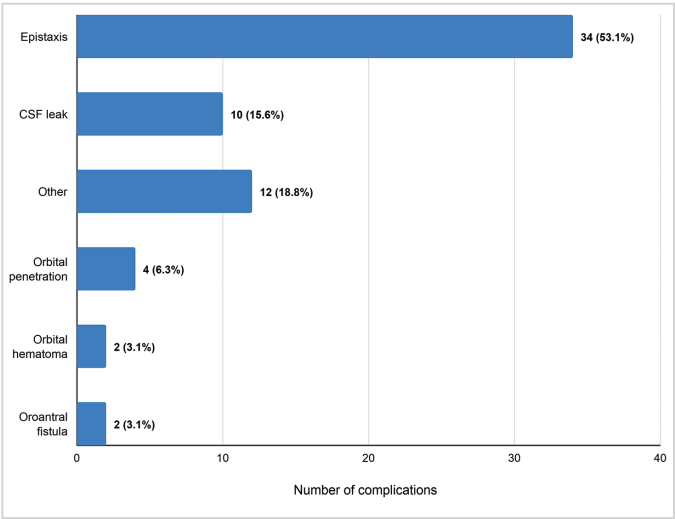

Figure 2. Distribution of perioperative and postoperative complications

As shown in Figure 3, epistaxis requiring intervention occurred in 5 of 18 patients with complications in the osseous group (27.8%), 9 of 18 in the sinonasal papilloma group (50.0%), 16 of 17 in the JNA group (94.1%), and 4 of 11 in the other benign tumor group (36.4%). CSF leak occurred in

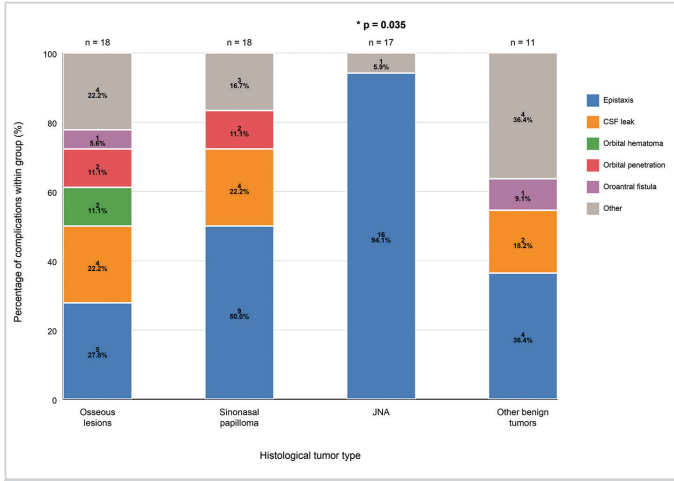

Figure 3. Distribution of complication types according to histological tumor type
CSF: Cerebrospinal fluid, JNA: Juvenile nasopharyngeal angiofibroma

Table 2. Histopathological distribution of other benign sinonasal tumors and their subtypes

Histopathological diagnosis	n (%)
Hemangioma	**33 (37.1)**
Lobular capillary hemangioma	15 (45.5)
Cavernous hemangioma	8 (24.2)
Epithelioid hemangioma	1 (3.0)
Hemangioma, not specified	9 (27.3)
Hamartoma	**16 (18.0)**
Respiratory epithelial adenomatoid hamartoma	13 (81.2)
Seromucinous hamartoma	3 (18.8)
Ameloblastoma	**7 (7.9)**
Central giant cell granuloma	**7 (7.9)**
Odontogenic myxoma/fibromyxoma	**5 (5.6)**
Schwannoma	**4 (4.5)**
Meningioma	**2 (2.2)**
Mature teratoma	**2 (2.2)**
Solitary fibrous tumor	**2 (2.2)**
Langerhans cell histiocytoma	**2 (2.2)**
Benign spindle cell neoplasm, not specified	**2 (2.2)**
Sinonasal glomangiopericytoma	**2 (2.2)**
Pleomorphic adenoma	**2 (2.2)**
Aneurysmal bone cyst	**1 (1.1)**
Chondroma	**1 (1.1)**
Paraganglioma	**1 (1.1)**
Total	**89 (100.0)**

Data are presented as n (%). Percentages for main diagnoses were calculated among the 89 tumors classified as other benign sinonasal tumors; percentages for the indented hemangioma and hamartoma subtypes were calculated within their respective parent diagnoses

Table 3. Tumor staging of juvenile nasopharyngeal angiofibroma and inverted papilloma

Tumor type	Staging system	Stage	n (%)
Juvenile nasopharyngeal angiofibroma	Radkowski	IA	7 (10.0)
		IB	9 (12.9)
		IIA	23 (32.9)
		IIB	7 (10.0)
		IIC	7 (10.0)
		IIIA	14 (20.0)
		IIIB	3 (4.3)
		Total	70 (100.0)
Inverted papilloma	Krouse	T1	13 (12.3)
		T2	41 (38.7)
		T3	47 (44.3)
		T4	5 (4.7)
		Total	106 (100.0)

Data are presented as n (%). Percentages were calculated within each tumor type. JNA was staged according to the Radkowski classification (11), and inverted papilloma was staged according to the Krouse classification (12). JNA: Juvenile nasopharyngeal angiofibroma

four osseous lesion cases, four sinonasal papilloma cases, and two other benign tumor cases. Orbital hematoma occurred only in the osseous group, orbital penetration occurred in the osseous and sinonasal papilloma groups, and oroantral fistula occurred in one osseous lesion case and one other benign tumor case.

Recurrence

Recurrence status was available for 326 patients. Of these, 40 patients (12.3%) experienced recurrence, whereas 286 patients (87.7%) showed no evidence of recurrence. Recurrence rates varied significantly across tumor types (χ^2=11.39, df=3, p=0.010), with the highest recurrence observed in JNA (23.4%) compared to osseous lesions (5.8%), sinonasal papilloma (8.9%), and other tumors (13.6%) (Table 6). Recurrence was observed in 29 of 269 primary surgeries (10.8%) and 11 of 57 revision surgeries (19.3%), while no recurrence was documented in 240 primary cases (89.2%) and 46 revision cases (80.7%), with no statistically significant difference (χ^2=3.17, df=1, p=0.075).

The median time to recurrence was 26.2 months (IQR: 13.6-44.4 months). There was no statistically significant difference in time to recurrence across tumor types (H=6.46, df=3, p=0.091) (Figure 4).

Among patients with recurrence, 35 (87.5%) underwent revision surgery, whereas 5 (12.5%) were managed with observation alone. Surgery was the most common management strategy across all tumor types, with rates of 75.0% for osseous lesions (3/4), 100.0% for sinonasal papilloma (10/10), 80.0% for JNA (12/15), and 90.9% for other tumors (10/11) (p>0.05). Representative radiological images of selected tumors, postoperative findings, and recurrence are presented in Figure 5.

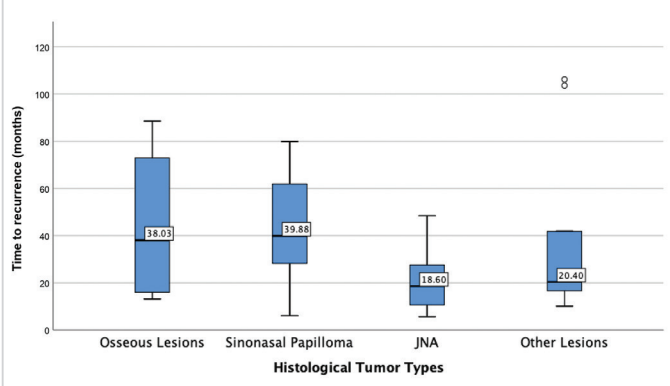

Figure 4. Time to recurrence according to histological tumor type

Table 4. Surgical approaches according to histological tumor type

Surgical approach	Osseous lesions (n=83)	Sinonasal papilloma (n=126)	JNA (n=70)	Other benign tumors (n=89)	Total (n=368)
Endoscopic	40 (48.2)	111 (88.1)	53 (75.7)	70 (78.7)	274 (74.5)
Open	31 (37.3)	4 (3.2)	9 (12.9)	14 (15.7)	58 (15.8)
Combined	12 (14.5)	11 (8.7)	8 (11.4)	5 (5.6)	36 (9.8)

Data are presented as n (%). Percentages are column percentages. Overall association between surgical approach and histological tumor type: chi-square=52.41, df=6, p<0.001. JNA: Juvenile nasopharyngeal angiofibroma

Table 5. Residual disease according to osseous lesion subtype

Osseous lesion subtype	No. of patients	Residual disease, n (%)
Osteoma	39	6 (15.4)
Fibrous dysplasia	24	6 (25.0)
Ossifying fibroma	15	5 (33.3)
Aneurysmal bone cyst	5	1 (20.0)
Total	**83**	**18 (21.7)**

Data are presented as n (%). Percentages were calculated within each osseous lesion subtype

Table 6. Recurrence according to histological tumor type

Recurrence status	Osseous lesions (n=69)	Sinonasal papilloma (n=112)	JNA (n=64)	Other benign tumors (n=81)	Total (n=326)
No recurrence	65 (94.2)	102 (91.1)	49 (76.6)	70 (86.4)	286 (87.7)
Recurrence	4 (5.8)	10 (8.9)	15 (23.4)	11 (13.6)	40 (12.3)

Data are presented as n (%). Percentages are column percentages among patients with available recurrence data. Overall association between recurrence and histological tumor type: chi-square =11.39, df=3, p=0.010. JNA: Juvenile nasopharyngeal angiofibroma

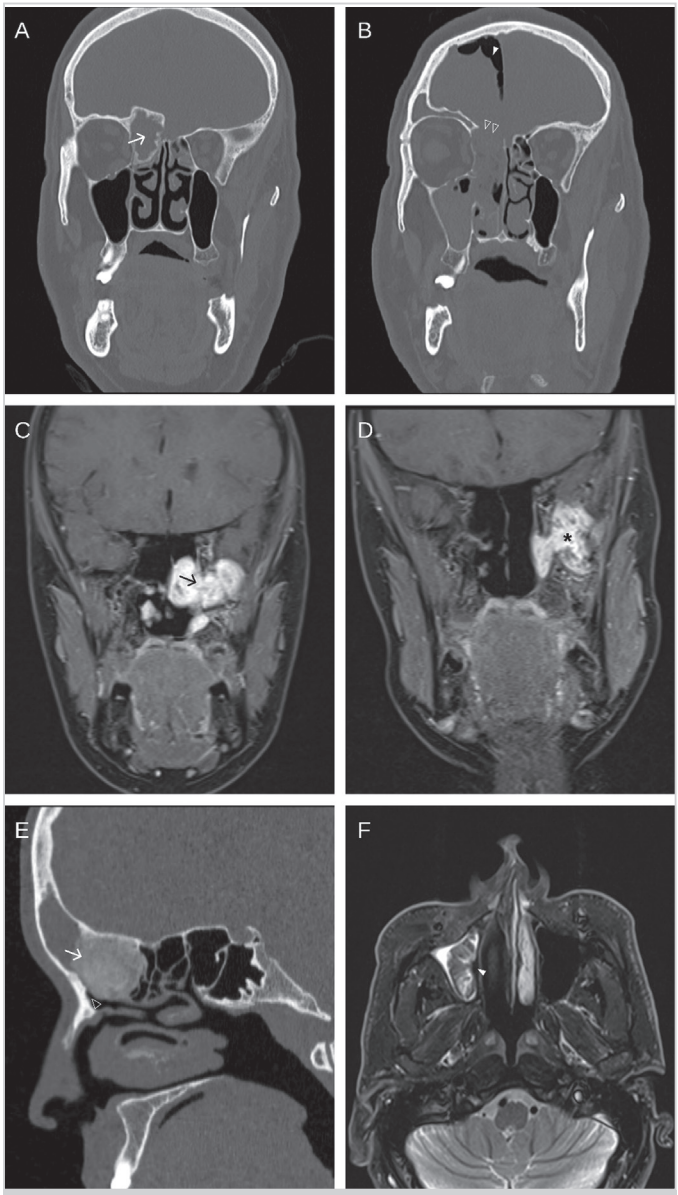

Figure 5. Representative cases of surgically treated benign sinonasal tumors. (A) Preoperative coronal computed tomography showing an ossifying fibroma displacing the right lamina papyracea and anterior skull base. (B) Coronal computed tomography obtained on postoperative day 1 in the same patient, who developed headache after excision and fascia lata skull base repair, demonstrating the bony skull base defect and pneumocephalus. (C) Preoperative coronal magnetic resonance imaging of a recurrent juvenile nasopharyngeal angiofibroma in the left infratemporal fossa. (D) Follow-up coronal magnetic resonance imaging of the same patient showing further recurrence at the same site. (E) Sagittal computed tomography of a frontoethmoidal osteoma narrowing the frontal recess. (F) Axial magnetic resonance imaging showing a convoluted cerebriform pattern consistent with inverted papilloma in the maxillary sinus; the site of origin was suggested to be the medial maxillary wall and confirmed intraoperatively

Discussion

Benign sinonasal tumors encompass a broad spectrum of histopathological subtypes with differing biological behavior and distinct implications for diagnostic evaluation, treatment, and surveillance (1). In our cohort of 368 surgically treated benign sinonasal tumors, histological subtype was associated with clinically meaningful differences in patient demographics, surgical approach, residual disease, complication patterns and recurrence. The demographic distribution across tumor subtypes was consistent with the established epidemiology of these lesions. Sinonasal papilloma typically presents in middle-aged adults with a male predominance, whereas JNA characteristically affects adolescent males; a similar pattern was observed in our cohort (2,3).

The significant association between histological subtype and surgical approach in our cohort suggests that operative strategy was driven primarily by lesion-specific anatomical and biological characteristics. Endoscopic surgery predominated overall, particularly in sinonasal papilloma and JNA, which is in line with prior series showing that endoscopic resection has become the preferred approach for most sinonasal papillomas and is effective in appropriately selected JNA cases (5,6,14). The more frequent use of open surgery in osseous lesions is therefore clinically plausible. This approach is consistent with previous reports on sinonasal fibro-osseous lesions, in which external or combined approaches were required in selected cases according to lesion site and extent, particularly when the orbit, frontal sinus, or skull base was involved (4,9). Although used in a limited number of patients, combined approaches were observed across multiple histological groups in our series. The presence of combined approaches across histological groups supports the view that endoscopic and open techniques should be regarded as complementary rather than mutually exclusive when managing benign sinonasal tumors.

Residual disease also differed significantly across histological subtypes, with the highest rate observed in osseous lesions. This finding should be interpreted cautiously, as the osseous group comprises entities with distinct biological behavior and different therapeutic goals. In ossifying fibroma, particularly in juvenile variants, complete excision is generally pursued whenever feasible because these lesions may behave in a locally aggressive manner (9). By contrast, fibrous dysplasia is typically regarded as a developmental fibro-osseous disorder rather than a true neoplasm, and management is often conservative unless there are compressive symptoms, functional impairment, or progressive deformity (15,16). Osteomas likewise differ from both ossifying fibroma and fibrous dysplasia in that they are usually slow-growing and frequently asymptomatic; accordingly, observation may be appropriate in selected cases, whereas surgery is generally

reserved for symptomatic lesions or for tumors whose size and location create a risk of orbital, skull base, or frontal sinus-related complications (16-18). Taken together, these considerations suggest that the higher rate of residual disease in osseous lesions in our cohort reflects not only technical constraints of resection but also biological and management heterogeneity within this group. Residual disease was identified in 6.3% of our sinonasal papilloma cases, and 71.4% of these patients underwent additional surgery. In sinonasal papilloma, complete resection remains the operative goal because these tumors are locally aggressive and have potential for malignant transformation (10), limiting the suitability of observation in the presence of residual disease. In JNA, the residual disease rate in our cohort (8.6%) was comparable to the pooled residual tumor rate reported in a systematic review of exclusively endoscopic series (7.7%, 95% confidence interval 5.4%-10.1%), although the comparability of these figures is limited by the fact that our cohort was not managed exclusively with an endoscopic approach (19). Among our patients with residual JNA, half underwent additional surgery, whereas the remainder were followed without immediate reintervention. This variable management pattern may reflect that residual JNA is not managed uniformly in clinical practice; rather, decisions are often guided by serial imaging findings, lesion location, and the balance between the risk of progression and the morbidity of further intervention (14).

Perioperative and postoperative complications occurred in 17.4% of our cohort, and although the overall complication rate was not significantly associated with histological subtype, complication types varied across tumor groups. Epistaxis requiring intervention was the dominant complication and was especially common in JNA, which accounted for 47.1% of all epistaxis events. At our institution, preoperative embolization is routinely utilized 24-48 hours before surgery in all patients with JNA unless there is a contraindication for the procedure. This practice is consistent with the literature, in which preoperative embolization is commonly performed 24-48 hours before surgery and has been associated with lower intraoperative blood loss and reduced transfusion requirements (20-24). The prominence of epistaxis as a complication in our JNA group underscores the intrinsic vascularity of this tumor rather than the absence of a preventive preoperative strategy. CSF leak, in contrast, was seen mainly in osseous lesions and sinonasal papilloma, a pattern that may reflect the need for dissection near the skull base and frontal sinus. Complication rates were higher in revision cases than in primary procedures in our cohort (21.3% vs. 16.9%), but this difference did not reach statistical significance. This may indicate that perioperative morbidity in benign sinonasal tumors is influenced more by lesion-specific anatomical surgical demands rather than revision status alone, but the relatively small number of revision cases in our series should also be considered.

Recurrence also varied by histological subtype in our cohort, with the highest rate observed in JNA (23.4%), followed by other tumors (13.6%), sinonasal papilloma (8.9%), and osseous lesions (5.8%). In JNA, the recurrence rate in our series was similar to the 24.5% overall recurrence rate reported in a meta-analysis by Reyes et al. including both endoscopic and open approaches (25). McCombe et al. (26) reported an association between preoperative embolization and recurrence in JNA however, more recent literature has suggested that embolization may be correlated with lower recurrence rates (21,27,28). In a recurrence analysis by Attya et al. (29), embolization was associated with recurrence on univariable analysis, whereas only age and tumor size remained independent predictors on multivariable analysis. Taken together, these findings imply that recurrence in JNA may be more strongly related to tumor-driven factors. The recurrence rate observed in sinonasal papilloma in our cases (8.9%) was lower than that reported in many recent series, in which recurrence is generally described in the range of 15% to 20% (10,30,31). In these studies, recurrence was linked to revision cases, more extensive tumors, and technically challenging sites such as the frontal sinus although these associations have not been uniform across all series. Our comparatively low recurrence rate in sinonasal papilloma may be attributable to the differences in tumor extent and location. Recurrence in general was numerically more frequent in revision cases than in primary cases (19.3%-10.8%), but this difference did not reach statistical significance. The median time to recurrence was 26.2 months, with no substantial variation across tumor groups. This time course supports sustained postoperative surveillance, particularly because both JNA and sinonasal papilloma may recur beyond the early postoperative period (10,32).

Study Limitations

Our study has several strengths. It represents a relatively large single-center surgical cohort of benign sinonasal tumors, encompassing a broad histopathological spectrum. The mean follow-up duration was substantial, allowing assessment of both early and late postoperative outcomes. At the same time, several limitations should be acknowledged, including the retrospective design, the long study period with possible temporal variation in imaging, surgical technique, postoperative management, and follow-up, and biological heterogeneity within the osseous lesions and other tumor groups.

Conclusion

In this large single-center retrospective cohort of surgically treated benign sinonasal tumors, histological subtype was associated with meaningful differences in patient demographics, surgical approach, residual disease, complication patterns, and recurrence. Endoscopic surgery

was the predominant approach overall, particularly for sinonasal papilloma and JNA, whereas osseous lesions more frequently required open or combined approaches and had higher rates of residual disease. Although the overall complication rate did not differ significantly between tumor groups, complication types varied according to histology, with epistaxis being the most common complication, especially in patients with JNA. Recurrence occurred in a minority of patients but was most frequent in JNA, emphasizing the need for long-term, tumor-specific surveillance. These findings support individualized surgical planning and follow-up strategies based on histopathological subtype in patients with benign sinonasal tumors.

Ethics

Ethics Committee Approval: A single-center retrospective cohort study was conducted and approved by the İstanbul University, İstanbul Faculty of Medicine Clinical Research Ethics Committee (approval no: 08, date: 18.04.2025).

Informed Consent: Written informed consent for surgery and for the use of anonymized clinical data for scientific purposes was obtained as part of the institutional general surgical consent process.

Footnotes

Authorship Contributions

Surgical and Medical Practices: H.K., L.A., Ş.Ç., M.N.K.T., Concept: H.K., L.A., Ş.Ç., M.N.K.T., Design: H.K., K.A., L.A., Data Collection and/or Processing: V.E.A., F.O., Y.B.Ö., Analysis or Interpretation: H.K., K.A., L.A., Ş.Ç., M.N.K.T., Literature Search: K.A., V.E.A., F.O., Y.B.Ö., Writing: H.K., K.A., V.E.A.

Conflict of Interest: The authors declare that they have no conflict of interest.

Financial Disclosure: The authors declare that this study has received no financial support.

Main Points

- Histological subtype was associated with surgical approach, residual disease, and recurrence in surgically treated benign sinonasal tumors.
- Endoscopic surgery was the predominant approach overall, but open or combined approaches remained important, particularly for osseous lesions.
- Recurrence occurred in 12.3% of patients with available follow-up and was most frequent in juvenile nasopharyngeal angiofibroma.
- Tumor-specific surgical planning and long-term surveillance are warranted in benign sinonasal tumors.

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